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SENEGAL BIODIVERSITY AND TROPICAL FORESTS ASSESSMENT

PROSPERITY, LIVELIHOODS AND CONSERVING
ECOSYSTEMS (PLACE) IQC TASK ORDER #1

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This Senegal 118/119 Assessment Report was completed in reference to the task order. The views expressed and opinions contained in this report are those of the Senegal 118/119 Assessment Team and are not intended as statements of policy of either USAID or the contractor companies.

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DISCLAIMER

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EXECUTIVE SUMMARY

This is the required report of a Section 118/119 assessment on biodiversity and tropical forestry concerning the new five year Strategic Plan (2006 – 2011) for USAID/ Senegal’s overall Bilateral Assistance Program.

As part of its ongoing efforts to design and program a new strategy for Senegal for 2006 – 2011, USAID/Senegal contracted the services of a biodiversity – tropical forest assessment team through the ECODIT PLACE IQC Consortium. The assessment is an early review of the Mission’s new multi-year strategy for the country aimed at ensuring that:

- Planned activities and investments are not likely to adversely affect biodiversity and tropical forests.
- Opportunities for program synergy that can be improved and promoted to enhance the conservation of biodiversity and tropical forests are identified.
- Other issues and opportunities for USAID assistance that match the Mission’s overall strategy are identified.

The New Strategy for the USAID/Senegal Bilateral Program

USAID/Senegal’s program is designed to spur economic growth by boosting Senegal’s trade capacity and improving the business and investment environment. It will prepare the next generation of healthy and productive citizens by improving Senegal’s health and education systems. At the local level, it will expand economic opportunities in rural areas by helping citizens generate income, connect to domestic and international markets, manage the country’s natural resources, and govern more effectively.

The new USAID/Senegal five-year program includes four major Strategic Objectives:

- Improving the health status of families;
- Increasing economic growth through trade and agriculture/natural resources management;
- Improving youth education; and
- Advancing the Casamance peace process in a sustainable manner.

Major Findings for the New USAID/Senegal Bilateral Program

The team’s findings support the USAID strategies. First, the team has not detected any instances where planned activities would be likely to adversely affect biodiversity and tropical forests. Second, the team concurs with the evaluation of the “Wula Nafaa” Project that “activities have been, in general, quite successful”, and that another five years of support should be considered to bring the new institutions and initiatives to a point where they can be continued without outside donor support. Furthermore, the team concurs that during this second phase, the Project be expanded to include other forest areas, as well as coastal areas.

The following observations were gleaned from interviews of interested parties, as well as field visits, conducted by the team concerning the status of biodiversity and tropical forests and threats to these resources in Senegal:

- The status of natural resources continues to deteriorate due primarily to anthropogenic and natural causes. The team concluded that the primary threats caused by human activities are uncontrolled fires (*feux de brousse*), shifting agriculture, and poaching (*braconnage*) driven by poverty or inequitable access to economic opportunity. The team also considered climate change, soil erosion, and soil salinization to be important primary threats caused by human activities. In this context, the team directly observed changes in forest species that are occurring in the Fathalah Private Reserve and Niokolo Koba National Park, where dryland species normally found in the Sahelian vegetation formation are replacing trees in the relatively moist Guinean vegetation formation. The team considered charcoal production and animal migration (*transhumance*) to be secondary threats largely as the result of successful community forest (CF) management programs being implemented through programs such as WN, PROGEDE and PGIES (Dankou).
- Many people the team interviewed stated they thought mining and the exploitation of recently-discovered mineral deposits of gold, iron and zirconium (e.g., the Zone d'Intérêt Cynégétique [ZIC] near Niokolo Koba National Park and within the Park itself) constituted the most serious potential threat to biodiversity and tropical forests. The reason given for this is that mining interests tend to be given authority and priority over the conservation of natural resources occurring in protected areas.
- Several people noted the increasing tendency of the national government to declassify and reclassify *forêts classés* (FCs) and other protected areas (PAs) as being a significant threat, since this is apparently done to promote special interests at the expense of existing agreements with local communities. This practice demoralizes people, and leads to their ill will, with the end result being that interest is lost in sustainably managing PAs.
- Many interviewees told the team that Senegal has excellent policies and laws that deal with the conservation of biodiversity and tropical forests, but the ability to implement these policies and laws is constrained by the lack of human resources, inadequate human capacity, and insufficient political motivation. The example usually given was the government's decentralization policy, and the inability of local communities to implement this policy.
- Many interviewees stated that tourism should be market driven in order to maximize returns on investment, and that more private reserves similar to Bandia should be created.

Key Recommendations

Based on these interviews and observations, the Assessment Team makes the following recommendations:

- Continue, and expand, the Wula Nafaa Project to establish and support community Resource Councils (RCs) that promote the USAID "Nature, Wealth and Power" paradigm objectives through natural resource conservation, economic growth, and good governance in local communities.
- Develop synergies between the Economic Growth and Trade/Natural Resources Management SO and the Youth Education SO to increase the awareness of basic environmental functions; with the Health Status of Families SO to eliminate stagnant water where mosquitoes breed and improve the availability and quality of potable water; and with the Casamance Peace Process SO to promote sustainable natural resources management.
- Promote donor collaboration through the Comité Permanente/ Conseil Superior des Ressources Naturelles et de l'Environnement (CP/CONSERE) to facilitate the coordination of activities by Government Ministries and Institutions, as well as donors, NGOs, universities, and community level

organizations that are concerned with programs to conserve biodiversity conservation and tropical forests. The team views collaboration amongst all donor organizations and parties involved in the management of biodiversity and tropical forests as being essential for the successful conservation of natural resources.

- Consider establishing an independent foundation that will enable the SP/CONSERE to function, as well as provide funding for small-scale projects and programs to conserve biodiversity and tropical forests. The availability of funding on a continuous basis is a key issue regarding the long-term ability of the Secrétaire Permanente of the CONSERE (SP/CONSERE) to provide oversight of the environment and natural resources sector. This recommendation is based on experience gained through other NEAP Programs (e.g., Madagascar).
- Take concrete steps to improve donor collaboration at the community level (e.g., exchange information on impacts of activities and programs, lessons learned, policies formulated and implemented, etc.) in order to avoid duplication of effort and maximize the use of financial resources and technical expertise. In and around the Niokolo Koba National Park, for example, there are three projects being implemented by three donors (i.e., the USAID WN Project and UNDP PGIES Project outside the Park, and the WB PROGEDE Project both outside and inside the Park), and there appears to be a lack of collaboration amongst the three donors.
- Prepare and implement Environmental Assessment, Social Assessment and Economic Assessment instruments to assure that potential adverse impacts on biodiversity and tropical forests caused by project and program implementation by all parties are appropriately minimized and mitigated. There are several mining operations currently being proposed in various specific locations, plus the building of major structures and the construction of highways in and around Dakar as well as other parts of the country which could benefit from such assessments.
- Provide assistance to the Government of Senegal for the formulation of policies concerning numerous activities looming on the horizon that will require concrete measures to mitigate potential negative impacts on the environment, while maintaining transparency for private sector development. These activities include the potential exploitation of heavy petroleum deposits, growth in international tourism, increased commercial fishing by international conglomerates, and the development of large-scale mining operations. To this end, consideration should be given in the second phase of the Wula Nafaa Project to working with both national and local government ministries and institutions to assure that: 1) existing national laws and policies are implemented and enforced; 2) effective environmental impact assessments are conducted and approved by the MEPN/DEEC, and that recommendations to mitigate potential negative impacts are strictly followed; and 3) laws and policies are interpreted and applied at the local level, sustainable resource management plans are developed, and people in local communities receive adequate training to effectively implement these management plans.
- Put in place concrete changes required to harmonize the lists of animal and plant species that are considered to be fully and partially protected by international conventions with those lists maintained by the DEFCCS and DPN (e.g., integration of the lists of threatened and endangered species under the IUCN Red List with those species that are fully or partially protected in the Code Forestier and the Code de la Chasse), and evaluate those species presently considered to have socio-economic importance or ecological significance.
- Implement steps to promote the honoring of existing agreements between the government and local communities; thereby increasing the likelihood these communities will continue to practice sustainable management of natural resources. Existing and future community agreements should be

recognized as legally binding by both the national and local governments, and any potential changes (e.g., eminent domain) should be settled in a court of law.

- Promote enhanced participation of the private sector and local communities in the management of biological resources in protected areas, within the context of overseeing charge accounts and the monitoring of engagements by different partners (taking into consideration equitable returns to local populations for community management of biological resources and conservation efforts).

Additional Opportunities for USAID/Senegal

The following opportunities exist for improving the status of protected areas:

Efforts to include the full value of biodiversity in the national accounts should be continued. The point is to demonstrate that the conservation of biodiversity can be both profitable and sustainable in the long term. This could level the playing field during arbitration between the conservation of the environment and the exploitation of mining, energy resources or other activities which degrade or destroy the environment.

A new policy for classification of natural areas is needed to take into account the important role which the private sector and other national and local organizations can play in the conservation of Senegal's forests and biodiversity.

Real property rights must be granted to those organizations which invest in and improve natural resources. The law must ensure complete security for all private actors, national or foreign, that guarantee environmental sustainability, plus the involvement of local populations in the co-management of new protected areas, as well as a clear understanding of the rights and responsibilities of each category of actors. As an example, all the classified forests should be the subject of participatory and co-management plans, thereby guaranteeing interests of the state in preservation of resources, the need for local populations to derive incomes from the sustainable exploitation of natural resources, and, finally, guaranteeing private sector investors a fair return on investment for developing the economic potential of natural resources.

