CHEMONICS INTERNATIONAL INC.

SECTION 118/119
BIODIVERSITY AND TROPICAL FORESTRY ASSESSMENT OF THE USAID/PANAMA PROGRAM

Environment, Biodiversity, Water, and Tropical Forest
Conservation, Protection, and Management in Panama:
Assessment and Recommendations

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ACRONYMS

ACP	Panama Canal Authority (Autoridad del Canal Panama)
AECI	Spanish International Cooperation Agency
ALIDES	Alianza Centroamericana para el Desarrollo Sostenible; Central American Alliance for Sustainable Development
ANAM	National Environmental Authority (Government of Panama)
ANCON	Asociación Nacional para la Conservación de la Naturaleza
APSL	San Lorenzo Protected Area
ARI	Autoridad de la Región Inter-Oceánica; Inter-oceanic Region Authority
BIOFOR	Bolivia Sustainable Forest Management Project
CAM	Central American and Mexico (as in: Regional Strategy for Central American and Mexico)
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza; Tropical Agricultural Research and Higher Education Center
CBMAP	Panamanian Atlantic Mesoamerican Corridor
CCAB-AP	Consejo Centroamericano de Bosques y Areas Protegidas; Central American Council on Forests and Protected Areas
CCAD	Comisión Centroamericana de Ambiente y Desarrollo; Central American Commission for Environment and Development
CEMARE	Centro de Capacitación para el Manejo de los Recursos Naturales (JICA)
CI	Conservation International/Conservación Internacional
CICH	Comisión Inter-Institucional para la Cuenca Hidrográfico
CICA	Centro Internacional para la Capacitación Ambiental (ANCON)
CIDA	Canadian International Development Agency; Agencia Canadiense para el Desarrollo Internacional
CIFLORPAN	Centro de Investigación de la Flora Panameña, at UNIPAN
CIFOR	Center for International Forestry Research; Centro para la Investigación Forestal Internacional
CITES	Convention on International Trade in Endangered Species
COPEG	Panama-USA Commission to Eradicate the Screw Worm
EAST	Environmental Audits for Sustainable Tourism Project (USAID/Jamaica-CAR)
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
FAO	Food and Agriculture Organization of the United Nations; Organización de las Naciones Unidas para la Agricultura y la Alimentación
FINNIDA	Finnish International Development Agency
FIDECO	Ecologic Trust Fund of Panamá (within Fundacion NATURA)
FSC	Forest Stewardship Council
FY	Fiscal Year
GEF	Global Environment Facility; Fondo Mundial para el Medio Ambiente
GOP	Government of Panama
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit; Agencia de Cooperación Técnica Alemana
IBRD	World Bank
ICBG	International Cooperative Biodiversity Groups, at STRI
IDB	Inter-American Development Bank

IDIAP	Instituto de Investigaciones Agropecuarias at Ministerio de Desarrollo Agropecuario (MIDA)
IEE	Initial Environmental Examination
INRENARE	National Institute for Renewable Natural Resources (Government of Panama)
IQC	Indefinate Quantity Contract
IR	Intermediate Result
ITTO	International Tropical Timber Organization; Organización Internacional de Maderas Tropicales (OIMT)
IUCN	International Union for the Conservation of Nature; Unión Mundial para la Naturaleza
JICA	Japan International Cooperation Agency
MARENA	Management of Natural Resources Project (USAID/Panama)
MASAR	Programa de Manejo Sostenible de las Areas Rurales de la Cuenca Hidrográfica del Canal de Panamá
MBC	Mesoamerican Biological Corridor; Corredor Biológico Mesoamericano
MEDUC	Ministry of Education; Ministerio de Educación
MIDA	Ministry of Agricultural Development
NATURA	Conservation Foundation
NGO	Non-Governmental Organization
OIMT	Organización Internacional de Maderas Tropicales; International Tropical Timber Organization (ITTO)
OLAFO	Regional Central American Initiative for Sustainable Forest Management (in CATIE with support from Sweden, Norway and Denmark aid agencies)
PAFT-PAN	Plan de Acción Forestal de Panama
PAN	Programa Ambiental Nacional
PCW	Panamá Canal Watershed
PiP	Parks in Peril Project (TNC)
PMCC	Panama Canal Watershed Monitoring Project (Proyecto de Monitoreo de la Cuenca del Canal de Panama)
PROARCA	Programa Ambiental Regional para Centroamérica (USAID/G-CAP)
PRONAT	Programa Nacional de Administración de Tierras; National Land Administration Program
PVO	Private Voluntary Organization
RAMSAR	Convention on Wetlands of International Importance, especially as Waterfowl Habitats
RENARE	General Directorate for Renewable Natural Resources (now ANAM)
SAP	Panamá Audubon Society; Sociedad Audubon de Panamá
SENACYT	National Secretariate of Science, Technology and Innovation; Secretaria Nacional de Ciencia, Tecnología e Innovaación
SINAP	Sistema Nacional de Areas Protegidas; National System of Protected Areas
SINIA	El Sistema Nacional de Información Ambiental
SMN	National Maritime Service; Servicio Marítimo Nacional
SO	Strategic Objective
SOW	Scope of Work
SPA	Small Projects Assistance Program
STRI	Smithsonian Tropical Research Institute
TFCA	U.S. Tropical Forest Conservation Act
TNC	The Nature Conservancy
UNDP	United Nations Development Programme; Programa de las Naciones Unidas para el Desarrollo (PNUD)
UNEP	United Nations Environment Programme; Programa de las Naciones Unidas para el Medio Ambiente (PNUMA)

UNIPAN	Universidad de Panamá; The University of Panamá
UNACHI	Universidad Autónoma de Chiriquí; Autonomous University of Chiriquí
USAID	United States Agency for International Development; Agencia de los Estados Unidos para el Desarrollo Internacional
USMA	Universidad Santa María La Antigua
UTP	Universidad Tecnológica de Panamá
WCMC	World Conservation Monitoring Centre; Centro Mundial de Monitoreo de la Conservación
WHS	World Heritage Site
WWF	World Wildlife Fund; Fondo Mundial para la Naturaleza

EXECUTIVE SUMMARY

As part of its ongoing efforts to design and program a new Country Plan for FY 2004-2008, USAID/Panama contracted Chemonics International to provide the services of a tropical forestry/biodiversity assessment team under the BIOFOR IQC. The Foreign Assistance Act amendment of 1987 added a new environmental requirement, called a Section 118/119 Assessment, to be included in each new USAID country plan. A Section 118/119 Assessment (the current report) analyses the actions necessary to achieve conservation and sustainable management of tropical forests and biological diversity, and the extent to which the proposed actions meet these identified needs. The current report aims to assess:

- The current status of tropical forests and biodiversity in Panama.
- The major threats to tropical forests and biodiversity in Panama.
- How USAID/Panama activities and investments are likely to contribute to or adversely affect tropical forestry and biodiversity conservation.
- How opportunities for program synergy among the strategic objectives can contribute to tropical forests conservation and biodiversity.
- Other issues and opportunities for USAID assistance that match the mission's overall strategy.

In addition to the Section 118/119 Assessment, the mission asked the team to prioritize eco-regions and watersheds to determine common conservation challenges affecting them, and to begin to identify whether other sectors of the mission program have roles to play in addressing these issues.

Our review concludes that the planned activities, as they have been so far designed and described, are not likely to have an adverse environmental impact on tropical forests or on biodiversity in Panama. In addition, because of the close linkages between tropical forestry and biodiversity with the mission's strategy, actions, and investments, the new Country Plan will continue to contribute to conservation in Panama. To its credit, the mission is continuously involved in carrying out environmental reviews of its activities, from Initial Environmental Examinations (IEEs), to developing environmental guidelines and monitoring compliance and impacts (under 22 CFR 216 or Reg. 216).

The team has therefore focused on recommendations addressing issues and opportunities related to synergy within the overall program and possible new activities that appear to be both appropriate for the current setting and potentially valuable for natural resource conservation. In doing this, we have addressed the issues of watershed protection, rural poverty, and local governance.

Status of Biodiversity and Tropical Forests

As a tropical country with fairly abundant rainfall, Panama supports a high biodiversity. Further contributing to the richness of species are the life forms that have migrated here over the millennia: plant and animal species from farther north and completely unrelated species from South America. Throw into the equation the geography of Panama – from vast underwater marine habitats, ecnormous coastlines, and substantial mountain ranges – and you have a breathtaking array of life's diversty, packed into a relatively small space on the globe.

The availability and quality of freshwater supplies in the country is directly linked to the status of forest cover and good management of watersheds; any deterioration or loss of healthy, diverse vegetation is a threat to both water quality and biological diversity. The status of fresh water resources in Panama depends upon their location within the country. Water quality is reflected in the characteristics of the watershed that produced it. Undisturbed watersheds, generally found in remote regions and protected

areas, produce high quality, unpolluted water. Water bodies (lakes, streams and wetlands) that occur below deforested, farmed, grazed, roaded and urban lands have lower water quality, usually with higher levels of sediment, and organic and inorganic contaminats. Undisturbed forested areas produce less flooding and fewer landslides during periods of high rainfall, and more water flow during the dry season, when compared to developed and degraded watersheds. Watershed areas considered critical in Panama include the Panama Canal watershed, and the Bayano watershed. The Rio Bayano is one of the most important rivers in Panama for hydroelectric power and freshwater swamps, while the Panama Canal watershed is important for the operation of the canal, and therefore Panama's economic health, and global commerce. The Panama Canal watershed is also important for electric energy production, agriculture, industry, and the demand for drinking water, in addition to the survival of forests and wildlife. The status of the PCW depends upon the location of the sub-watershed in question. Protected areas have fairly good water quality status, while those near settlements, industry, and roads have poorer status.

Overall, the status of biodiversity and tropical forests in Panama is fairly good, though threatened. This is due to a relatively low population density outside urban areas, with large areas of virtual wilderness, high education levels in many parts of society, and a history of job opportunities outside of farming (especially in and near the canal area). Also, in recent decades Panama has established an impressive system of protected areas, designed to maintain diverse habitats and lifeforms. Protected areas cover about 25 percent of the country, and 44.5 percent of the country is forested. The current deforestation rate is calculated at 0.5 percent per year, lower than earlier forecasts. Although numerous species are considered threatened with or in danger of extinction, none are reported to have become extinct in recent centuries. Nonetheless, Panama's rich biodiversity and forest resources nationwide, and a relatively high quantity and quality of fresh water, are subject to intense and localized threats.

Major Threats to Biodiversity and Tropical Forest

The most important threats to biodiversity and tropical forests in Panama include road construction and road improvement, especially in the Darien, and the Caribbean Coast; agricultural expansion, particularly in Darien and Bocas del Toro regions (which is linked to new and improved roads and resulting increased access to forests); and loss of mangrove forests due to filling for development and conversion of shrimp ponds. Threats to water quality and the periodicity of water quantity (floods in rainy seasons, and low water flow in dry seasons) are numerous. The major threats include deforestation, road construction, mining, burning, urbanization, poor farming practices, widespread grazing and farming on steep slopes, industrial growth. These activities can result in increased sedimentation from erosion, increase in nutrients, pesticide runoff, organic contamination, microbial contamination, and erratic water flow.

An important factor in loss of forests and other habitats is the perception that undeveloped natural areas are available for other uses. This perception sometimes appears to be held by the government of Panama, which has been inclined to appropriate protected lands for roads and developments (i.e. Metropolitan Park, and Volcan Baru), and farmers and cattle ranchers who face little or no opposition to clearing forests for agricultural production. National lands are especially vulnerable because there is often weak local individual or community capacity to enforce the protection of these lands and national authorities are woefully understaffed to defend 'their integrity. Another threat, although not highlighted in the documents reviewed, is the extraction of valuable resources on a national scale: valuable timbers, wildlife for meat and souvenirs, and other valuable plant and animal species. This has left some local habitats in a depauperate and degraded state. Again, this trend is closely linked to the lack of local control over forest resources and weak institutional capacity of national authorities to enforce regulations. Degraded areas are especially vulnerable to the invasion of elephant grass (*Saccharum spontaneum*), which has been a real problem within the PCW. Elephant grass was introduced to control erosion for the canal and served that purpose. Other areas covered by elephant grass, however, can pose a threat to biodiversity,

preventing the establishment of native forests, and falling victim to repeated wild fires. Finally, critical local threats include devastating forest fires, pollution of water habitats, and sedimentation that is destructive to marine life.

Finally, other critical threats to natural forests and the biodiversity they harbor come from sometimes devastating, uncontrolled forest fires, and from sedimentation of aquatic habitats, especially where coral reefs are present.

Recommendations

The recommendations outlined here are summaries of more detailed suggestions found in the main document. These recommendations are divided, first as general themes and next as more specific actions that should be considered by USAID/Panama in the context of the SOs described in the Country Plan 2004–2008.

General Themes

- **Through policy dialogue, the GOP should be encouraged to respect protected areas' boundaries.** Development and improvement of roads should be discouraged in critical undisturbed areas, including the Darien Highway and roads into the Caribbean coast. Alternatives should be considered, including greater investment in already settled areas and job-producing industries, education and awareness of environmental values, and the enforcement of national land protection.

- **The National Cadastral Survey, being carried out by PRONAT (*Programa Nacional de Administración de Tierras*) currently underway in some pilot areas of the country, should have a major impact on protected areas, forestry, and farming in Panama.** PRONAT will document and guarantee land tenure and consolidate and demarcate protected areas and indigenous territories. This effort should have a stabilizing effect on future management of all lands in the country, as the results of the cadastral survey become known by the general public, and land titling procedures are widely understood. Farmers and ranchers will be less likely to move into areas where title will not be granted to those who cleared protected areas and where the current demarcation process is completed.. This land survey, which will lead to the stablization of land ownership, and enforcement of protected area boundaries, is critical to the future of forestry, agriculture, and the biodiversity of Panama.Guidelines for land titling within and near protected areas are being worked out within the pilot areas of the project. Currently titles issued by PRONAT within protected areas are conditional, and only those activities approved by an agreement with ANAM are allowed. Violation of these conditions will result in a loss of title.

- **USAID/Panama should strongly support upgrading the National Environmental Authority (ANAM) to ministerial level within the government of Panama.** The elevation of ANAM to ministerial level would result in a greater influence on all aspects of the country's governanace from an environmental point of view. To better carry out the demands of forest management certification, prevent illegal logging, and to transfer control, use, and protection of resources to the communities within and adjacent to national lands, the Forest Department should have increased autonomy, funding, and staff,and a more appropriate mandate. Similarly, strengthening of the Parks and Wildlife Service through increased staffing and resources would enable them to protect and manage protected areas.

It has been suggested that the creation of ANAM weakened Panama's ability to the management of its National System of Protected Areas, and has resulted in reduced financing for the protected areas. Other claims include the influence of politics in management decisions and personnel selection, inefficiencies in day-to-day operations and decision making, and loss of well-trained protected area staff. It has been suggested that SINAP management should be separate from ANAM's regional administration (Bathrick and Kernan 2003). This echos others contention that the Forest Service could better carry out its responsibilities without the cumbersome administration of the environmental agency.

Specific Actions for USAID/Panama Consideration

Major recommendations for USAID/Panama are listed here. Discussion, justification, and details are found in the recommendations section of this report. How each recommendation supports the mission's strategic objectives and intermediate results are found in the following paragraphs.

1. **Support the upgrade of the National Environmental Agency to a ministry at the cabinet level.**
2. **Develop and endow a Conservation Research Center**. (*Critical applied research needs include the ecology of timber species, the ecology of forest habitats that produce important economic benefits, and the effects of management activities*.)
3. **Encourage and facilitate laws and regulations that transfer use rights of forest lands, marine areas, and resources to local communities and local interest groups**. (*Some examples include community forest concessions, marine reserves, mangrove forests*.)
4. **Write or change regulations that encourage good land stewardship**. (*Some examples are certification regulations, organic production regulations, incentives for private conservation reserves, and regulations that give communities long-term concessions*.)
5. **Support and provide funds to the Panamanian Forest Service to enable it to carry out its increased role**. (*Expanded responsibilities will include halting the movement of illegal timber, granting community forest concessions, training citizen groups in forest management, and advising the public on reforestation practices*.)
6. **Support and provide funds to the Panamanian Parks and Wildlife Service to enable it to carry out its role**. (*Expand abilities to patrol, protect, and monitor protected areas with adequate staffing and resources*.)

Geographic Recommendations

After a review of important environmental regions of the country, the team recommends that USAID/Panama focus on two geographical areas. Discussion of these conclusions is found in the recommendations section of this report.

1. **The Panama Canal Watershed**
2. **The Darien Province**

Linkages to USAID/Panama's Country Plan

Strategic Objective 1 (SO 1) Ruling Justly: More Responsive, Transparent, Governance

Intermediate Result 1.1 Strengthened Rule of Law

Opportunities to enhance biodiversity and forest conservation by addressing major threats:

- Develop laws and regulations that decentralize rights and responsibilities over forests and natural resources.

- Transfer tracts of land to responsible, supported, and trained groups and entrepreneurs.
- Train "corregidores" in environmental governance to forestall illegal logging and ranching.
- Put check posts outside protected areas to stop illegal logging trucks where the posts do not exist and reinforce the existing ones.

Intermediate Result 1.2 Greater Transparency and Accountability

Opportunities to enhance biodiversity and forest conservation by addressing major threats:

- Transfer natural resources and responsibilities to local groups.
- Have a clear application process and awarding system for natural resource concessions.
- Have community forest concessions approved by a community council and require that payment be directed to an auditable community bank account and record-keeping system.
- Increase forest concessions to 50 or more years, to improve accountability over the state of the resource.

Strategic Objective 2 (SO 2) Economic Freedom: An Open, Diversified, Expanding Economy

Intermediate Result 2.1 Laws, Policies, and Regulations that Promote Trade and Investment

Opportunities to enhance biodiversity and forest conservation by addressing major threats:

- Facilitate the certification of forest products produced by communities, timber companies, and craftsman.
- Better control and secure tenure to enhance investment in resource management.
- Study available tree species, their trade, and uses and demand worldwide.
- Develop laws and regulations that grant local rights and responsibilities over forests and natural resources.
- Transfer tracts of national land to responsible, supported, and trained groups and entrepreneurs.

Intermediate Result 2.4 Improved Management and Conservation of Critical Watersheds

Opportunities to enhance biodiversity and forest conservation by addressing major threats:

- Support and endow a conservation research center
- Providing training in low-impact harvesting
- Research ecology, conservation, and sustainable harvesting of valuable wild crops.
- Develop laws and regulations that grant local rights and responsibilities over forests and natural resources
- Transfer tracts of national land to responsible, supported and trained groups and entrepreneurs
- Provide training in fire prevention and suppression.
- Provide training in the development of long term forest management plans
- Provide training in low-impact harvesting methods (timber and other)
- Provide training in writing forest management plans
- Enhance forest certification

RESUMEN EJECUTIVO

Como parte de su trabajo en curso para elaborar y programar un nuevo Plan para el País correspondiente al periodo fiscal que se extiende del 2004 al 2008, USAID/Panamá contrató a Chemonics International a fin de brindar los servicios de un equipo de evaluación de manejo forestal y biodiversidad tropical conforme a BIFOR IQC. La enmienda al Decreto de Ayuda Extranjera de 1987 añadió un nuevo requisito ambiental, denominado Evaluación según la Sección 118/119, que sería incluido en todo nuevo plan para el país elaborado por USAID. Las Evaluaciones según la Sección 118/119 sirven para analizar las acciones necesarias para la conservación y el manejo sostenible de bosques tropicales y diversidad biológica, y el grado en que las acciones propuestas cumplen con estas necesidades. En el presente informe se pretende evaluar:

- El estado actual de los bosques tropicales y la biodiversidad en Panamá.
- Las principales amenazas para los bosques tropicales y la biodiversidad en Panamá.
- La forma en que las actividades e inversiones de USAID/Panamá podrán aportar o afectar adversamente al manejo forestal tropical y la conservación de la biodiversidad
- La forma en que las oportunidades de sinergia del programa, entre objetivos estratégicos, podrán aportar a la conservación de bosques tropicales y biodiversidad.
- Otros temas y oportunidades para la asistencia por parte de USAID que coincidan con la estrategia general de la misión.

Además de la Evaluación según la Sección 118/119, la misión solicitó que el equipo establezca prioridades de eco-regiones y cuencas para determinar problemas comunes de conservación que les afectaban, y comience a establecer si otros sectores del programa de la misión pueden tener algún papel en estos temas.

El análisis efectuado por el equipo permite concluir que las actividades planificadas, conforme a su diseño y descripción hasta la fecha, no tendrán efectos ambientales adversos en los bosques tropicales o la biodiversidad de Panamá. Asimismo, puesto que existen vínculos estrechos entre el manejo forestal tropical y la biodiversidad dentro de la estrategia, las acciones y las inversiones de la misión, el nuevo Plan para el País continuará aportando a la conservación en Panamá. Cabe señalar que la misión continuamente efectúa revisiones ambientales de sus actividades, que abarcan Análisis Ambientales Iniciales (AAI), elaboración de directrices ambientales, y monitoreo de cumplimiento e impactos (conforme a 22 CFR o Reg. 216).

Por consiguiente, el equipo se ha enfocado en ofrecer recomendaciones para abordar temas y oportunidades relacionados con la sinergia dentro del programa en general y posibles actividades que podrían ser adecuadas para las condiciones actuales y valiosas para la conservación de recursos naturales. Para este fin, se han abordado los temas de protección de cuencas, pobreza rural y gobierno local.

Estado de la Biodiversidad y los Bosques Tropicales

Debido a su clima tropical y abundante precipitación pluvial, Panamá cuenta con una alta biodiversidad. Asimismo contribuyen a la riqueza de especies las formas de vida que han migrado a la región durante miles de años: especies vegetales y animales de zonas situadas más al norte y especies totalmente ajenas provenientes de Sudamérica. Si se aumenta a este escenario la geografía de Panamá – que abarca hábitats subacuáticos marinos, extensas costas y considerables cadenas montañosas – se cuenta con una impresionante diversidad, concentrada en un pequeño espacio del planeta.

En general, el estado de la biodiversidad y los bosques tropicales de Panamá es bastante bueno, si bien existen amenazas. Esto se debe a una densidad demográfica relativamente baja fuera de las áreas urbanas, con grandes extensiones de selvas, al alto nivel de educación de muchos sectores de la sociedad y al historial de oportunidades laborales fuera de la agricultura (especialmente en y cerca del área canalera). Asimismo, en décadas recientes Panamá ha instaurado un impresionante sistema de áreas protegidas, concebidas para mantener diversos hábitats y formas de vida. Las áreas protegidas abarcan alrededor de un 25 por ciento de la superficie del país y un 44,5 de éste se encuentra cubierto por bosques. Se calcula que la tasa actual de deforestación es de 0,5 por ciento al año, habiéndose reducido con respecto a pronósticos anteriores. Si bien se considera que varias especies están amenazadas o en peligro de extinción, no se reporta que ninguna de éstas se haya extinguido recientemente. No obstante, la rica biodiversidad de Panamá y sus recursos forestales, además de su gran cantidad y calidad de agua dulce, están sujetos a intensas amenazas localizadas.

Principales Amenazas para la Biodiversidad y el Bosque Tropical

Las amenazas más importantes para la biodiversidad y los bosques tropicales de Panamá son la construcción y mejora de caminos, especialmente en el Darién y la costa del Caribe; la expansión agrícola, particularmente en las regiones del Darién y Bocas del Toro (que está vinculada a la presencia de nuevas carreteras y al consiguiente mayor acceso al bosque); y la pérdida de manglares debido al rellenado para la construcción de estanques para la cría de camarones. La disponibilidad y calidad de fuentes de agua dulce en el país están directamente ligadas al estado de la cobertura boscosa y al buen manejo de cuencas; cualquier deterioro o pérdida de vegetación constituye una amenaza tanto para la calidad del agua como para la diversidad biológica.

Un factor importante para la pérdida de bosques y otros hábitats es la percepción de que las áreas naturales están disponibles para otros usos. En ciertas ocasiones, esta percepción es compartida por el gobierno del país, que ha mostrado inclinación a expropiar tierras protegidas para construcción de caminos y otros tipos de desarrollo (ej. Parque Metropolitano y Volcán Baru), y por agricultores y ganaderos que encuentran poca o ninguna oposición a sus actividades de desmonte para la producción agropecuaria. Las tierras fiscales son especialmente vulnerables puesto que en general existe poca capacidad local, individual o comunitaria, para hacer cumplir la protección de estas tierras y las autoridades nacionales no cuentan con personal suficiente para defender su integridad. Otra amenaza, si bien ésta no se destaca en los documentos revisados, es la extracción de valiosos recursos en escala nacional: madera fina, fauna silvestre para su consumo o venta como recuerdo, y otras valiosas especies vegetales y animales. Esto ha empobrecido y degradado algunos de los hábitats locales. Reiterando, esta tendencia está muy relacionada con la falta de control local de los recursos forestales y la debilidad institucional de las autoridades nacionales para hacer cumplir las regulaciones. Las áreas degradadas son particularmente vulnerables a la invasión de paja canalera (*Saccharum spontaneum*), que se ha convertido en un problema serio dentro del PCW. Las zonas cubiertas por pasto elefante constituyen una amenaza para la diversidad del área, puesto que evitan el establecimiento de bosques nativos y frecuentemente son presa de incendios. Finalmente, otras amenazas críticas para los bosques naturales y la biodiversidad que éstos albergan provienen de incendios forestales, en algunos casos devastadores e incontrolados, y de la sedimentación de hábitats acuáticos, especialmente en zonas donde existen arrecifes coralinos.

Recomendaciones

Las recomendaciones que aquí se ofrecen son sugerencias resumidas que aparecen en mayor detalle en el documento principal. Dichas recomendaciones están divididas primero como temas generales y, seguidamente, como acciones más específicas que deberán ser consideradas por USAID/Panamá en el contexto de los objetivos estratégicos que se describen en el Plan para el País para 2004–2008.

Temas Generales

- **Mediante el diálogo acerca de políticas, se deberá fomentar el respeto de los límites de áreas protegidas por parte del Gobierno de Panamá.** Se debe evitar la construcción y mejora de carreteras en áreas críticas no alteradas, incluida la carretera del Darién y los caminos de penetración a la costa del Caribe. Se deberá considerar alternativas tales como la mayor inversión en zonas ya colonizadas e industrias generadoras de empleo, educación y concienciación sobre valores ambientales, y el cumplimiento de la protección de tierras fiscales.

- **El Estudio Catastral Nacional, que actualmente lleva a cabo PRONAT (*Programa Nacional de Administración de Tierras*) en algunas áreas piloto del país, deberá tener un gran impacto en las áreas protegidas, el manejo forestal y la agricultura del país.** PRONAT deberá documentar y garantizar la tenencia de tierras y consolidar y demarcar áreas protegidas y territorios indígenas. Este esfuerzo debería tener un efecto estabilizador en el futuro manejo de todas las tierras del país, a medida que el estudio catastral sea más conocido por el público en general y los procedimientos de titulación de tierras tengan mayor difusión. Será menos probable que agricultores y ganaderos ocupen tierras donde no se otorguen títulos a quienes desmonten áreas protegidas o donde el proceso actual de demarcación se haya finalizado. Este estudio de tierras, que conllevará a la estabilización de derechos propietarios y al respeto de límites de áreas protegidas, es de importancia crítica para el futuro del manejo forestal, la agricultura y la biodiversidad de Panamá. Se están elaborando directrices de titulación de tierras dentro y cerca de áreas protegidas, dentro de las áreas piloto del proyecto. Los títulos actualmente otorgados por PRONAT, dentro de áreas protegidas, son condicionales y sólo se permite el desarrollo de actividades aprobadas mediante un convenio con ANAM. La violación de estas condiciones puede conllevar a la pérdida de la titulación.

- **USAID/Panamá deberá brindar todo su apoyo para la elevación de la Autoridad Nacional Ambiental (ANAM) al nivel de ministerio dentro del gobierno de Panamá.** La elevación de ANAM al nivel de ministerio conllevará a una mayor influencia en todos los aspectos de gobernabilidad del país desde un punto de vista ambiental. A fin de lograr un mejor cumplimiento de las exigencias de la certificación del manejo forestal, evitar la extracción ilegal de madera, y transferir el control, el uso y la protección de recursos a las comunidades asentadas dentro y alrededor de tierras fiscales, el Departamento Forestal deberá contar con mayor autonomía, financiación y personal, además de tener un mandato más adecuado. Del mismo modo, el fortalecimiento del Servicio de Parques y Vida Silvestre, mediante un aumento de personal y recursos, permitirá que esta entidad proteja y maneje mejor las áreas protegidas.

Se comenta que la creación de ANAM debilitó la capacidad del país para manejar su Sistema Nacional de Áreas Protegidas y que ha conllevado a un menor financiamiento de las áreas protegidas. Otros comentarios indican que existe influencia política en las decisiones administrativas y de selección de personal, ineficiencia en las operaciones cotidianas y en la toma de decisiones, y pérdida de personal capacitado de las áreas protegidas. Se ha indicado también que la administración del SINAP deberá ser separada de la administración regional de ANAM (Bathrick and Kernan 2003). Esto se fundamenta en el argumento de que el Servicio Forestal podría desempeñar mejor estas responsabilidades sin necesidad de la onerosa administración de la agencia ambiental.

Acciones Específicas a ser consideradas por USAID/Panamá

A continuación se listan las principales recomendaciones para USAID/Panamá. La discusión, la justificación y los detalles al respecto se encuentran en la sección de recomendaciones del presente

informe. En los siguientes párrafos se especifica la forma en que cada recomendación apoya los objetivos estratégicos y resultados intermedios de la misión.

1. **Apoyar la elevación de la Autoridad Nacional Ambiental a ministerio dentro del gabinete.**
2. **Crear y equipar un Centro de Investigación para la Conservación**. (*Entre la investigación aplicada se debe incluir la ecología de las especies maderables, la ecología de los hábitats forestales que producen beneficios económicos de importancia y los efectos de las actividades de manejo*.)
3. **Fomentar la promulgación de leyes y reglamentos que transfieran los derechos de uso de tierras forestales, áreas marinas y recursos a comunidades locales y grupos locales de interesados**. (*Algunos ejemplos serían concesiones forestales comunitarias, reservas marinas, manglares*.)
4. **Elaborar o modificar reglamentaciones para fomentar el buen uso de la tierra**. (*Algunos ejemplos serían: reglamentación para la certificación, reglamentación para la producción orgánica, incentivos para la creación de reservas privadas para la conservación y reglamentación que otorgue concesiones a largo plazo a las comunidades*.)
5. **Apoyar y financiar al Servicio Forestal de Panamá para que cumpla un papel más preponderante**. (*Sus nuevas responsabilidades incluirían prevención del transporte de madera ilegal, otorgamiento de concesiones forestales comunitarias, capacitación de grupos de ciudadanos en manejo forestal y asesoría pública acerca de reforestación*.)
6. **Apoyar y financiar al Servicio de Parques y Vida Silvestre de Panamá para que cumpla sus funciones**. (*Aumentar la capacidad de patrullar, proteger y monitorear áreas protegidas mediante una cantidad adecuada de personal y recursos.*)

Recomendaciones Geográficas

Después de haber realizado un análisis de las regiones ambientales importantes del país, el equipo recomienda que USAID/Panamá se enfoque en dos áreas geográficas. La discusión acerca de estas conclusiones se encuentra en la sección de recomendaciones del presente informe.

1. **La cuenca del Canal de Panamá**
2. **La provincia del Darién**

Vinculación con el Plan para el país de USAID/Panamá

Objetivo Estratégico 1 (OE 1) Gobernar con justicia: gobierno más sensible y transparente
Resultado intermedio 1.1 Fortalecimiento del estado de derecho

Oportunidades para mejorar la conservación de biodiversidad y bosques encarando las principales amenazas:

- Formular leyes y reglamentaciones que descentralicen los derechos y las responsabilidades concernientes a los bosques y los recursos naturales.
- Transferir extensiones de tierras a grupos y empresarios responsables, capacitados y con apoyo.
- Capacitar a corregidores en reglamentación ambiental para evitar la extracción ilegal de madera y el desmonte de tierras.
- Instalar nuevos puestos de vigilancia fuera de las áreas protegidas para detener camiones con madera ilegal y reforzar los puestos ya existentes.

Resultado intermedio 1.2 Mayor transparencia y responsabilidad

Oportunidades para mejorar la conservación de biodiversidad y bosques encarando las principales amenazas:

- Transferir recursos naturales y responsabilidades a grupos locales.
- Contar con un proceso claro de solicitud y un sistema de otorgamiento de concesiones de recursos naturales.
- Que las concesiones forestales comunitarias sean aprobadas por un consejo comunitario y que el pago de éstas se deposite en un una cuenta bancaria comunal, sujeta a auditorías, y que se instaure un sistema de registro.
- Ampliar el plazo de concesión a 50 o más años, a fin de aumentar la responsabilidad con respecto a la situación del recurso.