It will be necessary to vary and to develop all devolved functions in the classified zones: the cultural, historic and recreational functions of these zones must be better evaluated and developed, especially with regard to environmental education for the promotion of a conservation ethic among citizens. Following the Bandia Private Reserve model, visitors' fees could be used to fund training and education programs for local people.

The State should continue to assume its functions of regulation and control, and yield to the private sector management functions and the improvement of conditions for conservation of biodiversity and forests on a mutually advantageous contractual basis. This could be achieved by following the WN model where local communities participate in conducting resource inventories and developing management plans, as well as actually implementing these management plans.

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ACRONYMS

Abbreviations and acronyms have been kept to a minimum in the text of this document. Where abbreviations or acronyms have been used, they are accompanied by their full expression the first time they appear, unless they are commonly used and generally understood abbreviations such as NGO, kg., etc. However, in order to facilitate understanding of the acronyms used, a complete list is included here.

ACDI	Agence Canadienne pour le Développement International (CIDA)
AFD	Agence Française de Développement
AGRHYMET	Agrometeorological and Operational Hydrology and their Applications Regional Center (Centre Régional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle)
AG/NRM	Agricultural and Natural Resources Management (USAID/Senegal name for Wula Nafaa project)
ANCAR	Agence Nationale de Conseil Agricole et Rural
ARM	Association for Responsible Mining
ARD	Agence Régionale de Développement
BAD	Banque Africaine de Développement (AfDB)
BD-TF	Biodiversity – Tropical Forest
BDS	Business Development Services
BFC	Baobab Fruit Company
BIC	Bureau Inventaire et Cartographie
BMZ	Ministère Fédéral Allemand de la Coopération Economique et du Développement
BNUS	Bureau des Nations Unies pour la Zone Soudano-sahélienne (UNSO)
BRGM	Bureau de Recherches Géologiques et Minières
CBD	Convention sur la Biodiversité Biologique
CBO	Community-Based Organization
CDEAO	Communauté Economique des Etats de l'Afrique de l'Ouest
CERER	Centre d'Etudes et de Recherches sur les Energies Renouvelables
CF	Classified Forest
CFA	Communauté Financière Africaine
CFD	Caisse Française du Développement
CILSS	Comite Inter-Etats de Lutte contre la Sécheresse au Sahel
CIRAD	Centre International de Recherche Agricole pour le Développement
CIVD	Inter-Village Development Council and Inter-Village Development and Management Council (Comité Inter Villageois de Développement)
CLD	Comités Locaux de Développement
CLUSA	Cooperative League of the United States of America
CMS	Crédit Mutuel du Sénégal
CF	Community Forest
CONSERE	Conseil Supérieur des Ressources Naturelles et de l'Environnement
CPA	Controlled Production Areas

CR	Communauté rurale and rural council
CRD	Comité Régional de Développement
CRDI	Centre de Recherche pour le Développement International
CSE	Centre de Suivi Ecologique
CTFT	Centre Technique Forestière Tropical
CVD	Village Development Council
CVGD	Village Development and Management Council (same as CVD)
DANIDA	Danish International Development Agency
DAT	Direction de l'Aménagement du Territoire
DCEF	Direction de la Coopération Economique et Financière
DEEC	Direction de l'Environnement et des Etablissements Classés
DEFCCS	Direction des Eaux, Forêts, Chasse et Conservation des Sols
DN	Direction Nationale
DNA	Direction Nationale de l'Agriculture
DNE	Direction Nationale de l'Elevage
DOPM	Direction de l'Océanographie et des Pêches Maritimes
DPN	Direction des Parcs Nationaux
DPV	Direction de la Protection Végétaux
DRPF	Direction des Recherches sur les Productions Forestières
EIG	Economic Interest Groups
ENDA	Environnement, Développement et Action dans les Tiers Monde
EROS	Earth Resources Observation Satellite
FAO	United Nations Food and Agriculture Organization
FED	Fonds Européen de Développement
FFN	National Forestry Fund (Fonds Forestier National)
FS	Forest Service of the Government of Senegal (Direction des Eaux et Forêts, Chasse et Conservation des sols)
GDRN	Gestion Durable des Ressources Naturelles
GEF	Global Environment Facility
GERME	Better Manage Your Enterprise (Gérer Mieux Votre Entreprise)
GIE	Economic Interest Group or Producer Group (Groupement d'Intérêt)
GIS	Geographic Information System
GOS	Government of Senegal
GPF	Groupement de Producteurs Féminins (Women Producers Group)
GPL	Groupement de Producteurs de Laalo (Karaya Gum Producers Group)
GRN	Gestion des Ressources Naturelles
GRNE	Gestion des Ressources Naturelles et de l'Environnement
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit GTZ (German Technical Cooperation)
HACCP	Hazard Analysis and Critical Control Point (food safety system)
IFAN	Institut Fondamental d'Afrique Noire
IIED	International Institute for Environment and Development

INE	Institut National de l'Environnement
IREF	Regional Inspection of the Forestry Department (Inspection Régionale des Eaux et Forêts)
ISE	Institut des Sciences de l'Environnement
IRG	International Resources Group
LC	Local Convention (Convention Locale)
LCD	Lutte Contre la Désertification
MAB	Man and the Biosphere (L'Homme et la Biosphère)
MAE	Ministère de l'Agriculture et de l'Élevage
MCC	Millennium Challenge Corporation
M&E	Monitoring and Evaluation
MEF	Ministère de l'Économie et des Finances
MEPN	Ministère de l'Environnement et de la Protection de la Nature (Ministry for the Environment and Protection of Nature)
MERA	Monitoring, Evaluation, Restitution and Analysis
MI	Ministère de l'Intérieur
MIA	Ministère de l'Industrie et de l'Artisanat
MMEH	Ministère des Mines, de l'Énergie et de l'Hydraulique
MRST	Ministère de la Recherche Scientifique et Technologique
NR	Natural Resources
NRM	Natural Resources Management
NTA	Non-Traditional Agriculture
OCDE	Organisation de Coopération et de Développement Économique (OECD)
OMVS	Organisation pour la Mise en Valeur du Fleuve Sénégal
ONCAD	Office Nationale de Coopération et d'Assistance au Développement
ONG	Organisation non Gouvernementale (NGO)
PA-ELV	Plan d'Action de l'Élevage
PAFS	Plan d'Action Forestier du Sénégal
PAFT	Plan d'Action Forestier Tropical (Tropical Forestry Action Plan – TFAP)
PAN/LCD	Plan d'Action National de Lutte Contre la Désertification
PDDF	Plan Directeur de Développement Forestier
PG	Producer Groups
PMP	Progress Monitoring Plan
PNACD	Plan National d'Action pour la Conservation de la Biodiversité
PNAE	Plan national d'Action pour l'Environnement (National Environmental Action Plan – NEAP)
PNDS	Parc National du Delta du Saloum
PNNK	Parc National du Niokolo Koba
PNUD	Programme des Nations Unies pour le Développement (UNDP)
PNUE	Plan des Nations Unies pour l'Environnement (UNEP)
PRAE	Plan Régional d'Action pour l'Environnement
PRAF	Plan Régional d'Action Forestier

PRDI	Plan Régional de Développement Intégré
PRSP	Poverty Reduction Strategy Paper
RC	Rural Community or Rural Council (Conseil Rurale or Communauté Rurale)
REDDA	Réseau pour l'Environnement et le Développement Durable en Afrique
RC	Regional Council
RFFN	Reserve de Faune du Ferlo Nord
R&R	Rights and Responsibilities project component
SAGIC	Support for Accelerated Growth and Increased Competitiveness for Trade (USAID/Senegal project)
SECID	South-East Consortium for International Development
SN/DB	Stratégie Nationale de la Biodiversité
SNIB	Système National d'Information sur la Biodiversité
SO	Strategic Objective
SP/CONSERE	Secrétariat Permanente/ Conseil Superior des Ressources Naturelles et de l'Environnement
UNCEF	Union Nationale des Coopératives d'Exploitants Forestiers
UNESCO	Organisation des Nations Unies pour l'Education, la Science et la Culture
UNIFEM	United Nations Development Fund for Women
UNSO/BNUS	Bureau des Nations Unies pour la Zone Sudano-Sahelienne
UPEN	Unite de Politique Environnementale
USAID	United States Agency for International Development
USAID/AFR	United States Agency for International Development/Africa Bureau
USAID/Senegal	United States Agency for International Development/Senegal Mission
USFS	United States Forest Service
WG	Women's Group
WN	Wula Nafaa (Programme AG/GRN)
WWF	World Wildlife Fund
WAMER	West Africa Marine Ecoregion Programme (WWF Program)
ZEG	Zone Eco-Géographique
ZIC	Zone d'Intérêt Cynégétique (Zone of Hunting Interest)

1. INTRODUCTION

In 1987, the United States Congress amended the Foreign Assistance Act to add new requirements concerning USAID's environmental procedures codified under 22 CFR 216. The following are overviews of the specific requirements:

Section 117- Environment and Natural Resources. It is 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.

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.

Accordingly, as part of its ongoing efforts to design and program a new assistance strategy for Senegal for 2006-2011, USAID/Senegal has contracted the services of a tropical forestry/biodiversity assessment team under the PLACE IQC held by ECODIT, Inc.

It is important to note that the tropical forestry and biodiversity assessment is not specifically a programming or sector-specific design effort. As specified in the SOW, it is an early environmental review of the Mission's new multi-year strategy for the country aimed at ensuring that:

- Planned activities and investments are not likely to adversely affect tropical forestry and biodiversity.
- Opportunities for program synergy among the strategic objectives are identified that could contribute to conservation and biodiversity.
- Other issues and opportunities for USAID assistance that may match the Mission's overall strategy are identified.

1.1 ASSESSMENT OBJECTIVES

Following the procedures customary with Section 118/119 Assessments, the overall findings and recommendations will be reviewed and incorporated by the Mission, at its discretion, in the ongoing development of its strategy. The complete *Senegal Biodiversity and Tropical Forests Assessment* will be in the master Mission CSP files and available on request. This assessment does not substitute for the Initial Environmental Examination (IEE) of activities identified in the 2006-2011 strategy. Each SO team will be responsible for ensuring that an IEE, or a Request for Categorical Exclusion, is conducted at the SO level for all activities funded by USAID.

1.2 METHODOLOGY

This assessment was conducted from November to December 2007 to by a team consisting of a Team Leader/Environment and Natural Resources Management Specialist, a Senegalese Biodiversity Specialist, and Senegalese Natural Resources Management Specialist. The Scope of Work, plus questions derived from the SOW that were used as a guide for all interviews conducted by the team, are in **Annex A**. Brief biographical sketches of the team members are in **Annex B**. The straightforward methodology for the assessment depended primarily on secondary sources of information, including a review of the existing literature (see **Annex C**), plus interviews with persons in Washington, D.C. and people knowledgeable about tropical forests and biodiversity in Senegal (see **Annex D** for the List of Persons Consulted). **Annex E** provides a synopsis of the official text of Sections 118/119 Amendments to the Foreign Assistance Act that generated the need for this Assessment. **Annex F** provides a list of threatened and endangered plant and animal species for Senegal and the region. **Annex G** consists of political maps and GIS images that show environment and natural resources of Senegal.

2. PROGRAM CONTEXT

2.1 BACKGROUND ON USAID SENEGAL PROGRAM

The U.S. Agency for International Development (USAID) implements the U.S. Government's development assistance program. In the current program, USAID/Senegal and the Government of Senegal (GOS) have mutually agreed on projects in the following focus areas: promoting economic growth/private sector development by expanding microfinance and business development services and commercializing natural and non-traditional products; improving local delivery of services and sustainable use of resources; increasing use of decentralized health services; and improving middle school education, especially for girls. In addition, there is a conflict resolution and rehabilitation program to improve conditions for peace in Senegal's two southern regions known as the "Casamance". Total U.S. assistance for Senegal in FY 2007 is approximately \$ 34.9 million, of which approximately \$ 19.2 million were for development assistance.

2.2 CURRENT PROGRAMMING EFFORTS

The Senegal Mission's current E/NRM program reflects lessons learned from the previous AG/NRM programs. According to the "Impact Assessment of the Agriculture/Natural Resources Management Strategic Objective of USAID/Senegal (Old SO2)" (USAID, 1999), certain Mission objectives were not met due to various factors including: 1) changes in how the USAID conducted business (decline in funding and staffing, plus competition for resources resulting from reinvention efforts); 2) GOS structural adjustment and the resulting decline in support for sound soil management practices; and 3) natural phenomena (decline in annual rainfall and the subsequent opening of new lands for cultivation and livestock grazing).

Recommendations made in the 1999 Assessment included: 1) integration of natural resources management and agriculture activities that respond to the needs, desires and resource constraints of the rural population; 2) greater emphasis on natural regeneration in agroforestry activities, where feasible, rather than planting trees; 3) promote the use of improved wood-burning cook stoves; 4) develop a natural forest management program that collaborates with local populations to manage public woodlands, pasture lands, and coastal areas, including protected areas; 5) intensification of water and soil erosion control; and 6) development of techniques to reduce salt intrusion on agricultural lands along the rivers and water courses that constitute Senegal's water courses.

A major portion of the Agriculture and Natural Resources Management Program (AG/NRM) is currently being carried out under the Wula Nafaa (meaning "benefits from the forest") project. This 5-year, \$11.75 million project led by IRG, which promotes conservation, poverty reduction and good governance, adopts the Nature, Wealth and Power approach based on experience learned by USAID throughout Africa over the last 20 years (USAID, 2002).

The Wula Nafaa project promotes sustainable use of non-traditional agriculture and natural products by encouraging profitable joint ventures between rural communities and private enterprises to market natural products and traditional agricultural products (including cashews, sesame, a local cereal known as fonio, hibiscus and mango) for local and national consumption and export markets. This project also trains forest

guards, who are handpicked by their communities, to protect their forests and fields from fires and unwanted livestock and outsiders who come in to exploit the forest for fuelwood and charcoal. It is noteworthy that considerable progress has been made by the WN project to increase production of charcoal from managed forests, and an increasing amount of charcoal is being obtained from these forests by the charcoal cartels.

The FRAME Program implemented for USAID by International Resources Group (IRG) captures and shares knowledge within the natural resources management (NRM) community in Africa, Asia and Latin America. In Senegal, the FRAME program has focused on identifying local experiences where NRM practitioners have demonstrated the link between environmental conservation, poverty reduction and good governance. It then makes this information available for a wider audience through reports, interactive website and workshops. Under the FRAME program, USAID has conducted a series of natural product studies and workshops in Senegal to evaluate opportunities for policy interventions which allow for the integration of natural products into rural development strategies. The “Laalo Mbep” Gum Workshop held in Dakar during 2005 was the first in a series of natural product workshops organized to review field study results in Senegal.

The USAID/Senegal Mission program is strengthened through partnerships with other USG Agencies. Most notable amongst these is the work being done with the USGS/EROS Data Center, which has developed many excellent GIS images and maps showing the ecological zones, vegetation, rainfall distribution, soils, etc (see Annex G). USGS/EROS has provided technical training and equipment to the Senegalese, and they have worked extensively with the Centre de Suivi Ecologique (CSE) to develop and update these GIS images. They have also conducted long term studies of the seasonal vegetation growth patterns of Senegal that are triggered by the annual monsoon using historical NDVI (Normalized Difference Vegetation Index) images acquired by the NOAA (National Oceanic and Atmospheric Administration) satellites (Tappen, et al, 2004). These images, covering the period of 1982 to 1995, permit a qualitative view of the initiation of growth, length of the growing season, and the relative amount of above ground photosynthetically active biomass. This work is being continued under the “Framework for Long-Term Monitoring of Natural Resources in Senegal” program, as well as the carbon sequestration studies being conducted with USGS, CSE, CILSS and USAID. (Woomer, P.L., et al. 2004).

2.3 CONTEXT FOR NATURAL RESOURCES MANAGEMENT IN SENEGAL

General

Senegal is the most westerly state of West Africa. Composed primarily of a gently sloping, poorly dissected plain, Senegal is relatively flat with low relief. Its total land area is 196,192 km square. The northern border, which is shared with Mauritania, is defined by the Senegal River. The Falémé River delineates part of the eastern border with Mali; Guinea and Guinea-Bissau are Senegal's southern neighbors, and The Gambia forms an enclave of 11,295 km square along the Gambia River in the southern part of Senegal (Appendix G., Map 1).

As all of Senegal lies south of the 17 degree north latitude parallel – well within the tropics – temperatures are high throughout the year. Annual rainfall is almost entirely limited to the summer wet season, which lasts up to six months in the south and decreases to three months in the north (USGS/EROS, 2004). Like all areas near the northern limits of the Southwesterlies, Senegal suffers from extremely variable rainfall. Average rainfall varies from over 1,500 mm in the southwest to just under 300 mm in the northwest. The rainfall trend (Appendix G, Map 2) in the last several decades shows a significant decline.

The transportation network is good and consists of over 13,000 km of roads, of which over 2,500 km are paved. Rail services extend east and north of Dakar and consist of 1,186 km of rail. River traffic is negligible. Air transport is well-developed within the country and serves 15 cities besides Dakar.

Population

The population of Senegal is estimated at 12.5 million, with an estimated annual growth rate of 2.7 percent (CLUSA, 2006). The growth rate has been relatively stable since the first national census in 1976. About 61 percent of the population is rural with approximately 70 percent of the total labor force is employed in agriculture.

While the overall population growth rate is stable, there is a large difference in rates for the urban and rural populations. The urban growth rate has averaged 3.83 percent in the 12 years between the 1976 and 1988 censuses, while the rural population has averaged 2.07 percent. This suggests that there is considerable continuing migration from the rural areas to the towns and cities (République du Sénégal, 1988).

As the overall population increases, so does the population density. In 1976, there was an average of 25 persons per square kilometer. In 1988, the figure had increased to 35 persons per square kilometer. The uneven distribution of population has resulted in six administrative departments having over 100 persons per square kilometer in 1988 (République du Senegal, 1988).

The Senegalese population is made up of at least 12 ethnic groups of which the major ones are: Wolof, Serer, Toucouleur, Manding, Diola, and Peul. The Wolof people make up a considerable majority of the population of Senegal, more than a third of the total. Despite the diversity of Senegalese peoples, there is relative harmony among the groups and Senegal is well known for its political stability.

Physiography

Senegal's topography is relatively flat except for moderate relief in the southeast. Most of the country is a Tertiary sedimentary subsidence basin (USGS/EROS, op. cit.) There are four major rivers which flow west into the Atlantic: the Senegal, Saloum, Gambia, and Casamance. They are wide and meandering with broad estuaries at their mouths.

Geologically, Senegal is composed of two primary relief features. The first is a dissected, elevated region of Paleozoic and Precambrian folded and faulted rocks in the southeast. These are rocks of the "African Shield." They are primarily quartzite, granite, and granitized schists. The second is a sedimentary basin of Tertiary and Quaternary rocks and sediments occupying the western and northeastern part of the country. This is the "Continental Terminal" formation, which occupies by far the largest part of the country. This sedimentary layer is composed of heterogeneous clay sandstones of varying thickness. It consists of a low plateau and plains overlain by wind-blown sediments, alluvial deposits, and intermittent laterite hardcap.