Objetivo Estratégico 2 (OE 2) Libertad económica: economía abierta, diversificada y en crecimiento
Resultado intermedio 2.1 Leyes, políticas y reglamentación que promuevan el comercio y la inversión

Oportunidades para mejorar la conservación de biodiversidad y bosques encarando las principales amenazas:

- Facilitar la certificación de productos forestales elaborados por comunidades, empresas madereras y artesanos.
- Mejor control y tenencia segura para aumentar la inversión en manejo de recursos.
- Estudio de las especies maderables disponibles, así como de su comercio, uso y demanda en el ámbito mundial.
- Promulgar leyes y reglamentaciones que otorguen derechos y responsabilidades locales con respecto a los bosques y los recursos naturales.
- Transferir extensiones de tierras fiscales a grupos y empresarios responsables, con apoyo y capacitados.

Resultado intermedio 2.4 Mejora en el manejo y la conservación de cuencas de importancia crítica

Oportunidades para mejorar la conservación de biodiversidad y bosques encarando las principales amenazas:

- Apoyar y equipar un centro de investigación para la conservación.
- Impartir capacitación acerca de aprovechamiento de impacto reducido.
- Investigar la ecología, la conservación y el aprovechamiento sostenible de productos silvestres.
- Formular leyes y reglamentaciones que otorguen derechos y responsabilidades locales con respecto a los bosques y los recursos naturales.
- Transferir extensiones de tierras fiscales a grupos y empresarios responsables, con apoyo y capacitados.
- Impartir capacitación acerca de prevención y combate de incendios.
- Impartir capacitación sobre elaboración de planes de manejo forestal a largo plazo.
- Impartir capacitación sobre métodos de aprovechamiento de impacto reducido (de madera y otros productos).
- Impartir capacitación acerca de redacción de planes de manejo forestal.
- Mejorar la certificación forestal.

INTRODUCTION

The Foreign Assistance Act was amended in 1987 by the United States Congress to add new requirements above USAID's environmental procedures codified in 22 CFR 216. Overviews of the specific requirements follow:

> ***Section 118 - Tropical Forests***. Each country development strategy statement or other country plan prepared by USAID shall include an analysis of (1) the actions necessary to achieve conservation and sustainable management of tropical forests, and (2) the extent to which the actions proposed for support by USAID meet the identified needs.
>
> ***Section 119 - Biodiversity***. Each country development strategy statement or other country plan prepared by USAID 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 USAID meet the needs thus identified.

USAID/Panama, as part of its efforts to design and program a Country Plan for Panama for 2004-2008, has contracted the services of a tropical forestry/biodiversity assessment team under BIOFOR IQC with Chemonics International Inc.

Assessment Objectives

The tropical forest and biodiversity assessment is not specifically a programming or sector-wide design effort. With Section 118/119 Assessments, it is customary for overall findings and recommendations to be incorporated by the mission into the ongoing development of its strategy. This assessment does not substitute for an Initial Environmental Examination (IEE) for specific activities identified in the Country Plan. Each SO team will be responsible for ensuring that an IEE or a Request for Categorical Exclusion is conducted for all activities funded by USAID. Rather, this paper is an early environmental review of the mission's new multi-year strategy for the country, and aims to assess:

- The current status of tropical forests and biodiversity in Panama.
- The major threats to tropical forests and biodiversity in Panama.
- How USAID/Panama activities and investments are likely to contribute to or adversely affect tropical forestry and biodiversity conservation.
- How opportunities for program synergy among the strategic objectives that can contribute to tropical forest conservation and biodiversity.
- Other issues and opportunities for USAID assistance that match the mission's overall strategy.

Methodology

This assessment was conducted from February to April 2004 by a team leader/natural resources management specialist, a biodiversity specialist, and a protected area specialist. The complete statement of work is found in **Annex A**. Brief biographical sketches of the team members are found in **Annex B**. The assessment primarily depended on secondary sources of information, including a review of the existing literature (see **Annex C**), and interviews with persons in Panama and the region knowledgeable on the subjects of tropical forests and biodiversity (see **Annex D** for the list of persons consulted.) Several site visits were made, including a fly-over of the Pacific slope and coast of western Panama. **Annex E** is a synopsis of the official text of the sections 118/119 amendments to the Foreign Assistance Act, which generated the requirement for this assessment.

SECTION I

Status of Panama's Biodiversity and Tropical Forests

A. Country Overview

When the guidelines for preparing a 118/119 assessment were written, many countries had very little data or information upon which to base their findings, therefore emphasis was placed on pointing out the gaps that existed. Although no country will ever have all the information needed on its environmental resources, or by definition, the changes in the status of their resources, Panama has an enviable number of sources and publications, both government and nongovernmental; educated and professionals; and a well-developed tourism industry to call on in support of conservation of its natural resources. The country is uniquely situated geographically at the crossroads of the hemisphere, both in terms of biology and transportation. Overlaying this wealth of experience and ability are the beautiful richness and diversity of Panama's coastal wetlands, beaches, islands, cloud forest mountain chains, and lowland jungles.

The majority of the following information is from the World Factbook (CIA 2003), unless otherwise noted:

Political. Panama's government is a constitutional democracy, based on a legal system of civil law. Judicial review of legislative acts occurs in the Supreme Court of Justice. The president and vice presidents are elected by popular vote for five-year terms. The current chief of state is President Mireya Elisa Moscoso Rodriguez (since 1 September 1999), with the next election scheduled for May 2004. The cabinet is appointed by the president. The legislative branch is formed by a unicameral Legislative Assembly (*Asamblea Legislativa*) with 71 seats, the members of which are elected by popular vote to serve five-year terms. The judicial branch of government includes the Supreme Court of Justice (*Corte Suprema de Justicia*), which has nine judges appointed for 10-year terms; five superior courts; and three courts of appeals.

Recently the government of Panama has been backing public works programs, tax reforms, new regional trade agreements, and focusing on tourism development in order to stimulate growth.

Economic. Three-fourths of Panama's GDP is primarily based on the services sector, including operating the Panama Canal, banking, the Colon Free Zone, insurance, container ports, flagship registry, and tourism. Economic growth was slowed during 2000-2003, due to a slump in Colon Free Zone exports, agricultural exports, the global slowdown, and the withdrawal of US military forces from long occupied bases in the Canal Zone. Industries include construction, petroleum refining, brewing, cement and other construction materials and sugar milling. The GDP composition, by sector, is agriculture (7 percent), industry (17 percent), and services (76 percent) (2001 estimate).

Demographics. Panama's population is 2,960,784 (July 2003 est.), with a population growth rate of 1.36 percent (2003 estimate). Life expectancy at birth for the total population is 72.32 years (male: 69.97 years, female: 74.79 years) (2003 estimate). The total fertility rate is 2.53 children /woman (2003 estimate). The HIV/AIDS adult prevalence rate is 1.5 percent (2001 estimate). Ethnic groups are described as mestizo (mixed Amerindian and white) 70 percent, Amerindian and mixed (West Indian) 14 percent, white 10 percent, Amerindian 6 percent. The literacy rate for the total population is 92.6 percent (male: 93.2 percent, female: 91.9 percent) (2003 estimate).

Geography. Panama is located in Central America, holding a strategic location on the eastern end of the isthmus forming part of the land bridge between North and South America, bordering Colombia and Costa Rica. The Panama Canal links the Caribbean Sea and the North Pacific Ocean. The country consists of nine provinces: Panama, Darien, Colón, Herrera, Chiriquí, Coclé, Los Santos, Bocas del Toro, and Veraguas, and five Indigenous Peoples Comarcas: Kuna Yala, Embera-Wounnan, Madungandi, Wargandi and Ngöbe-Bugle (Corredor Biologico Mesoamericano, 2003). Panama's total area is 78,200 sq km (75,990 sq km of land, and 2,210 sq km of water). Panama has 2,490 km of coastline, with coastal areas that are largely rolling hills and plains, upland dissected plains, and mostly steep, rugged mountains in the interior. The highest point is the Volcano Chiriqui at 3,475 meters. Natural resources include copper, mahogany forests, shrimp, and hydropower.

Land ownership. Small farmers are estimated to be 32.8 percent of the population. Small farms number 152,948 (less than 5 hectares), and occupy only 4.2 percent of the land under cultivation (122,549 hectares), although they represent 71.5 percent of the number of farms in the country. These small land holdings often suffer from poor quality soil, lack of capital, and inappropriate agricultural practices, and often cannot produce the volume or quality needed to achieve a subsistence level of harvest. Low production often results in clearing of new marginal areas, accelerating deforestation, erosion, and loss of fertility, and frequent migration to cities in search of employment. On the other hand, 1,794 farmers work large farms (more than 200 hectares); in 1990 these occupied 37 percent of the land under cultivation (1,100,000 hectares). The large land holders represent only 0.98 percent of the farmers in Panama. Among these agriculturalists are a few agro-industrial producers and high technology cattle operations, the rest of the large land holdings produce relatively little, as with extensive cattle ranches.

Farmers are seriously affected by the lack of title to their lands: 46 percent are without title, (especially in the provinces of Veraguas, Panama and Darien), 19 percent have mixed titling, 1.2 percent rent, and 34 percent have property titles (ANAM 1999). The lack of a land title can have a variety of consequences, making it difficult to get a loan, difficult to sell or inherit the land. With less incentive to improve or invest in your farm, you are more likely to abandon it, and perhaps move on to new, more fertile lands. A farmer with insecure tenure would also be liable to be pushed off their land by neighbors or other claimants.

Water resources. Panama's hydrological system is composed of 51 watersheds, 33 (65 percent) on the Pacific slope with 350 rivers, and 18 (35 percent) of which are on the Caribbean slope with 150 rivers. Chiriquí province has the most important rivers of the Pacific slope: Chiriquí Viejo, Platanal or Chico, Chiriquí, Tabasará, and San Felíx. Other important rivers are Santa María (Herrera), Chepo or Bayano (Panama), and Tuira (Darién). Bocas del Toro province has the most important rivers on the Caribbean slope: Sixaola, Yorkin, Teribe, Changuinola, Cricamola, and Calovébora. Other important rivers are Coclé del Norte (Coclé), and Indio and Chagres (Colón) (ANAM 1999b, ANAM 1999d).

Most socioeconomic activities in Panama are concentrated on the Pacific slope watersheds, where the main cities and populated centers are found. These activities include agriculture, cattle ranching, mining, industry, and commerce.

A low water supply in some parts of the country has an impact on electric energy production at hydroelectric centers. In addition, these watersheds supply drinking water for cities and populated centers and water for agricultural, livestock, tourism activities, wildlife survival, and the functioning of the Panama Canal. Currently the low water supply is affecting periurban communities near Panama City, Colón, Chorrera, and David, and the provinces in the "dry arc" region of low rainfall: Coclé, Herrera, and Los Santos.

Causes of the low water supply have natural and human origins. Natural causes include the dry season, seasonal presence of a dry period during the rainy season, "veranillo de San Juan", and the El Niño phenomenon. Human causes include water pollution due to garbage disposal and domestic sewage, sedimentation, and a lack of techniques and systems to take advantage of rainwater in islands and remote communities. Another cause is the lack of optimal watershed management, which leads to deficient protection, use, and conservation of the water resource. Low water availability is the result of deforestation, poor land use practices and management, and the lack of a water storing systems in central provinces.

Energy resources. Energy in Panama comes from fossil fuel (37 percent), hydropower (61.3 percent), and other sources (1.7 percent). Panama neither produces nor uses nuclear energy. Oil consumption is 52,000 bbl/day (2001 estimate), with no domestic production.

Climate. The climate is described as tropical maritime, generally hot and humid in the lowlands and cool in the mountains. There is an extended rainy season (May to January), and a short dry season (January to May). Rainfall differs from the wetter Caribbean slope to the dryer Pacific side, with moist Caribbean trade winds hitting the central mountain and dropping heavy rains on the north side of the isthmus. Overall, the Caribbean side receives about 1,500 to 3,500 mm rain per year, while the dryer Pacific slope receives from 1,140 to 2,290 mm.

B. Major Biomes of Panama

Panama's diverse ecosystems are reflected in its broad array of biodiversity. Although there are many recent and long-used vegetation maps of Panama (ANAM 2003a; Dinerstein et al. 1995; Biodiversity Support Program 1995), for this review we will group them in biomes, and discuss the details on a finer scale. The biomes found in Panama include tropical lowland humid forests, tropical montane forests, tropical dry forests, freshwater wetlands, mangroves, coral reefs, and tropical islands.

A terrestrial ecosystem classification often used is Holdridge's Life Zones (Holdridge 1967), which is based on climatic and elevational information, independent of human activities. According to this classification, Panama's combination of altitude, biotemperature and humidity (rainfall) represent 12 of the 30 possible life zones on earth.

Table 1. Biomes of Panama, corresponding life zones, and area covered (Informe Ambiental, ANAM 1999)

BIOME	HOLDRIDGE'S LIFE ZONE	percent PANAMA AREA
TROPICAL LOWLAND HUMID FORESTS	Tropical Moist Forests	32 percent
	Tropical Wet Forests	13.4 percent
TROPICAL MONTANE FORESTS	Pre-Montane Moist Forests	3.5 percent
	Pre-Montane Wet Forests	18 percent
	Pre-Montane Rain Forests	12.6 percent
	Lower Montane Moist Forest	< 2 percent
	Lower Montane Wet Forest	< 2 percent

Table 1. Biomes of Panama, corresponding life zones, and area covered (Informe Ambiental, ANAM 1999)		
BIOME	**HOLDRIDGE'S LIFE ZONE**	**percent PANAMA AREA**
	Lower Montane Rain Forests	3.2 percent
	Montane Wet Forest	< 2 percent
	Montane Rain Forest	< 2 percent
TROPICAL DRY FOREST	Tropical Dry Forests	7 percent
	Pre-montane Dry Forest	3 percent
FRESHWATER WETLANDS	(found in all life zones)	-
MANGROVES	(found at sea level, therefore a type of tropical humid forest)	-
CORAL REEFS	(oceanic)	-
TROPICAL ISLANDS	(various life zones, depending on elevation and rainfall)	-

Tropical lowland humid forests. This biome includes two categories from Holdridge's life zones (tropical moist forests and tropical wet forests), extending from sea-level to about 1,000 m, included are forests with a canopy to about 30 m high. Emergent trees can be 45-55 m tall, 1-3 m in dbh (diameter at breast height), and frequently with large buttresses.

- *Tropical moist forest:* This life zone is characterized by high humidity and an annual precipitation about 2,000-3,000 mm, from sea level to 1,000 meters. Its climatic conditions support high biodiversity. Lianas do very well in this formation (in the canopy and also the subcanopy), whereas epiphytes and ferns are relatively scarce. Some dominant, emergent trees include the deciduous *Cavanillesia platanifolia* (to 40 m and 2 m in dbh), and *Ceiba pentandra*, and *Anacardium excelsum* (CBM 2003, Davis et al. 1997). This life zone is found along the length of Panama, and is the most prevalent vegetation type in the Darién (CBM 2003, Davis et al. 1997).

- *Tropical wet forest:* This life zone has intense rains almost all year, with a mean annual temperature from about 20-25.5°C, found from about 500-900 meters asl. Epiphytes are abundant and canopy lianas common. *Anacardium excelsum* is dominant in the canopy and the following trees are frequent (at least in the Darien area): *Bombacopsis* spp., *Brosimum guianense*, *Ceiba pentandra*, *Cochlospermum williamsii*, *Dipteryx panamensis* and *Myroxylon balsamum*; a main subcanopy tree is *Oenocarpus panamanus*. The dominant understory shrub is *Mabea occidentalis* and frequent shrubs include *Clidemia* spp., *Conostegia* spp. and *Miconia* spp. (Davis et al. 1997). This life zone is found the length of Panama, especially along the Caribbean coast with isolated areas on the southwest coast of the Pacific.

Tropical montane forests. Within this biome we include eight life zones, (pre-montane, lower montane and montane forests), with various levels of precipitation.

The Premontane Belt (600-800 m to 1,300-1,500 m) has a high biodiversity and complexity. These forests, with a canopy 30-40 m high, have large cylindric trunks with well-formed crowns, supporting many epiphytes. Ferns and palms are abundant in the ground layer (Davis et al. 1997).

- *Pre-montane moist forest*: This life zone is found discontinuously in an arc around the Panama Gulf on the Pacific coast.
- *Pre-montane wet forest*: This life zone is characterized by an annual precipitation of more than 4,000 mm in its areas more humid. Its elevation is up to 200 meters asl, with moderate temperatures that vary between the 21.5°C and 24°C. Among the species of characteristic plants are almendro *(Coumarouna panamensis)*, granadillo *(Platymiscium dimorphandrum)*, guabas *(Inga vera)* and higuerones *(Ficus sp.)* (CBM 2003). This life zone is found scattered through the length of Panama, at the base of higher mountains.
- *Pre-montane rain forest:* The forest canopy is low (30 m) and dense, with many subcanopy palms; lianas are common. *Brosimum* and *Dipteryx* species are frequent in the canopy and *Cephaelis elata* is a dominant shrub (in the Darien); ferns are common in this zone. The precipitation is variable, oscillating between 4,000 and 7,000 mm. Elevation ranges from 400 to 1,400 meters asl. The temperature varies between 18°C and 24°C. Much of this life zone is characterized by primary forests on steep slopes. Other vegetation can include caimitos silvestres *(Chrysophyllum sp.)*, robles *(Quercus sp.)*, malagueta de montaña *(Virola sp.)*, maría *(Calophyllum sp.)*, yamery *(Vochysia sp.)*, guabas *(Inga sp.),* and mamey silvestre *(Calocarpum sp.)*(CBM 2003). This life zone is found scattered through the length of Panama, at the base of higher mountains.

The Lower Montane Belt can begin at about 1,300 meters, or higher, with a wide variety of species, especially in the Lauraceae family. Canopy species can include *Cornus disciflora*, *Roupala complicata*, *Sapium* spp., *Hyeronima poasana*, *Magnolia poasana*, *Didymopanax pittieri* and *Podocarpus macrostachyus*. The oak *Quercus seemannii*, sometimes to 40 m tall, is frequent, whereas *Q. oocarpa* and *Q. rapurahuensis* are common. *Quercus copeyensis* appears at higher elevations. Epiphytes, bryophytes and lichens are common. (Davis et al. 1997).

- *Lower montane moist forest:* Rainfall is less than 2,000 mm. annually. Among plant species characteristics of this ecosystem are magnolia *(Magnolia serorum)*, robles *(Quercus sp.)*, pinos nativos *(Podocarpus sp.)*, ferns and epiphytes, and also includes paramo forests, a formation dominated by grasses and certain shrubs (CBM 2003). This life zone is found in a small area near the Costa Rican Border.

- *Lower montane wet forest: This forest* extends from 1,200 to almost 2,000 meters asl. The mean annual temperature varies between the 17°C and 18°C and annual precipitation is less than 4,000 mm. Species of plants characteristic of this ecosystem are the robles *(Quercus* sp.*)*, pinos nativos *(Podocarpus* sp.), encillos *(Weinmannia* sp.) and other plants associated with ferns, lichens, mosses and bromeliads (CBM 2003). This life zone is found in a small area near the Costa Rican border, in the western sector of the Cordillera Central, in areas around Volcanos Barú, Cerro Pando, and Boquete.

- *Lower montane rain forest:* These are often cloud forests and on higher exposed sites are elfin forests. They are found between 1,200 and 1,400 meters asl. Temperature varies between the 12°C and 18 °C and precipitation exceeds 4,000 mm. The wild avocado *(Persea schiedeana)*, roble *(Quercus copeyensis)*, encillo *(Weinmannia pinnata)* and cedro *(Cedrela toduzii)* are often represented. The dominant trees in the Darien cloud forests are *Oenocarpus panamanus*, and in elfin forests *Clusia* spp. The trees and shrubs of this ecosystem support an abundance of epiphytes and mosses. This life zone is found on peaks and ridges of the Cordillera Central of western Panama, and in a small scattered arc in the Darien, near the Colombian border.

The Montane Belt**,** a vegetation belt, is found from about 2,300-3,300 meters, and includes montane wet forest and montane rain forest. Some *Quercus copeyensis* trees, with large buttresses, are 50 m in height

and 1.5 m in dbh. Other common species in this belt (in the Amistad area) are the conifers *Podocarpus macrostachyus* and *Prumnopitys standleyi*, along with *Magnolia poasana*, *Cleyera theaeoides*, several species of *Ilex* and *Weinmannia* and many genera and species of Lauraceae (*Ocotea*, *Persea*, *Nectandra*, *Phoebe*) and Araliaceae. Some of the forest in the montane belt have oak species associated with *Chusquea* bamboo. In the understory species of Rubiaceae, Melastomataceae and Myrsinaceae are also common (Davis et al. 1997).

- *Montane wet forest*: These occupy areas generally above 2,000 meters asl; are distinguished by high humidity, with annual precipitation exceeding 2,400 mm; have an average temperature of approximately 15°C; and are often on steep topography. Among characteristic trees are robles (*Quercus* sp.) aguacates silvestres *(Persea schiedeana)*, chaquiros *(Podocarpus sp.)*, orchids and ferns. (CBM 2003). This life zone is found in a small area near the Costa Rican Border.

- *Montane rain forest*: This ecosystem has frequent cloud cover and is very wet. Plants characteristics of this life zone are roble *(Quercus sp.)*, encillo *(Weinmania sp.)*, chaquiro *(Podocarpus sp.)*, chilco *(Escallonia sp.)* and cedrillo *(Brunellia sp.)*. The formation is found in small areas of the cordillera Central, near the Costa Rican Border (CBM 2003). Within this life zone is found Subalpine Rain Páramo, which generally occurs above 3,100 m, on very wet, very humid or rocky and dry habitats. It has many grass species and shrubs to 3 m tall. The ecosystem is fairly rare in Panama, found on the summits of Fábrega, Echandi, and Barú.

Tropical dry forests. This biome is found in an arc along the Pacific coast, including the two life zones tropical dry forest and pre-montane dry forests. These areas support thorn and seasonally deciduous to semi-deciduous forests. Characteristic trees include *Albizia caribaea*, *Bombacopsis quinata*, *Cochlospermum vitifolium*, *Prosopis juliflora* and *Sabal allenii* (Davis et al. 1997).

- *Tropical dry forest*: This life zone is found along the coastline of the provinces of Los Santos, Herrera and Coclé.
- *Pre-montane dry forests*: This life zone is found near the coast in the provinces of Los Santos, Herrera and Coclé, and in patches on the Pacific coast of the Darien.

Freshwater wetlands. Panama is reported to have 1.2 of its surface covered with water (896.37 km^2) (ANAM 2003a), including the partially man-made Panama Canal. The Rio Bayano is one of the most important rivers in Panama for hydroelectric power and freshwater swamps. Within the classification of production forest, two types are considered of great importance for their potential productivity and their geographic location: the forest of *Orey* in Bocas del Toro and the forests of *Cativo* in the Darién. Orey forests are composed mostly of the orey tree (*Campnosperma panamensis*), and are found principally in swampy zones of Chiriquí Lagoon in Bocas del Toro. The forests of Cativo are composed mainly of the species cativo (*Prioria copaifera*) and are found on alluvial lands that receive periodic flooding with fresh water (ANAM 1999b).

The National Environmental Strategy (ANAM 2002) reviews and summarized the status of water resources in Panama, including water quality and pollutants, for both surface and underground sources. Also discussed are availability of fresh water, effects of flooding, demands from urban and industrial areas. The diversity of life that depends on fresh water is reviewed, and the effects of deforestation, erosion, and contamination are highlighted. Critical areas in the country are listed, including the Panama Canal watershed, the Rio Bayano upper watershed, among others of priority, emphasizing the need for water for electric energy production, agriculture, industry, and the demand for drinking water. The status of water resources in the Panama Canal watershed is reviewed in the Panama Canal Watershed Monitoring Project's (PMCC) final report (Heckadon-Moreno, et al. 1999).

Coastal: Mangroves, coral reefs and islands.The marine coastal zone is a combination of land and ocean: land areas influenced by the proximity of the ocean and ocean affected by its proximity to land. Panama has a considerable coastline of 2,988.3 kilometers (1,700.6 kilometers on the Pacific ocean, and 1,287.7 kilometers on the Caribbean). The country is located at the south end of the hurricane belt, where it is not directly impacted by these storms. The ocean territory extends over a 12-mile wide zone, with an area of 320,000 square kilometers.

The Caribbean coast is characterized by its proximity to the mountains;, a continental shelf from 5 to 35 kilometers wide, though rarely exceeding 25 kilometers;, and by a great diversity of environments. These environments include narrow mangroves and beaches separated by natural canals, estuaries, and sandy, swampy, or rocky shores, as well as sea-grass beds and extensive coral reefs.

There are 250 kilometers of coral reefs along the length of the Caribbean coast, including the Kuna Yala archipelago with more than 300 coral islands that extend to the Colombian border. In the zone near the border with Costa Rica, the marine lagoon of Chiriquí (840 km^2), is one of the most attractive and extensive of the Caribbean.

On the Pacific coast, the continental shelf is wide, extending to 150 kilometers. There strong ocean winds influence the upwelling of deep waters, augmenting primary productivity that result in an abundance of marine species. The Pacific is a heterogenous coast, with mangroves, sand and mud beaches, estuaries, igneous rock formations, and coral reefs. River systems drain the coast and form large estuaries associated with submarine sand banks and extensive mangrove systems, such as in San Miguel in the Darién, the largest in the country. According to the 1997 "Plan de Ordenación y Conservación de los Manglares de Panama" (1997), there are 171,000 hectares of mangroves in the country.

The pristine island of Coiba, with 493 km^2, was recently established as a national park; it is the largest island in the country. The Panama Gulf, 20,000 km^2, is almost twice as large as the province of Panama, and constitutes the most important tourist zone in the country with an impressive fringe of extensive beaches and islands, including Taboga and Contadora.

The coastal zones of the Pacific and the Caribbean have different environmental patterns. The Caribbean is relatively more stable, permitting the development of coral species, while the Pacific coast is characterized by its extensive mangrove ecosystems (ANAM 1999b).

Fishery production is valued at $72.1 million annually. Local fishermen number 9,370 on the Pacific coast and between 2,000 and 3,000 on the Caribbean coast. An estimated 25,000 metric tons of fish are caught annually. Of this production, 70 percent depends on the health of mangrove ecosystems, which in turn is dependent on mangrove conservation and the protection of inland terrestrial ecosystems (Gutierrez 2001b).

C. Biodiversity and Endemism

Panama is a country of high biodiversity as a result of its geographical position, geological history, and variety of habitats (Méndez 1983, ANAMc 1999, Samudio 2002). The Atlantic and Pacific coastal-marine biodiversity is rich in invertebrates in the four littoral zones, mangroves, sea-grasses, and coral reefs. Panamanian Caribbean coral reefs are among the highest in diversity in the Caribbean region, whereas the Pacific coral reefs' diversity is the highest in the continental American Pacific. Especially rich are the coral found in the Archipelagos of Bocas del Toro, Kuna Yala, Golfo de Chiriquí, and Coiba (ANAM 1999a, ANAM 1999c, ANAM 1999e).

Panamá contains two "biodiversity hot spots" known as *Mesoamerica* in the west of the country, and *Darién-Choco-Western Ecuador* in the east. These two hot spots meet east of the Canal Area (Mittermeier *et al*. 19). Among the six ecoregions represented in Panamá (Dinerstein *et al*. 1995), the Central American Atlantic moist forest, the Talamancan montane forest, the Choco-Darién moist forest, and Eastern Panamanian montane forest are high in species richness and endemism. 'The most important mangroves in Panama are the Golfo de Chriquí, Golfo de Montijo, Bahía de Panamá, Golfo de San Miguel, and Bocas del Toro(ANAM 1999a; Dinerstein *et al*. 1995).

The plants of Panama show high endemism, with 1,500 species (15 percent of 10,115 spp.) found only in the country. Among known fish, 23 fresh water species (16 percent of 146 spp.) and 4 marine species are endemics (0.3 percent of 1351 spp.). For terrestrial vertebrates, 16 mammal (6 percent of 259 spp.), 12 birds (1 percent of 957 spp.), 23 reptiles (10 percent of 229 spp.), and 29 amphibians are endemics (16 percent of 179 spp.). Main centers of high diversity and endemism for plants and vertebrates are found in Darien, Bocas del Toro-Chiriquí, and the Panama Canal Watershed (ANAM 1999c, Young *et al*. 1999, Samudio 2001, 2002, Angehr 2003). With more studies in the future, the number of species and endemic species found in Panama is expected to rise (Samudio 2001, 2002), mainly in mountain and island habitats (Carleton and Musser 1995, Kalko and Handley 1994).

D. Threatened and Endangered Species

The Convention on International Trade in Endangered Species (CITES) has three published appendices that categorize species that have become endangered by international trade. Species listed in Appendix I are highly reccomended by CITES to be banned from trading; species listed in Appendix II include those that are species endangered but the trading of which can still be decided by individual countries; and Appendix III includes those species that each country reports as endangered by their national criteria. In Panama, the Appendix III list comes from ANAM's official list of endangered species. However, Panama is in an ongoing process of reviewing the list of endangered fauna, and as a result there are many unofficial listings.

In terms of flora, there was no official national list until the year 2000, when ANAM published a list of Panamanian Endangered Plant Species produced by a workshop of specialists. Prior to that, all native plant species included in CITES appendix II, and those considered by IUCN as species globally threatened, were protected. (ANAM 2000).

During the late Pleistocene period, approximately 10,000 years ago, megafaunal mass extinction occurred in Panama as in other parts of the world (Webb 1984). In more recent periods, however, despite Panama's role as a transit zone, which exposed it to exotic species, diseases, and human disturbances that 'can lead to species extinction, there have been no reports of species extinction in Panama in the last 600 years. It is possible that in future years Panama will lose several amphibian species, mainly in mountain areas, due to the distruction of critical habitat, and low populations (Lips 1999). Among other vertebrates those on islands (i.e. Archipelagos of Bocas del Toro, Las Perlas, and Golfo de Chiriquí) and in the mountains (i. e. Cerro Punta-Volcan, Gaital, Campana, Majé), have threatened habitats. Among mammals, the crab-eating rat (*Ichthyomys tweedii*) is an example of a species that could go extinct, because it is known from only a few collections in the foothills of Campana. Current ecological information for most of Panamanian wildlife is incomplete, consequently their classification in any national conservation category (such as threatened or endangered) is very speculative (ANAM 2000c, Samudio 2001, 2002). Nevertheless, some species are protected by national law.

Threatened plants. The number of species listed as threatened are 5,438 species of angiosperms, 15 gymnosperms, all 38 endemic ferns, and all 51 tree ferns (ANAM 2000c). There are 483 species of plants

included in CITES Appendix II. Endemic plant species classified as globally threatened are: *Adelobotrys jefensis*, *Amphitecna spathicalyx*, *Blakea elliptica*, *Brunfelsia dwyeri*, *Corida lesliae*, *Couepia acottmorii*, *Dorstenia panamensis*, *Erythroxylum brennae*, *Escheilera garagarae*, *Meriania panamensis*, *Psittacanthus pusillus*, *Sievekingia butcheri*, *and Sthruthanthus anamensisi* (WCMC 1998).

Caoba (Swietenia macrophylla) Big Leaf Mahogany, is currently the most valuable timber species in Latin America and the Caribbean, worth more than 5 times many other tropical species. Its extreme value has led to unsustainable and often illegal logging. Given the high levels of exploitation, mahogany species are regulated by CITES, and at the 2002 CITES conference, member countries upgraded big leaf mahogany from CITES Appendix III to Appendix II. As a result, all trade in mahogany requires the exporting country to verify that the shipment was both legally obtained and that its harvest was not detrimental to the survival of the species in its ecosystem (USAID 2003a).

Threatened amphibians. Only one species is officially listed as endangered in Panama – the golden frog *Atelopus zeteki*, due to overexploitation and habitat loss. Eleven species are included in CITES appendices I and II (ANAMe). A follow up review of amphibian conservation status recommended that 100 species be considered as threatened (IUCN 1999) and a recent revision found 45 species to be threatened (ANAM 2002), though these lists are not official.

Threatened reptiles. Ten species of reptiles are protected in Panama, including the caguama turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), carey turtle (*Lepidochelys olivacea*), canal turtle (*Dermochelys coriacea*), galapago turtle (*Geochelone carbonaria*), babillo (*Caiman crocodilus*), boa (*Boa constrictor*), and green iguana (*Iguana iguana*). CITES Appendices I and II include 17 species. Unofficially, however, a national workshop of experts in 1997 recommended 128 species to be listed as threatened (IUCN 1999), and in 2000 48 species wre recommened to be added to the list (ANAM 2002).

Threatened birds. Panamanian laws officially protects 38 species. Among them are 3 tinamous, 10 ducks, 2 raptors (including the harpy eagle *Harpia harpyja*), 4 curassows and guams, 1 quail (*Odonthoporus gujanensis*), 11 doves and pigeons, 6 macaws and parakeets, and the quetzal (*Pharomachrus mocino*) (ANAMc). However, the 1997 national workshop of experts unofficially recommended 210 species be considered threatened (IUCN 1999, Angehr 2003), and in. 2000, the workshop recommended 145 species be added to CITES appendix II and 205 species be considered threatened in Panama (ANAM 2000). These lists are not official.

Threatened mammals. Under national law, 34 species of mammals are protected. The list includes 5 edentates, all 8 monkeys, 2 canids (bush dog - *Speothos venaticus* and gray fox), all 5 cats, 1 otter (*Lontra longicaudis*), 3 racoon-like mammals, the manatee (*Trichechus manatus*), the tapir (*Tapirus bairdii*), 2 peccaries, all 3 deer, and 3 caviomorph rodents (ANAM 2000). There are 14 species included in CITES Appendix I, 5 in Appendix II, and 12 in Appendix III (CITES 1998, ANAM 2000). Once again, the 1997 workshop recommended that 83 species be classified as threatened (IUCN 1999) and the workshop in 2000 recommended that 10 species be considered as threatened in Panama (ANAM 2002); but these lists are not official.

E. Tropical Forests

According to available sources, Panama is described as 44.5 percent forested, 39 percent under agriculture, 0.7 percent under bodies of water, and the rest, 15 percent is covered by civil infrastructure, housing, villages and cities (ANAM 1999). Similarly, from the total surface area (7,492,677 hectares), forests cover 3,364,591 hectares, representing 45 percent of country (Gutierrez 2001a).

The Forest Law (Law 1 - 3 February 1994) describes three categories of forests in Panama, each classified according to diverse functions that each one accomplishes: production, protection and protected. Of the total area of forests, currently 11.5 percent are classified as production forests, and 51.9 percent are considered protection forests.

Table 2. Forests by category, area, percentage, and in relation to Panama's area.

Forest Category	Area (Hectares)	percent of Forests	percent in Relation to Country Area
Production Forests	350,000	11.5	4.6
Protected Forests	1,584,682	51.9	21
Protection Forests	1,117,622	36.6	14.8
TOTAL	3,052,304	100	40.4

Forests in Panama are managed by a variety of organizations, private owners, and government agencies. The government organization charged with managing production forests, those intended for timber production in the eastern region, and protection forests – those not withn protectin area systems, but by their characteristic must be managed carefully – is the Forest Service, withinthe *Dirección Nacional de Patrimonio Natural* of the ANAM. The *Servicio Nacional de Administración de Areas Protegidas y Vida Silvestre*, is responsible for the management of parks and protected areas, which are generally forested (Protected Forest).

The System of National Protected Areas (SINAP, under ANAM) is the main mechanism to conserve forests of the country *in situ*. The system has 51 areas and a coverage of almost 2 million hectares, which corresponds to roughly 25 percent of the nation's territory. The forests within the parks and protected areas system are considered Protected Forests.

Almost all production forest concessions awarded since 1980 have been in the Panama and Darien provinces. Deforestation, the absence of management, and lease periods for these concessions of two to five years, have left only an estimated 250,000 to 350,000 hectares production forests (Gutierrez 2001a).

The forests classified as production have not been demarcated on the ground, although this is an objective of the land classification strategy (ordenación) of the Darién and Bayano watersheds. Of the total estimated production forests in the country, 6.3 percent have been officially harvested (22,000 hectares located in the provinces of Panama and Darién) (ANAM 1999b).

Within the classification of production forest, two types are considered of great importance for their potential productivity and their geographic location: the forests of *Orey* in Bocas del Toro and the forests of *Cativo* in the Darién. Orey forests are composed mostly of the orey tree (*Campnosperma panamensis*), and are found principally in swampy zones of Chiriquí Lagoon in Bocas del Toro. They cover an area estimated 50,000 hectares. The forests of Cativo are composed mainly of the species cativo (*Prioria copaifera*) and are found on alluvial lands that receive periodic flooding with fresh water. Mixed and homogenous cativales cover approximately 15,000 hectares (ANAM 1999b).

In addition, Panama has been described and mapped with a wide variety of vegetation classification systems, often in order to highlight the rarity and threat level of these vegetation types. One of these is *An*

Evaluation of the Conservation Status of Terrestrial Eco-Regions in Latin America and the Caribbean (Dinerstein et al. 1995) (Table 3). Also, the publication *A Regional Analysis of Geographic Priorities for Biodiversity Conservation in Latin America and the Caribbean* (Biodiversity Support Program 1995) classifies Panama's vegetation and evaluates its status and threats (table 4).

The Forest Service, within ANAM, has developed a system for organizing information on forest resources in Panama. Maps in this system include potential soil use, forest cover, life zones, vegetation cover, protected areas, areas at risk of fire, and regional maps. Information collected in databases includes statistics on production, import and export of forest products, natural production forests, forest plantations, and employment in the forestry sector. Other databases on file include information on EIAs, NGOs, agrometerological, water concessions, and inventories of protected areas, among others (Gutierrez 2001a).

Forest product harvest. Panama produces a modest quantity of industrial roundwood from which sawnwood and panels are manufactured. Panama imports moderate quantities of forest products, particularly paper. Tannins and chicle are important non-wood forest products in Panama, as are numerous products for crafts and daily living. Subsistence hunting is widespread in the country.

F. Protected Areas

The National Environment Authority (ANAM) was established in 1998; it provides the framework for the National System of Protected Areas (SINAP), created in 1992 by INRENARE (the former name of the environmental institution). The 'system' currently has 51 protected areas, about 25 percent of the country and about 2 million hectares (see Annex G for details on each protected area).

Types of protected areas. There are 17 management categories of protected areas (including the recognition of three international categories) established through INRENARE's Board of Directors Resolution 09-94 (Table 3). In addition, the category of protection forest is justified by the current Forestry Law (Law # 1, February 3, 1994). Of the 18 official categories, 16 have been used to name protected areas; the ones that have not been used are buffer zone and resource reserve. All protected areas established by laws, decrees, board of directors or municipal resolutions become part of the national system of protected areas, according to INRENARE's Board of Directors Resolution #022-92. Management categories designated by law are considered to be too many and should be revised. Terms of reference reportedly have been drafted and funding is being sought to carry out the needed revision.

Table 3. Protected Areas in Panama by Management Categories

National management category	IUCN's international category	Conservation units by category	Total extension (ha)
1. Scientific Reserve	Ia and Ib	1	605
2.National Park	II	14	1,101,034
3.Marine National Park	II	2	283,349
4. Natural Parks	II	1	265
5. Recreational Areas	II	2	408
6. Natural Monuments	III	3	6,404
7. Wildlife Refuge	IV	9	38,684
8. Wetlands of International Importance *	IV	4 (+1)	168,443

Table 3. Protected Areas in Panama by Management Categories			
9. Protected Wildland	IV	1	100,000
10. Forest Reserve	VI	5	89,194
11. Hydrological Protection zone	VI	2	27,242
12. Biological Corridor*	VI	1	31,275
13. Multiple Use area	VI	1	2,000
14. Resources Reserve	--	0	0
15. Buffer Zone	--	0	0
16. World Heritage Site	Several	[2 natural, 2 cultural]	[ ]
17. Biosphere Reserve	Several	[2]	[ ]
18. Protection Forest	VI	1	125,000

Note: * = this line includes a wetland of national importance; [ ] = extension accounted for in another category.

Six of the protected area categories cover 71 percent of the conservation units, : national parks (14), marine national parks (2), wildlife refuge (9), forest reserves (5), wetlands of international importance (4), and natural monuments (3).

The national park category together with the marine national park category represent about 74 percent of all protected territory in terms of hectares. Special international designations have been granted to eight protected areas in Panama, including biosphere reserves (2 areas), World Heritage Sites (2 Cultural WHS; 2 Natural WHS, the last two are also biosphere reserves), or ramsar sites (4 areas).

More than 60 percent of the land area in the protected area system correspond to terrestrial environments, the rest are coastal-marine, with 30 percent of the number of protected areas including marine territories.

Table 4. Examples of co-management of protected areas with ANAM.

- ***Barro Colorado Natural Monument***. This area has been under the administration of the Smithsonian Tropical Research Institute (STRI) for approximately 80 years. STRI will continue as the custodian of this Natural Monument through an Agreement with the Government of Panama (Ministry of External Relations Agreement June 10, 1997).
- ***Fortuna Forest Reserve***. The reserve was created in the 1970s to provide protection to the hydrological power production plant under (IRHE), which also managed the reserve. In recent years hydroelectric power production services were privatized, becoming Ege Fortuna, the firm now in charge of protection and management of Fortuna Forest Reserve.
- ***Punta Patiño Wetland***. In accord with an ANCON (National Associataion for the Conservation of Nature) work agreement with ANAM this area has been under ANCON's administration since its declaration; there is also collaboration between ANCON and the marine resources office based on a letter of understanding.
- ***Nargana Protected Wildland***. As stated in the INRENARE Resolution creating this protected area in 1994, it falls under the responsibility of the Kuna General Congress with technical and administrative assistance from ANAM.
- ***Isla Cañas Wildlife Refuge***. Though administered by ANAM, there is a collaboration agreement with the community to participate in a protection program. The community benefits with a part of the marine turtle eggs 'produced' in the refuge.
- ***Metropolitan Natural Park***. Since its creation, the park has been administered by a Board of Directors (Patronato) formed by government and non-government organizations, lead by the Mayor of the municipality, including ANAM as part of its Board of Directors.
- ***Isla Galeta***. Based on a temporary agreement, a group of national and local institutions, universities and foundations are in charge of this reserve.
- ***Filo del Tallo***. In 1990 a group of campesinos, members of a rural health committee from the Darién requested support from ANAM to save the water sources in Filo del Tallo. These water resources supply their basic needs (and those of several other communities). This request for support gave origin to a protected area and a commitment of joint work among these communities and ANAM (Castillo, Herrera and others 1999).

Management Models of Protected Areas. Protected areas in Panama are managed by ANAM, in accordance with Law # 41, and management is carried out by ANAM's Parks and Wildlife Service (*Servicio de Administración de Areas Protegidas y Vida Silvestre*). The initial procedures to manage a reserve are to designate personnel to each area, if possible, and provide guidelines and training from central headquarters. After several unsuccessful attempts to empower regional offices, currently the source of information and management guidelines is the central headquarter offices, which gives support to the institution's 14 regional offices, which include personnel from each technical department (including forestry, tourism, parks, and wildlife, among others). Management activities are coordinated in regional offices, while ANAM central level technical offices provide support. Thirty-six protected areas, out of 51, have designated personnel, and 300 of ANAM's employees work directly for SINAP (ANAM 2003c). Although conservation *in situ* is a high priority in Panama, available resources to accomplish this are scarce (Godoy, Corrales, Windevoxhel, 2003; ANAM 2002). In a few protected areas, some other institutions and NGOs have provided funds to increase personnel levels, such as the Fundación AVINA funding personnel for Coiba National Park, ARI providing park guards for San Lorenzo, and 57 members of the Ecological Police patrolling within the canal watershed along with ANAM's personnel.

Although protected areas are regulated by ANAM, administrative or services concessions can be given to municipalities and provincial governments, as well as boards of directors, foundations,and private firms if supported by prior technical studies (Law # 41). There are several examples of areas that have been under the administration of other institutions working in collaboration with ANAM, that areas represent the initial stages of co-management options within the SINAP.

In 1999, as part of the process of preparation of the management plan for Bastimentos Marine National Park, a coalition of local communities, nongovernmental organizations and institutions was formed to support the plan's development. This coalition holds periodic meetings and encourages civil society participation in planning, conservation, and development of natural resources in Bocas del Toro (Binns, Brown and Windevoxhel 1999). Although this coalition may eventually evolve into another co-management agreement, co-management as of yet has no formal mechanism of regulation at the national level. Recently the terms of reference for a consultancy in this topic have been prepared (ANAM 2003b).

Eexamples of service concessions in protected areas include the Canopy Tower administered via Divertimento Ecológico, S.A., on Semaphore hill within Soberanía National Park, and the Canal Area administered by ANCON within Darién National Park.

Future Directions. Both the administrative and services concessions cited above are continuing efforts to consolidate co-management agreements and private reserves and to obtain long-term financing options for individual protected areas, or for financing SINAP in general. These trends are indicative of the path other concessions are likely to follow as well.

Private reserves: A year ago the Network of Private Reserves (*Red de Reservas Privadas*) signed a basic work agreement with ANAM and was given office space within ANAM. Current private reserves include Canopy Adventure in El Valle de Antón, Cerro La Vieja in Coclé, Río Caimito in Colón province, and El Jilguero in Chiriquí (Casas 2002).

New areas for protection: Several more areas are in the process of incorporation in SINAP. Of the 26 new protected areas Tovar (1996) documented as needing to be incorporated, five have already become part of SINAP (Gaital, San Lorenzo, Galeta, Filo del Tallo and Santa Fe) while others are in different stages of

analysis and incorporation. Current requisites to declare a protected area include: preparation of a technical summary chart with general, biological, socio-economical, and cultural information, as well as tenure status. A proposal to declare Ancon Hill a wildlife refuge (McKay, et al. 2000) was approved by a municipal resolution, but the area is still in the process of incorporation within ANAM.

Within the inter-oceanic region, a group of areas have been set aside for protection according to Law # 21 of July 2, 1997, that established the Regional Development Plan for the Inter-Oceanic Region and the general use, conservation, and development plan for the canal area. Isla Galeta and San Lorenzo were both originally part of this group, but their transfer from ARI to ANAM was completed within the last two years. Among other areas included in Law 21 are Islas Orquídeas, Punta Salud, Punta Bohío, Buena Vista, Frijoles, and the peninsula south of Isla Maíz. These wild lands are in different stages of incorporation to the National System of Protected Areas.

There is also a recent international marine conservation and development corridor linking islands from Costa Rica, Panama, Colombia, and Ecuador. The corridor was proposed at the Johannesburg Summit, and is in the process of incorporation within SINAP.

The Panamanian Atlantic Mesoamerican Corridor (CBMAP) is a program initiated in 1998 to promote conservation, use, and management of biological diversity in the country. ANAM is executing this project on 2.8 million hectares (almost 40 percent of the country) with funds provided by GEF-World Bank-Government of Panama. Priority areas have been identified, including existing conservation areas and six corridors of focus: Chorogo-Palo Blanco-San Bartolo, San Lorenzo-Tabasara, La Gloria, Peninsula Valiente-Río Chúcara, Ngutduoro and Teribe-San San Pond Sak.

There is also interest in the scientific community in classifying the island of Escudo de Veraguas either as a scientific reserve or a natural monument, due to its endemic fauna and vulnerable species (Tovar 1996).

SECTION II

Synopsis of Deforestation and Principal Threats

A. Deforestation

If left undisturbed, essentially all of Panama would support forests, due to the country's suitable climate and geographic characteristics. Deforestation is the conversion of forested land to another land-use category, such as clearing for agriculture and development for settlements. Logging or over-use of forest resources, for whatever purposes, rarely leads immediately to deforestation, although a forest degraded by unmanaged timber and fuelwood exploitation may be more easily converted into another land-use type. The opening of roads historically results in degraded forests, followed by the settlement and clearing for agriculture and pastures. Inappropriate deforestation is usually a symptom of a larger land-use issue, such as land tenure uncertainties, demographic pressure, inappropriate agricultural practices that drive small farmers on to new lands after their farms have become exhausted, and market prices and demand for products.

Table 5. Estimations of Forested Area in Panama 1947-2000 (ANAM 2003a)

Year	Area (hectares)	Percent
1947	5,245,000	70
1970	4,081,600	53
1974	3,900,000	50
1992	3,695,160	49.3
2000	3,364,591	45

Forest exploitation in Panama was temporarily suspended in 1983, and again in 1985, to establish norms for concessionaires. A resolution was passed in 1987 to suspend all tree cutting throughout Panama for five years, during which time studies aimed at rational use of forest resources were to be implemented. The ban was lifted in 1990 (Weaver and Bauer 2003).

In 1992, Panama prohibited the export of timber from natural forests as roundwood. In addition, it also prohibited the export of big-leaf mahogany, Spanish cedar, and other threatened species , although their export as finished products remains legal (Weaver and Bauer 2003). The bans on harvesting and export over the years were reactions by the GOP to the accelerated loss of natural forests, and lack of forest management. Nevertheless, earlier bans did not have a positive effect, since deforestation continued at the same rate, while the forest industry was severely affected. Negative impacts on the industry included the closing of forest industries, a loss of employment, and insufficient replacement of basic wood supplies through imports. In addition, the bans on harvesting and export did not stop deforestation, because they did not address the root causes of land use change (Gutierrez 2001a).

In 1992, Panama's 7,492,677 hectares were covered with 3,695,160 hectares of forest, representing 49 percent of the total surface of the country. In 2000 a study determined that the forest area was down to 3,364,591 hectares, representing 45 percent of country. This loss represents 4 percent decrease in forest cover countrywide, or 0.5 percent deforestation per year.

The two provinces with the least forest cover are Los Santos (7.38 percent) and Herrera (3.99 percent). The provinces/comarcas in Panama with the greatest percentage of forest cover are Comarca Emberá

Wounaan (91.56 percent), Comarca Kuna Yala (86.96 percent), Bocas del Toro (73.39 percent), and Darién (71.43 percent).

The provinces with the greatest decline in forest cover during the eight-year period cited are Comarca Ngöbe Buglé, 12.02 percent; Darién, 11.5 percent; and Panama and Colón, 5.9 percent and 4.9 percent, respectively. Some districts gained forest cover during this time period, including San Francisco in Veraguas province (11.07 percent), San Carlos in the province of Panama (2.45 percent), Parita in Herrera (2.43 percent), and La Pintada (2.61 percent) in Coclé among others. (ANAM 2003a).

In Panama, the incentives to encourage forest management are few, and no special program exists. The four incentives listed here reportedly have practically no effect on forest management (Gutierrez 2001a).

- The state offers recognition of a contract lease (of whatever title), when it is dedicated to reforestation or forest management and utilization.
- Private lands (suitable for forestry) with reforestation plans and an approved management plan, are excluded from Agrarian Reform (Reforma Agraria).
- All persons who have reforested, or left at least half of their property under natural primary or secondary forests, on state lands that are considered occupied under possession rights, with an approved management plan, will be awarded conditional title.
- All state credits awarded to promote reforestation and sustainable management of natural and plantation forests will be considered promotion credit (*creditios de fomento*). The State will give incentives to private banks to dedicate a part of its *cartera al financiamiento* to forestry activities.

Some disincentives to maintain natural forest cover in Panama include:

- A widely held belief that land must be cleared and farmed in order to claim title.
- Long bureaucratic processes necessary to legally harvest timber.
- Local regulations against allowing land to remain as “brush fields.”
- Cultural affinity to cattle-raising.
- The high price of beef.
- Near houses and settlements, a fear of tree windfall damage and mosquito population increase.
- A fear of land confiscation for agrarian reform.
- A lack of jobs as an alternative to subsistence agriculture.

The value of grazing lands has an important impact on deforestation. International trends in beef demand, local policies on imports, and currency devaluations have major effects on beef prices in Panama and can impact forest clearing and the reversion of pasture land to secondary forests. The MARENA evaluation (Bathrick and Kernan 2003) noted a study that indicated a strong trend towards the abandonment of pastureland in the Panama Canal watershed when national policies removed protection for domestic cattle products. As a result, Panama cattle producers could not produce beef as cheaply as their competitors in other Central American countries. Their field observations confirmed that the watershed had a large proportion of recently abandoned pastures covered with natural regeneration of native species. It was noted that measures to protect and manage Panama’s natural resources and environment would be futile unless they were designed within the context of international economic trends and local currency rates. (Bathrick and Kernan 2003). Other incentives and policies that effect agriculture, such as subsidies, price supports, agricultural product export policies, extension programs, and subsidized credit, can have an impact on deforestation. Major development plans, including tourism development, public service improvement, and roads can also spur deforestation in particular areas.

B. Principal Threats

Many initiatives in Panama respond to the perception that environmental quality is continuing to deteriorate. Most terrestrial, coastal-marine, freshwater, and wetland ecosystems are deteriorating as a result of large development projects (roads, hydroelectric dams, ports, mining, and tourism), agricultural and livestock activity, sewage water disposal, and agro-chemical products. The First Report on Biodiversity Richness and Status in Panama (ANAM 2000) suggests the following factors as the main threats to biodiversity:

- Habitat loss and deterioration.
- Plant and animal overexploitation.
- Non-sustainable extraction of forestry resources.
- Over-fishing and extraction of aquatic resources.
- Sport and commercial hunting without regulation.
- Traffic of species, and their products and sub-products.
- Climate change.
- An economic system that does not include biodiversity values.
- A deficiency in biodiversity knowledge, its application, and management.

Impacts of development projects. Development projects in Panama have increased since the 1980s, partly due to the government's emphasis on economic progress (Méndez 1985, Cáceres et al. 1986, Hughes 1998). Both public and private development projects include roads, tourist resorts, mines, hydroelectric dams, ports, and industrial parks. Road and highway projects include the Boquete-Cerro Punta road in Chiriquí, Almirante-Valle Riscó-Chiriquí Grande road in Bocas del Toro, Corredor Norte and Panama-Colón highways in Panama, Llano-Carti road in Kuna Yala, and the Yaviza-Colombian border road in Darién. Given that these projects can directly or indirectly cause the elimination of biota, habitat loss, fragmentation, pollution, and land colonization (ANAM 1999ac, Samudio 2002), regulations and procedures regarding environmental assessment studies for development projects need to be revised.

Although Panama Canal watershed expansion is planned, there is no public document that describes these plans or actions. Currently the capacity of the Panama Canal is limited to ships below the Panamax type size, and there is concern about water availability for canal function. These conditions have led the Panama Canal Authority (Autoridad del Canal del Panamá, ACP) to the search for alternatives and options for the Panama Canal. One of these alternatives is the expansion of the official canal watershed. In August 1999, the Panamanian Legislative Assembly approved Law 44, through which the canal watershed is expanded by 213,112 ha (2131.1 km^2). This extension expands the canal watershed to 7 percent of the national territory (5527.6 km^2). The main argument ACP uses for this increase is the requirement for of canal expansion, and the water demands from the urban areas of Panama and Colón provinces (Bocanegra 2000, Brown Araúz 2000, Hughes 2002).

The canal expansion project includes: 1. Construction of a third set of locks, 2. Canal expansions at both ends of the canal entrances, 3. Expansion of Lake Gatun and Gailard Cut (Culebra Cut) basins, 4. Construction of two bridges, one on the Pacific side, and the other on the Atlantic, 5. Construction of two hydroelectric dams and plants (Río Indio and Coclé del Norte), the first with capacity of 25 MW, the second with capacity of 150 MW, 6. Creation of three lakes or dams in Coclé del Norte, Caño Sucio, and Río Indio watersheds, and 7. All infrastructures, waste deposition areas, and communication routes that the above projects require. The estimated investment by ACP of the canal expansion is approximately $6 million (Bocanegra 2000, Brown Araúz 2000, Hughes 2002).

The approval of this law immediately caused reactions from the people living in the area of the expanded watershed, illustrating the socio-economic impacts of the plan, in addition to the environmental consequences. These impacts would result from the flooding of an extensive territory (75, 000-80,000 ha) where human settlements are currently located, and which passes through the Mesoamerican Biological Corridor, with its forests and biodiversity. Three river watersheds, Coclé del Norte, Caño Sucio, and Río Indio, will be flooded for lakes, linked to the construction of two hydroelectric plants. If these dams are created, more than 8,500 persons (80-90 communities) will be affected. These individuals would be relocated to other (non-determined) areas. The relocation could cause additional socio-economic and environmental impacts in the new areas due to increased demands for social services and the use of natural resources (Brown Araúz 2000, Hughes 2002).

In the last decade, several reserves have been reduced and fragmented due to special regulations enacted to facilitate road development. This was the case of Metropolitan Natural Park highway in 1995, and is the process developing in Volcán Barú National Park (*NGO campaign alerts Panamanians to ecological dangers of highway through cloud forest park; protests stall construction* Rainforest Alliance 2004), and road construction to the Caribbean coast from Santa Fe. Before the Darien highway up to the Colombian border and through Darien National Park is completed, alternative transportation methods should be developed in advance. Camino de Cruces National Park has also lost land, but no additional legislation had to be enacted because its original decree allowed this type of development. In addition land has been segregated by law for other uses, such as sports and recreation in Camino de Cruces and Soberanía in 2003 (Law 20, 2003). The area of at least three forest reserves has been reduced because they contained disturbed forest that could be used by neighboring residents. In this same period, additions to 11 of the current protected areas have been proposed to incorporate important adjacent forests or other special resources: La Amistad (2,000 ha), Cerro Hoya (10,000 ha, 60 percent marine), Chagres (8,000 ha), Portobelo (200 ha), Soberania (~700 ha), Camino de Cruces (500 ha) Bastimentos (2,000 ha), Playa La Barqueta (4,000 ha), Isla Iguana (10,154 ha of marine territories), Lago Gatun (1,300 ha) and Nargana (146,341 ha of marine territories) (Tovar, 1996; Bastimentos Marine National Park Management Draft Plan 2002). The first six of these reserves are national parks and the seventh a marine national park.

Logging. Between 1980 and 1990, concessions for 77,800 hectares of production forests were awarded to 23 companies, for periods ranging from two to five years. Now, for reasons of deforestation, absence of management, and access difficulty, concessions only exist in the Darien Province. Between 1991 and 2000, 28 concessions covering an area of 67,150 hectares, 17 permits on private lands more than 3,389 hectares, and 66 community permits covering about 15,069 hectares were granted (Gutierrez 2001a). There is currently a moratorium on exporting timber in log form, although sawn timber and wood products can be exported (Gutierrez 2004, personal communication).

Since 1993, the Panamanian Forest Service has adopted a policy of granting forest concessions to indigenous communities within their comarcas (59 permits to 35 communities between 1993 and 2000). Unfortunately, these concessions are also only in effect for up to two years, limiting the sustainable character of these activities. Harvesting is carried out by private companies that buy the resulting timber. The incentive for the companies is the reduced amount of bureaucracy involved in acquiring a concession. An important weakness in this mechanism is that the communities retain almost no value added through the process, and community leaders are perceived as personally gaining the total economic benefit. Indigenous communities, in spite of their acknowledged vision of resource conservation, have shown little interest in forest management, or community management of their forest lands (Gutierrez 2001a).

Other legal ways of harvesting timber in Panama include special permits, one type of which authorizes the harvest of valuable timber on forest lands after they have been converted to agriculture and ranching

following fires. These permits require less paperwork and are more quickly obtained. However, it was thought the degradation of forest land with high value timber might have been premeditated, in order to secure these special permits, and the Forest Service has suspended their use (Gutierrez 2001a).

Another form of special permit that was granted for 1-2 year concessions was a permit for 100 hectares, for 1-2 years, but these were also suspended in 1996. After 1998, permits were granted for timber harvesting on private estates for up to 2,000 hectares (most are less, from 22-800 hectares) (Gutierrez 2001a).

Subsistence permits involve the harvesting of trees within and outside forests, on state lands or on private property with legal title or with user rights. Regulations require that for each tree removed, 10 seedlings must be planted, but with budget and personnel constraints, ANAM does not verify that these requirements are met (Gutierrez 2001a).

In spite of the legal requirements of sustainable forest management, currently natural (production) forests that are harvested are not subject to sustainable management, even though forest inventories are conducted and management plans are written. As a result, only tree species with a market value are harvested, using inferior techniques and leaving a high level of waste at the site (30 percent of the logwood volume) (Gutierrez 2001a).

Due to their low economic stature in the country, forest activities have a low political priority. Practically all the concessions granted in the 1980s have been converted to pastures, and although the forests concessioned in the 1990s have not yet suffered the same fate, a large part is being converted to other uses (Gutierrez 2001a).

Timber species in Panama with a high resale value include *Prioria copaifera* ("cativo"), *Anacardium excelsum*, *Bombacopsis quinata*, *Vatairea* sp., *Hyeronima oblonga), and* Caoba (*Swietenia macrophylla*), likely the most valuable timber species. Other trees of value for timber, plywood exports, and paper and pulp products include, *Anacardium excelsum*, *Capara guianensis*, *Cedrela odorata*, *Cordia alliodora*, *Dialium guianense*, *Myroxylon balsamum*, *Swietenia macrophylla*, *Tabebuia guayacan*, *Tabebuia rosea* and *Terminalia amazonia* (Herrera-MacBryde and ANCON 1997).

Agricultural expansion. In Panama human activities have disturbed the natural environment since Pre-Columbian times (Bennett 1976, Linares and Ranere 1980, Cooke *et al*. 1985, Piperno 1990, Bush *et al*. 1992). Agricultural and livestock activities have increased since the Spanish arrival at the Isthmus, resulting in great environmental modification. Land used for agriculture increased in the 19th century due to the establishment of banana and sugar cane plantations for export, among others crops. The number of cattle in Panama increased until 1977, and although the number of cattle had decreased by 1991, pasture area increased during this time, mainly in the provinces of Chiriquí, Bocas del Toro, Colón, and Darién (Jaén 1985, McKay 1985, Pasos *et al*. 1994).

Agriculture and livestock activities can be divided into widespread subsistence agriculture, and high technology, intensive agriculture (ANAM 1999d). Thousands of peasants without off-farm job opportunities depend on subsistance agriculture and livestock activities, that have limited access to markets. These agricultural activities are practice throughout the country, but especially on the Pacific slope. Subsistance farming often contributes to the process of soil degradation, which directly affects a peasant's quality of life. Almost 64 percent of the rural population subsists on small farming establishments that depend on soil conditions, rainfall, seed availability, traditional knowledge, and community support. Extensive grazing establishments usually have a low production rate for the amout of

land utilized and can contribute to environmental degradation. The combination of deforestation, use of poor soils, slash and burn practices, planting crops on steep slopes, overgrazing, and monocultures has caused environmental degradation through soil erosion and compaction, in addition to stream and river pollution by sediment and agrochemical runoff.

Agricultural and livestock activities in hill and mountain zones, which are classified to be used as productive or protection forests to conserve soils, watersheds, and biodiversity, can result in soil deterioration. Most mountain inhabitants, both indigenous and campesinos, practice some kind of agricultural activities, primarily in western Panama due to the rich volcanic soils. Agricultural activities occurr mainly at elevations between 700 and 2,300 meters. Livestock activities also occurr with diverse domestic animals (see Samudio 2001). Extreme poverty is another main factor that pushes peasants to occupy and work in remote or ecological critical areas, or over-exploit their land. Rural migration in Panama is principally directed toward "new lands" in Bocas del Toro, Colón, Darien and specifically Bayano.

High technology agricultural and livestock activities can affect soil and water through intensive cultivation, agro-chemicals, and agricultural machinery, resulting in a loss of site productivity. Commercial agricultural and livestock activities support the national economy: about 8.7 percent of the economically active population work in commercial agriculture. The agriculture and livestock sector contributed $423 million (6.4 percent) in 1997 to Panama's Gross National Product. The low productivity per harvested area and the traditional harvest methods used are indicators of the need to modernize and develop this sector.

Other factors that negatively influence agricultural and livestock activities are the lack of funds for technical personnel, transportation, and equipment at government agencies (e. g. MIDA, ANAM, MINSA), which supervise, advise, and train farmers and ranchers in soil and water conservation. The insecurity of land tenure frightens peasants away from investing in farm or ranch improvements that conserve soil and water. Finally, there is a lack of development policies that include environmental controls and regulations to mitigate impacts from the establishment of human settlements, development projects, and agriculture and livestock production.

Poaching and animal trading. Poaching is a common occurrence in rural areas, with wild game a traditional source of protein for residents. Wild game is often on the menu in small town restaurants. Trade in rare and endangered species is a constant threat, due to the high prices paid for exotic pets, fashion accessories, and medicinal ingredients around the world. Tourists can be tempted to buy and take home exotic souvenirs. A free brochure (World Wildlife Fund 2003) directed at travelers is available in Panama listing products to avoid in the Caribbean area. This list provides a good summary of those species most at risk:

- All sea turtle products, including the shells and products made from the skins
- All spotted cat skin products
- Certain leather products, including some made from caiman, crocodiles, lizards and snakes
- Most live birds, including many parrots, macaws, cockatoos and finches
- Some wild bird feathers, mounted birds, skins and some skin products
- Live monkeys
- Some corals and coral products
- Certain orchids, cacti and cycads.

Climate change. The global phenomena of an increase in temperatures, unusual weather patterns (El Niño), and a rise in sea level, will have serious consequences on mangroves, coral reefs, coastal wetlands and mountain forests. The publication *Primera Comunicación Nacional sobre Cambio Climático* (ANAM 2000) discusses the circumstances in Panama, studies completed on greenhouse gases, analysis of mitigation measures, climatic observations, and an evaluation of vulnerability and adverse impacts of global climate change.

Forest fires. Forest fires constitute one of the most serious threats to forest cover, and can endanger biodiversity. In addition, soil stability faces further risk after a fire due to subsequent erosion. Fires also contribute to a loss of infrastructure and the destruction of productive systems.

The national program for the prevention and control of forest fires is supported by the private sector, professional groups, local governments, and a unit within ANAM. An action plan for forest fires can be found on the ANAM Web site *Plan de Prevención y Control de Incendios y Manejo del Fuego* (Gutierrez 2001a). ITTO is formulating a project proposal for strengthening institutional capacity for the prevention, mitigation, and management of forest fires in Panama.

Energy demands. Many households in rural areas burn firewood as a source of cooking energy. Fuelwood is not mentioned much in literature as being in short supply except in the driest provinces, nor that its collection is especially detrimental to the country's biodiversity or forest resources. The presence of forests and natural areas ensures the provision of firewood needs for Panama's population (reportedly 30 percent of whom use fuelwood), and small and medium businesses whose production is based on fuelwood. The estimated annual volume of fuelwood consumed is 740,000 m^3 (Gutierrez 2001b).