Vegetation

The vegetation of Senegal can be divided into three major ecological regions. From north to south, they are: the Sahelian Region, the Sudanian Region, and the Guinean Region (USGS/EROS, op cit.) (Appendix G, Map 3). The Sahelian Region occurs between rainfall isohyets of 150 and 700 mm/yr. The core area lies between the 300 and 500 mm/yr isohyets. It is located in northern Senegal. The early seasonal rains, which usually begin in July, transform the landscapes into green, lush rangelands, drying out quickly after the last rains in late September. During the long dry season of 8 to 10 months, the herbaceous cover disappears as livestock and termites devour it, exposing bare soil to wind erosion. The primary land use is raising animals, which has been a traditional activity for centuries. Woody plants are usually associated with the vast expanses of seasonal grass cover, together forming the dominant vegetation types of the Sahelian Region. The most common types are shrub savannas, shrub and tree savannas, and bushlands.

The Sudanian Region lies to the south of the Sahelian, covering about two-thirds of central and southern Senegal. It is the domain of the savanna. The typical vegetation types include the savanna woodland and the dry woodland. The Region predominates between the 700 and 1500 mm/yr isohyets and is centered on the 900 to 1200 mm/yr isohyets. It is characterized by rainfall spread over 5 to 6 months, of which July, August and September are nearly certain to have rain. Like the Sahelian Region, the rains occur during the high sun, summer months. A distinct dry season of 6 to 7 months is transformed into a wet, green season by the first rains, triggering vigorous vegetation growth.

While the Sudanian Region is often defined by average annual rainfall, other criteria are also considered. Some 80 woodland species have been identified as being specific to this region. Sahelian species that extend into the Sudanian Region disappear in a gradual transition as one progresses into the central Sudanian domain. Trees typical of the central Sudanian Region include *Cassia sieberiana*, *Daniellia oliveri*, *Khaya senegalensis*, and *Terminalia macroptera*. There are also many species of *Combretum* and *Acacia*.

Human occupation has greatly modified the vegetation composition and structure, particularly in the Peanut Basin. To the east, including much of the Tambacounda Region, human pressure is less intense, and the vegetation formations approximate the climax vegetation (savanna woodlands and dry woodlands) that once blanketed the Sudanian Region. Annual bush fires continue to play an important role in maintaining open woody vegetation types (Appendix G, Map 4).

The Guinean Region proper can only be found in the extreme southwest corner of Senegal, although characteristics of this zone begin to manifest themselves in the southern Sudanian Region. This is the region of the semi-evergreen dense forest; its extent has been reduced to a few remnant communities by widespread deforestation for the cultivation of rice, manioc and peanuts. The Guinean Region predominates in the areas of average annual rainfall exceeding 1500 mm/yr, with the central Guinean Region having precipitation levels of over 1800 mm (in countries south of Senegal). Despite the high rainfall, this region has a distinctly dry season of 7 to 8 months, distinguishing it from the Equatorial Region of Africa.

Soils

The soils of Senegal range from dry sandy soils in the north, to tropical ferruginous soils in the central region, and to ferralitic soils in the south (Appendix G, Map 5). Overall, soil fertility is low and soils are mostly fragile, making them highly susceptible to water and wind erosion (USGS/EROS, op. cit.). The soil texture of most fresh water river valleys tends to be high in clay and silt content. Soils in these valleys are classified as "generally good soils", i.e., they do not have serious limitations and are able to produce good yields of suitable, climatically adapted crops. Most cultivated soils located in the Peanut Basin are "generally poor to moderate soils". These soils have one or more limitations that restrict their use, are usually of fairly low natural fertility, and generally give low to moderate yields of climatically adapted crops under traditional systems of management.

Agriculture

Agriculture is the dominant economic activity in Senegal, providing employment for about 70 percent of the labor force (USGS/EROS, Ibid). It is dominated by rainfed cultivation whose vegetative cycle coincides with the short wet season. The distribution and kinds of crops are closely tied to the amount, distribution, and timing of rainfall. Crops in the northern half of the country are particularly prone to the effects of erratic rainfall and drought. In addition to rainfed cultivation, two other types of traditional agriculture are practiced. One depends on flooding of low-lying areas due to rainwater runoff. This type is found in the humid south and is associated with paddy rice cultivation. The second is the flood recessional agriculture associated mainly with the Senegal River. A non-traditional form of cultivation is irrigated agriculture. It is found mainly along the Senegal River where water is available year-round.

Agriculture plays an essential role in both the national food supply and in the national economy. Rainfed (dryland) cultivation consists of cash crops dominated by groundnuts (peanuts), and subsistence crops dominated by millet and sorghum. Groundnuts are the main cash crop grown in Senegal and, although its share of total export value has fallen drastically in recent years, it is still a major source of rural income and critical to one of Senegal's major industries - the groundnut oil mills - which produce groundnut oil for the domestic market and for export. Climatic conditions and the world price for groundnuts are dominant in determining Senegal's balance of trade. There is a shortage of foodstuffs in the country, and much of it must be imported to cover domestic food requirements.

As previously noted, the general trend has been for a decrease in the amounts of rainfall over the past several decades (Appendix G. Map 2). When examined at the ecoregion level, it becomes clear that some ecoregions are undergoing fundamental transformations, while others remain fairly stable (Tappan, et al., 2006; USGS, 2007; Appendix G. Map 6). It is postulated that the changes seen result from declines in the area of the country's diverse vegetation types, both through outright conversion to agriculture and through reduction (modification) of woody cover. These changes, while significant, are not entirely consistent with the presentations of doom and gloom that can be found in a long string of environmental-crisis reports on Senegal. In 2000, Senegal is still largely a country dominated by a great diversity of land cover types, while less than a quarter of its land area is devoted to food production. Even within Senegal's agricultural landscapes, farmers usually preserve a diversity of trees that represent a great source of natural wealth.

The trends highlight several areas of concern. One is the clear loss of more than half of Senegal's forests (cover types with over 80 percent canopy closure) in just 35 years (Tappan, et al., Ibid). Most of these represent biodiverse 'hotspots,'—habitats for a great variety of flora and fauna. A second trend, not reflected directly in land cover change, is the decline in woody cover throughout Senegal. An unrelenting demand for fuel, particularly in the form of charcoal, is driving an ever-growing wave of selective logging in all regions with significant woody resources. Tappan, et al. (Ibid) found that 28 percent of Senegal's wooded savannas and woodlands were moderately-to-severely degraded by charcoal production.

It is worth noting, however, that examples do exist where forest regeneration will occur – even in the most degraded areas. The PAGERNA Project, which was funded by the German GTZ over an 8-10 year period helped communities around the Kaolack and Fatick regions establish and manage naturally-regenerated woodlands. It was the first forestry project that worked to empower communities to manage their own forest resources. (Communities decided what areas to protect and got all their people on board not to let their cattle in certain areas – or not to cut wood – in order to regenerate the forest.) PAGERNA provided organizational training and helped communities organize and prepare and implement management plans. Some of the forests were large (over 1,000 ha) while some were only a few hectares. They proved that using the same WN principles that communities can regenerate forest stands through *mise en defens* without resorting to fencing.

3. LEGAL AND INSTITUTIONAL FRAMEWORK FOR BIODIVERSITY AND FORESTS

This chapter will focus on the existing legal, policy and institutional framework for biodiversity and tropical forests and suggest improvements needed to make the framework more effective.

3.1 LEGAL AND REGULATORY FRAMEWORK

Conservation of biodiversity and forests in Senegal involves many sectors, both with regard to the structures it regulates and with the structures and legal tools that govern and regulate it. The legal instruments, as well as the institutions responsible for their implementation, are often based on French laws and institutions. However, these various laws leave little room for the enforcement of traditional law, which leads quite often to the outbreak of conflicts between the legitimacy of modern law and the reality of traditional law.

At the international level, Senegal has signed various treaties and conventions relating to wildlife and natural resources, including the Ramsar Convention, Paris Convention of 1972, Washington Convention of 1973 (CITES), the Bonn Convention relative to the protection of migratory species, United Nations Law of the Sea, Biodiversity Convention, the Desertification Convention, the African Convention of Algiers, and the Convention of Abidjan concerning protection of marine species.

3.2 PRESENTATION OF THE MAIN LAWS GOVERNING BIODIVERSITY AND FOREST CONSERVATION

FOREST LEGISLATION

Law N° 93-06 of February 04, 1993 and its enforcement decree 95-357 of 11 April 1995 place the protection of Forests which is under the authority of DEFCCS. The Department of Water and Forests (DEF) has principal responsibility for forest conservation and management. With one exception the law does not transfer any responsibility for forest conservation to local communities. This one exception is the “*terroir lands*” where management of the forest is the responsibility of a local community on the basis of a management plan approved by the DEF (Appendix G, Map 7).

Water and Forests agents “are responsible for the protection, conservation, and development of both national plant and animal forest resources” (Article L. 56 of the Forest Code). They must approve any measures that are likely to alter forest resources. Thus, any excavation that affects the soil and forests is normally prohibited in classified forests. If such work is done outside classified forest zones, the authorization of the Regional Council President is necessary after consultation with the concerned rural council. To insure protection of

this area, the authorization to start operations can only be granted after submission of a case that includes an environmental impact assessment. (Article L. 44 of the Forest Code). However, because the human and budgetary resources available are insufficient to enforce the law, people frequently enter the forest and degrade it.

HUNTING AND WILDLIFE PROTECTION LEGISLATION

The hunting and wildlife code was established by law No. 86-04 of January 24, 1986 and Decree No. 86-844 of July 14, 1986. It replaces the provisions of Law No. 67-28 of May 23, 1968 establishing the Hunting and wildlife protection code. Its adoption was necessary because of the acceleration of poaching and the destruction of forests and savannah. New elements introduced in the code include the strengthening of sentences which have been multiplied by ten and the strict enforcement of penalties when the act is committed in a protected area.