Alien invasive species. This category includes domestic and wild introduced plant and animal species. These species can be competitors, predators, parasites, or pathogens for native biota in coastal-marine, fresh water, and terrestrial ecosystems. The species include crop plants, forestry species (teak, pine), wild plants (Vietnamese grass, or elephant grass *Saccharum spontaneum*), which inhibits regeneration of native forests as it quickly invades open areas. Exotic fish (31 spp., e. g. rainbow trout, tilapia, and catfish Gonzales 1995), cosmopolitan rodents (*Rattus* and *Mus*), and domestic animals (dogs, cats, goats) can also be invasive.

C. Specific Threats to Biomes

Evaluations and analyses of vegetation, ecosystem, and biodiveristy have been made in order to judge their biological value, and the degree of threat to their existence (see tables 6 and 7).

Tropical lowland wet forests.Within Panama's protected areas system, the life zones best represented are the wet tropical forests and the moist tropical forests, which account for about 27 percent and 31 percent of the total protected, respectively. The principal activities of conversion, degradation, and exploitation within the biome include hunting, timber extraction, non-timber product extraction, agricultural expansion, burning, and pollution. Darien and East Panama in particular, are threatened by forest cutting, extraction of timber and non-timber products, agricultural expansion, forest fires, and hunting, burning, and introduction of exotic species (CBM 2003). This biome in the provinces of Chiriqui, central and south Veraguas, Herrera, Los Santos and west Panama are threatened by deforestation, agricultural and ranching expansion, and pollution by shrimp farms, fires, and the introduction of exotic species.

Tropical montane forests. Montane forests of the Darien are threatened from logging, agriculture expansion, burning, hunting, and gathering. Other threats to tropical montane forest in the region include the development of national projects such as dams, highways, ports, oil pipelines and military

Table 6 From *An Evaluation of the Conservation Status of Terrestrial Eco-Regions in Latin America and the Caribbean* (**Dinerstein et al. 1995**)

Tropical Wet Broadleaf Forests
- *Wet Forests* (Chocó/Darien) - Vulnerable, Outstanding at a global level
- *Moist Montane Forests of Talamanca* - Relatively Stable, Outstanding at a regional level
- *Wet Forests of the Pacific Coast* - Endangered, Outstanding at a bio-regional level
- *Wet forest on the Atlantic Coast* - Vulnerable, Outstanding at a bio-regional level
- *Montane Forests of Eastern Panama* - Vulnerable, Outstanding at a bio-regional level

Tropical Dry Broadleaf Forests
- *Dry Forests* - Critical, Important at a Local Level

Mangroves
- *Atlantic Coast or Central America* (Bocas del Toro/Isla de Bastimentos/Kuna Yala) - Relatively Vulnerable, Stable, Medium Threat
- *Dry Pacific Coast of Panama* - Relatively Stable, Low Threat
- *Gulf of Panama* - Relatively Stable, Medium Threat

Table 7 From *A Regional Analysis of Geographic Priorities for Biodiversity Conservation in Latin America and the Caribbean* (**Biodiversity Support Program 1995**)

Tropical Moist Lowland Forests (Chocó-Darién)
Rated as: Regionally significant (Biological Value), Vulnerable (Conservation Status), and locally important (Conservation Priority 3)

Tropical Moist Lowland Forests (Central American Lowland)
Rated as: Locally important (Biological Value), Endangered (Conservation Status), and Conservation Strategy 3, or Locally Important

Tropical Moist Montane Forests (Central American Montane)
Rated as: Regionally significant (Biological Value), Vulnerable (Conservation Status), and locally important (Conservation Priority 3)

Tropical Dry Forests (Central American Dry)
Rated as: Locally important (Biological Value), Critical (Conservation Status), and locally important (Conservation Priority 3)

installations. The cloud forests of Cerro Jefe and Cerro Azul are threatened by forest harvesting, agricultural expansion, introduction of exotic species, hunting, and gathering. The cloud forests of Chiriqui, Bocas del Toro, Veraguas and Coele suffer from deforestation, agricultural expansion, and fires that produce soil erosion; hunting and gathering threaten the integrity of the ecosystems. Some areas of the central and eastern montane forests are being degraded by mining and subsistance and commercial hunting. Of the life zones found in the country, the premontane moist forest appears to be the only one not represented in the protected areas system, although it is possible that one small example is found in the private reserve of Punta Patiño. One life zone little represented is the Wet Montane Forest, with only 0.02 percent of the system. (ANAM 1999)

Tropical dry forests. This area of the country has been long-settled, cleared and grazed, and little protected. Found in the provinces of Cocle, Herrera, Los Santos, west Panama and Darien (Garachine), these areas are threatened by deforestation, expansion of agriculture and ranching and the establishement of farms, shrimp farms, and *salinas*. There are also important negative effects from burning, herbicide use, exotic species introduction, fuelwood collection, and hunting. One life zone little represented in the protected areas system of Panama is the tropical dry forests, which is only 0.09 percent of the system, although the life zone occupys 10 percent of Panama's land area. (ANAM 1999)

Freshwater wetlands. Of the freshwater wetlands in Panama, threats to these ecosystems include dams, draining, and conversion to other uses. The forested swamps of the *Orey* tree (*Campnosperma panamensis*) in Bocas del Toro, and *Cativo* (*Prioria copaifera*) in the Darién are subject to harvesting on a large scale. Although there are numerous studies and reports on mangrove ecosystems, the team did not find a good summary of freshwater wetlands in Panama.

Water resources in Panama are assessed in the National Environmental Strategy (ANAM 2002). Threats to water quality are reviewed, for both surface and underground sources. Also discussed are the availability of fresh water, the effects of flooding, and the increasing demands from urban and industrial areas. The diversity of life that depends on fresh water is reviewed, and the effects of deforestation, erosion, and contamination are highlighted. Critical areas in the country are listed, including the Panama Canal watershed, the Rio Bayano upper watershed, among others of priority, emphasizing the need for water for electric energy production, agriculture, industry, and the demand for drinking water. The freshwater wetlands of the Panama Canal watershed are reviewed in the Panama Canal Watershed Monitoring Project's (PMCC) final report (Heckadon-Moreno, et al. 1999), focusing on the threats of pollution and sedimentation.

Coastal: Mangroves and coral reefs and islands. Urban, industrial and agriculture development, without planning and mitigation measures of the environmental impacts, constitute one of the largest generator of change in the state of the marine resources of Panama.

Rivers and their watersheds have a great influence over coastal and marine ecosystems. The highly erosive wind and water currents remove material from the earth's surface and deposit it finally at the coast and ocean, affecting important scenic resources (as in the Bay of Panama), and biological resources including fisheries and coral reefs (as near Portobelo).

On the Caribbean coast, urban development is just beginning, including Bocas del Toro (in the banana zone of Guabito, Changuinola and Almirante), with the greatest population density in the city of Colón (70,000 residents). On the contrary, more than 80 percent of the country's population resides in proximity to the Pacific coastal zone, with more than a million people in the Panama City metropolitan area and population centers of the interior of the country. On the south coast, agricultural production and livestock activities have been established over the coastal plains a few kilometers from the sea (ANAM 1999b).

The impact of development in coastal marine zones has been great. The past 30 years have seen the loss of 5,647 hectares of mangroves, transformed to livestock and agricultural use, enormous ponds for the shrimp cultivation, and filled and developed areas for tourist and urban projects. In the Chame region on the Pacific coast, 55 percent of the area has been transformed for aquiculture. Other important mangrove forests have been lost through urbanization and industrial pollution, (as in the Juan Díaz area), petroleum spills, charcoal production, and materials and pilings for construction.

Mangrove destruction is important to ocean ecosystems far beyond the shore, due to a strong relationship between mangroves and the life cycle of many comercial marine species in Panama (including wild shrimp). In addition, mangroves are important sources of charcoal, posts for wooden construction in rural areas, telephone poles, and tannins, which constitute a source of work and economic income for nearby populations.

Fishing activities play a significant role in the national economy, and a number of fish species are over-exploited or in danger of over-exploitation, threatening to diminish the economic benefits they generate. Fishery resources are also affected by water quality: in the Bay of Panama, fishing has been prohibited due to the high rate of fecal contamination. In 1997, the fish harvested in Panama measured 139 thousand metric tons, with an estimated production of $83.3 million. The foreign exchange earned by fish exports was $122.4 million, with the sale of 44.5 metric tons of fresh and processed fish. Nevertheless, white and red shrimp are over-exploited, titi shrimp, carabalí, fidel and achoveta are harvested at the maximum level, and snappers, groupers, corvina, shark and other comercial species are either harvested at a maximum level or over-harvested.

Panama has a rich coral ecosystem, which important protection of the coastal zone as well as ecological and economic value.. Pristine coral reefs are an important resource in coastal areas, drawing divers and snorklers from great distances. Considering coral's slow growth and high vulnerability, these areas must be managed with extreme care.

Coral reefs are negatively affected by sedimentation, eutrophication by nutrients, and over–fishing, which impacts other species, from herbivores to fish-eaters. The removal of some species contributes to a disequilibrium that threatens the survival of corals. A serious case of excessive macro-algal growth can result from low numbers of herbivorous fish species. In El Porvenir (Kuna Yala), algae cover and coral cover was 28 percent and 26 percent, respectively, in 1990. However, in 1992 the algal cover had grown to between 55 and 82 percent, reducing the cover of live coral to less than 10 percent. Reefs in the central sector of the Panamanian Caribbean have been similarly impacted, live coral coverage of 4 percent (in the industrial zone of the Las Minas Bay) and 9 percent (in the sector of Portobelo and Isla Grande); algal coverage is more than 65 percent in both areas. Some fishing techniques, such as the use of certain nets, spears, traps, and the use of toxic chemicals like chlorine, also play an important role in the destruction of coral reefs. Hydrocarbon pollution, as well as heavy metals in the marine environment resulting from mining, dredging and waste water, is damaging factors that are lethal to some species. Rising water temperatures, recently documented in many regions of the globe, will destroy vast coral reef systems over time.

Problems with water pollution, as well as filling and breakwater construction, affect the quality and diversity of species that live on rocky coastlines. Rock, sand, and mud shores provide coastal protection, and are an important comercial food source for many coastal populations. In addition, the species present contribute to the ecological balance and diversity of the shore area.

Critical coastal shore areas include the Panama Bay, Limón Bay, Las Minas Bay (Colon) and the Gulf of San Miquel (Darién). Among important zones for tourism are Punta Chame, Parita Bay, Pedasí, Gulf of Montijo, Gulf of Chiriquí, Bocas del Toro Archipelago and the Gulf of Kuna Yala. (ANAM 1999b)

Coastal ecosystems are degraded from a variety of natural and anthropogenic sources. A summary of this degradation includes:

- **Coral reefs** threatened by pollution, sedimentation, and sea water temperature change.
- **Wetlands** threatened by improper solid waste disposal, over-harvesting, and habitat destruction.
- **Sea grass beds** threatened by removal for recreational activities, damage by fishing gear and boating activities, and land reclamation.
- **Rocky shores** threatened by development and improper solid waste disposal.
- **Benthos** degraded by dredging, damage from recreational users, and installation of structures.
- **Bays and estuaries** threatened by surface runoff, land-based sources of pollution, and habitat destruction.

SECTION III

Conservation Efforts in Panama

Current protection and rehabilitation activities in Panama are numerous. The institutional framework for forestry and biodiversity in Panama includes government agencies, national and local NGOs, private voluntary organizations (PVOs), bilateral and multilateral institutions, international technical assistance institutions (i.e., FAO, UNDP, and UNEP), regional governmental and nongovernmental organizations, and international PVOs. This section also covers activities of the private sector, civil institutions, and universities.

A. National Government

Environmental treaties and legislation In order to protect and regulate the use of wildlife, flora and fauna, the Panamanian government has created numberous laws and made international agreements to fulfill these objectives. See Annex H for a more complete list of laws and regulations.

International agreements. Panama is a signatory to more than 21 international and regional multilateral environmental agreements (MEAs)that influence policies and programs at the national level. The major MEAs that affect forestry and biodiversity are:

- The Convention for the Protection of the World Heritage: Cultural and Natural, 1975.
- The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), ratified by Panama August 17, 1978.
- The Convention on Biological Diversity (CDB), ratified by Panama January 17, 1995
- The International Convention on Tropical Timbers. Ratified by Panama on March 3, 1989
- The Convention on the Conservation of Migratory Species, 1989.
- The Convention on Wetlands of International Importance, especially as Waterfowl Habitats (RAMSAR), ratified by Panama on November 26, 1996.

Regional agreements. In recent years, the countries of Central America have agreed to numerous regional endeavors to help balance environmental concerns and development:

- CCAD (Comisión Centroamericana de Ambiente y Desarrollo - Central American Commission for Environment and Development) in 1989, which entered into effect 14/6/90. CCAD's members include the ministers of the environment in Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica and Panama.
- The Central American Agenda on Environment and Development (1992).
- The Alianza para el Desarrollo Sostenible de Centroamérica (Alliance for Sustainable Development of Central America), 12/10/94 (13 pp.).
- The Convenio para la Conservación de la Biodiversidad y Protección de Areas Silvestres Prioritarias en América Central (Convention for the Conservation of Biodiversity and Protection of Priority Wild Areas in Central America), 1992. The Global Environment Facility (GEF) in 1994 provided an initial $50 million to the Central American Environmental Fund in support of this Alliance.
- Forestry Guidelines. The Regional Convention for the Management and Conservation of Natural Forest Ecosystems and the Development of Forest Plantations, signed in Guatemala, 29 October 1993. This agreement promoted the creation of the Central American Council of Forests (CCAB). Also, there was progress made on the formulation of forestry policies, action plans, inventories and indicators, and plans for the integration of women in forestry development plans and projects, as well as in fire prevention programs.

- The Convention for the Establishment of the Interamerican Commission of the Tropical Tuna, 1954.
- The Mesoamerican Biological Corridor. The Panamanian Atlantic Mesoamerican Biological Corridor (CBMAP) is a program begun in 1998, as part of the Mesoamerican Biological Corridor (MBC) regional initiative, promoted by the governments of the Central American region.

Environmental legislation. The initial legislation protecting Panama's biological diversity was Law # 23 (January 30, 1967) on the protection and conservation of wildlife. Another important piece of legislation is Resolution # DIR-002-80 (January 4, 1980) that identifies 82 species in danger of extinction and bans hunting, capturing, buying, selling, or exporting of all species included in this list. Other important norms are included in Resolution # DIR-003-80 (January 25, 1980) that regulates wildlife in captivity and its importation and exportation, and Law # 24 (June 7, 1995), the wildlife law, which includes requirements for the introduction of exotic species. Table 8 shows some of the main pieces of legislation relating to protected areas.

Government institutions and agencies. *Autoridad Nacional del Ambiente (ANAM)*. The National Environment Authority is the primary government institution for forest and biodiversity conservation and management. ANAM plans, coordinates, regulates and promotes policies and actions to use, conserve and develop renewable resources of the country. ANAM's mission statement is to guarantee a healthy environment through the promotion of rational use of natural resources, the organization of environmental management and the transformation of Panamanian culture to improve the quality of life.

Although ANAM cannot carry out research, previous support to INRENARE by JICA established a training center, which included a forestry and agroforestry research component. The program included research projects (49) and demonstrations (28) in forest nurseries, plantations, agro-forestry and forest management. Now the center is focused generally on training (Gutierrez 2001b).

Table 8. Legal Framework for Protected Areas

- ***INRENARE's Board of Directors Resolution #022-92***. Establishes the national system of protected areas (SINAP, acronym in Spanish). This resolution is reinforced by Article 66 within **Law 41**, of July 1, 1998; this law also established **ANAM** and designated it as the normative institution for SINAP.
- ***INRENARE's Board of Directors Resolution #09-94***. Defines the 17 management categories for protected areas in the country. This resolution is complemented by the Forestry Law (Law # 1, February 3, 1994) which defines the protection forest management category.
- ***INRENARE's Board of Directors Resolution #07-96, July 10, 1996***. This resolution establishes the fees for different services performed by SINAP. It includes admission fees, (segregating national and international visitors admission fees); use of facilities and other zones within protected areas (refugees, scientific station, camping area, parking area), anchoring; and film production. Resolution #15-97 of August 21, 1997, is an updated and more detailed version of the above mentioned resolution.
- ***Wildlife Law or Law 24, June 7, 1995***. Chapter V establishes the National Wildlife Fund as a source to provide money to accomplish objectives of the wildlife law, including investment expenses (gastos de inversion) and to promote projects regarding management, protection, conservation, development and education on wildlife. These funds are under the administration of the protected areas and wildlife service and under the supervision of the Contraloría General de la Nación.
- ***Executive Decree #327, November 30, 1998***. Establishes the Tourism-Conservation-Research strategic alliances committee as an adjunct organism to the National Council on Sustainable Development. The role of this committee is to design, promote and conduct a national plan to develop tourism industry in the country through a system of alliances among tourism, environmental conservation and heritage, scientific, cultural and historic research.
- ***Cabinet Resolution #36, May 31, 1999*** Approves the national strategy for the environment establishing eight priorities that target reduction of pollution, deforestation and soil degradation; transforming production processes that are negatively affecting the environment, increasing inter-institutional coordination, the need to conduct environmental *ordenamiento* in fragile lands and the transformation of the environmental culture.

ANAM has a total work force of 1,146 persons, with a relatively low proportion of technical specialists (Gutierrez 2001b). The short tenure of the director generals, with seven individuals between 1990 and 2001, reflects the difficulty of the position. In February of 2004 the director general resigned and in March his successor also resigned.

ANAM, which has great influence in natural resource management in the country, does not have a cabinet position (*Consejo de Gabinete*), limiting its participation in the debate at the highest level of government. In spite of improved laws and regulations, it is clear from continued cutting and degradation of forest lands that the causes of this deterioration have not been addressed (Gutierrez 2001a).

Sistema Nacional de Areas Protegidas (SINAP). The National System of Protected Areas are under the *Servicio de Administracion de Areas Protegidas y Vida Silvestre*, a technical office in ANAM Although ANAM was established in 1998, SINAP predates ANAM by six years. SINAP currently has 51 protected areas officially included, representing about 25 percent of the country and about 2 million hectares. A more thorough discussion of SINAP is found under Protected Areas in Section I (see Annex G for details on each protected area).

*Servicio Nacional de Desarrollo y Administración Forestal. U*nder the *Dirección Nacional de Patrimonio Natural* of ANAM, the Forest Service is charged with management of all forests in the country not in protected areas. It also, evaluates, finances and continues forestry activities in natural forests, both planted and industrial.

Table 9. Some important laws relating to forest management in Panama

- *Law 14* (21 April 1995), which approved the **Regional Convention Regional for the Management and Conservation of Natural Forest Ecosystems and the Development of Forest Plantations**, signed in Guatemala, 29 October 1993.
- *Law 22* (8 January 1996), approval of the **International Convention on Tropical Wood**, written in Geneva, 26 January 1994.
- *Law 1* (3 February 1994), which created the **Forest Law** of the Republic of Panama, with the goal to protect, conserve, improve, acrecentar, educate, research, manage and utilize rationally forest resources.
- *Law 24* (23 November 1992), which establish **Reforestation Incentives and Regulations** in the Republic of Panama.
- *Resolution JD 01-98*, of INRENARE (predecessor to ANAM), which established rates for INRENARE services of management, use and utilization of forest resources.
- *Resolution JD 08-96*, of INRENARE (predecessor to ANAM), which states measures for the use and protection of **mangroves**.

A research institution dedicated to forest research in Panama does not exist, which limits the availabiltiy of much needed technical information for forest management. It has also been suggested that the institution that manages forests should be separate from the one that controls and manages environmental regulation nationwide. Currently the Forest Service is a technical office within ANAM (Gutierrez 2001a).

The Forest Service has had support from the donor community over the years. At present, the Forest Service has major support from FAO and ITTO (International Tropical Timber Organization) dealing with national forest information gathering and management, and forest policy and management.

Instituto Panameño de Turismo (IPAT). The Panamanian Tourism Institute is in charge of promotion and regulation of tourism activities in the country, including eco-tourism. The Institute supports the creation of CEFATI (Center for Tourism Facilitation) in several districts of the country, and promotes tourism

development and visits to special destinations. IPAT designates areas of interest for tourism development and provides incentives for tourism investment.

Ministerio de Desarrollo Agropecuario (MIDA). The Ministry of Agriculture and Livestock Development provides technical aid and advice in agricultural and cattle raising production at a national level. MIDA's responsibilities include providing information on sustainable coffee production, and *Tilapia* fish production. MIDA also participates in the Program to control screw worm (U.S.-Panama commission to eradicate the screw worm: COPEG); conducts the Colón, Capira and Coclé (CCC) Sustainable Development program (which includes land titling to develop agriculture and sustainable development activities); conducts research on agricultural varieties via the IDIAP research center; regulates the import and export of domesticated plant varieties and animals via the Agricultural Quarantine Office (DECA); and participates in rural poverty alleviation and natural resources conservation programs complementing the CBMAP on the Pacific coast of Herrera, Los Santos and Veraguas.

Autoridad Marítima de Panamá (AMP). The Maritime Authority, created in 1998, unifies in one institution duties that were dispersed among the Ports Authority, the General Directorate for Consular and Ships duties, Marine Resources and the Nautical school. The Maritime Authority promotes, coordinates and conducts the national maritime strategy, and administrates the Panamanian ports system of 18 ports, of which AMP is directly in charge of 11; the rest of the ports are under private developers supervised by the AMP.

Autoridad de la Región Interoceánica (ARI). The Inter-Oceanic Region Authority administrates the Panama Canal Area resources returned to Panama through the Torrijos-Carter Treaties. ARI has identified areas worth protecting among those returned to Panamanian administration and has promoted initial development of the San Lorenzo protected area, designating protection personnel and participating in the planning process for the area. It designates use concessions in wildlands and developed sectors until they become fully incorporated into the country's economic scheme.

Law #21 of July 1997 of the Legislative Assembly approved the Regional Plan for the Development of the Inter-Oceanic Region and the General Plan of Use, Conservation, and Development of the Canal Area. This law applies to the territories of Canal Area and the Panama Canal Watershed, which together form the Inter-Oceanic Region. The law is executed ARI. The main objective of these plans is to integrate reverted/returned areas and properties into Panama's development and economy. Other objectives are to promote the development of the marine sector, including Panama Canal and port infrastructures, as well as to contribute to secure the efficient and competitive functioning of the Panama Canal, and to encourage integrated urban and rural development in the Canal Area and Watershed, including the cities of Panama and Colon. The final main objective is to promote the protection of the Canal Watershed within a sustainable development policy, for the conservation and appropriate use of natural resources and biodiversity.

The General Plan includes information and maps regarding land uses and natural resources. Land use plans include structured, coherent, and scientific information which serve to determine the different categories of land uses or zoning in the Inter-Oceanic Region. Land use categories include protected wildland areas (e. g. national parks, forest and water protection), rural production areas (e. g. agriculture, livestock, forestry), urban areas (e. g. green and housing areas), compatible areas with regard to the Panama Canal (e. g. canal operation, locks), limited and restricted use areas (e. g. contaminated, wetlands, flooding), and other uses (e. g. tourism-ecotourism, mining).

The General Plan establishes and defines compatible area as those designated for the functioning, protection, and expansion of the Panama Canal. In cases in which the ARI requires a compatibility approval from the Panama Canal Authority (Autoridad del Canal de Panamá: ACP), the ACP has 90

calendar days to approve or disapprove the petition. Public properties defined in the General Plan can not be privately owned, but other lands or properties can be sold, rented or assigned to private ownership or use by ARI, or ARI can play the role of custodian and administrator of non-public land or properties. In regard to the Inter-Oceanic Region, ARI, together with the Ministry of Housing, which is the institution on charge of urban development, can change land use categories, after consultation with the Canal Affairs Commission of the Legislative Assembly, through legislation.

ARI´s Regional and General Plans have some weaknesses, especially regarding protection of natural resources (e. g. protected areas and biodiversity) (Whitney 1999). The establishment of an evaluation process has been recommended, supported by the monitoring of biophysical factors, to determine the conditions of natural resources within the protected areas (Whitney 1999).

Autoridad del Canal de Panamá (ACP). Since 1997, the Panama Canal Authority conducts the administration, management, conservation, and modernization of the Panama Canal. Several areas critical to the canal working efficiently are under ACP's responsibility, including the management of borders of the canal waterway and the port at the mouth of the Chagres River, within the San Lorenzo Protected Area. Within these areas ACP supports surveillance and management. It is the ultimately responsible for the water resources of the PCW (Law 19, 1997).

Ministerio de Salud (MINSA). The Ministry of Health supervises and assesses food and water production and processing, and waste and sewage management. The Ministry also supports the establishment of aqueducts, and has an office that deals with medicinal plants and the cultural groups using them. Through its Environmental Office it generates and disseminates information on UV radiations and skin protection, and air and water quality.

Ministerio de Educación (MEDUC). The Ministry of Education has the mandate to provide education up to the sixth grade throughout the country. MEDUC leads formal environmental education activities in the country and participates in and supports activities in informal environmental education.

Secretaria Nacional de Ciencia, Tecnología e Innovación (SENACYT). The Secretariat provides some support for research within specific areas, develops training courses, and documents/promotes incorporation of ISO regulations.

Support for biodiversity conservation and sustaining forest management. Numerous activities have been, and are currently being, carried out in Panama to conserve biodiversity and promote sustainable forest management. A few major initiatives are discussed here.

Programa Ambiental Nacional (PAN). This broad program within ANAM includes numerous initiatives, including the National System of Environmental Information - *El Sistema Nacional de Informacion Ambiental* (SINIA), and the Inter-institutional System (SIA). SINIA is designed to generate indicators of the status and evolution of natural resources and the environment, supported by CIDA (Canadian International Development Agency). Other ANAM strengthening activities involve decentralization of environmental management, promoting initiatives in environmental management (investment financing), and the development of norms and regulations. Among recent publications is the National Environmental Strategy – Panama (ANAM 2002).

Plan de Acción Forestal de Panama (PAF-PAN). In 1986 Panama began the Programa de Acción Forestal, supported by FAO, and initiated a national strategy *Plan de Acción Forestal de Panama* (PAF-PAN). For various reasons, the plan reportedly did not tackle directly the causes of deforestation in the country. In 1994 a new forestry law was approved, which institutionalized forest management and

established its legal framework. Later, in 1998, the general environmental law was passed, establishing regulations and standards for natural resource management in the country (Gutierrez 2001a).

Reforestation efforts. Panama's experience with reforestation projects through planting (reforestation can occur without planting trees) dates from the 1960s, principally involving pine (*Pinus caribaea*) in degraded areas of the cordillera of the central region. In 1992 a law was passed to provide incentives for the establishment of plantations, mainly with exotic species. By 2001, 31,000 hectares had been planted to take advantage of these incentives, which included tax free status on income for 25 years; tax deductions of essentially all investment; exoneration of import taxes and fees on machinery, equipment and chemicals, exemption on real estate taxes; and the offer of an immigrant visa to investors of $40,000 or more. These activities, though they increased public interest and participation in forest management, have been criticized for not including native species and for lacking a market for wood products resulting from necessary plantation thinnings. They also lacked control or quality of the plantations in terms of soil types, species selection, seedling density, and the relatively low numbers of hectares reforested in relation to the amount of exemptions claimed (costs of reforestation and management were cited at $3,068 on average per hectare). In 1997 the GOP took steps to modify the reforestation incentives law, but due to private sector opposition, it was not changed (Gutierrez 2001a).

Certification. Some companies involved in reforestation are using sustainable practices, including some that have been certified under the Forest Stewardship Council (FSC). Two companies have been certified, and one more is in the process. Since 1996 Panama has been taking steps to incorporate forest certification as an instrument to motivate the forestry sector to use improved sustainable management and improve market opportunities. Certification is relatively expensive, though voluntary, and the forest industry private sector is generally perceived as being receptive to the mechanism of certification (Gutierrez 2001a).

Panama is in the process of exploring a national system of forest certification. With the support of the ITTO, the Forest Service has developed a pre-project to formulate a forestry certification project aimed at promoting the sustainable management and use of Panama's forests. A goal is to maintain a supply of forest products, satisfying the demands of the international market for tropical wood, and increasing the possibilities for exports that would generate financial returns. The project to be designed will establish national standards of forest certification.

In May 2003, Panama hosted a regional workshop on forest certification in Latin America, with the support of ITTO (ANAM web site 2004).

Some other activities in Panama now include:

- The Plant Inventory and Conservation Project, *Herbario Nacional de la Universidad de Panamá* (National Herbarium at the University of Panama).
- The Herpetological Research and Conservation Program, *Círculo Herpetológico de Panamá* (*Panama Herpetological Circle*).
- "Important Bird Areas in Panama," a recent publication by the *Sociedad Audubon de Panama* (*Panama Audubon Society*).
- The Ecology and Conservation Program on Mammal Biodiversity, *Sociedad Mastozoológica de Panamá* (*Panamanian Mammal Society*).
- The Native Tree Species Reforestation Project, *Smithsonian Tropical Research Institute/Yale University* (*Instituto Smithsonian de Investigaciones Tropicales/Universidad de Yale*).
- The Tuna Research Program, *Centro de Estudios Tropicales del Atún* (*Tuna Tropical Studies Center*).
- The San San Pond Sak Sea Turtle Monitoring Program, Bocas del Toro, *Asociación Amigos y*

Vecinos para la Conservación de la Naturaleza (Friends and Neighbors Association for the Conservation of Nature).
- The Recovery Program for the Harpy Eagle and other Neotropical Raptores, *Centro de Rapaces Neotropicales del Fondo Peregrino* (Peregrine Fund Center of Neotropical Raptors).
- The Central American Tapir Captive Conservation Program, *Jardín Botánico y Zoológico Summit* (Summit Botanical Garden and Zoo).
- The Wildlife Captive Management and Breeding Program, *Asociación Nacional para la Conservación de la Naturaleza* (National Association for the Conservation of Nature).
- Program for Rio Bayano. The Rio Bayano is one of the most important rivers in Panama for hydroelectric power and freshwater swamps. The conservation and recuperation of these wetlands is part of a program, with the participation of the Kuna and Emberá-Wounaan ethnic groups.

Environmental protection regulations. The environmental impact assessment (EIA) of planned activities functions as an early warning system, with continuing analysis, and allows preventive and mitigation measures for environmental protection. An environmental impact study (EIS) is a central part of the EIA. The EIS is a document that describes a proposed activity, information about environmental impacts, and mitigation measures for these impacts. All new investments – public and private, national, regional, or local projects and their modifications, which are included in a restricted list (Executive Decree # 59 of March 16, 2000) – require an EIA before starting the project.

The EIA began in Panama in 1990, originally with several institutions (Ministry of Commerce and Industry) independently established and regulated EIAs. INRENARE (the predecessor organization to ANAM) was frequently asked to review these studies, and began working on the regulation and standardization of EIAs that apply to all projects and institutions.

The main laws and regulations related with EIAs are Forestry Law No. 1, EIS Law No. 30, General Environmental Law No. 41, and Executive Decree No. 57 for public consultation and formal complaint, No. 59 for EIA; and Resolution No.AG-0292-01 that created the EIS operative manual.

Today, consultants and firms that prepare EISs must be registered at ANAM and pay a fee for technical services during the assessment process ($350, $1,250, or $3,000, depending on the study category - I, II, or III, respectively).

During 2003 ANAM promoted workshops for consultants and firms to standardize the EIS. However, there is a growing agreement among consultants that this operative manual has weak sections that might limit its positive impacts. To confront irregularities in EIA official procedures, an umbrella association of firms and consultants has been formed to standardize procedures among themselves and identify failures in the regulations and procedures of EIAs.

Some weaknesses in the process of EIAs identified by consultants follow. The ANAM office supervising EIAs lacks well-trained personnel on the subject. The levels of academic and technical training of staff at the firms that carry out EISs differ, resulting in products that differ in quality. The lack of previous biological studies in most of the country to support EIS baseline data forces ANAM to request in-depth field research with its limited available funds, and the project promoter or builder controls the funds to carry out EISs, a condition that can influence the EIS, and bias its results. The most significant weakeness is that EIS are not required to present different options for the same project, including the option of not carrying out the project. Currently mitigations are presented for only one option. A good summary of the current status of environmental review can be found on ANAM's Web site, under PAN (*Programa Ambiental Nacional*). The part of the program entitled *Desarrollo de Normatividad, Reglamentacion e*

Instrumentos de Gestion Ambiental includes (2.) Mechanisms to Evaluate Environmental Impact of Projects (*Mecanismos para Evaluación de Impacto Ambiental de Proyectos*) (http://ns.anam.gob.pa/pan/panfinal/CIIMEIAP.htm). Another goal of PAN is to design and apply the diagnostic tools, PAMAS (Planes de Adecuacion y Manejo Ambiental), Planes de Manejo Ambiental, and environmental audits. Often the PAMAS are of acceptable quality, but the supervision of the measures' implementation is weak.

Environmental protection regulations extend to conservation measures in effect through forest laws and regulations. Some of these regulations include the protection of bodies of water (springs, rivers, lakes and marshes, and fragile areas. In forest concessions, where there are threatened species, areas with high biodiversity, or wildlife in general, certain regulations must be followed. In forest concessions seed trees must be marked and left during harvesting (Gutierrez 2001a).

Forests that are destined for uses other than timber harvesting, such as ecotourism or research, have legal norms that require a management plan with detailed activities. When these activities will have an effect on natural resources or environment, an environmental impact study must also be made (Gutierrez 2001a). There is also significant need for policing and enforcement of environmental regulations in Panama. Compliance and enforcement is carried on mainly by these organizations:

- The Panamanian national police force is responsible for preventing all infractions of the law. During ANAM patrols, inspections, and activities, when illegal activities are encountered, such as tree cutting, natural resource extraction, transport of natural products, hunting violations, ANAM counts on police support, which is often more concerned about major crime, and routinely treat environmental infractions as minor nuisances.
- The ecological police, within the national police force, focuses mainly on the enforcement of environmental laws in the Panama Canal Watershed, in support of ANAM.
- The Panamanian Coast Guard is also part of the national police, assisting with fisheries enforcement and other conservation programs, particularly when activities take place offshore, on islands, and/or fishing banks.
- Local governments (provincial, indigenous, and municipal). These government entities participate with ANAM in environment and natural resource projects, as well as supervising ANAM activities. They also support and collaborate in the protection and conservation of natural resources and the enforcement of environmental laws.
- ANAM personnel. Special park and forest guards and inspectors, are authorized to enforce environmental laws. They perform their policing and enforcement duties in protected areas, wild lands, cities, airports, and ports. These officers collaborate with personnel from other environmental agencies, as well as personnel from the Ministry of Health, the Ministry of Agricultural and Livestock Development, and the National Marine Authority, among others.
- Customs Officials
- The National Maritime Service (Servicio Marítimo Nacional - SMN) provides protection for Panamanian coasts and territorial waters, including illegal migration prevention, prevention of smuggling and robbery, and drug control.
- The Panama Firemen Corps (Cuerpo de Bomberos de Panamá). The Firemen Corps supports ANAM's personnel in forest fire control. Recently a special brigade for forest fire control was formed in the metropolitan region (the Pulaski Brigade).

Academic institutions

- Universidad de Panamá (UNIPAN) has undergraduate programs and a few graduate programs offering degrees in a variety of biological sciences and a degree in forestry.

- Universidad Autónoma de Chiriquí (UNACHI) is a small regional university with undergraduate degree programs and a graduate program in medicine.
- Universidad Santa María La Antigua (USMA) has undergraduate and graduate degrees programs, with science-oriented graduate work.
- Universidad Tecnológica de Panamá (UTP) offers a technical education, with some bachelors and graduate programs in environmental engineering and related fields.

Other related programs and initiatives. Within the last decade Fundación Natura, Corredor Biológico Mesoamericano and PRONAT have become important supporters in the development of SINAP.

*The National Land Administration Program (Programa Nacional de Administración de Tierras - PRONAT)*is conducting a cadastral survey, aimed at ensuring equitable access to land and improve land tenure security by providing land administration services in selected rural, peri-urban, and urban areas, and enhancing natural resources conservation through the consolidation of SINAP and indigenous people's territories. In 2001, PRONAT (a five-year land administration program) committed to demarcate protected areas. This program, sponsored by the World Bank as a loan to the Republic of Panama, is complemented by an IDB land titling component.

A pilot of PRONAT is currently active establishing physical demarcations, signage, and land tenure-conflict resolution activities in Portobelo National Park and Cerro Hoya National Park, and demarcation of all reserves and comarcas in Chirquí and Bocas del Toro plus the rest of the Colón province. Implementing agencies for PRONAT include the National directorate of Agrarian Reform (DINRA), the Public Registry, the Ministry of Economy and Finance through the General Directorate of Cadastre (DGC), the National Authority for the Environment's National Directorate of Protected areas and Wildlife (ANAM), and the Project Coordination Unit.

Mesoamerican Biological Corridor (Corredor Biológico Mesoamericano). Work on the Mesoamerican corridor has occured at two levels in the last six years: 1) the Panamanian Atlantic Mesoamerican Biological corridor is a specific project (CBMAP) conducted in the country via ANAM since 1998. This project has concentrated on 2.8 million hectares (almost 40 percent of the country), mostly on the Atlantic Slope, to work with funds provided by GEF, the World Bank and the Government of Panama. Priority areas have been identified including existing conservation areas and other wildlands that may eventually be proposed as conservation areas; some small grants have been offered to local people for specific activities regarding conservation and ecotourism. In addition, 2) the regional office in Panama representing the regional Mesoamerican corridor program conducted participatory planning to identify new potential corridors, particularly in the western part of the country, and has prioritized six of them (CBM, 2003).

Fundación NATURA, begun in 1991, is dedicated to the promotion of plans and programs for the protection and conservation of the natural heritage of the country. Since 1995 NATURA has administered the $25-million Ecological Trust Fund (FIDECO), established by the government of Panama, USAID, and TNC. The Fund has the goal of financing, permanently, investments in support of conservation of natural resources and environmental protection, with particular emphasis on those activities to manage natural resources, and give a high priority to the Canal Watershed (ANAM 1999). T through donations to NGOs and base groups, this fund has sponsored more than 70 projects within five main programmatic areas: agroforestry and sustainable management of forests, conservation of biodiversity, ecotourism, protected areas management, and pollution prevention/decrease (NATURA 2001). Also through FIDECO, support has been granted to 36 protected areas where there is a physical presence of management. This support, in the future, will be concentrated in 19 areas, of which six will share larger

donations (L. Fernández, pers. comm.). This decision was made to ensure consolidation and development of a few units in a shorter period (M. Pérez, pers. comm.).

Proyecto Sistema de Información Forestal. ITTO is providing support to the forestry sector through the *Proyecto Sistema de Información Forestal*, which evaluates and monitors the forest resources of Panama by establishing a computer network for the ANAM regional offices, training personnel, creating useful databases, and establishing a methodology for the evaluation, up-dating and monitoring of forest resources. It recently published a document on Panama's maps forest cover and other attributes of the country (ANAM 2003a).

B. Municipal and Local Governments

Relations with local governments (provincial, comarcas, and municipal), are developed within the framework of consultive commissions. This mechanism permits the adequate participation of the local governments in environmental management and natural resources, and assures a reasonable vigilance in the institutional management of ANAM in the various provinces, municipalities and comarcas. Similarly, ANAM finds through this mechanism an opportunity to support and collaborate with local governments in coordinating environmental protection and the conservation and development of natural resources. Through the association of municipalities AMUPA, municipalities support the development of green and protected areas within their jurisdiction, and promote small business tourism projects with local, national, and international support.

C. Civil Society

Panama has a wide variety of private organizations working in conservation. A few major players are listed here.

ANCON (Asociación Nacional para la Conservación de la Naturaleza). The National Association for the Conservation of Nature was founded in 1985 by academic and business leaders. The organization has played a major role in the creation of national parks in Panama, and on many occasions has spurred government orgnizations (especially ANAM) into action. ANCON has purchased several large tracts of wild lands for preservation. Through a subsidiary, Ancon Expeditions of Panama, ANCON is a leader in making these and other biologically rich areas more accessible to tourists (Doggett 2001).

SAP (Sociedad Audubon de Panamá). Panamá Audubon Society focuses on bird observation, conservation, and public education. They have developed a program to prioritize important bird areas in the country and published the results.

Círculo Herpetológico. The group has developed research regarding amphibians in selected protected areas within the Panamá Canal Watershed. They continue to identify priority issues for amphibian conservation.

Sociedad Mastozoológica de Panamá. The Mammal Society of Panama promotes research, conservation, training, and environmental education regarding mammals and their habitats.

Fundación Dobbo Yala. The foundation was formed by indigenous professionals who address issues of concern to indigenous peoples, including demarcation of territories, and the study and conservation of natural resources.

Fondo Peregrino-Panama. The Peregrine Fund is a regional program that conducts research and education on wild and captive birds of prey that are threatened with extinction.

Centro de Estudios y Acción Social Panameño (CEASPA). The Panamanian Social Studies and Action Center has contributed in the last three years to biodiversity conservation and supported people and groups interested in the protection of San Lorenzo Protected Area (APSL). CEASPA is responsible for the APSL's management plan, and fund raising for sustainable development projects in the areas neighboring APSL. Activities include a community education program, a coffee production improvement program, and a community plant nursery in Achiote.

Fundación para el Desarrollo de la Libertad Ciudadana The group is a federation of NGOs that, among other topics of concern for citizens, addresses issues regarding the environment. They promoted the presentation of two cases before the Central American Water Tribunal.

Fundación NATURA. The Nature Foundation is a private organization that administers an ecological fund established by the governments of Panama and the United States. Its beneficiaries are both private organizations and the gSINAP. Activities include fund raising for environmental protection, the administration of donated funds and the strengthening of environmental initiatives. For several years NATURA provided supplementary funds for 36 protected areas through ANAM. Beginning in 2004, they will provide funds for 19 priority areas in SINAP; six of which will receive larger donations and the remaining 13 will receive small donations. Through NGO grants the foundation supports works on relevant topics for communities and conservation areas, such as the coffee production project in villages in Colón, and efforts to halt the expansion of occupied land close to the San Lorenzo Protected Area.

Colegio de Ingenieros Forestales de Panama is an organization of professional foresters.

D. Private Sector

Timber Companies. The number of businesses in the timber industry each year has always been irregular, due to the short time periods of their concessions, cutting and export bans, and the bureaucratic process required to harvest. Between 1980 and 1986, the number of concessions varied between 16 and 23, with an area varying annually between 500 and 4,500 hectares, totaling an area of 70,000 hectacres. Between 1987 and 1990 there were only 5 concessions awarded in the relatively homogenous forests of cativo (*Prioria copaifera*), over an area of 7,800 hectares, due to the prohibition on cutting during this period.

The forest industry in Panama is composed principally of sawmills to process wood, plywood, furniture, paper, and cardboard. There are about 31 sawmills (notable old and inefficient), three plywood factories and 371 establishments for secondary manufacture of wood products, including woodworking and furniture makers (Gutierrez 2001). The forest industry is said to have 2,581 employees, and 12,900 indirect beneficiaries (ANAM 1999d).

The installed capacity was estimated at 200,000 meters^3, while the estimate of production was 129,000 m^3. Traditionally, the timbers harvested from the forests are sufficient for the industry, except for paper and cardboard production, which imports its primary materials. There is no integration between forest production and industry. Sawmills and factories are found mostly in Panama City, far from forest concessions. Panama exports little wood (ANAM 1999d).

The forest industry has been in decline for several decades, with high levels of obsolete and aging equipment, low levels of technology, low operating levels, and no tendency to modernize. From 51 sawmills in 1968, there was a drop to 31 in 1999 (Gutierrez 2001a). Volumes harvested also have been

irregular and have generally tended to decrease over the years. The reasons for this decline is attributed to different factors: lack of a clear and consistent national policy in forest production, globalization and free market policy, the growing general perception that forest activities in natural forests are damaging to the ecosystem, and a low interest from the forest industry, due to a lack of incentives and credit (Gutierrez 2001a).

The trend in forest management is closely linked with the forestry actions conceived by the GOP, which is notably influenced by the low level of forest economic activity in the country. The amount added to the gross national product from forestry does not exceed 1 percent. Employment in the forest industry has also been decreasing, from 3,578 persons in 1992 to 2,691 in 1996, and 2,581 in 1999 (Gutierrez 2001a).

Several bans on harvesting and export were imposed in the 1990s, due to the rapid loss of natural forests, and lack of forest management. These bans did not slow forest loss (Gutierrez 2001a).

Tourism Development. Ecological tourism in Panama is varied and widespread, including snorkeling and diving, surfing, birdwatching, hiking, mountain climbing, kayaking, mountain biking, fishing, and whale watching. Cultural tourism in Panama is also fascinating, based on numerous Amerindian tribes that have maintained much of their historical territory, and traditional, colorful dress and customs. A leader and pioneer in ecological tourism is Ancon Expeditions of Panama, making biologically rich areas more accessible to tourists. In 1994 legislation offered incentives for tourism development, mainly through tax breaks and long term leases.

In Panama there is a highly developed service sector, mostly in developed or luxury tourism. Recently there has been an expansion in natural tourism, focusing on the fabulous resources available in the country. Some indigenous communities have been successful in bringing tourists into their villages for "cultural tourism," and there is some discussion of "agricultural tourism" in the future.

Private Natural Reserves. The Nature Conservancy. 2002. Conservación en Panamá - Análisis del Marco Legal para la Conservación en Tierras Privadas en Panamá. The Nature Conservancy and USAID. Panama City. Page 133 laws mechanisms, incentives, recommendations and the experiences of other Latin American countries.

The Panama Association of Natural Private Reserve Network (*La Asociacion Panameña de Red de Reservas Naturales Privadas*) was established in December of 2001. The network, a civil society organizationbased on Law 41, 98 (art. 68), is a novel way to promote the participation of private land owners in conservation that will guarantee the permanence of their natural ecosystems and permit the owners to generate environmental goods and services that result in economic rewards.

E. International Contributions

There are numerous international organizations making contributions to biological and forest conservation. The list that follows is not exhaustive.

Donor and Multilateral International Organizations. International bilateral and multilateral organizations supporting forestry and biodiversity are numerous.

- *United States Agency for International Development* (USAID) (see Section V)

- *Other U.S. government agencies* involved in conservation activities in Panama include the U.S. Embassy, the U.S. Peace Corps (volunteers who provide environmental education, forestry

education, small businesses advice, public health, sanitary infrastructure improvement, among other fields), the U.S. Forest Service, U.S. Park Service, and the U.S. Fish and Wildlife Service, *the* National Institutes of Health, the National Science Foundation and the U.S. Department of Agriculture.

- *FAO* (Food and Agriculture Organization of the United Nations - *Organización de las Naciones Unidas para la Agricultura y la Alimentación*) has projects in Panama dealing with sustainable management in rural areas and in the Canal Watershed, technical assistance, institutional and private participation in forest activities, and studies to define priority areas and action mechanisms for forest management. FAO was supportive in the preparation of the *Plan de Acción Forestal de Panama*.

- *World Bank* (IBRD). The World Bank has provided funding for the Mesoamerican Biological Corridor through the Global Environment Facility (GEF); *Conservación de la Biodiversidad a través del Desarrollo Comunitario Sostenible in* Darién; support to PRONAT, The National Land Administration Program; and implementing activities in land management and PCW conservation.

- *ITTO* (International Tropical Timber Organization). The ITTO has supported ANAM since 1997 in reviewing the forest situation in Panama, and developing the gathering and reporting forest cover in the country (Gutierrez 2001a). ITTO is providing support to the forestry sector through the *Proyecto Sistema de Información Forestal*, and the management, conservation and development of the mangrove forests in Panama, which among other things is providing training to mangrove-dependent communities in sustainable management and harvesting techniques of mangroves, using about 4,000 hectares of mangrove forests on the Panamanian Pacific Coast and rehabilitating about 1,250 hectares of degraded lands. Other ITTO support includes national workshops to train forest managers and concessionaires in the use of the ITTO criteria and indicators for sustainable forest management. Proyecto Inventario Forestal Nacional is another project.

- *UNDP* (United Nations Development Program) (PNUD) supported the *Plan de Acción Forestal de Panama*. More recently it has funded the project in the Darien - *Conservación e la Biodiversidad a través del desarrollo Comunitario Sostenible*. A completed project, that included forest development activities is *Desarrollo Comunitario y Producción de Alimentos en Zonas Deprimidas*.

- *UNEP* United Nations Environmental Program (*PNUMA*) has its Latin America and Caribbean Regional Office in Mexico City. Projects include the UNEP/GEF (Global Environmental Facility) activities, support for the National Biodiversity Strategy, Action Plan, and Country Report. There are numerous regional activities, including regional coastal initiatives.

- *IDB* Inter-American Development Bank. Current and recent support for natural resource management in Panama include: Multiphase for Sustainable Development of Bocas del Toro; Land Administration and Regularization Project; Implementation of a Science, Technology and Innovation Center; Environmental Management Instruments; and Development Panama Canal Watershed Project. The IDB has assisted the GOP in the development of a National Environmental Strategy.

- *AECI* (Agencia Española de Cooperación Internacional). The Spanish International Cooperation Agency promotes development of cultural and natural programs in Portobelo National Park and

associated villages, including a draft management plan, urban waste collection, ecotourism, urban and peri-urban agricultural projects. In Coiba National Park AECI has sponsored research on natural resources and prepared a management plan.

- *DANIDA* (The Development Agency of Denmark) DANIDA supports the Program of Forest Seeds (Programa de Semillas Forestales - PROSEFOR)

- *FINNIDA* (The Development Agency of Finland) has supported the *Centro de Manejo, Aprovechamiento y Pequeña Industria Forestal* (CEMAPIF) CCAD/FINNIDA. The program provides training in forestry management for professionals and producers in the public and private sector.

- *GTZ* (German Agency for International Cooperation) supports management planning in Cerro Hoya National Park and environmental education programs, and research in Ngöbe-Bugle territories. A forestry project is titled *Desarrollo de Sistemas Agroforestales y Forestales en el Area Indígena Ngobe-Chiriquí*.

- *JICA* (Japan International Cooperation Agency) supports basic research and program development in parks, governmental institutions, and NGOs within the Panamá Canal Watershed. JICA has a follow up project to PROCAPA, with 18 communities of the upper river basin, promoting better cultivation practices, soil conservation and diversification of products, to empower local villagers and work towards sustainability.

  The Training Center for the Management of Natural Resources (CEMARE, under ANAM), was established with the support of the JICA. The center is providing training in environmental education and awareness, forestry and agroforestry techniques, for public officials and residents of the watershed and buffer areas.

- *General Consulate of the Republic of China* provides support to agriculture and environmental education activities.

- *Smithsonian Tropical Research Institute* (STRI) maintains a close relationship with ANAM, particularly in research related to natural resources. ANAM has completed a research project of the cativo forests (*Prioria copaifera*) and tagua (*Pitelepha seemmani*) in the Darién, with co-participation of STRI. The Institute has a natural area, Barro Colorado Natural Monument, of 5,364 hectares on the edge of the Panama Canal used in flora and fauna research of terrestrial ecosystems. All research and collections that STRI makes outside this area is supervised and authorized by ANAM.

  STRI maintains a research staff with long term studies, and every year hosts invited researchers to conduct studies on a diversity of issues related to natural resources. Some research programs listed on their Web site include archaeology, behavioral ecology, socio-cultural anthropology, environmental monitoring, the Panama Canal Monitoring Project, forest ecology, the Biological Dynamics of Forest Fragments Project (BDFFP), the Center for Tropical Forest Science (CTFS), International Cooperative Biodiversity Groups (ICBG), Tropical forest canopy biology, paleoecology, molecular evolution, plant physiology, the Free Air Carbon Enhancement Project (FACE), and tropical marine ecology.

- CCAD. Among many regional activities, CCAD and the EEC are supporting a program in the Darien *Programa de Desarrollo sostenible en Zonas de Frontera Agrícola en Centroamérica*;

CCAD has also supported the *Centro de Manejo, Aprovechamiento y Pequeña Industria Forestal* (CEMAPIF) CCAD/FINNIDA. The program provides training in forestry management for professionals and producers in the public and private sector.

International nongovernmental organizations.

- The Nature Conservancy works in conservation and management of protected areas, land acquisition, inventory and monitoring of wildlife, including the Parks in Peril (PiP) Program.

- *The* World Wildlife Fund works towards environmental conservation including training and conservation of natural resources in Central America. (TRAFFIC deals with trade in endangered and threatened species). WWF has been active in community forestry in Nicaragua and Colombia, and other areas in the region.

- Conservation International works on sustainable development, ecosystem conservation, and certification.

- Rainforest Alliance is leading PROARCA/APM's tourism and agriculture efforts in Central America, expanding the availability of products and services certified as "sustainable, and building alliances to help successfully market green products. Their activities in Panama are in the Amistad-Cahuita-Rio Canas area near the Costa Rican border.

- IUCN, Manejo y conservación de los Bosques Nativos del Este de Panama. IUCN protection of the watershed and hydroelectric facility of Bayano.

- Centro Agronómico de Investigación y Enseñanza (Costa Rica). CATIE participates in formal education via the University of Panama training professionals at the graduate level in protected areas management. CATIE has participated in projects focused on forest management, agricultural practices, among other issues, including *Programa de Semillas Forestales* (PROSEFOR), and the completed project in Bocas del Toro – *Conservación Para el Desarrollo Sostenible* (CATIE, OLAFO)

- McGill University is currently involved in a project to investigate carbon sequestration in plantations and pastures. Proyecto FACE RING. It studies CO2 capture in secondary forests, plantations and pastures (McGill University of Montreal, Canada, STRI, USMA y UP).

F. Ex-Situ Conservation

The conservation of biodiversity outside of a species' natural habitat, or *ex-situ* is a complementary strategy to biodiversity conservation in protected areas (or *in-situ* conservation). The purpose of *ex-situ* conservation is to store, conserve, and study biodiversity resources in order to repopulate, recover, and use plant and animal species (Tovar 1996, ANAM 1999ac).

*Botanical gardens, zoos, and aquariums. I*n these institutions plants and animals are kept alive for conservation, education, and research purposes. The major national institution is the Summit Botanical Garden and Zoo, managed by the Panama City Municipality. The Instituto de Investigaciones Agropecuarias (IDIAP) at Ministerio de Desarrollo Agropecuario (MIDA) and the Facultad de Ciencias Agropecuarias at the University of Panama (UNIPAN) have collections of field crops. Others include the El Nispero Zoo, Villa Griselda Zoo, Fondo Peregrino, Fundación de Rehabilitation de Especies Tropicales, Punta Culebra Exhibition Center and Aquarium at STRI, Pacific Aquiculture Station at Vacamonte, and the Laboratorio del Atun.

Herbaria and museums. In these institutions preserved plant and animal collections are stored for research and education. Herbaria are found at the Departamento de Botanica at UNIPAN, the Universidad Autónoma de Chiriquí (UNACHI) and STRI. Museums are found at the Departamento de Zoología at UNIPAN and UNACHI, and Instituto Gorgas de Investigaciones en Salud-MINSA.

Breeding of captive animals. Management of captive animal species is carried out for their economic value as food or for other products. Currently species managed for human food are the green iguana and the paca, while the crocodile is raised for leather products. There are more than 100 small wildlife ranching farms in the country and two companies dealing with crocodile commercial ventures.

Bioprospection. Bioprospection is the identification and study of pharmacological properties of some plants and animal species, with the objective of finding drugs that cure diseases and often include the objective of generating income to support other conservation strategies (e. g. protected areas). Organizations involved in bioprospection are Centro de Investigación de la Flora Panameña (CIFLORPAN) at UNIPAN, and the International Cooperative Biodiversity Group (ICBG) at STRI.

Seed Banks. The genetic resources of some native species are kept in seed banks, plant nurseries, and plantations. Organizations that carry out this activity are Centro de Semillas Forestales and Centro de Manejo de Recursos Naturales (CEMARE) from ANAM, and the Centro Internacional Forestal (CIFOR) at STRI.

Germplasm banks and biotechnology. This *ex-situ* conservation program is directed mainly to domestic plant and animal species. Biotechnology focuses on the development of in vitro cultivation methods, genetic modification, and germplasm banks, among others, that shorten plant reproductive time. This technique has been used mainly in agriculture, and lately in forestry. IDIAP and Departamento de Genética-UNIPAN are working in this line of research.

Germplasm banks are used for the conservation or storage of plant genetic material from domestic plant and animal species of economic interest. The main institutions in Panama are IDIAP and Facultad de Ciencias Agropecuarias-UNIPAN, which focus in the conservation of plant germplasm from crops species such as coffee, corn, rice, and potato, among others.

SECTION IV

USAID/Panama's Program

With the writing of the new country plan, USAID/Panama will align itself under the new Regional Strategy for Central American and Mexico (CAM) FY 2003-2008, the goal of which is "a more democratic and prosperous Central America and Mexico, sharing the benefits of trade-led growth broadly among their citizens." This section first reports on USAID's activities under the previous strategy, then introduces the new CAM regional strategy and the new country plan for Panama.

A. Background on the USAID/Panama Program

In 1940 the Panama U.S. assistance program began with technical assistance to establish a rubber tree plantation. The U.S. Agency for International Development (USAID) and its predecessor agencies, over the past 64 years, have provided $1.2 billion in bilateral economic assistance to Panama.

Financial resources assisted the Government of Panama (GOP) during the 1960s and 1970s and most of the 1980s in a range of socioeconomic sectors. Financed activities included projects in health, education, population and nutrition, housing, rural and urban development, institutional strengthening, and community development, among others. During the 1990s, USAID carried out a process of reengineering, to achieve greater efficiencies and development impacts with increasingly limited resources. Today, as a result, USAID/Panama focuses on a reduced number of strategic objectives.

Historically USAID/Panama has had positive impact on the conservation of tropical forests and biological diversity, including the establishment and management of Panama's protected areas. Credit is given to USAID's MARENA Project for saving much of the canal regions protected areas after handover of the territory. Without the parks infrastructure and management staff, settlers would have quickly moved in (Bathrick and Kernan 2003). USAID has also been a leader in protected area management, innovative funding mechanisms and raising the awareness of local communities to the benefits of nearby protected lands. Watershed management in Panama has been enhanced through USAIDs environmental-friendly technology demonstrations. Ecotourism and handicrafts support has also been a focus of activities, encouraging communities to find economic reward in conservation.

B. USAID/Panama's Previous Program 2000–Present

- The strategy for Panama had the following strategic objective and two special objectives: Panama Sustainably Manages the Panama Canal Watershed (PCW) and Buffer Area
- Improved Governance and Judicial Reform
- Community Development Humanitarian Assistance in Panama's Darien Province
  Small Projects Assistance (SPA) Program

USAID environmental activities focused on the protection of the canal watershed, forming a large part of its overall strategy. The resource management program included the following two initiatives.

Protection of the Panama Canal Watershed. Begun in 2000, this six-year, approximately $25 million initiative is carried out in conjunction with the Panama Canal Authority (ACP) and numerous public and private agencies and organizations. Sustainable protection and management of the Panama Canal Watershed (PCW) is recognized as critical to protecting the fresh water necessary for Canal operations. The efficient and continuous Canal operations underlines the U.S. government's economic and strategic interests in this vital waterway, because an effectively functioning Canal ensures rapid transit of cargo,

cruise ships and U.S. warships between oceans. The PCW also provides the water resources for industrial and human consumption in Panama City and Colon.

Technical assistance, training, and commodities are provided in this program to enhance Panamanian institutional capability to effectively protect and conserve the natural resources in the Panama Canal Watershed. This activity seeks to increase the participation of current and future residents in the area in the decision-making process and in the implementation of specific actions designed to achieve the Strategic Objective. The focus is on building alliances that integrate the efforts of Central Government line ministries with those of the private sector, civil society, local governments, and local communities to address critical environmental issues in the watershed through environmentally sound practices, improved management, and activities that enhance biodiversity and water quality conservation (from the U.S. Embassy Web site).

This Strategic Objective was divided into two complementary areas (intermediate results) described below.

- Integrated watershed management demonstrated in selected sub-watersheds. Outcomes expected include the development of policies, technology and financial mechanisms for replication throughout the PCW, and to have the PCW stakeholders perform their roles and responsibilities effectively. Activities take place in selected pilot sub-watersheds, demonstrating watershed management on a manageable community scale.

- Environmental management of protected areas upgraded. Expected outcomes include the implementation of sustainable management models, and the implementation of sound economic activities in protected areas. A debt swap under the Tropical Forest Conservation Act has been negotiated that will ensure sustainability of the Parks in Peril pilot activity in the Chagres National Park. USAID is assisting in the development of an ecotourism pilot project in Soberania National Park.

The two special objectives under the old strategy are summarized below. These activities will continue and be expanded under the new country plan.

Improved governance and judicial reform. The current justice system suffers from a lack of transparency, delays, inefficency and insufficient resources. USAID's activities have focused on four intermediate results: (1) Criminal court systems functioning more effectively by implementing targeted institutional reforms, (2) Commercial court systems functioning more effectively by demonstrating the effectiveness of alternative dispute resolutions (ADR), (3) Increased public pressure for judicial sector reform, and (4) Improved collaboration between investigators and prosecutors.

Community development humanitarian assistance in Panama's Darien Province. In FY 2003, USAID initiated a three-year $6 million pilot program in Panama's Darien province under the Andean Regional Initiative, designed to establish a buffer against the Colombian conflict and to support stability in the area. USAID is providing small grants, technical assistance, and training directly to communities for self-help development programs, in order to strengthen local government and nongovernmental organizations in Darien, and improve the populations' economic and social well-being in selected communities.

C. Regional Programs

A variety of other USAID activities in Panama include regionally supported activities, managed from the Guatemala-Central American Program (G-CAP) office.

PROARCA/APM. The Protected Areas and Environmentally Sound Products Component of the Central American Environmental Program (PROARCA/APM) is a five-year effort started in 2001 to consolidate the Mesoamerican Biological Corridor by strengthening management of the area's parks, and by expanding both production of and market access for environmentally sound products and services. CCADdirects the project, with financial support by USAID. The Nature Conservancy, World Wildlife Fund and the Rainforest Alliance are implementing the initiative. The Rainforest Alliance and WWF are working with producers and traders of certified, eco-friendly wood, coffee, bananas and seafood, as well as tourism operators. PROARCA/APM is focusing on four biologically rich areas of Central America, including the Gulf of Honduras (Belize, Guatemala, Honduras), the Gulf of Fonseca (El Salvador, Honduras, Nicaragua), La Mosquítia (Honduras and Nicaragua), and Amistad-Cahuita-Rio Cañas (Costa Rica, Panama).

In all four of these regions, Rainforest Alliance is leading PROARCA/APM's tourism and agriculture efforts. Through expanding the availability of products and services certified as "sustainable," and by building alliances to help successfully market these green goods, the livelihoods of local people are improved while reducing threats to the area's wealth of biodiversity.

By providing market incentives that encourage foresters, farmers, and tourism operators to meet environmental and social standards, and become careful, caring land stewards, environmental threats to parks, reserves and other critical ecosystems along the biological corridor are minimized. Sustainably managed operations can be good neighbors to protected areas, minimize the potentially negative impact of their work, help stabilize local communities, and set them on the path toward sustainable development.

The Peregrine Fund is expected to breed and release additional harpy eagles in Panama and other countries of Central America. The organization will also implement its sustainability plan, and expand its environmental education program to other areas of Panama and Central America where it plans to release harpy eagles.

Regional strategy for Central American and Mexico (CAM) FY 2003-2008. In order for USAID to continue its role in humanitarian aid in crisis situations, and strengthen emergency preparedness in a region known for hurricanes, flooding and earthquakes, a Special Objective to deal with crises is included in the strategy:

Table 10. Central American and Mexico Regional Strategy FY 2003-2008

Ruling Justly: More Responsive, Transparent Governance SO1
- IR 1: Strengthen Rule of Law
- IR 2: Greater Transparency and Accountability of Governments

Economic Freedom: Open, Diversified, Expanding Economies SO2
- IR 1: Laws, policies and regulations that promote trade and investment
- IR 2: More competitive, market-oriented private enterprises
- IR 3: Broader access to financial markets and services
- IR 4: Improved management and conservation of critical watersheds

Investing in People: Healthier, Better Educated People SO3
- IR 1: Increased and improved social sector investments and transparency
- IR 2: Increased and improved basic education opportunities
- IR 3: Improved integrated management of child and reproductive health
- IR 4: HIV/AIDS and other infectious diseases contained and impact mitigated

Timely, Effective Humanitarian Assistance and Crisis Response SPO
- IR 1: Disaster/crisis prevention and preparedness
- IR 2: Humanitarian relief and reconstruction

The regional strategy calls for numerous activities that will conserve and better manage forests, natural resources and biodiversity. The strategy will stem threats of environmental and resource degradation and loss of biodiversity; and decentralize and devolve authority to local groups, in order to place resource decisions "closer to the public and citizenry's watchful eye."

The CAM strategy recommends providing technical assistance to legislatures and ministries in developing laws and regulations that encourage targeted policy interventions to facilitate civil society and local government participation in cultural and natural resource management. Policy reform is essential to ensure sustainability and "scale up" ability - local government and communities must have more control over the resources on which they depend, as well as real economic advancement. Also along the lines of policy, the correct policy frameworks and incentives for enterprises, and improved legal and regulatory environment for small and medium enterprises would encourage the conversion of commodities, in this case commodities based on natural resource input, into higher value-added products.

The Regional Strategy emphasized both the rural sector and the nonagricultural sector. Economies must diversify, and expand the nonagricultural sector, in particular the rural sector, with an emphasis on job creation. USAID programs should help the private sector establish new enterprises and market linkages, especially when these these enterprises and linkages provide economic opportunities supported by the natural resource base, including tourism, services, specialty coffee, forest products, and "green products." An important link with environmentally focused markets includes product certification. Technical assistance to help firms identify and compete effectively in "green" markets are needed.

Some illustrative activities suggested in the regional strategy included supporting technical assistance for sustainable tropical forestry activities; help to certify and market legally-sourced timber and non-timber products; technical assistance to protected areas management targeting sustainable economic alternative in critical watersheds, including major tourism sites. The regional strategy also specifically recommended activities that promote biodiversity conservation, and carbon capture and sequestration.