Trade of animal species is controlled in accordance with commitments under the CITES Framework Convention. Consequently Decree No. 80-445 of 29 April 1980 prohibiting the importation of fully protected living animals prohibits the importation of certain animals, corpses or trophies in Senegal except in the case it is for the interest of the public following a decision taken by the Ministry of Nature Conservation. Since 1983 a Water, Forests and Hunting control office was created at Léopold Sédar Senghor Airport in Dakar in order to control the import and export of animals and wildlife. In 1985, a similar office was set up at the port of Dakar.

Decree No. 96-1134 of 27 December 1996, which provides for the implementation of Law No. 96-07 of March 22, 1996 with respect to natural resources, gives the responsibility for wildlife protection to local authorities, particularly the authority to create natural animal reserves.

MINING LEGISLATION

Law No. 2003-36 dated 6 February 2003 bearing the Mining Code supersedes law No. 88-06 of 26 August 1986 and its enforcement decree No. 89-907 dated 5 August 1989 which established the Mining Code. This new law, which regulates exploration and mining conditions, as well as the mode of operation of quarries, ensures the protection of mineral resources. In addition, any operation licensee must participate in the rehabilitation of mine sites by opening a fiduciary account to cover the implementation costs of the rehabilitation program. Similarly, any mining activity that is carried out in classified forests is required to comply with the provisions of the Forest Code.

NATIONAL STRATEGY FOR BIODIVERSITY CONSERVATION

Developed in 1998, it focuses on four objectives:

- Conservation of biodiversity in high density sites;
- The integration of biodiversity conservation in programs and production activities;
- The equitable sharing of the roles, responsibilities and benefits of biodiversity conservation;
- The education of all stakeholders on the importance of biodiversity and the need for its conservation.

This strategy is supported by an action plan consisting of urgent priority actions, achievable in five years, which is broken down into two categories:

- Actions of a general nature such as the establishment of a unit to coordinate and monitor the strategy and action plan, as well as assist in the development of regional plans for the conservation of biodiversity.
- Specific actions in national parks, reserves, and classified forests on the one hand, in marine, coastal, river and lacustrine ecosystems, on the other hand, and finally in classified forests and forests located in “*terroir*” lands (Appendix G, Map 8).

Following the Durban conference in 2003, a national strategy for protected areas (Elan Durban) is being developed. This opportunity has allowed the development of regional strategies that will be summarized into an update of the national strategy. Regional strategies have already been developed and the process, which has experienced a delay, should be completed no later than 2008. This new national strategy will update the biodiversity conservation strategy developed in 1998 and will set out the basic co-management principles of the various protected areas.

3.3 INSTITUTIONAL FRAMEWORK

The national and local institutions involved in the management of forests and protected areas Decree No. 2000-309 of 9 May 2000 states that the Minister of the Environment and Nature conservation "prepares and implements the policy decided on by the Head of State in the fields of Environment and Nature Protection."

The Ministry of Environment and Nature Protection is responsible for natural resource management activities (forests, wildlife) and environmental protection in all sectors of activity (pollution and nuisance control, ecosystem preservation and so on.). The Ministry is responsible for insuring that all other ministries comply with the environmental code.

The ministry includes four directorates that are responsible for the implementation of environmental policy; the Directorate of National Parks (DPN), the Directorate of Environment and Classified Establishments (DEEC), the Directorate of Water, Forests, Hunting and Soil Conservation (DEFCCS), and the Directorate of water retention basins and artificial lakes (DBRLA).

Lack of staff and limited budgetary resources impede the monitoring of protected areas. In addition, the national park agents do not always have the necessary technical preparation to carry out their responsibilities. It should be noted that for some years now, the recruitment of executive level staff at the DPN has helped to diversify the staff profile and strengthen its capacities (veterinary doctors, engineers, environmentalists, planning specialists and so on.).

Following the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 two new entities with cross-sectoral responsibilities were created: the CONSERE (high Commission for natural resources and the environment and the SDC (Sustainable Development Commission).

Decree No. 93-885 of August 4, 1993 created the Higher Council for Natural Resources and the Environment (CONSERE). It is a "framework for dialogue that promotes the inclusion of environmental considerations in the economic and social development of Senegal" (Article 2 first paragraph). This supervision and coordination structure has the responsibility to ensure coherence of the legal and institutional framework and harmonize actions of the various stakeholders involved in the management of natural

resources (ministerial departments and state technical departments, local communities, NGOs, private sector, civil society associations and so on.).

The CONSERE is organized around the following structure: a Ministerial Council, a decision-making body (chaired by the Prime Minister), a Standing Committee, monitoring body (chaired by the Minister of the Environment) and a permanent secretariat, an implementation body (placed under the supervision of the Minister of the Environment).

After conducting a participatory and decentralized exercise in 1998 to design the National Environmental National Action Plan (NEAP), the instrument which insures that environmental concerns are taken into account in all sectors of economic and social activity, the CONSERE fell into a non-functional state due to a lack of human and material capacity. (The main donor that was funding its operations withdrew in 1998, and the State does not seem to have the political will to rehabilitate this structure.) Since then, aspects relating to policy harmonization and coordination of stakeholders in the area of the environment and natural resource management are rarely taken into account. Only the Environmental Directorate (DEEC), in charge of the environmental code including the implementation of environmental impact assessments, manages aspects related to the mitigation of the adverse effects of programs and environmental projects.

However, because of the cross-cutting nature of the environment, the Environmental Directorate (DEEC) can not take into account the cross cutting nature of natural resource management and environmental protection in general, and concerns relating to the conservation of biodiversity and protected areas in particular. This function should be the responsibility of an inter-ministerial structure that incorporates within its structure all categories of stakeholders to help coordinate activities, and help increase the chances for concerns relating to the environment and sustainable management of biodiversity being considered during political negotiations relating to large mining and/or energy development projects.

Decree No. 5161 of May 26, 1995 established the Commission on Sustainable Development. It is composed of three sub-committees:

- The sub-committee responsible for setting the agenda and identifying the key issues of the overall policy of sustainable development is chaired by the Prime Minister.
- The sub-committee in charge of monitoring and assessment: chaired by the Environment and Classified Establishments Directorate has the mandate to monitor and assess the recommendations of the Rio conference.
- The sub-committee in charge of project management; under the authority of the Ministry of Economy and Finance, is responsible for initiating the pre-selection of projects submitted for funding before these are sent to development partners.

The National Sustainable Development Committee (CNDD) does not have its own budget and has long worked with the resources available at the Environment and Classified Establishments Directorate. With the support of the UNDP Capacity 21 program, the committee developed the National Strategy for Sustainable Development and the regional Sustainable Development Strategies in 2005. The national and regional committees are the monitoring bodies in charge of the implementation of these strategies. The national strategy is broken into six priorities including the promotion of sustainable modes of production and consumption and the promotion of balanced and harmonious development. An action plan for the implementation of this strategy must be developed.

Law no. 96-07 of March 22, 1996, supplementing the local communities code, transferred authority for nine sectors concerning environment and natural resource management to local communities. (These nine sectors

include Environment and Management of Natural Resources, Health, Population and Social Action, Youth, Sports and Leisure, Education, Planning, Territory Management, Urbanism and Habitat.) The law distributed authority to different levels of the local communities (the region, municipality and the rural community). Decree No. 96-1134 of December 27, 1996 specified the conditions for the transfer of authority in the area of the environment and natural resources.

Consequently the local communities are responsible for the protection and management of natural resources and the environment. But all their authority is exercised under the supervision of decentralized administrative authorities in close collaboration with the technical department in charge of the management of environmental issues (water and forests, national parks, etc.). A technical structure, the Regional Development Agency, was created to provide support to different levels of local communities, particularly in the field of environment and natural resource management.

The state created an endowment fund for the implementation of the transferred authority and a fund for the equipment of local communities. In addition, the local communities have other resources within the framework of decentralized cooperation. However, it should be pointed out that the local communities do not have sufficient resources and means to exercise this transferred authority, given the limited amounts and the failure to transfer resources associated with certain transferred powers such as the environment. This situation has delayed the decentralization process. It should be noted that in 2004 and again in 2006, DEFCCS conducted institutional analyses that made recommendations on streamlining the Department to make it more efficient, but these have not been acted upon. For this reason some of the transferred authorities, such as the development of community forests, the setting up of community natural reserves etc...can only be achieved with the support of development projects funded by donors partnering with Senegal.

3.4 POLITICAL FRAMEWORK

The following policies have an impact on biodiversity and forests:

LAND MANAGEMENT POLICY

Land management is governed by law 64-46 of June 17, 1964. This law provides for equitable access to land, an essential for natural resource management. Based on this law, supplemented by Law 72-25 of April 19, 1972 relating to rural communities, the government initiated a land reform. This reform has been implemented in two stages:

- The "nationalization" of all non classified lands including, non-registered land. Occupants who had made some investments were allowed to register the land they occupied;
- The authority to manage *terroir* lands (which include the land considered a working tool for the rural world) returned to the rural community council).

Urban areas, pioneer areas and classified areas are under the authority of the State Departments.

This legislation permanently supersedes the customary law enshrining the traditional "right of use" for the benefit of people who have the capacity to make the land productive.

The main problems posed by this law include:

- The lack of real rights to the land, transactions between individuals and in general, of any real estate transaction, including of credits;
- The protection of investors and land traders; and
- Insufficient consideration of pastoral and forest activities.