Some indicators proposed in the regional strategy included sales of environmentally friendly goods and services; revenue generated from sustainable use of natural resources; volume/value of product sales under systems of environmental certification; number of alliances for effective commercialization of certified products and services; and the amount of fees collected for environmental services.

The regional strategy addressed another subject of importance to forest and biodiversity concervation - forest fires. A special objective supports the improvement of emergency preparedness systems, including the assessment of forest fire risk. Improved national and regional disaster preparedness, and response institutions and networks, will ensure sound planning and can help reduce loss of forest resources and biodiversity.

D. Panama Country Plan FY 2004-2008

During USAID/Panama's transition from the current bilateral strategy to the regional strategy for Central America, the mission plans to continue the Panama Canal Watershed and justice reform activities, under two new strategic objectives (Country Plan, USAID 2004).

Strategic Objective 1 (SO 1) ***Ruling Justly: More Responsive, Transparent, Governance***
During the strategy period the approach in Panama will be first to build a base of support and demand for justice reform and fighting corruption. This will be accomplished through supporting civil society organizations that will work with agents of change in the new GOP (elections are scheduled for May

2004), the media, and others. Conflict prevention activities (provision of social services including justice mediation centers or similar) in the Darien will continue as funding allows. The first two years of the strategy are basically a continuation of the bridge program with the exception of adding an interagency approach to addressing critical issues in fighting corruption. In later years of the strategy (Years 3 through 5) the expectation is that the momentum for reform, especially in the justice sector, will have increased sufficiently to support sustainable rule of law reform which will promote Panamanian interest, values and expectations in the manner that can command sustained efforts by political leaders, institutions and civil society. The objective of expanded support for sustainable rule of law reform would be to strengthen the overall independence, fairness, efficiency, accessibility, and transparency of the justice system.

The principal results anticipated at the end of the five-year country plan are: strengthened rule of law and greater transparency and accountability of the government. If funding permits, selected conflict prevention activities under both IRs in environmental governance and transparency will be implemented in the Darien that will help to prevent spillover effects of the violence in Colombia.

Intermediate Result 1.1 ***Strengthened Rule of Law***
Activities under the first IR will expand the participation of civil society, including business organizations and the media, in promoting and maintaining momentum for justice reform; giving citizens greater access to prompt, fair, and affordable avenues to resolve disputes; expanding the capacity of justice sector institutions to implement selected reforms including the criminal procedures code; increasing GOP presence in at-risk communities of the Darién through the provision of local justice and environmental justice activities.

Among illustrative activities are some that are Darien-specific, including mediation centers, "*corregidores*" trained in environmental governance to forestall illegal logging and ranching, civil society trained to carry out social auditing activities of strategic planning and infrastructure construction activities of selected municipalities.

Intermediate Result 1.2 ***Greater Transparency and Accountability***
Activities under the second IR will foster political will to reduce corruption and increase greater transparency of government activities. Especially important to conflict prevention will be supporting democracy activities at the grassroots, such as training CSOs to work in partnership with municipalities to oversee community development activities in the Darien.

Strategic Objective 2 (SO 2) ***Economic Freedom: An Open, Diversified, Expanding Economy***
USAID/Panama is convinced that an integrated program of watershed management that focuses on sub-watershed level environmental governance and on-the-ground implementation of best practices and technologies will significantly enhance Panama's ability to ensure sustainable development and provide for the domestic and productive needs for water of its population. Promoting locally-based sustainable natural resources management is furthermore an excellent entry point to support well-functioning and democratic models of decentralized governance and conflict resolution.

In the Panama Canal Watershed, the protection of the natural environment is vital to safeguarding the freshwater resources upon which both the canal's hydrology and watershed residents depend. Intact vegetative cover is an overall goal, and promoting more environmentally sustainable forms of economic development, especially ecotourism, will help ensure that critical ecosystems are conserved well into the future.

The rural economy of the Darien Province is strongly dependent on the natural resource base. Diverse ethnic groups have sustainably derived their livelihood for centuries from rich tropical forests, extensive river systems, and coastal resources, resources which are increasingly scarce and threatened. Faced with increased population pressures and introduction of different types of economic activities, the adoption of improved land and resource management practices is essential, in conjunction with increased basic service delivery, in the context of community-based and participatory models of decision-making about use of shared resources.

In addition to efforts located in and around critical protected areas, with a focus on the expansion of high potential public-private partnerships in ecotourism, national activities will be promoted, such as the harmonization of legal and regulatory instruments for environmental management and increased enforcement and compliance with environmental law. Additional areas of environmental law may be explored for the protection of environmentally sensitive areas, including the role of conservation easements and incentives for relocation or changed practices of private landowners, and other environmental legal and policy reform that fosters the enabling environment for economic opportunity. Strong emphasis will be placed on participatory environmental governance, including the active involvement of marginalized groups and women.

Intermediate Result 2.1 ***Laws, Policies, and Regulations that Promote Trade and Investment***
Activities under this IR will facilitate implementation of the FTA (Free Trade Agreement) between Panama and the United States.

Intermediate Result 2.4 ***Improved Management and Conservation of Critical Watersheds***
Activities under this IR will promote policy and legal reforms, behavioral change, and a more participatory and practical approach to watershed and protected areas management. Successful watershed management activities in pilot sub-watersheds and protected areas will be replicated with national impact.

Illustrative activities, in the Canal Watershed, include community watershed planning, implementation of better management practices by the agricultural sector, implementation of a jointly managed incentive fund for community-based actions with the ACP/CICH, promotion of public-private partnerships for environmentally sustainable economic activities, improved information management, and community awareness/behavior change interventions. Activities will also build on efforts in the area of environmental law initiated under the previous strategy.

Illustrative interventions in the Darien will emphasize community involvement and planning, information management, public-private partnerships, and ecologically friendly economic development. Particular emphasis will be placed on mitigating natural resource-based conflicts through more effective and equitable decision-making processes. Opportunities to execute another TFCA debt-for-nature swap arrangement will also be pursued in conjunction with a suitable partner NGO, as a potential source of sustainable financing for watershed protection and conservation in the Darien.

SECTION V

Recommendations and Conclusions

The Section 118/119 Assessment team carried out its activities from February to March of 2004. The Assessment is designed to advise the USAID/Panama mission on the status of biodiversity and tropical forests in Panama, evaluate the impact of the new strategy activities on biodiversity and tropical forests, and recommend important opportunities and synergies within their program.

A. Major Recommendations

A list of the major recommendations is followed by discussion, justification, details, and an explanation of how each supports the mission's strategic objectives and intermediate results.

1. **Support the upgrade of the National Environmental Agency to a ministry at the cabinet level.**
2. **Develop and endow a Conservation Research Center**. (*Critical applied research needs include the ecology of timber species, the ecology of forest habitats that produce important economic benefits, and the effects of management activities*.)
3. **Encourage and facilitate laws and regulations that transfer use rights of forest lands, marine areas, and resources to local communities and local interest groups**. (*Some examples include community forest concessions, marine reserves, mangrove forests*.)
4. **Write or change regulations that encourage good land stewardship**. (*Some examples are certification regulations, organic production regulations, incentives for private conservation reserves, and regulations that give communities long-term concessions*.)
5. **Support and provide funds to the Panamanian Forest Service to enable it to carry out its increased role**. (*Expanded responsibilities will include halting the movement of illegal timber, granting community forest concessions, training citizen groups in forest management, and advising the public on reforestation practices*.)
6. **Support and provide funds to the Panamanian Parks and Wildlife Service to enable it to carry out its role**. (*Expand abilities to patrol, protect, and monitor protected areas with adequate staffing and resources.*)

B. Geographic Recommendations

After a review of important environmental regions of the country, the team recommends that USAID/Panama focus on two geographical areas. Discussion of these conclusions is found in the recommendations section of this report.

1. **The Panama Canal Watershed**
2. **The Darien Province**

C. Status of Biodiversity and Tropical Forests

As a tropical country with fairly abundant rainfall, Panama supports a high biodiversity. Further contributing to the richness of species are the life forms that have migrated here over the millenia, plant and animal species from farther north, and completely unrelated species from South America. Throw into the equation the geography of Panama – from vast underwater marine habitats, enormous coastlines and

substantial mountain ranges – and you have a breathtaking array of life's diversity, packed into a relatively small space on the globe.

The availability and quality of freshwater supplies in the country is directly linked to the status of forest cover and good management of watersheds; any deterioration or loss of healthy, diverse vegetation is a threat to both water quality and biological diversity. The status of fresh water resources in Panama depends upon their location within the country. Water quality is reflected in the characteristics of the watershed that produced it. Undisturbed watersheds, generally found in remote regions and protected areas, produce high quality, unpolluted water. Water bodies (lakes, streams and wetlands) that occur below deforested, farmed, grazed, roaded and urban lands have lower water quality, usually with higher levels of sediment, and organic and inorganic contaminats. Undisturbed forested areas produce less flooding and fewer landslides during periods of high rainfall, and more water flow during the dry season, when compared to developed and degraded watersheds. Watershed areas considered critical in Panama include the Panama Canal watershed, and the Bayano watershed. The Rio Bayano is one of the most important rivers in Panama for hydroelectric power and freshwater swamps, while the Panama Canal watershed is important for the operation of the canal, and therefore Panama's economic health, and global commerce. The Panama Canal watershed is also important for electric energy production, agriculture, industry, and the demand for drinking water, in addition to the survival of forests and wildlife. The status of the PCW depends upon the location of the sub-watershed in question. Protected areas have fairly good water quality status, while those near settlements, industry, and roads have poorer status.

Overall, the team finds the status of biodiversity and tropical forests in Panama fairly good, though threatened. This is due to a relatively low population density outside urban areas, with large areas of virtual wilderness, high education levels in many parts of society, and a history of job opportunities outside of farming (especially in and near the canal area). Also, in recent decades Panama has set aside an impressive system of protected areas, designed to maintain its diverse habitats and lifeforms. Protected areas cover about 25 percent of the country, and 44.5 percent of the country is forested. A recent deforestation rate is calculated at 0.5 percent per year, lower than earlier forecasts. And, although numerous species are considered threatened with or in danger of extinction, none are reported to have become extinct in recent centuries. This may be due to the fact that many areas are little known or studied, and major gaps remain in our knowledge of their ecosystems and biodiversity. Although Panama has rich biodiversity and forest resources nationwide, these resources have intense and localized threats, threats that continually undermine and convert rich natural habitats to poor, degraded sites.

D. Major Threats to Biodiversity and Tropical Forest Resources

The most important threats to biodiversity and tropical forests in Panama include road construction and road improvement, especially in the Darien, and the Caribbean Coast; agricultural expansion, particularly in Darien and Bocas del Toro regions (which is linked to new and improved roads and resulting increased access to forests); and loss of mangrove forests due to filling for development and conversion of shrimp ponds.

Threats to water quality and the periodicity of water quantity (floods in rainy seasons, and low water flow in dry seasons) are numerous. The major threats include deforestation, road construction, mining, burning, urbanization, poor farming practices, widespread grazing and farming on steep slopes, industrial growth. These activities can result in increased sedimentation from erosion, increase in nutrients, pesticide runoff, organic contamination, microbial contamination, and erratic water flow.

An important factor in loss of forests and other habitats is the perception that undeveloped natural areas are available for other uses. This perception sometimes appears to be held by the government of Panama, which has been inclined to appropriate protected lands for roads and developments (i.e. Metropolitan Park and Volcan Baru), and farmers and cattle ranchers who face little or no opposition to clearing forest land for agricultural production. National lands are especially vulnerable, as there is often no local individual or community to enforce the protection of these lands, and the national authorities are woefully understaffed to defend national land's integrity. Another threat, although not highlighted in the documents reviewed, is the constant removal of valuable resources occurring nationwide, include valuable timbers, wildlife for meat and souvenirs, and other useful plant and animal species, leaving habitats depauperate and degraded. This too is due to lack of local control of resources, and the scarcity of national authorities to enforce regulations. Degraded areas are especially vulnerable to the invasion of elephant grass (*Saccharum spontaneum*), which has been a real problem within the PCW. Elephant grass was introduced to control erosion for the canal and served that purpose. Other areas covered by elephant grass, however, can pose a threat to biodiversity, preventing the establishment of native forests, and falling victim to repeated wild fires. Finally, critical local threats include devastating forest fires, pollution of water habitats, and sedimentation that is destructive to marine life.

***Deforestation recommendations*:**

- **Encourage and facilitate laws and regulations that transfer use rights of forest lands, marine areas, and resources to local communities and local interest groups**.
- **Write or change regulations that encourage good land stewardship**.
- **Support and provide funds to the Panamanian Forest Service to enable it to carry out its increased role**.

Deforestation is a continuous threat to biodiversity in Panama. Loss of forest cover is often linked to agricultural expansion, which often follows new or improved roads, resulting in increased access to forests. Early logging concessions resulted in the conversion of forests to agriculture, and illegal logging is a common problem that continues today. Illegal loggers avoid paying felling permits, taxes, the time-consuming buracracy required to harvest legally. Additionally, the government lacks of control over management plans, border customs houses and ports (Weaver and Bauer 2003).

In the Darien a source of friction among the population is illegal logging and other resource extraction. The Interamerican highway is seen as facilitating resource depletion, blamed for severe environmental degradation in the region, as it allows trucks to penetrate the previously dense forests (ACDI/VOCA and CICR. 2003).

Much deforestation comes from a lack of land rights by farmers, and the belief that clearing and farming land will bring you title. The National Cadastral Survey, being carried out by PRONAT (*Programa Nacional de Administración de Tierras*) is currently underway in some pilot areas of the country. This land survey project should have a major impact on protected areas, forestry, and farming in Panama. PRONAT is to document and guarantee land tenure, and consolidate and demarcate protected areas and indigenous territories. This effort should have a stabilizing effect on future management of all lands in Panama, as the results of the cadastral survey become known by the general public, and land titling procedures are widely understood. If it is known that title will not be granted to those who cleared protected areas, and the current demarcation process is completed, farmers and ranchers will be less likely to move into these areas. This land survey is considered by the team to be of critical importance to the future of forestry, agriculture and the biodiversity of Panama, through the stabilization of land ownership, and enforcement of protected area boundaries.

Many opportunities are available to increase forest cover in Panama. Several NGOs have experience in enabling legislation, training groups in writing forest management plans, planning sustainable harvesting, directional felling, and marketing of forest resources. Support should be offered to revise forest management regulations, including concessions, co-management, and management of private plantations and forests.

Communities should be given long-term tenure over forest lands, along with training in forest management planning, forest harvesting, and skills training in processing and marketing forest products. The result will be an increase in individual and community income, while creating incentive for protecting watersheds under permanent forest cover.

We recommend that USAID/Panama embrace and encourage the transfer of resource management capacity to local communities where appropriate. The advantage of the natural linkages between the well being of native (indigenous) people and conservation of unique flora and fauna are well documented. USAID has experience throughout the isthmus in the successful management of natural forests through community forestry – tapping into the benefits of local empowerment. USAID's capacity to deliver international expertise in forest management, promote transfer of resource tenure to local residents, foster income generation based on wild forest products (supported by micro-finance, training, marketing and conservation research), could have a significant impact on the more remote, highly-unique resource areas of Panama as well as the more commercial core area of the Canal. Native populations in Panama inhabit the remaining large tracts of forest in the country, located in areas of strategic importance to the United States, including the Darién. These biologically rich areas are not only threatened by the encroachment of settlers, but also by illegal mining, land speculation, extreme poverty, illegal logging and drug trafficking. Our recommendation to work with community empowerment is consistent with the need to address many of these ills.

Policy and regulation recommendations

- **Encourage and facilitate laws and regulations that transfer use rights of forest lands, marine areas, and resources to local communities and local interest groups**.
- **Write or change regulations that encourage good land stewardship.**

The mission should provide specialized and technical assistance to enlighten government regulations as they pertain to long term logging concessions, local tenure, titling of private lands, forest certification, ecotourism concessions and agricultural policies. The resources that would be better managed by trained communities and entrepreneurs include forests, non-timber forest product's habitat, and productive coastal and marine sites.

Institutional recommendations:

- **Support the upgrade of the National Environmental Agencies to aministry at cabinet level.**
- **Support and provide funds to the Panamanian Forest Service and the SINAP to better carry out their increased roles**.

USAID/Panama should strongly support the elevation of the National Environmental Authority to ministerial level within the government. Such an elevation would result in influence on all aspects of the country's governanace from an environmental point of view.

The Forest Department should have increased autonomy, funding, increased staff, and a more appropriate mandate and regulations for transferring control, use, and protection of resources to the communities within and adjacent to national lands. This will also enable it to better carry out the demands of forest

management certification, and preventing illegal logging. Similarly, strengthening of the Parks and Wildlife Service through increased staffing and resources would enable them to protect and manage protected areas.

It has been suggested that the creation of ANAM weakened Panama's ability to manage its National System of Protected Areas and has resulted in reduced financing for the protected areas. Other claims include the influence of politics in management decisions and personnel selection, inefficiencies in day-to-day operations and decision making, and loss of well-trained protected area staff. It has been suggested that SINAP management should be separate from ANAM's regional administration (Bathrick and Kernan 2003). This echos others contention that the Forest Service could better carry out its responsibilities without the cumbersome administration of the environmental agency.

ANAM is perceived in some quarters to be an example of government corruption, with representatives unable to carry out their mandate of enforcing environmental regulations, including oversight of logging concessions and other natural resource extraction. A perception of serious corruption within the governance structure of the indigenous communities also exists, including problems in granting timber concessions to outside logging interests (ACDI/VOCA and CICR 2003).

Research recommendation

- **Develop and endow a Conservation Research Center**

Biodiversity research focused on managing Panama's tropical forests is inadequate. There is no organization or institution in Panama devoted to applicable biodiversity or forest management research. ANAM is prohibited from carrying out research; STRI focuses on valuable ecological research, but not in most protected areas and not subjects critical for biodiversity conservation and management; local university research is mostly limited to students' theses. No organization in Panama plans, coordinates or funds research on valuable wild species and their management in Panama. Protected Area inventories would be a good place to start, especially in areas where there is almost no field information on biodiversity. Numerous areas of the country could use support, including the Darien area, Golfo de Chiriquí Marine National Park (Guzmán from STRI is exclusively looking at corals), Portobelo National Park, Gaital Natural Monument as well as some proposed small biological corridor examples where there are local communities and entrepreneurs are active in ecotourism (such as the proposed Cerro Campana - Cerro Gaital - Cerro La Vieja biological corridor). Targeted research on economically valuable species and their habitats will result in better management of wild populations and viable stocks of raw materials to support local residents and artisans in perpetuity.

A review of appropriate organizations and locations would be necessary. Several NGOs are interested in such research support. TNC is interested in establishing a long term biodiversity monitoring program at the landscape scale for the region between Chiriquí Gulf and Montijo Gulf, for La Amistad, and also along the Central Cordillera. Proposals have been made to establish a biodiversity institute in Panama, supported by the Wildlife Conservation Society and the Panama Mammal Society. Such an institute would be valuable to guide, fund and support research on ecosystems in managed protected areas and natural forests of the country.

E. Globalization

The government of Panama will be negotiating a Free Trade Agreement (FTA) with the United States, and part of the country plan is dedicated to facilitating this agreement. The process of globalization and a free market could have negative consequences for the forest industry, due to its inability to compete with

imported products. If the consumer has access to cheaper products from the international market, the demand for national timber is lessened, which reduces the economical value of national forests and the possibility that they will be used as productive resources. The limits of the attractiveness of investments in the forestry sector, predisposes these lands to more economical activities (Gutierrez 2001a).

The value of grazing lands has an important impact on deforestation. International trends in beef demand, local policies on imports and currency devaluations have major effects on beef prices in Panama. This can impact forest clearing and the reversion of pasture land to secondary forests. The MARENA evaluation (Bathrick and Kernan 2003) noted a study that indicated a strong trend towards the abandonment of pastureland in the Panama Canal Watershed when national policies removed protection for domestic cattle products. As a result, Panama cattle producers could not produce beef as cheaply as their competitors in other Central American countries. Their field observations confirmed that the watershed had a large proportion of recently abandoned pastures covered with natural regeneration of native species. It was noted that measures to protect and manage Panama's natural resources and environment would be futile unless they are designed within the context of international economic trends and local currency rates (Bathrick and Kernan 2003).

The links and consequences of globalization are complex and multiple. The unintended effects on forests and biodiversity could be positive or negative, and a careful review of potential impacts should be studied and considered.

F. Priority of Eco-Regions

The environmental assessment team recommends that USAID/Panama expand the scope of its program to encompass a broader view of strategic options and opportunities in natural resource conservation, community empowerment, and income generation. Limiting assistance to the Panama Canal Watershed, while beneficial and important to the canal watershed, does not allow engagement to address accelerating destruction of globally important biological resources in other parts of the country, nor support indigenous groups that are the key stakeholders in sustainable use and conservation of vast areas of unique rainforest habitat. These forest areas are now facing daily destruction brought about by increasing pressure from farmers struggling to make a living from subsistence agriculture.

Part of the present assessment was to consider different geographic areas in Panama for their tropical forests and biological diversity. The team decided to highlight several as being critical for improved management and protection (Table 9). These areas include the Cordillera Central and adjacent Caribbean Slope, Dry Tropical Forests, the Darién, the Canal Watershed, and coastlines and islands. In addition, Comarcas are suggested as an appropriate area for community forestry, since these indigenous territories occupy large areas of intact forests. Other land classifications to be targeted are national parks and private lands.

Table 9. Potential Geographic Areas of Focus

GEOGRAPHIC AREAS	PROVINCES	SALIENT FEATURES IN CONSERVATION
Cordillera Central	Chiriqui, Bocas del Toro	Biosphere Reserve; cloud forests; Indigenous populations
Dry Forests	Peninsula Azuero, Darién, Chiriqui	Dry forests little represented as protected sites in Panama and Central America; ancient archeological sites
Coasts and/or Islands	All regions of country	Mangroves critical in shore protection; nursery of sea life; beaches of high tourist value; high endemism of species (islands); high biodiversity in coral reefs; economic value of fisheries

Table 9. Potential Geographic Areas of Focus		
Darién	Darién	High diversity, large undisturbed conservation areas; Indigenous and Afro-Hispanic populations; biological link of continents; rapid deforestation; armed conflict
Atlantic Coast Forests	Colon, Veraguas	Lowland to Montane forests, Panama's largest area of intact forest, Biological Corridor between 2 areas of high diversity, low population density, Indigenous populations
Canal Watershed	Panama, Colon	Watershed valuable for high biodiversity, important for hydroelectric power, drinking water source for large population

After a review of the options, the team recommends that USAID/Panama focus on two geographical areas of the country – the Panama Canal Watershed and the Darien Province. The PCW, and its stability and protection, are of special interest on a global scale. The mission has many successful activities and investments within the watershed, and should continue with these efforts.

The Darien, too, is a special case. Long seen as a region of high biodiversity and natural wealth, it merits increased attention in protected area management and conservation. Among the many reasons for increased focus on the Darien are the quality of its wilderness, its diverse fauna and flora, including endemics and threatened species, its important watersheds, native Amerindian groups, its value as an intercontinental disease barrier, and its great potential for ecotourism.

The Darién is recognized as one of the most diverse and species-rich regions in Central America. It includes many vegetation types, from the littoral strand and coastal dry forests to mangroves, brackish and freshwater swamps, and various lowland and premontane to lower montane rain-forest life-zones, including cloud forests and elfin forests (Davis et al. 1997).

Serious threats menace the area, from spontaneous colonization, logging, agriculture, grazing, road-building, and mining, to armed conflict spillover from Colombia.

The Darien presents opportunities to improve environmental governance andwatershed management, protect and document rare biodiversity, improve park protection and practice forest management and conservation. In addition, the region is considered a high priority area under the CAM Regional Strategy.

G. USAID/Panama Impact on Biodiversity and Conservation

Based on our review, the team can report that the planned activities, as they have been so far designed and described, are not likely to have an adverse environmental impact on tropical forests or on biodiversity in Panama. In addition, because of the close linkages between tropical forestry and biodiversity with the mission's strategy, actions and investments, the new Country Plan will continue to contribute to conservation in Panama. To its credit, the mission is continuously involved in carrying out environmental review of its activities, from Initial Environmental Examinations (IEEs), to developing environmental guidelines and monitoring compliance and impacts (under 22 CFR 216 or Reg. 216).

H. USAID/Panama Program Synergy and New Opportunities

Linkages between the recommended actions and USAID/Panama's Country Plan are listed below. Repetition of an illustrative activity is intentional, and is an example of much sought after synergy.

Strategic Objective 1 (SO 1) Ruling Justly: More Responsive, Transparent, Governance

Intermediate Result 1.1 Strengthened Rule of Law

Opportunities to enhance biodiversity and forest conservation by addressing major threats:

- Develop laws and regulations that decentralize rights and responsibilities over forests and natural resources.
- Transfer tracts of land to responsible, supported, and trained groups and entrepreneurs.
- Train "corregidores" in environmental governance to forestall illegal logging and ranching.
- Put check posts outside protected areas to stop illegal logging trucks where the posts do not exist and reinforce the existing ones.

Intermediate Result 1.2 Greater Transparency and Accountability

Opportunities to enhance biodiversity and forest conservation by addressing major threats:

- Transfer natural resources and responsibilities to local groups.
- Have a clear application process and awarding system for natural resource concessions.
- Have community forest concessions approved by a community council and require that payment be directed to an auditable community bank account and record-keeping system.
- Increase forest concessions to 50 or more years, to improve accountability over the state of the resource.

Strategic Objective 2 (SO 2) Economic Freedom: An Open, Diversified, Expanding Economy

Intermediate Result 2.1 Laws, Policies, and Regulations that Promote Trade and Investment

Opportunities to enhance biodiversity and forest conservation by addressing major threats:

- Facilitate the certification of forest products produced by communities, timber companies, and craftsman.
- Better control and secure tenure to enhance investment in resource management.
- Study available tree species, their trade, and uses and demand worldwide.
- Develop laws and regulations that grant local rights and responsibilities over forests and natural resources.
- Transfer tracts of national land to responsible, supported, and trained groups and entrepreneurs.

Intermediate Result 2.4 Improved Management and Conservation of Critical Watersheds

Opportunities to enhance biodiversity and forest conservation by addressing major threats:

- Support and endow a conservation research center
- Providing training in low-impact harvesting
- Research ecology, conservation, and sustainable harvesting of valuable wild crops.
- Develop laws and regulations that grant local rights and responsibilities over forests and natural resources
- Transfer tracts of national land to responsible, supported and trained groups and entrepreneurs
- Provide training in fire prevention and suppression.
- Provide training in the development of long term forest management plans
- Provide training in low-impact harvesting methods (timber and other)
- Provide training in writing forest management plans
- Enhance forest certification

Suggested Activities for USAID/Panama. We have included here several ideas for future USAID/Panama activities, utilizing the recommendations offered in this assessment. Efforts were made to point out opportunities, benefits and linkages, funding ideas, and proposed actions, including the review of similar endeavors by other missions, and promising NGO partners. Many of the best linkages, however, will be dependent on where the activity takes place, and who the existing local actors are.

Sustainable Use, Collection, and Trade in Timber, Plants, Wildlife, and Fisheries

Opportunities:

- There is an increasing awareness of resource shortages of various non-timber forest products.
- High demand from traditional collectors, raises the price of resource.
- Traditional collectors are motivated to protect and manage the ecosystem.

Benefits and Links: Local users can stop encroachment of their forest lands, safeguard income to artisans; avoid degradation of harvested species. Better management linked to local control of resource; critical need for research on ecosystems and species highlighted; possibility of certification.

Proposed Actions: 1. List species of value to particular communities. 2. Support research on the habitats, life cycles, and preferred harvesting practices. 3. Determine maximum harvesting levels. 4. Advertise the sustainable nature of the articles produced to boost price and increase sales. 5. Explore certification possibilities. 6. Explore mechanisms to hand over management to local communities.

Notes: Local residents and artisans sometimes over-harvest forest species, resulting in the loss of valuable renewable resources if they are not able to reproduce and regrow in the wild. As a result of this pressure, there is a need for native species research, to safe-guard these important income-producing activities.

There is an increasing awareness of resource shortages of various non-timber forest products, due to a high demand from traditional collectors, and the possibility of encroachment of outside collectors, as shortages and prices drives up the demand for the products. Some raw materials provided by forest lands include fibers for hats, woven bags, baskets, medicinal plants, *tagua* seeds for vegetable ivory carvings, cocobolo wood (*Dalbergia retusa* Rosewood) for carving, fuelwood, building posts and timbers, roof thatch, building materials: sand, rocks, wild plants, such as orchids and ferns, charcoal and tannins. As a result of increased use of these products, there are increasing needs for management strategies based on ecological studies of species and ecosystems.

Benefits to better knowledge of high value species include safeguarding income to artisans, and avoiding degradation of harvested species. Better habitat management can lead to higher prices for local products, through advertising of it’s sustainable management, and possibly certification.

Some initial steps needed to carry out this work include: the listing of various species used by communities, supporting research on the habitats, life cycles, and preferred harvesting practices of selected species, determining maximum harvesting levels. Once ecosystems are managed in an enlightened manner, support can be given to advertise the sustainable nature of the articles produced to boost price and increase sales, explore certification possibilities, and explore mechanisms to hand over management to local communities.

Governance, Legislation, And Tenure

Opportunities:

- opportunities now exist to change land management decisions, including a growing public perception of the problems, recognition by government officials, and the beginning of a national cadastral survey.
- provide examples of decentralization in resource management exist in the region
- existing efforts in Panama to review forest and tourism regulations

Benefits and Links: Links governance, empowerment and decentralization with resource conservation.

Proposed Actions: In order to pursue local management of forest lands, there should be a review of forest concessions in the region, including enabling legislation, regulations, time frame, management requirements and monitoring. Also in need of consideration are agricultural policies, indigenous community management of natural resources, and the impact of commodity prices on land clearing or abandonment for livestock. An area potentially very important for encouraging forest cover in the landscape is the regulations and incentives for the network of private reserves, and conservation/ecological easements.

Some steps to carry out this aspect of judicial reform would include listing corregidores found in proximity to reserves and parks, developing training materials, distribute information and hold training sessions.

Notes: Environmental issues are greatly influenced by governance issues, including local application of environmental regulations, and lack of local empowerment of communities, such as insecure tenure over forest lands. In Panama, government policies often encourage forest clearing, through a variety of mechanisms and popular conceptions.

FAO and the International Tropical Timber Organization (ITTO) have several projects designed to support forest management in Panama, to define mechanisms for institutional and private participation in forest activities, and to define priority areas and action mechanisms for forest management.

Local corregidores often have little knowledge of environmental laws, and little impact on their enforcement. These local officials are important links in the enforcement of environmental laws, and have influence on resident's behavior. Training targeted officials adjacent to or within protected areas result in less illegal hunting and harvesting in protected areas. Training could also be tied to support for local solid waste management, water conservation and forest burning. Municipalities are supposed to fulfill a role in conservation of natural resources; some municipalities developed environmental plans with advice/support from Greencom, a USAID funded project.

Management and Protection of Natural Forests

Opportunities:

- New programs should take advantage of recent initiatives in Latin America to hand control of forest resources to local communities.
- The experience will aid in revising forest management regulations, including concessions, co-management, management of private plantations and forests.
- WWF Forestry office in Costa Rica has community forest program in Nicaragua, and WWF Colombia has a large program in community forest management in the Choco/Darién area of Colombia.
- Demand for certified forest products are growing worldwide, and experience with certification has matured.

Benefits and Links: The benefits of encouraging local control over forested, or potentially forested watersheds include halting and reversing deforestation, forest fire protection, increased rural incomes, increase community organization and resources; these benefits could be especially valuable to indigenous communities with vast forest territories.

Funding Possibilities: Funding possibilities include the Global Development Alliance, Tropical Forest Conservation Act Debt Swap, and Program Funds.

Proposed Actions: In order to pursue this course of forest conservation, community management in the Petén of Guatemala (USAID/Guatemala's Petén Community Forest Concessions), in Bolivia (USAID/Bolivia's BOLFOR) and recent community forest programs in Nicaragua and Colombia should be reviewed. Essential is the study of enabling legislation for community forest management in other countries, such as long-term concessions, conservation easements, etc. Contact should be initiated with experienced NGOs (WWF, Conservation International-Rainforest Alliance) to discuss their track record and recommendations for Panama. The certification process should be reviewed (four private forest owners are currently certified by Smartwood and SGS). On the ground in Panama, an effort should be made to locate promising combinations of native forests, local communities and USAID/Panama interest and influence.

Notes: Government policies, national, municipal and local, often encourage forest removal, and secondary forest clearing (brush fields) clearing, to the detriment of overall forest cover, wildlife habitat and biological diversity. These policies not only speed up the removal of mature forests, but produce landscapes without patches of forests between farms and fields. Such treed landscapes are essential for the viability of ecological corridors. In addition, good forest management is not encouraged through laws and regulations, nor is it economically viable.

Promising combinations of native forests and adjacent or imbedded local communities include the Embera/Wounaan Territories (eastern Panamá, former Darien Province, partially inside Darién NP) and Majé-Bayano Region, inhabited by the Emberá-Wounaan and Kunas (province of Panamá, partially related to the Bayano Lake catchment area). There is currently a problem with indigenous leaders giving concessions rights to timber companies, and ANAM is concerned and considering the possibility of establishing a pilot project regarding training and sustainable forest use. Another region of interest is the Ngobe/Bugle Territory (western Panamá, partly former Chiriquí and Bocas del Toro provinces) where territories overlap with the Palo Seco Protection Forest and Fortuna Forest Reserve. Here forest resources are being rapidly consumed by local people, resulting in deforestation.

Improved Land Use and Tourism Practices

Opportunities:

- More visitors are demanding eco-friendly lodging.
- Natural areas are drawing travelers that can give local residents the opportunities for development and income, in terms of small businesses, providing fresh produce, service jobs, and as nature guides or possibly sports fishing guides
- Fortunately, Panama has examples for improved agricultural activities to reduce erosion, and mechanism for increasing trees in the landscape through agroforestry. There is a growing awareness of the problems of overuse and incorrect use of pesticides and fertilizers.

Benefits and Links: Locals benefits by increased visitor levels, and a healthier environment.

Funding Possibilities:

Proposed Actions: Initial steps could include a check with the Panama Tourism Institute's program to see if they have a program for green hotels. Other initial steps would include a review of the region for other successful community management by coastal and protected area communities (such as in Belize, supported through USAID G-CAP's PROARCA, Jamaica's and other possible models), and an inquiry into Panama's hotel and restaurant association's willingness and concern with environmental friendly operations, and the search for appropriate NGO partners. A complete review of Panama's coastal policy would be appropriate.

Initial steps should include the determination of high risk watersheds, such as those near important protected areas, or those having an impact of coastal resources; review policies that foster poor land management, and a lack of trees in landscape. Also important is an analysis of farm commodity prices that effect land use.

Some organizations to consider include *Green Globe 21***,** a worldwide bench marking and certification program which facilitates sustainable travel and tourism for consumers, companies and communities, and the *EAST* (Environmental Audits for Sustainable Tourism) Project, which encourages and assists the tourism and manufacturing industries to identify and adopt cost-savings and environmental mitigation measures in Jamaica and the wider Caribbean Region, through USAID's Caribbean Regional Program.

Notes: While all watersheds in Panama could arguably be deserving of improved management, the team recognized a few that stand out as high risk, and important, such as those near important protected areas or those having impact of coastal resources. These include parts of the Darién, where Filo del Tallo is a hydrological reserve within a sector where water becomes scarce in the dry season, Chiriquí, and Azuero where the Arco Seco has a lack of water during dry season, with the rivers La Villa, Grande, Chico and Guararé are the main sources of water. This shortage affects not only humans and their activities but also biological resources.

Two problems in need of attention are widespread livestock grazing on inappropriate soils, and gold miners using mercury.

Income Generation by Rural Residents

Opportunities:

- Panama has an impressive history and talent in craftsmanship and production.
- There is widespread use of forest products, and local knowledge of locations and field collections.
- Existence of a local and international market in Panama, without the need to export.
- Many artisans groups are already organized.

Benefits and Links: There are links to forest management; income generation; local empowerment; community organization; certification.

Proposed Actions: An initial step should be to review what is artisan raw materials are currently produced from Panama forests (a partial list includes natural fibers for hats, woven bags and baskets, medicinal plants, *tagua* seeds for vegetable ivory carvings, and cocobolo WOOD (*Dalbergia retusa* Rosewood) for carving. A review of centers of expertise and skill in craftsmanship, and an exploration of the supply chain from forest collectors to artisans would be needed. Finally, a search can be made to find informed NGOs and individuals that could advise artisans in improved designs and marketing, and prioritize regions with diversity of crafts of natural resource base products, probably based on proximity to areas important for their ecological value.

Notes:

Rural residents have few options for income generation, driving many to destructive land use practices and urban migration. By providing craftsmen and women with guidance in design and marketing of natural resource based products, incomes will rise, and the productive forests will be more highly valued, and potentially better protected.

Some regions known for their diversity of crafts based on natural resource products include Darién-Comarcas Embera -Wounaan, Coclé (campesinos and cholos), and Ngobe-Bugle. One organization to consider for improved design and marketing would include Aid to Artisans, who have worked on projects funded by USAID/Costa Rica and USAID/Honduras.

ANNEXES

A. Scope of Work
B. Biosketches of Team Members
C. Bibliography
D. List of Persons Consulted
E. Sections 118/119 of the Foreign Assistance Act
F. Protected Areas in Panama by Management Categories
G. Protected Areas in Panama – Details
H. Laws and Regulations for Environment, by Category
I. Summary of Government Organizations and Non-Government Organizations

ANNEX A

Scope of Work

A.4 STATEMENT OF WORK

The study is conceptualized in two parts. The first part will result in a written report that follows relevant USAID guidance on Section 118-119 analysis, attached to this Scope of Work (SOW). The second part will involve assistance in determining how the Mission's Country Plan can respond to the issues identified. The first part will be carried out previous to the Mission Country Plan preparation and the second part will be done concurrent with the development of the Country Plan.

The background assessment will in general follow the illustrative outline presented in the attachment, and will summarize existing data and information on the status of biodiversity and tropical forests in Panama. It will provide an overall description of Panama's biodiversity and tropical forestry assets, evaluate their current status, and identify the pressures and threats affecting these resources. Much of this will involve synthesis and presentation of data and analyses already done by major non-governmental organizations active in the country (e.g., The Nature Conservancy (TNC), World Wildlife Foundation (WWF), Conservation International (CI, etc), other donors (e.g., UNDP, GEF, World Bank, IADB, GTZ) and the Government of Panama itself for all sectors considered in developing USAID/Panama's Country Plan. Information from other sectors programs that impact biodiversity and forestry management options and outcomes will be of particular interest. More specifically, and in accordance with Agency-wide guidance in the attachment, the assessment will compile available information on the following major themes:

- The Policy, Regulatory, and Institutional Framework for biodiversity and tropical forest resources including: a review of the policy and legislative basis for the protection of biodiversity and tropical forest resources, with attention to decentralization; Panama's participation in international treaties and agreements related to conservation; a description and overview of Panamanian Government institutions involved in the sector or whose programs directly impact this sector (e.g., Ministry of Agriculture, Bureau of Tourism, etc.); and an overview of current national level plans to address policy issues related to biodiversity and tropical forest resource conservation.

- An overview of the Non-Governmental Organization (NGO) community involved in biodiversity and tropical forest management activities, including a list of the major organizations, the highlights of their program priorities and an approximate level of finance of their programs.

- A description of the biodiversity and tropical forest conservation activities and commitments as well as descriptions of other major efforts by other Donors and Multilateral Organizations working in Panama that will impact these resources, the highlights of their program priorities and funding levels. Particular emphasis will be placed on plans (or lack thereof) for environmental assessments pursuant to planned large-scale infrastructure investments. If Panama has operational partnerships with other U.S. Government Agencies related to the environment sector, this section will also list and briefly describe those programs related to or impacting biodiversity and tropical forests.

- Provide a description of the major biodiversity and tropical forest conservation activities of the Commercial Private Sector to help identify ways to better foster private sector alliances. Of interest are the norms and standards followed by commercial entities highly involved in the management

and use of Panama's tropical forests and tracts near protected areas, including, inter alia, major logging companies, tourism developers, and other land development concerns.

- Provide a description of the status and management of the National System of Protected Areas (SINAP) in Panama including a list of all declared and proposed areas (national parks, wildlife reserves and refuges, forest reserves, sanctuaries, natural preserves and other protected areas), including marine and coastal areas. The inventory will identify the institution(s) responsible for the protection and management of each area, its date of establishment, area, and, as much as possible, list the status of each. This section will also include an assessment of the current effectiveness of protection and management, major challenges facing these areas and their importance to the economy of the country (including productive assets, environmental services and recreation and tourism opportunities).

- An assessment of the Status and Protection of Endangered Species in Panama, including species in its territorial waters. This section will identify important habitat conservation areas and issues, and evaluate pressures on these areas and efforts to mitigate them, including the participation and compliance with the Convention on International Trade of Endangered Species (CITES).

- An assessment of the Status of Conservation outside the Protected Area System, focused on the different natural resources ecosystems common to Panama, including forest resources, rangeland resources, arid/semi-arid resources, coastal/marine ecosystems, wetlands and the sustainability of the agricultural landscape. This section will include a general discussion of the economic, ecological and social importance of each of these ecosystems; with particular attention to critical environmental services they provide (watershed protection, erosion control, soil and water conservation and amenity and recreation). Emphasis will be placed on the status of wetlands and desert/arid lands in Panama and any threats affecting them. It will also assess the relationship between current land tenure arrangements and effective conservation in the country.

- An overview and assessment of the Impacts of Major Development Projects and Plans on biodiversity and tropical forest conservation, including an analysis of the current policy and regulatory framework for environmental review and approval of their projects and plans.

- An overall assessment of Panama programs for Ex-Situ Conservation and Conservation of Economically Important Species and Germplasm, including a list of the programs of natural history museums, zoos, herbariums, botanical gardens and captive breeding programs and a composite of existing conservation databases. It will also provide a description of on-going programs in Panama for the conservation of important species and germplasm, including gene banks and other efforts to support the sustained production and protection of commercially important wild plant and animal species.

- Provide an executive summary with the findings and recommendations of the assessment. Also, provide a Spanish translation of the executive summary. On the basis of the assessment activities specified above, the contractor will prepare a summary report on the Environment, Biodiversity, Water and Tropical Forest Conservation, Protection and Management in Panama: Assessment and Recommendations. This assessment will follow the attached Agency guidance and include an analysis of the needs for building national capacity, both public and private, and an aware and informed public constituency for biodiversity and tropical forest conservation. It will identify particular issues affecting the protected area system and natural resources protection and management in general. The contractor will include recommendations regarding USAID's future role in conservation in Panama and where U.S. comparative advantages and capabilities are likely to have the greatest impact. These issues and recommendations will be prioritized so as to identify those requiring the most immediate attention.

ANNEX B

Biosketches of Team Members

Tracey Parker (Ph.D.) is a forester specializing in forest ecology, dendrology, and natural forest management. Dr. Parker's professional work began with an OAS Research Fellowship in Argentina and Chile (1985), later evaluating forestry activities in refugee camps in Somalia (1987). She was the natural resource specialist in the USAID/Kathmandu Mission (Nepal), 1989-1993, responsible for the protected area, biodiversity and community forestry portfolio, and later was the regional environmental specialist for Central America (USAID G-CAP) from 1995-1998, focusing on compliance with environmental regulations. In Jamaica she worked for the Forest Department (2000-2002), writing the *Manual of Dendrology - Jamaica* (2003), specifically designed for use in the inventory of the island's forest lands. During her years in Guatemala and Jamaica, she taught dendrology courses to forestry students, and employees of the Forest Department.

Rafael Samudio, Jr. is a biodiversity specialist, with Ph. D. and M. Sc. degrees in Zoology from the University of Florida, and a bachelor's degree in Biology, with a major in Zoology from the University of Panama. His research interests focus on ecology and the behavior of mammals; diversity, biogeography, and conservation of Neotropical birds and mammals; and evolutionary physiological ecology of endotherms. He has working experience in aspects of tropical ecology, conservation biology, wildlife diseases, and teaching. He is a member of the Specialists Group of the Panama National Biodiversity Committee.

Julieta Carrión de Samudio holds a bachelor in biology with a major in zoology (Universidad de Panamá-Panamá); a master's degree in Latin American Studies with an emphasis on tropical conservation and development (University of Florida), and a masters of education with an emphasis in higher education (ULACIT-Panamá). Her research interest is in natural resources conservation and management, with an emphasis on protected areas, wildlife, and formal and non-formal environmental education. Her work experience includes the coordination of multidisciplinary teams in participatory rural appraisals in rural and indigenous communities, and the planning processes in protected areas. She has also participated in environmental impact assessments and has teaching experience.

ANNEX C

Bibliography

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ANNEX D

List of Persons Consulted

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The Nature Conservancy

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Alvin Alzamora	Protected Areas & Wildlife		(507) 315-0855
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José Santamaría	Protected Areas & Wildlife		
Yariela Hidalgo	Protected Areas & Wildlife		

ANAM/ Chagres National Park

Isidro González	Environmental Education Officer/Chagres NP	(507) 232-7220

PRONAT (Programa Nacional de Administración de Tierras)

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IPAT (Instituto Panameño de Turismo)

Denis Cuoto	Coordinator of Ecotourism guides training program	(507) 226-7000
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MIDA (Ministerio de Desarrollo Agropecuario)

Darío Tovar	Environmental Officer	(507) 207-7220

ANCON (Asociación Nacional para la Conservación de la Naturaleza)
Finca Agroforestal Río Cabuya

Augusto González	Breeding specialist for pacas and green iguanas	(507) 314-0060

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Charlotte Elton	Coordinator of the recently completed San Lorenzo Project	(507) 226-4529

Fundación NATURA (Fundación para la Conservación de los Recursos Naturales)

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Roberto Ibáñez	President		(507) 650-6544

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STRI (Smithsonian Tropical Research Institute)

Gisselle Didier	Deputy Director technical assistant	(507) 212-8000
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Yale University/CTFS

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Canopy Tower

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UCLA (Unión Campesina del Lago Alhajuela)

Cecilia Montero	Administrator
Secundino Hernández	President
Eustorgio Hernández	Member
Avilio Hernández	Member

Victoriano Lorenzo village

Daniel Torres	Local villager

Independent Consultant

Rogelio Samudio	(507) 360-2125

ANNEX E

Sections 118/119 of the Foreign Assistance Act

Foreign Assistance Act, Part I, Section 117 - Environment and Natural Resources

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Sec. 117 71 Environment and Natural Resources.--

(a) The Congress finds that if current trends in the degradation of natural resources in developing countries continue, they will severely undermine the best efforts to meet basic human needs, to achieve sustained economic growth, and to prevent international tension and conflict. The Congress also finds that the world faces enormous, urgent, and complex problems with respect to natural resources, which require new forms of cooperation between the United States and developing countries to prevent such problems from becoming unmanageable. It is, therefore, in the economic and security interests of the United States to provide leadership both in thoroughly reassessing policies relating to natural resources and the environment, and in cooperating extensively with developing countries in order to achieve environmentally sound development.

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71 22 U.S.C. 2151p. Sec. 117 was redesignated from being sec. 118 by sec. 301(1) of Public Law 99-529, resulting in the creation of two sections 117. Sec. 301(2) of Public Law 99-529 (100 Stat. 3014) further deleted subsec. (d) of that section, which dealt with tropical forests, and then sec. 301(3) of Public Law 99-529 added a new section 118 entitled Tropical Forests. This section, as added by sec. 113 of Public Law 95-88 (91 Stat. 537) and amended by sec. 110 of Public Law 95-424 (92 Stat. 948) and sec. 122 of Public Law 96-53 (93 Stat. 948), was further amended and restated by sec. 307 of the International Security and Development Cooperation Act of 1981 (Public Law 97-113; 95 Stat. 1533).

This section previously read as follows: Sec. 118. Environment and Natural Resources--

(a) The President is authorized to furnish assistance under this part for developing and strengthening the capacity of less developed countries to protect and manage their environment and natural resources. Special efforts shall be made to maintain and where possible restore the land, vegetation, water, wildlife and other resources upon which depend economic growth and human well-being, especially that of the poor.

(b) In carrying out programs under this chapter, the President shall take into consideration the environmental consequence of development actions. See also sec. 534 of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1990 (Public Law 101-167; 103 Stat. 1228), as amended, relating to Global Warming Initiative. See also sec. 533 of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1991 (Public Law 101-513; 104 Stat. 2013), as amended, relating to Environment and Global Warming. See also sec. 532 of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1993 (Public Law 102-391; 106 Stat. 1666), relating to Environment.

(b) In order to address the serious problems described in subsection (a), the President is authorized to furnish assistance under this part for developing and strengthening the capacity of developing countries to protect and manage their environment and natural resources. Special efforts shall be made to maintain and where possible to restore the land, vegetation, water, wildlife, and other resources upon which depend economic growth and human wellbeing, especially of the poor.

(c)(1) The President, in implementing programs and projects under this chapter and chapter 10 of this part72 shall take fully into account the impact of such programs and projects upon the environment and natural resources of developing countries. Subject to such procedures as the President considers appropriate, the President shall require all agencies and officials responsible for programs or projects under this chapter

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72 Sec. 562 of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1991 (Public Law 101-513; 104 Stat. 2026), added a new chapter 10 to part I of this Act, providing for long-term development in sub-Saharan Africa, and made a conforming amendment by inserting and chapter 10 of this part here.

(A) to prepare and take fully into account an environmental impact statement for any program or project under this chapter significantly affecting the environment of the global commons outside the jurisdiction of any country, the environment of the United States, or other aspects of the environment which the President may specify; and (B) to prepare and take fully into account an environmental assessment of any proposed program or project under this chapter significantly affecting the environment of any foreign country. Such agencies and officials should, where appropriate, use local technical resources in preparing environmental impact statements and environmental assessments pursuant to this subsection. (2) The President may establish exceptions from the requirements of this subsection for emergency conditions and for cases in which compliance with those requirements would be seriously detrimental to the foreign policy interests of the United States. Foreign Assistance Act, Part I, Section 119 - Endangered Species

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Sec. 11975 Endangered Species—

(a) The Congress finds the survival of many animal and plant species is endangered by overhunting, by the presence of toxic chemicals in water, air and soil, and by the destruction of habitats. The Congress further finds that the extinction of animal and plant species is an irreparable loss with potentially serious environmental and economic consequences for developing and developed countries alike. Accordingly, the preservation of animal and plant species through the regulation of the hunting and trade in endangered species, through limitations on the pollution of natural ecosystems, and through the protection of wildlife habitats should be an important objective of the United States development assistance.

7522 U.S.C. 2151q. Sec. 119, pars. (a) and (b) were added by sec. 702 of the International Environment Protection Act of 1983 (title VII of the Department of State Authorization Act, Fiscal Years 1984 and 1985, Public Law 98-164; 97 Stat. 1045).

(b) 75 In order to preserve biological diversity, the President is authorized to furnish assistance under this part, notwithstanding section 660,76 to assist countries in protecting and maintaining wildlife habitats and in developing sound wildlife management and plant conservation programs. Special efforts should be made to establish and maintain wildlife sanctuaries, reserves, and parks; to enact and enforce anti-poaching measures; and to identify, study, and catalog animal and plant species, especially in tropical environments.

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76 Section 533(d) (4) (A) of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1990 (Public Law 101-167; 103 Stat. 1227), added notwithstanding section 660ö at this point.

(c)77 Funding Level.--For fiscal year 1987, not less than $2,500,000 of the funds available to carry out this part (excluding funds made available to carry out section 104(c)(2), relating to the Child Survival

Fund) shall be allocated for assistance pursuant to subsection (b) for activities which were not funded prior to fiscal year 1987. In addition, the Agency for International Development shall, to the fullest extent possible, continue and increase assistance pursuant to subsection (b) for activities for which assistance was provided in fiscal years prior to fiscal year 1987.

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77 Pars. (c) Through (h) were added by sec. 302 of Public Law 99- 529 (100 Stat. 3017).

(d) 77 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. (e)77 Local Involvement. To the fullest extent possible, projects supported under this section shall include close consultation with and involvement of local people at all stages of design and implementation. (f)77 PVOs and Other Nongovernmental Organizations. Whenever feasible, the objectives of this section shall be accomplished through projects managed by appropriate private and voluntary organizations, or international, regional, or national nongovernmental organizations, which are active in the region or country where the project is located. S 94 (g)77 Actions by AID. The Administrator of the Agency for International Development shall: (h)77 Annual Reports. Each annual report required by section 634(a) of this Act shall include, in a separate volume, a report on the implementation of this section.

(1) cooperate with appropriate international organizations, both governmental and nongovernmental; (2) look to the World Conservation Strategy as an overall guide for actions to conserve biological diversity; (3) engage in dialogues and exchanges of information with recipient countries which stress the importance of conserving biological diversity for the long-term economic benefit of those countries and which identify and focus on policies of those countries which directly or indirectly contribute to loss of biological diversity; (4) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (5) whenever possible, enter into long-term agreements in which the recipient country agrees to protect ecosystems or other wildlife habitats recommended for protection by relevant governmental or nongovernmental organizations or as a result of activities undertaken pursuant to this paragraph, and the United States agrees to provide, subject to obtaining the necessary appropriations, additional assistance necessary for the establishment and maintenance of such protected areas; (6) support, as necessary and in cooperation with the appropriate governmental and nongovernmental organizations, efforts to identify and survey ecosystems in recipient countries worthy of protection; (7) cooperate with and support the relevant efforts of other agencies of the United States Government, including the United States Fish and Wildlife Service, the National Park Service, the Forest Service, and the Peace Corps; (8) review the Agency's environmental regulations and revise them as necessary to ensure that ongoing and proposed actions by the Agency do not inadvertently endanger wildlife species or their critical habitats, harm protected areas, or have other adverse impacts on biological diversity (and shall report to the Congress within a year after the date of enactment of this paragraph on the actions taken pursuant to this paragraph); (9) ensure that environmental profiles sponsored by the Agency include information needed for conservation of biological diversity; and (10) deny any direct or indirect assistance under this chapter for actions which significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas.

ANNEX F

Protected Areas in Panama by Management Categories

National Management Category	IUCN's International Category	Conservation Units by Category	Total Extension (ha)
1. Scientific Reserve	Ia and Ib	1	605
2. National Park	II	14	1,101,034
3. Marine National Park	II	2	283,349
4. Natural Parks	II	1	265
5. Recreational Areas	II	2	408
6. Natural Monuments	III	3	6,404
7. Wildlife Refuge	IV	9	38,684
8. Wetlands of International Importance *	IV	4 (+1)	168,443
9. Protected Wildland	IV	1	100,000
10. Forest Reserve	VI	5	89,194
11. Hydrological Protection zone	VI	2	27,242
12. Biological Corridor*	VI	1	31,275
13. Multiple Use area	VI	1	2,000
14. Resources Reserve	--	0	0
15. Buffer Zone	--	0	0
16. World Heritage Site	Several	[2 natural, 2 cultural]	[ ]
17. Biosphere Reserve	Several	[2]	[ ]
18. Protection Forest	VI	1	125,000

Note: * = this line includes a wetland of national importance; [ ] = extension accounted for in another category.

ANNEX G: Table 1. Protected Areas in Panama

Protected Areas by Management Category	Location (Province: district//Comarca: districts)	Extension	Legal Base	Operational buildings/structures, Facilities	Special values	Main Threats
National parks = 1,416, 417 hectares in 14 areas						
1. Volcán Barú	Chiriquí: Bugaba, Boquerón, David, Dolega, Boquete	14,000	ED 40, 06-24-76; CR 123, 12-04-02	Administrative offices, 2 park-guard houses, 1 refuge, 1 control post, 1 nature trail	-six life zones -connectivity -active local NGOs and base organizations -national and international tourism -petroglyphs, archaeological sites	-concentration of communicat-ion antennas/towers at the highest point; -extraction activities: wildlife, wood, volcanic rocks; -permanent and migratory human occupation -agriculture and -garbage dump beside access road to the park -fragmentation, loss of connectivity with PILA
2. La Amistad [International Park and World Natural Heritage Site]	Chiriquí: – Bocas del Toro:	207,000	BDR 21-88, 2-09-88	Administrative office, 1 park-guard residence, 1 control post, 2 nature trails, visitors dorm	-World Natural Heritage Site since 1990 -Biosphere reserve since 2000 -5 life zones -cloud forest -international and local connectivity -archaeological sites.	-connectivity with Volcán Barú NP is threatened; -territories overlap (~60%) with Naso-Teribe indigenous lands being claimed
3. General de División Omar Torrijos	Coclé: Antón, La Pintada - Colón: Donoso	25,275	ED 18, 06-311-86; ED 27, 08-05--99	1 administrative office with dorm, 1 refuge, 2 nature trails	-cloud forests -historic location -zone of relatively high density of archaeological sites	-ca. 10% pasture land -canal watershed expansion towards this protected area
4. Portobelo	Colón: Portobelo, Colón	35,929	L 91, 12-22-76; ED 43, 06-16-99; IR AG-0287, 10-10-00	administrative offices; with dorm; 1 refuge; 1 nature trail	-part of a World Cultural Heritage Site since 1980 -landscape value -4 life zones -fringing coral reef along the coast -archaeological sites	-human occupation and expansion -infrastructure development -expansion of agriculture plots and livestock

Protected Areas by Management Category	Location (Province: district//Comarca: districts)	Extension	Legal Base	Operational buildings/structures, Facilities	Special values	Main Threats
5. San Lorenzo	Colón: Colón	9,653 (95% land)	L 21, 02-07-97	Roads/trails, temporary administrative offices and dorm	-part of a World Cultural Heritage Site since 1980 -archaeological sites -historic buildings/structures -globally important bird area with more than 400 spp. Recorded including 160 spp. Of forest birds	-Canal watershed expansion will potentially bring displaced people to the area
6. Darién	Darién: Chepigana, Pinogana; Comarca Emberá-Wounaan: Cémaco, Sambú	579,000	08-07-80	2 field stations with dorms, 2 nature trails	-1981 World Natural Heritage Site; -1983 Biosphere Reserve; -largest natural area in the country; -4 life zones -historic resources -live cultures (Embera, Wounaan, Kunas, Afro Hispanic)	-2 field stations closed due to security problems related to the armed conflict in Colombia
7. Sarigua	Herrera: Parita, Santa María	8,000 (50% land)	E.D. 10-02-84; BDR 40-93, 12/10/93; BDR 10-98, 03/19/98; BDR 40-93.	1 administrative office with dorm, 1 nature trail	- archaeological sites - no human illegal occupation inside the park	-deforestation -shrimp concessions -limited coordination between ANAM and INAC
8. Cerro Hoya	Los Santos: Tonosí-Veraguas: Montijo	32,557 (12% marine)	ED 74, 10-02-84	2 administrative offices, 3 refuges, 1 nature trail	-5 life zones -scarlet macaws -collaboration agreement with Parque Natural Bixaa Limia in Spain	-human occupation and agricultural practices
9. Altos de Campana	Panamá: Capira, Chame	4,816	ED 153, 06-28-66; ED 35, 04-28-77	1 administrative office, 4 nature trails, 1 refuge	-endemic species: Atelopus zeteki -cloud forests -petroglyphs, archaeological sites -campers, hikers and other visitors	-agriculture frontier -human occupation

Protected Areas by Management Category	Location (Province: district//Comarca: districts)	Extension	Legal Base	Operational buildings/structures, Facilities	Special values	Main Threats
10. Camino de Cruces	Panamá: Panamá	4,405	L 30, 12-30-92; L 29, 06-23-95; L 20, 01-29-03	4 nature trails, 1 observation tower	-Historical roads, edifications, ruins, archaeological sites	-Pollution, trash accumulation, Hunting, tree cutting, high accessibility by roads, fragmentation
11. Soberanía	Panamá: Panama – Colón: Colón	19,421	ED 13, 05-27-80; L 29, 06-23-95; L 20, 01-29-03	1 administrative office, 3 park-guard residences, 1 control post, 2 refuges, 4 nature trails, 2 picnic/rest areas + concession (tower)	-Connectivity with Camino de Cruces National Park -historical roads, ruins -no illegal human occupation inside the park	-Hunting, tree cutting, high accessibility by roads, fragmentation, trash accumulation
12. Chagres	Panamá: Panama – Colón: Colón	129,600	ED 73, 10-02-84; BDR 37-93, 09-28-93	4 administrative offices with dorms, 4 refuges,	-migratory birds -high visitation to indigenous villages	-reforestation with exotic spp., - human occupation, urbanization, pressure to establish new occupation -poultry farms, agriculture
13. Coiba (A)	Veraguas: Montijo	270,125 (19 % land)	BDR 021-91, 12-17-91	Administrative offices, lodging for scientific personnel	- corals, marine habitats - forests,	- pressure to establish tourism developments
14. Santa Fe	Veraguas: Sta. Fe	76,636	E.D 147, 12-11-01	----	-part of the Central Cordillera -historic places -cloud forests	-agriculture frontier
Marine National Park= 27,964 ha in 2 areas						
15. Bastimentos	Bocas del Toro: Bocas del Toro	13,224 (16.2% land)	BDR 21-88, 09-02-88	2 research posts/refuges with dorm areas , 1 nature trail	-sea turtle nesting beaches, corals, -105 marine fish spp., 13 amphibians, 16 reptiles, 69 birds, 32 mammals, 44 plant spp. -Ngöbe population close to park limits -participatory process for the park's management plan	-unplanned tourism, -subsistence agriculture, illegal fishing and hunting, -coastal development

Protected Areas by Management Category	Location (Province: district//Comarca: districts)	Extension	Legal Base	Operational buildings/structures, Facilities	Special values	Main Threats
16. Golfo de Chiriqui	Chiriquí: San Lorenzo	14,740 (11.2% land)	BDR 19, 08-19-94	Temporary administrative office and dorm	-23 small islands -16 fish spp. , 3 marine turtle spp.	-coastal development -unregulated tourism
Recreation Nature Areas = 673 ha in 3 areas						
17. Metropolitano	Panamá: Panama	265	ED 15, 06-07-83; L 8, 07-05-85; L 29, 06-23-95	5 nature trails, 2 look out points, administrative offices, 2 large meeting rooms,	-connectivity with Camino de Cruces National Park (across La Amistad Rd.) -historical roads, edifications, archaeological sites -high visitation -Collaboration agreement with Cleveland Metro-parks -no illegal human occupation in the park	-High accessibility by roads, fragmentation, river pollution, fauna affected by road kills -pressure of developers to use the area -diminishing funds
18. Lago Gatún	Colón: Cristóbal	348	ED 88, 07-30-85	-administrative offices, picnic area, rest rooms,	-forested area close to Colon city	-encroachment, urbanization in neighboring areas -landslides have occurred in the area
19. El Salto de Las Palmas	Veraguas: Las Palmas	60	BODR 14-94, 07-29-94	----	-waterfall of ca. 30 mt -coordination ANAM-Municipality for its administration	-unregulated tourism -deforestation
Forest Reserves = 346,413 hectares in 6 areas						
18. Fortuna (E)	Chiriquí: San Lorenzo, Gualaca- Comarca Ngöbe-Bugle: Besiko	19,500	ED 68, 09-21-76	-Research station	-2 life zones, cloud forests -1,397 plant spp. Identified, 85% angiosperms -541 vertebrate spp. Identified -48 spp. of endemic birds of the C.Rica-Panamá highlands -archaeological sites	-Pressure to expand the agricultural frontier into the reserve
19. Canglón	Darién: Pinogana and Chepigana	31,650	ED 75, 10-02-84;	----	-zone of relatively high density of archaeological sites	-deforestation
20. El Montuoso	Herrera: Las Minas	10,375	L 12, 05-15-77	----	-hydrological resources	-deforestation

Protected Areas by Management Category	Location (Province: district//Comarca: districts)	Extension	Legal Base	Operational buildings/structures, Facilities	Special values	Main Threats
21. La Tronosa	Los Santos: Tonosí	20,579	L 52, 02-12-77; L 6 05-17-94	----	- hydrological resources	-deforestation
22. La Yeguada	Veraguas: Calobre	7,090	ED 94, 09-28-60	Administrative offices	-reforestation	-forest fires -exotic species
23.Chepigana	Darién: Chepigana	257,219	DE 94, 09-28-60; L 6, 05-17-94	----	-coastal resources and forest resources -includes dry tropical forest remnant	-deforestation -
Wildlife Refuges = 38,684 hectares in 9 areas						
24. La Barqueta Agrícola	Chiriquí: Alanje	5,935	BDR 16-94,	Administrative offices, dorm	-coastal resources, marine turtles	-development project for tourism, agriculture expansion
25. Playa de Boca Vieja	Chiriquí: Remedios	3,740	BDR 17-94, 08-02-94		-coastal resources, marine turtles	-development project for tourism, agriculture expansion
26. Cenegón del Mangle	Herrera: Parita	1,000	Municipal Council Resolutions #8-82, #5-80	___	-wetland, waterfowl	-pollution -agriculture development
25. El Peñón del Cedro de los Pozos	Herrera: Los Pozos	30	Municipal Council Resolution #3-91	__	-wildlife resources	-agriculture development
26. Isla Iguana	Los Santos: Pedasí	58	ED 20, 06-15-81	___	-corals	-agriculture development
27. El Peñón de la Honda	Los Santos: Los Santos	2,200	Municipal Council Resolution #14-82	___	-coastal resources	-unregulated tourism development
28. Pablo Arturo Barrios	Los Santos: Pedasí	30	Municipal Council Resolution #4, 02-11-92	___	-coastal resources	-unregulated tourism development
29.. Isla Cañas	Los Santos: Tonosí	25,433	BDR 10-94, 06-29-94	Administrative office	-marine turtles, coastal birds	-unregulated tourism development

Protected Areas by Management Category	Location (Province: district//Comarca: districts)	Extension	Legal Base	Operational buildings/structures, Facilities	Special values	Main Threats
30. Taboga	Panamá: Taboga	258	ED 76, 10-02-84	Administrative offices	-coastal birds, pelicans	-unregulated tourism development
Protected forests						
31. Palo Seco	Bocas del Toro: Changuinola; Ngöbe-Bugle Comarca: Kankintú	125,000	ED 25, 09-28-83	___	-4 life zones, partially scarped territory -Ngöbe-Bugle and and Naso Teribe live cultures	- resource extraction - 40% deforested
32. Alto Darién	Darién: Pinogana Emberá Wounaan: Cémaco		ED 84, 05-08-72	___	-large overlapping area with Emberá-Wounaan comarca	- resource extraction - deforestation
Wetlands of International Importance = 168,300 hectares in 4 areas						
33. San San Pond Sak	Bocas del Toro: Changuinola, Bocas del Toro	16,125	BDR 20-94, 08-02-94	____	-migratory birds, -manaties -Ramsar site	-pollution -coastal development, unregulated tourism
34. Punta Patiño (A)	Darién: Chepigana	13,805	BDR 21-94, 08-02-94	Administrative offices, dorms	-wetlands, Ramsar site -waterfowl, migratory birds	-poaching -deforestation
35. Golfo de Montijo	Veraguas: Soná, Santiago, Río de Jesús	89,452	BDR 15-94, 07-29-94; Ramsar site since 11-26-90	____	-wetlands, coastal-marine resources,	-deforestation -coastal development -unregulated tourism
36. Bahía de Panamá	Panamá:	48,918	10-20-2003	____	-Migrant shorebirds, wetlands	-urbanization -pollution
Wetlands of National Importance (note: not considered in ANAM's resolution as a national category)						
37. Humedal Lagunas del Volcán	Chiriquí: Bugaba	143	BDR 18-94, 08-02-94	---	-wetlands -111 vertebrate species reported, 105 plant species reported	-agriculture and urban development
Natural Monuments= 6,404 hectares in 3 areas						

Protected Areas by Management Category	Location (Province: district//Comarca: districts)	Extension	Legal Base	Operational buildings/structures, Facilities	Special values	Main Threats
38. Cerro Gaital	Coclé: Antón	1,000	ED 96, 06-09-2001	___	-local water sources for human consumtion, agriculture, cloud forests -geological important area -Panamanian endemic golden toad Atelopus zeteki and mountain fish Bryconamericus zeteki -connectivity: local corridor Campana-Gaital-La Vieja -national and international tourism -local support	-agriculture development -urbanization
39. Barro Colorado	Panamá: Panamá-Colón: Colón	5,400	Panama Government and STRI accord 06-10-97	-administrative offices, dorms, laboratories, conference room, exhibit area, nature trails	-oldest protected area in the country -highest visitation for tourism and education/research	-hunting
40. Los Pozos de Calobre	Veraguas: Calobre	4	BDR 13-94, 07-29-94	----	-thermal waters -riverine resources	-deforestation -unregulated tourism
Hydrological protection zones = 27,242 hectares in 2 areas						
43. Filo del Tallo	Darién: Pinogana, Chepigana	24,722	BDR 04-97, 01-22-97	---	-hydrological resources for local communities -partial overlap with Canglón reserve	-deforestation
44. Tapagra	Panamá: Chepo	2,520	BDR 22-93,	__	-hydrological resources	-deforestation -poaching
Protected Wildlands = 100,000 hectares in 1 area						
45. Corregimiento de Narganá	Kuna Yala Comarca	100,000	BDR 22-94, 08-02-94	Administration offices with dorm , research station basic structure, 1 nature trail	-coastal marine resources, forest resources	-invasion by campesinos to establish agriculture and households
Scientific Reserve = 605 hectares in 1 area						

Protected Areas by Management Category	Location (Province: district//Comarca: districts)	Extension	Legal Base	Operational buildings/structures, Facilities	Special values	Main Threats
46. Isla Galeta	Colón:	605	L 21, 02-07-97, ARI-R #283-99-4, 08-25-99	Administrative offices, dorms; research facilities and dorms by STRI	171 vertebrate species: 10 mammals, 150 birds including 15 migrants; -visitation for education purposes and tourism	-oil pollution -project developments
Biological Corridor						
47. Serranía del Bagre	Darién:	31,275	BDR #01-95, 07-26-95;	____	-connectivity: links Darién National Park with Punta Patiño Ramsar site -cloud forests	-agriculture development -deforestation
48. Isla de Coco-Coiba-Gorgona-Malpelo-Galápagos	Regional: tropical pacific	Not estimated yet	Recently approved	_____	Coastal marine regional connectivity	-pollution
Multiple use area						
49. Ciénaga de Las Macanas	Herrera: Santa María	2,000	MCA ##52, 06-05-95	___	-waterfowl, wetlands -migratory birds	-pollution -agriculture expansion -poaching
Total:						

Abbreviations: BDR = Board of Director's Resolution in INRENARE; ED = Executive Decree; L = Law; CR = Cabinet Resolution; ARI-R = Resolution of the Inter-oceanic Region authority; (E) = administration via Ege Fortuna; (S) = administration via Smithsonian Tropical Research Institute; (P-A) = administration coordinated between Programa de Estudio y Manejo de Areas Silvestres Kuna Yala and ANAM; (A)= administration via ANCON.