The national estate law needs to be revisited to take into account socio-economic trends (state withdrawal, monetization of the economy, development of socio-professional organizations and youth and dynamic women organizations, decentralization and transfer of environmental competence, empowering people, the need for land property security to promote investment in rural areas etc.). Many studies have been conducted and several recommendations have been made (for example “Plan d’action foncier pour la gestion durable des ressources naturelles, Ministère de l’Agriculture, Unité de Politique Agricole, 1996”). The Government has to make some political decisions: for example, to allow outside people to have rights on *terroir* lands, in order to make investments, which is not possible with the current law.

AGRICULTURAL POLICY

The current guidelines of the Senegalese agricultural policy must be analyzed in the context of the Agro-Sylvo-Pastoral orientation law (Law No. 2004 -16 of June 4, 2004), which aims to make agriculture an engine of growth of the economy.

Guidelines for the agricultural sector include:

- The creation of an attractive environment and incentives in rural areas to transform family farms from extensive production systems to intensified, diversified, sustainable systems that are respectful of Natural Resources; and
- The development of agricultural and rural entrepreneurship through a strategy of diversification of agricultural production, increased productivity and competitiveness of agricultural production on a sustainable basis.

Specific objectives of the agro-sylvo-pastoral development policy (ASPD) are:

- Reducing the impact of climatic, economic, and environmental health hazards through water management, the diversification of production, and the training of farmers in order to improve food security and ultimately to achieve food sovereignty;
- Improvement of the rural populations’ incomes and quality of life and the establishment of a social protection system that will benefit them;
- Improvement of the living environment and conditions in rural areas, especially through access to infrastructure and public services;
- Protection of the Environment and the sustainable management of natural resources especially through the improvement of soil fertility;
- Establishment of a system of incentives for private investment in agriculture in rural areas; and

- The improvement of the environment and quality of production to make agriculture a driving force of industrial and artisanal development, and to better meet the needs of internal and external markets (regional and international)

Despite the consideration of the environmental dimension in the orientation and specific goals for the ASPDP, considerable negative impacts of the current agricultural policy remain, including excessive clearing and the extensive exploitation of soils and forest resources in the cotton belt, which increasingly threatens the Falémé ZIC. This massive deforestation threatens forests and biodiversity in the zone.

FOREST POLICY

Forests are essential to protect the environment and conserve wildlife. The forest is the primary habitat of terrestrial biodiversity and an important carbon sink. Senegal's forest policy was adopted in 2005 for a period of 20 years. The policy aims essentially at:

- Strengthening the decentralization process to prevent natural resource degradation, through the involvement and support of local communities in the management of transferred environmental authority;
- Valorizing forest resources (rational and sustainable exploitation, fuel diversification, reduction of consumption losses), protecting the environment and combating desertification, striking the right balance between meeting the needs of the people and the preservation of biodiversity;
- Opening the sector to other operators who are able to increase the investments made in the field of natural resource management (NRM), through the involvement of the private sector especially in the management of natural forests, plantations, parks and wildlife reserves, in the framework of an environment that will allow investors to generate profits while ensuring the sustainability of the resources; and
- Improving and rationalizing forest exploitation, mainly charcoal, through the use of more efficient technologies (Casamance kiln) and in the context of the sustainable management of forests. This option will support sustainable production of charcoal from the forests. The promotion of other alternative energy sources, in particular solar energy, wind energy, biogas, crop residues, and plant biomass in general would also help to alleviate the main threats to forests, including the over-exploitation of forest resources and bushfires.

HUNTING AND WILDLIFE PROTECTION POLICIES

Wildlife policy emphasizes the protection of wildlife and its habitat in protected areas (national parks, wildlife reserves and wildlife areas of interest) and on control of organized hunting in tourist areas. The management of protected areas is delegated to the Department of National Parks, while hunting is overseen by the Directorate of Water and Forests.

Particular emphasis is given to outreach and education to promote the effective participation of local populations and involve them in the management of wildlife.

The state is increasingly willing to involve local populations in the management of national park buffer zones and tourist areas, and to grant hunting concessions to the private sector.

This policy has helped to reduce poaching by creating protected area communities and motivating people through income-generating activities. Poaching has often been justified by the poverty of people living in the buffer zones of national parks like the Niokolo – Koba. The creation of protected areas through the forced migration of human settlements has often been the subject of dispute. According to some of our contacts, creating RNC (or community biodiversity reserves) led to the return of wildlife in these areas.

FISHING POLICIES

The desire to promote judicious use of fishery resources has led the government to establish a fisheries policy whose overall objectives include:

- Protection of economically important fishery resources; and
- Control of marine pollution.

This policy also aims to promote the participation of Senegalese and their fishing activities in adjacent waters, while ensuring the preservation and rational exploitation of fisheries resources. The registration of fishing vessels is part of this initiative. The establishment of management committees for artisanal fisheries needs greater involvement of the people. The membership of the Committee for Sub-Regional Fisheries Surveillance, which brings together the main coastal sub-region is an asset for Senegal. The implementation of some fisheries agreements had negative consequence, such as over-fishing and pollution of the sea as a result of certain types of fishing and the use of non-compliant devices.

An action plan for 2001-2007 has been prepared by the Ministry of Fisheries. It consists of seven strategic thrusts including the sustainable management of fishery resources and aquaculture, monitoring, control, surveillance and security of fishing activities, as well as technical and managerial capacity building.

The recent establishment of Marine Protected Areas (MPA) is an important element in the policy for management of marine and coastal resources, including areas of production and growth.

URBAN AND HOUSING POLICY

This has as its objective a gradual and provisional management of different sized communities that are based on master plans. The housing policy in Senegal has always assumed a pronounced social character.

Urban and housing policy gives some consideration to environmental concerns, including the establishment and maintenance of green spaces in new cities. Real estate developments include environmental concerns in their preparation, but the space reserved for community facilities and green spaces are often converted into housing during the implementation of these programs.

Also, housing developments to satisfy the housing needs of a growing population, particularly in urban areas, frequently encroach on protected areas (the Mbao classified forest, the only green space in the Dakar region has been cleared for the benefit of the "Mbao-Villeneuve" housing project).

ENERGY POLICY AND MINING

Energy and mining policies address both non-renewable fossil fuels and renewable energy. Charcoal and fuelwood are the main sources of energy in Senegalese households, but until recently petroleum products (subsidized "gaz") were considered an alternative energy source, particularly in urban centers. Although exact figures are not available, the Forest Service has reported that households are reverting to using charcoal because "gaz" is no longer subsidized due to increased oil prices, and charcoal production "quotas" have increased during the past year. There is a need to explore alternative sources of renewable energy (e.g., solar, wind, biofuels), but research concerning these alternative sources has been very limited.

Another threat to forests is the granting of licenses for mining exploration and exploitation for the benefit of private operators. This exploitation is taking place in some protected areas (in the Falémé ZIC, inside the Niokolo Koba National Park, and the perimeter of reforestation and dune restoration of the Niayes zone). In addition, the planned construction of the Tambacounda-Dakar railway through the Niokolo Koba National Park, will increase the risk of disruption and loss of wildlife already caused by road construction. An EIA could suggest corrective measures, such as changing the route to circumvent the Park.

These large-scale development projects can be extremely destructive if they are not accompanied by measures to mitigate their impact. An EIA would have suggested mitigative measures in the case of gold mining operations in the Falémé ZIC, where excavations are left open after mining operations rather than being covered and reforested.

TOURISM POLICY

The Senegalese policy for ecological tourism is based on two essential principles:

- The need to safeguard flora and fauna (particularly vulnerable or threatened species) by protecting their habitats and maintaining favorable environmental conditions; and
- The need to satisfy socio-economic needs while promoting sustainable natural resource management, based on a more complete understanding of the requirements of the private sector.

The development plan for the hunting tourism sector elaborated by the government in 1995, proposed increasing tourism 25% by the year 2010. From the perspective of developing viable ecological tourism, Senegal made great efforts to promote tourism. It was thereby proposed to carry out both the preservation and the rational exploitation of natural resources as the basis for sustainable sector development.

This policy is expressed at two complementary levels, to promote both visual tourism and hunting tourism.

With regard to hunting tourism, the hunting code institutes a regulatory framework for protection of fauna that puts in place a policy for the conservation of wildlife resources.

Starting in 1972, the government decided to create zones for controlled exploitation of fauna to promote hunting tourism. It is under these circumstances that the first “zones of hunting interest” (ZIC) were created, and starting in 1988/89, zones for leased hunting rights (*zones amodiées*) were registered with relatively modest performance.

Different ZIC management plans were put in place where management was implemented by the DEFCCS (ZCAs) in protected domain territories, and hunting rights exercised by the state were leased to hunters (hunting guides).

The evaluation of this leasing policy, conducted by the DEFCCS in 2007, brought out unexpected results, most notably that management practices and equipment in leased zones contributed to the development of local communities. As a result of this evaluation, new agreement protocols were developed between local communities and lease holders, which replaced existing management agreements. These management agreements required lease holders to implement management practices to improve the habitat for fauna in the leased area, as well as contribute to the economic and social development of communities surrounding the zone.

In the Tamabacounda region, and perhaps Kolda and Ziguinchor, there are conflicting plans being made for land use (proposed gold and iron ore mining operations that could potentially invest over \$US 2 billion). Improving wildlife populations to attract more tourism is not being discussed or being put forward as an important aspect of Senegal's development in the southern regions. If action is not taken soon to conduct better land use planning, tourism may never be able to increase in the south, and therefore a sustainable source of foreign revenue could be lost.

3.5 CONSTRAINTS AND OPPORTUNITIES

The management of forests and biodiversity is governed by several laws which are implemented by different government agencies, and requires a multidisciplinary approach and articulate agricultural, forestry and energy policies. There is, however, some need for harmonization of certain provisions of certain laws, such as the inclusion in the list of species partially or wholly protected in the Code de la Chasse with species listed on the IUCN Red List. In addition, the management of protected areas for conservation of biodiversity under the same authority as those protected areas where certain activities destroy biodiversity, such as mining (i.e., the Falémé ZIC perimeter or reforestation and restoration of Niayes), appear to be in conflict. The need to harmonize the legal framework is therefore an urgent necessity.

3.6 PROPOSALS FOR IMPROVING THE LEGAL AND INSTITUTIONAL FRAMEWORK

The legal and institutional framework governing protected areas did not follow the economic and social development of the country. The reasons and circumstances that led to the classification of some of these PAs (e.g., classified forests) have changed a lot, and this has resulted in a need to update classification of these PAs. In addition, mining is currently a serious threat to certain protected areas where significant mineral deposits were discovered (i.e., gold, iron, rare minerals, oil), and development is often done for short term profits at the expense of sustainable conservation of biodiversity. The participatory approach for managing these PAs, that was initiated some years ago, has seen significant progress, but this progress has been limited by the inadequate understanding of government officials and the institutions they represent.

For all these reasons, we propose the following measures to improve the institutional and legal framework for biodiversity conservation and sustainable forest management in Senegal:

AT THE LEGAL LEVEL

Improvement of this framework will require addressing previously mentioned constraints, in particular:

1. Establish a general framework for the update and harmonization of biodiversity conservation laws (Reportedly an updated law is currently being drafted with the support of the GIRMAC). These laws should address the following concerns:
 - Identification, inventory and update of the limits of the different types of protected areas and activities that may be undertaken in each of them;

- The clear identification of the various categories of stakeholders involved in the management of protected areas (the State, local communities, the private sector, and so on), as well as populations included in the different areas: the core zone, buffer zone and the surrounding areas;
 - Harmonization of codes such the forestry code and hunting code, especially with regard to management of buffer zones of national parks and the strategies for protecting threatened species of flora and fauna;
 - Coordination of actions between business sectors that could have adverse impacts on biodiversity. For example, it is essential that the fishing, tourism, and transport of hydrocarbons take into account the conservation of marine and coastal biodiversity, especially with the proposed extension throughout the country by the Society for Management of the Small Coast SAPCO (which organizes and manages beach tourism for the state). In addition, the potential exploitation of offshore oil discovered in Casamance and Saint-Louis could have adverse impacts. Environmental impact studies could address potential negative effects resulting from the development of different sectors.
2. Establish a clear policy for private sector involvement in the conservation of BD with regard to three elements: environmental sustainability, promotion of favorable conditions for private investors, and the interests of local people;
 3. Grant concessions and/or public private partnerships for a long enough period to encourage private sector investment by organizations (local, national and foreign) which have demonstrated environmental sensitivity, to promote rehabilitation of degraded areas occurring near certain protected areas for their restoration and sustainable use. The State must continue to ensure effective monitoring to ensure sustainability. The government, NGOs and civil society should play a role in monitoring and evaluation.
 4. Formulate management approaches for different types of protected areas (especially the forest reserves and national parks), in order to harmonize the approaches and methods of intervention by the actors, especially development partners.
 5. Provide for systematic implementation of development and management plans (for example Niokolo Koba National Park has a management plan, but no means to implement it, especially in terms of infrastructure maintenance.)
 6. Consider linkages between biodiversity conservation and the generation of revenues to local populations from harvesting forest products under an approved sustained-yield management plan, such as those implemented under the WN, PROGEDE, and PGIES projects. The rationale being that if there are no economic incentives for local populations to protect areas with biodiversity, these areas become more susceptible to illegal exploitation and major damage.

AT THE INSTITUTIONAL LEVEL

7. Develop a mechanism for coordination and consultation between the various institutions and the different categories of actors responsible for the conservation of biodiversity and forests.

4. STATUS AND MANAGEMENT OF PROTECTED AREAS

4.1 CURRENT STATUS

Efforts to conserve biodiversity are focused on areas of high concentration that are protected areas (the definition of IUCN protected areas is very similar to those for areas classified as constituting the forest area of the state, established by the forestry code). A considerable amount of unprotected biodiversity occurs outside the forest areas in the *terroirs*, but additional measures, such as physical barriers (fences) or agreements with local communities (local conventions and/or local charters), are needed to protect this biodiversity.

The forest area includes classified areas (forest area of the State) and protected areas (forests in the areas of land which are the responsibility of local authorities). Management of the national forest estate is the responsibility of the Department of Water and Forests and the National Park Service. The management objective for these forests is in situ protection of biodiversity.

The national forest estate covers 31.7% of the country and includes classified forests, reforestation and restoration perimeters, integral nature reserves, national parks and reserves. These are distributed as follows: 213 classified forests of 6,237,648 hectares total area, of which 20 are sylvo-pastoral reserves (1,514,000 ha), 8 are hunting (*cynégétique*) areas (1,976,315 ha), 5 national parks, plus 10 integral and special reserves which cover an area of 1,613,790 ha, or about 8% of the national territory (Table 4.1).

Some parks or classified forests were established as biosphere reserves (Niokolo Koba, the Sine-Saloum Delta, and classified forest of Samba Dia), or World Heritage for Humanity sites (Niokolo Koba and Djoudj Parks).

The size of the classified area varies depending on the acts of classifying or declassifying forests taken in the overall context of land management. Currently, the classification rate (ranked relative to the size of the area) is shown in Table 4.1.

4.1.1 THE NATIONAL FOREST DOMAIN

CLASSIFIED FORESTS

There are about 213 classified forests in Senegal distributed in all regions of the country. These forests play an important role in conserving flora and fauna. Populations in the buffer zones of these classified forests have use rights. Beyond those few use rights, the exploitation of classified forests is forbidden. Their statute allows for specific uses (e.g., charcoal, firewood, wood for construction or furniture, and non-timber products) or for outright protection.

Most classified forests have benefited from this statute before independence in 1960. Between 1932 and 1960, 87 forest areas were classified (MEPN, 1998). These forests can be grouped in three categories according to the rationale for classifying them:

- a) Fuelwood reserves: classified forests that cover a total surface area of 271,468 hectares;
- b) Soil conservation; and
- c) Dense vegetation and/or rich in valuable species: classification of these forests aims to protect vegetation and biodiversity.

However, the limits of these forest areas are not well delineated and control measures are insufficient to prevent illegal trespassing and exploitation of these forests. These factors, combined with climate change pressures (marked reduction in rainfall and drought), have led to severe degradation of vegetation in some classified forests.

Table 4.1 : Classified Areas of Senegal Source PAFS, 1993 (Note: These official classified areas and rates have not been updated since 1993.)

Regions	Surface area (ha)	Classified domain		Classification rate
		Number	Surface area (ha)	
Dakar	55 000	10	6 064	11.0
Diourbel	435 900	0	0	0.0
Fatick	793 500	15	187 676	23.7
Kaolack	1 601 000	23	528 240	33.0
Kolda	2 101 100	26	505 383	24.1
Louga	2 918 800	19	1 216 688	41.7
St. Louis	4 412 700	61	1 889 432	42.8
Tamba	5 960 200	17	1 685 819	28.3
Thies	660 100	13	98 926	15.0
Ziguinchor	733 900	29	119 420	16.3
TOTAL	19 672 200	213	6 237 648	31.7

NATIONAL PARKS

National parks are areas where restrictions or prohibitions on hunting, trapping animals, the exploitation of plant products from the soil or subsoil are enacted for conservation of the environment. Senegal has a national park policy which dates back to colonial times.

The following table shows the status of national parks:

PN Niokolo - Koba	913,000 ha	established in 1951
PN Lower Casamance	5,000 ha	established in 1970
PN Djoudj (bird)	16,000 ha	established in 1971
PN The Langue de Barbarie	2,000 ha	established in 1976
PN Sine-Saloum	73,000 ha	established in 1978
PN Madeleine Islands	45 ha	established in 1976

One of the major constraints to park management is the lack of adequate human, material and logistical resources to ensure optimal management of the parks; particularly habitats and wildlife. Pressures on the parks include excessive cutting for timber and service wood, poaching and urbanization. The GOS is trying to alleviate these problems by raising awareness and involvement for coastal communities in the management of domestic parks. Employment of local residents as eco-guards also helps address these pressures. However, it is necessary to find income-generating activities with substantial revenue to guarantee the protection. Both of these recommendations have been achieved under WN —CBOs make and implement management plans and generate revenues from the implementation of plans. Replication of experiences with WN could provide specific recommendations about revenue-generating activities.

NATURE RESERVES

These are areas of the forest domain which are classified as restricted for any kind of hunting or fishing, all logging, farming or mining, excavation or prospecting, survey, excavation or construction, any action which might be harmful or disturb the fauna or flora, and the introduction of any species, whether local, imported, wild or not. These areas are composed of representative collections of natural formations that are classified for environmental or scientific reasons. There are 8 integral reserves covering nearly 120,000 hectares.

SPECIAL RESERVES

These are areas in which restrictions are imposed on hunting, trapping animals, the exploitation of plants, or products of the soil and subsoil. These restrictions are justified for scientific, ecological and tourism reasons. The Ministry of Environment details use of these areas which are created by decree. Several special reserves have been created. These include the Ndiel Wildlife reserve established in 1965, the Gueumbeul reserve in 1983, and the retention of Popenguine in 1986. Kalissaye reserve was founded in 1978.

SYLVOPASTORALS RESERVES

These are natural and restrictions are imposed, notably on industrial crops, in order to allow exploitation of biomass consistent with their wooded status (e.g., Ferlo sylvopastoral reserve which includes large areas of gum arabic plantations).

PERIMETERS OF REFORESTATION OR RESTORATION

These are bare land or undeveloped woodlands where there may be risks of severe erosion and whose restoration or reforestation is necessary for agronomic, economic or ecological reasons, such as the perimeter reforestation and restoration of Niayes zone that enabled sand dune stabilization and the protection of vegetable production basins from silting).