References: Alba et. al, 2003; Candanedo et al., 2003; ANAM, 2003; Dirección Nacional de Áreas Protegidas y Vida Silvestre. 1998; mapa de C. Fitzgerald citado en Leis (2000); Valdebenito (1999); Morse (1999); Planes de Manejo de: Parque Natural Metropolitano (1998); Parque Nacional Altos de Campana (1999), Parque Nacional Soberanía (1999), Parque Nacional Camino de Cruces (1999); Parque Nacional Chagres (1998); Monumento Natural Gaital (1999)

1,873,859

Table 2. Proposed areas/corridors

Name	Category	Estimated Extension (ha)	Location (Province or Comarca)	justification
1. Escudo de Veraguas	Scientific Reserve? Natural Monument	430 ha aprox	Comarca Ngöbe-Bugle	Endemic fauna: Amazilia handleyi (hummingbird), Artibeus incomitatus (bat) -vulnerable species as the 3 wattled bellbird Mature evergreen (and regenerating) forest island
2. Chorogó-Palo Blanco-San Bartolo	Sustainable development local corridor	31,603	Chiriquí	Squirrel monkey populations; baird trogons
3. Gualaca	Altitudinal corridor	170,000	Chiriquí	High diversity of mammals and birds, watersheds, cloud forests, lowland forests, mangroves
4. Teribe-San San Pond Sak	Sustainable development local corridor	40,190	Bocas del Toro; and proposed Naso Teribe Comarca	Aquatic fauna, riverine resources, 2 life zones present
5. Peninsula Valiente-Río Chucara	Sustainable development local corridor	263,196	Comarca Ngöbe Bugle;	Coastal resources, diverse forest resources, wetlands; potentially extending to include Escudo de Veraguas island
6. Ngutduoro o de Montaña	Sustainable development local corridor	189,290	Comarca Ngöbe-Bugle	-mountain lands, cloud forest, riverine resources, hydrological resources, forest diversity
7. La Gloria	Sustainable development local corridor	7,559	Bocas del Toro	Atlantic lowlands, riverine resources
8. San Lorenzo-Tabasará	Sustainable development local corridor	73,060	Chiriquí	Pacific lowlands, coastal marine resources, mangroves, wetlands

Name	Category	Estimated Extension (ha)	**Location** (Province: district)	Justification	Active NGOs or base groups	Studies
4. Teribe-San San Pond Sak	Corredor altitudinal de desarrollo sostenible					
5. Peninsula Valiente-Río Chucara	Corredor local de desarrollo sostenible					
6. Ngutduoro o de Montaña	Corredor local de desarrollo sostenible					
7. La Gloria	Corredor local de desarrollo sostenible					
8. San Lorenzo-Tabasará	Corredor local de desarrollo sostenible					

ANNEX H

Laws and Regulations for Environment, by Category

Environment

- *Constitution of the Republic of Panamá* (1972) with 1983 reforms- Ecological regime- confers to the State conservation and use functions.
- *Law 37 (September 1962) The Agrarian Code- . Resolutions #035 and #087, 1981 ruled on procedures to resolve discrepancies in lands occupied by Indians.*
- *Law # 41* (July 1, 1998) that establishes basic principles and norms regarding protection, conservation and restoration of the environment promoting sustainable use of natural resources; organizes environmental management integrating it to social and economic objectives to accomplish human sustainable development in the country; creates the National Environmental Authority; and mandates that municipalities must contribute to the conservation and protection of natural resources, enabling them to establish protected areas.
- *Law # 52* (July 12, 1996) that ratifies the constitution of the Central American Commission on the Environment and Development and its 1994 protocol.

Cadastral Survey

- *Executive Decree # 124* (Sept. 12, 2001). Establishes the legal structure for the national land administration program.

Protected Areas and Wildlife

- *Law # 6* (January 3, 1989) which approved the International Convention on the Protection of Important Wetlands (RAMSAR).
- *INRENARE's Resolution # JD-006-91* which empowers INRENARE personnel to confiscate all weapons, tools, ammunitions and transportation equipment used to hunt and that are introduced into protected areas.
- *INRENARE's Resolution # JD-022-92* which created within INRENARE the National System of Protected Areas and defines each management category. This resolution is reinforced by article 66 within Law 41, of July 1, 1998; this law also establishes ANAM and designates it as the normative institution for SINAP.
- *Law # 5* (February 25 1993) and *Law # 7* (March 7, 1995) that created the Inter-oceanic Region Authority (ARI).
- *INRENARE's Resolution # JD 09-94* which established 17 management categories of protected areas in SINAP. This resolution is complemented by the Forestry Law (Law # 1, February 3, 1994) which defines the protection forest management category.
- ***Law # 8 and Law 30, 1994.*** regarding tourism development incentives.
- ***Wildlife Law or Law # 24*** (June 7, 1995), Chapter V, that establishes the National Wildlife Fund as a source to accomplish objectives of the wildlife law, under the administration of the Protected areas and wildlife service and under the supervision of the General Comptroller.
- ***Law # 9*** (April 12, 1995) regulates the protection of Priority Protected Areas in Central America.
- *INRENARE's Resolution JD 07-96* covering cover tariffs for services performed by SINAP, whose article 5 was modified by Resolution JD 015-97.
- *Law 21* (July 2, 1997) that approves the regional plan for the development of the inter-oceanic region and the general use, conservation and development plan for the canal area.

- ***Executive Decree # 327*** (November 30, 1998)**,** that establishes the 'Tourism-Conservation-Research' strategic alliances committee as an adjunct organism to the National Council on Sustainable Development, to design, promote and conduct a national plan to develop tourism industry in the country through a system of alliances among tourism, environmental conservation and heritage, scientific, cultural and historic research.
- ***Cabinet Resolution #36,*** (May 31, 1999), that approved the national strategy for the environment with 8 priorities to target reduction of pollution, deforestation and soil degradation; to transform production processes that are negatively affecting the environment, increase inter-institutional coordination, the need to conduct environmental zoning in fragile lands and to transform the environmental culture.

Environmental Quality

- *Law # 16* (October 23, 1975) through which the International agreement regarding intervention in open sea in cases of accidents that cause hydrocarbon pollution is approved.
- *Law # 21* (July 9, 1980) that establishes norms regarding ocean and navigable waters.
- *Law # 17* (November l 9, 1981) that approves the 1973 International accord to prevent pollution by ships, subscribed in London. In November 1973.
- *Law # 2* (March 20, 1986), by which the national system to measure characteristics and components to supply agriculture and livestock is established; it prohibits the use of chemical products, that have been banished in other countries due to their human toxicity, in Panamá.
- *Law # 7* (April 04, 1986) through which the protocol for the protection of the Southeastern Pacific, against pollution originated from terrestrial sources, is approved.
- *Law # 6* (March 25, 1986) that approves the agreement for regional cooperation in case of urgency regarding pollution of the Southeast Pacific, due to oil and other negative substances.
- *Law # 13* (June 30, 1986) that approves the protocol referring to cooperation to combat oil spills in the Greater Caribbean region.
- *Law # 2* (January 05, 1987) by which the Vienna protocol to protect the ozone layer is approved.
- *Law # 7* (January 03, 1989) by which the Montreal Protocol, regarding substances that deplete the ozone layer, is approved.
- *Law # 2* (January 03, 1989) through which the Vienna agreement to protect the ozone layer is approved.
- *Law # 21* (December 6, 1990) by which the Basilea convention is approved, regarding trans-frontier movement of hazardous substances.
- *Law # 25* (December 10, 1990) through which the amendment for the Montreal protocol regarding substances that deplete the ozone layer is approved, adopted June 29, 1990 (London Amendment).
- *Law # 28* (December 26, 1990) by which article 9 of Law 2 March 20, 1986, related to safe use of pesticides is modified.
- *Law # 8* (June 7, 1991) by which import process for toxic or polluting wastes is prohibited in the Republic of Panama.
- *Law # 13* (April 21, 1995) by which the Regional Accord regarding Hazardous Wastes Trans-frontier movement.
- *Law # 35* (May 17, 1996) to control pollution by fuel, lead, the use of gasoline without lead, and the installation of catalytic conversion for motor vehicles.
- *Law # 46* (July 05, 1996) that approves the amendment to the Montreal Protocol regarding substances that deplete the ozone layer, adopted in the IV meeting of the parties celebrated in Copenhagen, November 25, 1992.

- *Executive Decree # 225* (November 16, 1996) that regulates Law #7 January 03, 1989, regarding protection to the ozone layer is enacted.
- *MIDA's Executive Decree # 63* (September 01, 1997) regulates Chapter V, title III of Law 47 (July 9, 1996) regarding pesticides and fertilizers control, registry, application, and also establishes the technical committee on pesticides.
- *MINSA's Resolution # 68-1998* through which the management of radioactive wastes is regulated.
- *MIDA's Resolution # APL-023-1998* by which the procedures to register, safe management and use of additives, fertilizers, technical materials and pesticides for agricultural use is regulated.
- *Executive Decree # 58* (March 16, 2000) through which the procedure to prepare Environmental Quality Norms and for Maximum Allowed Limits are regulated.
- *Executive Decree # 150* (February 19, 1971) by which the norms regarding noise produced by manufacturing plants, industries, workshops, and commercial stores.
- *MIDA's Resolution ALP-074-ADM-1997* that includes the list of 61 banned pesticides for use in agriculture within the Republic of Panama.
- *Executive Decree # 160* (June 7, 1993) by which the Norm on Vehicle traffic in Panamá is approved; in it chapter III, regulates the transportation of hazardous materials or substances.
- *Executive Decree # 1194* (December 3, 1991), through which the norm for radiological protection is established.
- *Executive Decree # 395* (July 1, 1992) of the Panama District Mayor's office, through which special ordinances regarding unnecessary noise is enacted and the job of collective, selective and school transportation vehicle driver is regulated.
- *Executive Decree # 6* (March 26, 1979) of the Panama District Mayor's office considers the confiscation of artifacts that generate noise without prejudice of the administrative penalties with fines character.
- *Panama District Mayor's office Agreement* (December 30, 1996) through which critical areas in the district of Panamá have been designated 'silence zones'.
- Panama District Mayor's office Agreement # 95 *(September 4, 1992) by which the noise levels emitted by collective, selective or School vehicles is regulated.*
- Technical norm # DGNTI-COPANIT 24-99 regarding reutilization of treated residual waters.
- Technical norm # DGNTI-COPANIT 35-2000 regarding liquid effluent waters discharged directly to superficial and subterranean water bodies.
- Technical norm # DGNTI-COPANIT 39-2000 regarding liquid effluents discharged directly into residual waters collection systems.
- Technical norm # DGNTI-COPANIT 47-2000 regarding waters use and final disposition of muds.
- *Resolution # 002/2002*-characterization and adjustment of technical norms DGNTI-COPANIT 35-2000 and DGNTI-COPANIT 39-2000 for the discharge of residual waters.
- *ANAM's Resolution # AG-0267-2001* (August 7, 2001) by which fess and tariffs regarding technical services provided by ANAM during the evaluation processes of Environmental Adequation and Management Programs (PAMA).
- *ANAM's Resolution # AG-0161-2001* by which establishes fees and tariffs corresponding to services provided for evaluation and procedures regarding registry of consultants and auditors dedicated to Environmental Impact Studies and Environmental Auditing and Environmental Adequation and Management Programs.
- *ANAM's Resolution # AG-0466-2002* through which the procedures to request permits or concessions for used or residual waters are established.

Environmental Impact

- *Law # 30* (December 30, 1994) regarding Environmental Impact Studies and by which Article 7 of Law 1 (February 03, 1994) and establishing environmental impact studies as compulsory for every development project or human activity.
- *Executive Decree # 59* (March 16, 2000) that establishes rules for the process of environmental Impact assessments or Chapter II, Title IV, of the Law 41 or Environmental Law (July 1, 1998).
- *ANAM's Resolution # AG-0292-01* (September 10, 2001) that establishes operative guidelines for the process of preparation and evaluation of environmental Impact assessments studies.

Environmental Education

- *Law # 10* (June 24, 1992) by which environmental education is adopted as a national strategy to conserve and preserve natural resources and the environment.
- *MINED's Resolution # 10 (December 10, 1993) through which Panama adopts the Environmental Education National Strategy as one of the basis to conserve and preserve natural resources and the environmen.*
- *Executive Decree # 57* (March 16, 2000) by which organization and functions of Environmental Consultative commissions are regulated and the mechanisms for public consultation as well as procedures to conduct public denunciation/complaints are explained.

Forest Resources

- *Law # 24* (November 23, 1992) establishes incentives for reforestation activities in the Republic of Panama.
- *Executive Decree # 89* (June 8, 1993) regulates Law 24 that establishes incentives for reforestation.
- *Law # 1* (February 3, 1994) through which the Forestry Law is established to protect, conserve, improve, educate, research, manage and provide rational use of forestry resources.
- *Law # 14* (April 21, 1995) that approves the Regional Agreement to Manage and Conserve natural forest ecosystems and develop forestry plantations signed in Guatemala on October 29, 1993.
- *Law # 22* (January 8, 1996) through which the International Agreement on Tropical Woods, made in Geneva (January 26, 1994), is approved.
- *Law # 47* (July 9, 1996) that rules all actions relative to the protection of the national agriculture heritage, with the main objective of preventing and controlling in an integral manner phyto-sanitary problems and obtaining plant and vegetable products with phyto-sanitary quality in the production, classification, packing, storing and transporting processes as well as eliminating the introduction, establishment and dissemination of plant and vegetable products plagues in the territories of the Republic of Panamá.
- *INRENARE's Resolution # JD 08-96* that dictates measures to protect and use mangrove.
- *INRENARE's Resolution # JD 01-98* that establishes rates to pay for services performed by INRENARE to manage and use forest resources.

Marine Resources

- *Executive Decree # 1* (January 5, 1985) that modifies Executive Decree 1 (January, 1977) which rules fishing within the country's territory.
- *Executive Decree # 124* (November 18, 1990), that rules on shrimp fishing.
- *Law # 11* (June 18, 1991) that approves the Protocol to Conserve and Manage Marine and Coastal protected areas of the Southeastern Pacific.

- *Executive Decree # 56* (June 26, 1995) that rules deep waters shrimp fishing, includes a shrimp species among those subject to fishing calendar and dictates other considerations.
- *Law # 58* (December 28, 1995) through which aquaculture is defined as an activity related to the agriculture and livestock sector and establishes incentives among other considerations.
- *Executive Decree # 7* (February 10, 1998) by which the Maritime Authority (AMP) is established in the Republic of Panamá unifying the Ports Authority, the Ships and Consular Directorate, the Marine Resources General Directorate and the Sailors school.
- *Executive Decree # 16* (May 7, 1999) which mandates the use of the Turtle Exclusion Divice (TED) and establishes other measures to reduce incidental capture and mortality of marine turtles while conducting shrimp operations.

Water Resources

- *Law # 35* (September 22, 1966) that regulates water uses.
- *Executive Decree # 55* (June 13, 1973) regulates in waters rights.
- *Executive Decree # 70* (July 27, 1973) regulates water permits or concessions.
- *Executive Decree # 202* (May 16, 1990) establishes the Inter-institutional Committee on Water, Sanitation and the Environment.
- *Law # 35* (September 22, 1996) regarding Water use.

Mineral Resources

- *Law # 23, 1963.* Mineral Resources Code.

Wildlife and Biodiversity

- *RENARE's Resolution # DIR 003-80* (January 25, 1980) that provides instruction to people holding wild animals in captivity as pets to register them in the corresponding institution and establishes conditions to import and export wild animals.
- ***RENARE's Resolution # DIR-001-85*** (January 24, 1985) that ***e***stablished internal procedures to request scientific and commercial permits and in-transit permits for wild flora and fauna.
- ***RENARE's Resolution # DIR-007-85*** (June 21, 1985) that ***e***stablished fees to charge for services regarding wild flora and fauna permits.
- *INRENARE's Resolution # JD 022-88* that provides measures to protect mammals associated to tuna fishing.
- *INRENARE's Resolution # JD 024-90* (October 5, 1990) that rules on the captive breeding of wildlife.
- *INRENARE's Resolution # JD 006-91* (March 1, 1991) that confers authority to INRENARE's personnel to retain arms, ammunition, tools, and transportation vehicles used for hunting within or outside of protected areas.
- *INRENARE's Resolution # JD 022-92* (September 2, 1992) that establishes the national system of protected areas (SINAP) which conserves flora and fauna in situ.
- *Law # 26* (December 10, 1993) by which the articles of association of the International Union for the Conservation of Nature, updated December 25, 1990, are approved.
- *Law # 24* (June 07, 1995) that establishes wildlife legislation in the Republic of Panama and provides other related considerations.
- *Law # 18* (April 10, 2002) that declares the Harpy Eagle as the national bird of the country.
- *ANAM's Resolution # AG-0164-2002* (April 22, 2002) that establishes the National Biodiversity Committee.

Climate

- *Law # 88* (November 30, 1998) by which the Kyoto protocol, celebrated on December 11, 1997, regarding the United Nation's Convention on Climatic Change was approved.

- *Law # 10* (April 12, 1995) by which the United Nations Convention on Climatic Change, conducted in New York in May 9, 1992, is approved.

- *Law # 11* (April 12, 1995) through which the regional Convention on Climatic Change, signed in Guatemala on October 29, 1993.

ANNEX I

Summary of Government Organizations and Non-Governmental Organizations

Institution or Agency: Service or Function	Related Projects or Activities
Central Government	
1. Autoridad Nacional del Ambiente (ANAM)-The National Environment Authority plans, coordinates, regulates and promotes policies and actions to use, conserve and develop renewable resources of the country. Web page: www.anam.gob..pa	Management, protection and zoning of resource use. Protection, administration/management of all protected areas, forest, wildlife in the country; non-formal environmental education regarding all these issues.
2. Autoridad Marítima de Panamá (AMP)- The Maritime Authority, created in 1998, unifies in one institution duties that were dispersed among the Ports Authority, the General directorate for Consular and Ships duties, Marine Resources and the Nautical school. Web page: www.autoridadmaritima.gob.pa e-mail: dpuertos@amp.gob.pa; in Colón, tel. 433-2005, fax: 441-7002.	Promotes, coordinates and conducts the National Maritime Strategy. Does the administration of the Panamanian ports system formed by 18 ports of which AMP is directly in charge of 11; the rest of the ports are under private developers supervised by AMP.
3. Autoridad de la Región Interoceánica (ARI)-Inter-oceanic Region Authority: Administration of patri-mony returned to Panamá through the Carter- Torrijos Treaties.	Has identified areas worth protecting among those returning to Panamanian administration; has promoted initial development of San Lorenzo protected area designating protection personnel and participating in the planning process for the area. It designates use concessions in wildlands and developed sectors until they become fully incorporated into the country's scheme.
4. Autoridad del Canal de Panamá (ACP)- The Panamá Canal Authority conducts, since 1997, the administration, management, conservation, and modernization of the Panamá Canal.	There are several particular sites or areas required to ensure efficient work in the canal, those are under ACP's responsibility: for example the borders of the canal waterway and the port at the mouth of the Chagres River within San Lorenzo Protected Area where ACP supports surveillance and management.
5. Ministerio de Desarrollo Agropecuario (MIDA)- The Ministry of Agriculture and Livestock Development provides technical aid and advise in agricultural and cattle raising production at the national level. Web page: www.mida.gob.pa	Advises in agriculture and cattle production, coffee sustainable production, Tilapias production. Among others; participates in the Program to control the screw worm (Panamá USA commission to eradicate the screw worm: COPEG); conducts the Colón, Capira and Coclé (CCC) Sustainable Development program (which includes land titling to develop agriculture and sustainable development activities); conducts research on agricultural varieties via IDIAP research center; regulates import and export of domesticated plant varieties and animals via the Agricultural Quarentine office (DECA); participates in the rural poverty alleviation and natural resources conservation program complementing the CBMAP in the Pacific coast in Herrera, Los Santos and Veraguas.
6. Ministerio de Salud (MINSA)-the Ministry of Health provides medical attention services to human population in the country.	It supervises and assesses food and water production and processing, waste and sewage management. Supports the establishment of aqueducts; has an office that deals with medicinal plants and cultural groups using them and through the Environmental office generates and disseminates information on UV radiations and skin protection, air and water quality.

Institution or Agency: Service or Function	Related Projects or Activities
7. Programa Nacional de Administración de Tierras (PRONAT) –The National Land Administration Program aims to ensure equitable access to land and improve land tenure security by providing land administration services in selected rural, peri-urban and urban areas and to enhance natural resources conservation through the consolidation of SINAP and indigenous people territories. Internet: www.mef.gob.pa, www.anam.gob.pa, www.worldbank.org/external/projects	There is a Pilot plan to establish physical demarcation, signage, and land tenure-conflict resolution in Portobelo National Park and Cerro Hoya National Park; demarcation of all reserves and comarcas in Chirquí and Bocas del Toro plus the rest of Colón province. Implementing agencies for PRONAT include the National Directorate of Protected areas and Wildlife (ANAM), the National directorate of Agrarian Reform (MIDA), the Public Registry and the General Directorate of Cadastre (MEF).
8. Municipalidades: The Municipalities promote local development, seek social wellness in collaboration with the central government. There is an association of municipalities: AMUPA.	Support the development of green and protected areas within their jurisdiction, promote tourism small business project with local, national and international support.
9. Instituto Panameño de Turismo (IPAT)- The Panamanian Tourism Institute is in charge of promotion and regulation of tourism activities in the country.	Supports the creation of 'CEFATI' (center for tourism facilitation) in several districts of the country. Promotes tourism development and visitation to special destinations; designates areas of tourism development interest and provides incentives for tourism investment.
10. Ministerio de Educación (MEDUC)-The Ministry of Education has the mandate to provide education up to the sixth grade throughout the country.	Leads formal environmental education in the country and participates and supports activities in non-formal and informal environmental education.
11. SENACYT (Secretaria Nacional de Ciencia, Tecoonología e Innovaación), Web page: www.senacyt.gob.pa	Provides some support for research within specific areas, develops training courses, and documents/promotes incorporation into ISO regulations.
12. a.Policía Área Canalera – the Canal Area Police offers protection in the canal activity area. b. Policía Ecológica- The Ecological Police works in support to personnel from protected areas as a special security force within the National Police.	Specific duties in several sectors within the watershed, for example Chagres river patrolling. Supports park guards in the surveillance and enforcement of nature protection laws against transgressors.
13. Servicio Marítimo Nacional (SMN)-The National Maritime Service works on the protection of Panamanian coasts and territorial waters.	Illegal migration prevention; prevention of smuggling and robbery, control of drug trafficking; and other activities occurring along the coasts.
14. Cuerpo de Bomberos de Panamá. Firemen Corps.	Supports ANAM's personnel in forest fire control. There is even a recent special brigade in the metropolitan region, the Pulaski brigade, for forest fire control: phone: 227-2570.
15. Procuraduría de la Nación In Portobelo, and other two districts of the country, triggering of sustainable human development projects in rural communities: local action – global vision.	In Portobelo the project includes: community organization, socioeconomic diagnosis, Strategic Planning, Tourism Development. Also creation of the local promotion development center CEGEL-Portobelo, an umbrella community based NGO for all organized groups in the district (civil society), Municipality (Local government) and a representation of the Central Government. Besides they are programming a Demonstrative Project: José del Mar Artisan Workshop.
International Cooperation Agencies	
1. United States Agency for International Development (USAID)- The United States of America governmental International Cooperation programs.	Development of specialized technical studies in themes and topics regarding interpretation and management of recreation areas through the United States Forest Service (USFS).

Institution or Agency: Service or Function	Related Projects or Activities
2. US Peace Corps-Through volunteers provide support for: environmental education, forestry education, small businesses advise, public health, sanitary infrastructure improvement, among other topics.	Supports to the community so that by themselves they can accomplish sustainable development.
3. Japan International Cooperation Agency (JICA)	Brings volunteers to aid in basic research and program development in parks, governmental institutions and NGOs; within the Panamá Canal Watershed has a follow up project to PROCAPA with 18 communities of the upper river basin, promoting better cultivation practices and diversification of products, soil conservation to empower local villagers and work towards sustainability.
4. German Agency for International Cooperation (GTZ)-German government International Cooperation Agency programs.	Support to management planning in Cerro Hoya National Park and environmental education programs; research in Ngöbe-Bugle territories.
5. General Consulate of the Republic of China –The Republic of China governmental cooperation programs	Support to agriculture and environmental education activities.
6. Agencia Española de Cooperación Internacional (AECI). The Spanish International Cooperation Agency	Promoted development of cultural and natural programs in Portobelo National Park and associated villages, including a draft of a management plan, urban waste collection, Ecotourism, urban and peri-urban agricultural project; in Coiba National Park sponsored research on natural resources and prepared a management plan.
N a t i o n a l N G O s	
1. Sociedad Audubon de Panamá (SAP)- Panamá Audubon Society. Web site: www.panamaaudubon.org	Bird observation, conservation, education. Developed a program to prioritize important bird areas in the country and published those results.
2. Círculo Herpetológico phone: 212-8000 (R. Ibáñez)	Developed research regarding amphibians in selected protected areas within the Panamá Canal Watershed. Continues identifying priority issues for amphibians' conservation.
3. Sociedad Mastozoológica de Panamá Phone: 222-3934 (R. Samudio)	Promotes research, conservation, training and environmental education regarding mammals and their habitats.
4. Fundación Dobbo Yala	Formed by professionals of indigenous groups addresses issues of main concern for them: demarcation of territories, study and conservation of natural resources.
5. Fondo Peregrino-Panama, Web site: www.peregrinefund.org.	Conducts research and education on wild and captive birds of prey that are threatened or in extinction threat.
6. Centro de Estudios y Acción Social Panameño (CEASPA)- The Panamanian Social Studies and Action Center in the last three years has contributed to biodiversity conservation and promoted support to people and groups interested in the protection of San Lorenzo protected area (APSL)	Responsible of the APSL's Management Plan generation, Fund raising for sustainable development projects in the neighboring area to APSL (project: Effective protection with community participation), Community education program, Coffee production improvement Program, Promoted Community plant nursery in Achiote.
7. Fundación para el Desarrollo de la Libertad Ciudadana	It is a federation of NGOs that, among other topics of concern for citizens, addresses issues regarding the environment. Promoted the presentation of two cases to be judged in the Central American Water Tribunal:

Institution or Agency: Service or Function	Related Projects or Activities
8. Fundación NATURA: Nature Foundation: Environmental Protection Fund raising and administration of donated funds; strengthening of environmental initiatives.	For several years provided supplementary funds for 36 protected areas via ANAM; starting on 2004 will only provide funds for 19 priority areas in SINAP 6 of which will receive larger donations and the remaining 13 will receive small donations. Through NGOs works in relevant topics for communities and conservation areas as the coffee production project in villages in Colón to halt expansion of land occupied close to San Lorenzo Protected Area.
International Institutions with office in Panamá	
1. Instituto de Investigaciones (IICA)	Conducts research on agriculture and assess on better practices
2. Centro Agronómico de Investigación y Enseñanza (CATIE) The agronomical center for research and learning.	It participated in formal education via Universidad de Panama training a group of professionals at the graduate level in Protected areas management. Has participated in projects regarding forest management, agricultural practices, among other issues.
3. Smithsonian Tropical Research Institute (STRI)	Maintains a research staff with long term studies and every year hosts invited researchers conducting studies in a diversity of issues related to natural resources.
Academic Institutions	
1. Universidad de Panamá (UNIPAN) The University of Panamá	Has all carriers at the bachelors level; has few graduate programs.
2. Universidad Autónoma de Chiriquí (UNACHI) Autonomous University of Chiriquí	Is a small regional university with all carriers at the bachelors' level, except medicine; has few graduate programs.
3. Universidad Santa María La Antigua (USMA)	Has an arts bachelors and masters degree, science oriented graduate programs.
4. Universidad Tecnológica de Panamá (UTP)	Have technical carriers and few bachelors and graduate programs in environmental engineering and related fields.
International NGOs	
World Wildlife Fund for Nature (WWF)	Works towards environmental conservation. Training and conservation of natural resources in Central America
The Nature Conservancy (TNC)	Conservation and management of protected areas, land acquisition, inventory and monitoring of wildlife
Conservation International (CI)	Sustainable development, ecosystem conservation, certification
Wildlife Conservation Society (WCS)	Wildlife research and conservation biology of wild and captive animals.
International Union for the Cosnervation of Nature and Natural Resources (IUCN)	Environmental conservation including equitable and sustainable use of natural resources.
World Monuments Fund (WMF)	Identification, research for restoration, conservation and management of cultural resources integrating the natural surrounding.