AREAS OF HUNTING INTEREST

These are defined as parts of the national domain where game management and hunting are of scientific interest or major economic value, where wildlife is likely without significant competition with other sectors of the economy, and this can be brought to as high a level as possible for its scientific study or its rational exploitation for tourism and hunting. The process of establishing such zones involves a decree by the President of the Republic based on the recommendation of the Minister responsible for water resources, forestry and hunting.

MARINE PROTECTED AREAS (MPAs)

The Congress on National Parks held in September 2003 in Durban, recommended that states focus on the protection of at least 5% of their marine coastal areas to protect important coastal and marine biodiversity. This also helps to achieve a rate of classification of 12% for the national territory, in order to promote the development of protected areas.

For this reason it was decided to create MPAs by Decree No 2004-1408 of November 4, 2004. Five Marine Protected Areas, whose total area is about 1030 km², were created. These include the following marine areas: St. Louis, Kayar, Joal-Fadiouth, Abéné and Bamboung.

4.1.2 FORESTS OF REGIONAL INTEREST

According to the forest code, these are forests located outside the national forest domain and included in the administrative limits of the region. These are community forests, situated in the administrative limits of townships that are administered as community forests situated in rural zones and managed by the rural communities. Law n° 96-07 of March 22nd 1996, relative to the transfer of competence to the regions, townships and rural communities, allows the region and the rural community to create local protected areas.

Since 2000, the joint management policies of national park buffer zones, between the state and local populations, have been reviewed and improved. The periphery of a park, situated in rural zones, is subjected to pressure caused by neighboring populations, who are often without resource and subject to restrictions for exploiting natural resources that are in the park. This is one of the reasons that motivated the creation of communal natural reserves (CNR) around the national parks, in order to better involve local populations in the management of the park through income generating activities (apiculture, raising of wild animals, diversification and agricultural intensification etc.) in return for protective services and surveillance of the park ("eco-guards"). The CNRs are governed by local conventions (or local charters) negotiated between the local populations (with the support of the technical services) and approved by local representatives of the territorial administration.

In some cases, park protectors are not called eco-guards but members of committees for protection of the forests, as in Kothiary. WN has also played a role in establishing local charters in its area of intervention (for example at Khossanto there is a local charter for protecting chimpanzees).

4.1.3 PARTICULAR FORMATIONS

They are notably:

- **Mangrove swamps**, fragile formations of swamp halophytes that currently cover less than 140,000 ha. They are in humid zones, notably in the delta of the Senegal River, a few in the region of Thiès, but especially in Casamance (88,750 ha) and in the delta of the Saloum (44.000 ha).
- **Palm groves** that are mainly plantations of *Elaeis guineensis* (nearly to 50,000 ha of oil palm trees in Casamance) or of *Borassus aethiopicum* (rônier), which are important species for agro-forestry systems, artisanal uses (handicrafts), food and construction (thatched roofs).
- **Bamboo plantations** located in Eastern Senegal, High Casamance, and a few in the Region of Kaolack. Bamboo is very much appreciated by local populations for the construction of fences, dwellings, furniture and utilitarian objects (bee hives);

- **Gallery forests** located along the main rivers and estuaries, which are important habitats for threatened and endangered species (e.g., chimpanzees).
- **Halophyte formations of “tannes”** Tammarind (*Tamarisk senegalensis*) indicates the presence of salinized soils.

4.1.4 THREATS LOOMING OVER PROTECTED AREAS

The forest area of the state has suffered, and continues to suffer, degradation by many who have greatly contributed to its deterioration. The same is true of forest composition, especially mangrove and gallery forests are disappearing along the Falémé following gold mining.

In addition to the decline in rainfall and drought, which has contributed significantly to the mortality of forest formations, especially gonakiers along the Senegal River, there was a massive encroachment on classified forests for reasons including conversion to agricultural uses, research, urbanization, and uncontrolled exploitation of timber and non-timber products.

The state has also tended to downgrade and declassify certain forests for the benefit of religious leaders (approximately 2000 ha for farming activities in the forest of Pout in 2006, not counting the decommissioning in 1992 of a 4,500 ha area in the Mbégué Khelcom forest), while the forestry code stipulates that such downgrading can be done for the benefit of local boundaries.

4.2 WATER RESOURCES (WATERSHEDS, MARINE AND COASTAL RESOURCES, HUMID ZONES)

Senegal has serious problems of marine and inshore erosion, as well as water erosion mainly at the level of the drainage basin of the Senegal River, because these soils are highly prone to erosion. This phenomenon threatens biodiversity and forests considerably in several rural zones, particularly areas located along the Senegal River where natural vegetation has completely disappeared and soils are deeply gullied.¹

Senegal has 700 kilometres of coastline. Pollution and garbage, physical alterations, and unsustainable forms of exploitation of resources threaten the biological diversity in coastal and marine environments. Senegal’s wetlands are located in the alluvial plain of the Senegal River; the valley of the Gambia River; the valley of the Casamance upstream of the estuary zone; lakes, pools and shallows; and coastal wetlands (e.g., case of the “Niayes”). In adherence with international commitments, Senegal is protecting these zones through a biodiversity back-up plan in the protected areas, and their buffer zones. A national strategy for management of wetlands in the Delta of the Casamance, Sine-Saloum, and Senegal Rivers is under development.

Priorities for wetland management include the reconstruction of marine habitats, development of rational management plans, consolidation of the coasts and control of industrial pollution.

4.3 ECONOMIC POTENTIAL

The economic evaluation of natural resources is an area of investigation that is fairly new in Senegal. While economic potential of biodiversity and forests is appreciated by the global community, it is not well

¹ Report on the state of the environment in Senegal, MEPN/CSE, 2005 issue

understood in Senegal. Studies exist on some alternatives for developing the economic potential of biodiversity and forests (charcoal, non woody forest products such as *Cordia pinata*, hunting leases, etc.) but these are partial and non exhaustive. For this reason the contribution of the forest sector to the Gross Domestic Product is much underestimated (about 1%) by the national statistics services. To correct this inaccuracy and contribute to an improved understanding of the economic value of biodiversity and forests, Senegal implemented the “VALEURS” project (Valorisation of Species for the Sustainable Use of the Wild Species in Senegal), under the aegis of IUCN.

Phase 1 of the project attempted to estimate the economic value of an important part of biodiversity and forests, notably some selected wild resources (non woody forestry products, wild fauna, products of fresh water fishing).²

The preliminary economic assessment of the wild resources has been made possible thanks to:

- studies of the system (source zones, retail and wholesale markets);
- research on the value chain of wild products; and
- quantitative investigations oriented toward the major source areas, as well as retail and wholesale markets

The development of a methodology for preliminary economic assessment of these resources concluded that they make important contributions to the national economy and to the incomes of the households involved in their harvesting, processing, and marketing. The trade of wild resources and products that are produced from them generates between CFA 19 and CFA 25 billion (US\$ 44 million to US\$ 59 million) per year.

Currently, the National Agency of Statistics and Demography, which is in charge of establishing national accounts, has not yet completed this study for forestry and biodiversity. Many forest products are included in the area of livestock (e.g., hunting, honey etc.) or in agriculture (e.g., non timber forest products, etc.). But if we combine all these wild resources and products, it can be estimated at around 5% of GDP.

Results obtained so far have been disseminated through the creation of a data base linked to a web page (www.cse.sn).

The inclusion of wild resources in national accounting is the main challenge of the VALEURS project. The approach to improving national accounting has focused on:

1. An examination of the national accounting system and the institutions in charge of the management of data on these resources; and
2. The conditions necessary to insure that the value of wild resources is included in the national accounts.

This study has supported the development of mechanisms for integration of the economic value of wild resources in the national accounts. The study will be continued under phase 2 of the project, which will be implemented by CSE and in collaboration with the National Agency of Statistics and Demography, the BAME of the ISRA, the CRODT, the DEFCCS and the DPN.

²The economic value of wild resources in Senegal : a preliminary evaluation of non timber forest products, game and freshwater fisheries, IUCN

4.4 OUTLOOK

The following opportunities exist for improving the status of protected areas:

The full value of biodiversity, through an exact estimate of its economic, historical, cultural and social potential, must be investigated. The aim is to demonstrate, through this study, that the conservation of biodiversity can be as profitable in the long run as the exploitation of mineral resources and energy that provides immediate income in the short run.

Efforts to include the full value of biodiversity in the national accounts must continue. The point is to demonstrate through this evaluation that the conservation of biodiversity can be both profitable and sustainable in the long term while the exploitation of mining and energy resources yields immediate short term income while depleting resources.

Demonstrating the true value of biodiversity's contribution to the national economy could level the playing field during negotiations between the preservation of the environment and the exploitation of mining and energy resources which degrade or destroy the environment.

The preparation of EIAs, and the implementation of mitigation and remediation measures, should be systematized whenever a project is suspected of having negative impacts on biodiversity.

The policy of classification used in the creation of classified forests, parks and reserves must be reviewed, while taking into account the socioeconomic implications. It is often aberrant to see a "classified forest" sign in a completely bare zone, following spontaneous colonization and unsustainable agriculture in formerly forested areas. This is the case of numerous classified forests situated in the department of Podor such as the "Ngaoulé Classified Forest." Other examples include: the city of Pire, which is located entirely within the classified forest of Pire; the "Corniche" classified forest in Dakar (100 ha); which is totally occupied by hotels; the Pata forest, which is 54% occupied by settlements and fields; and the Naere forest at Ross Bethio, Saint Louis region, which is 88% occupied by settlements and fields. The rate of occupation of classified forests is 64% in Dakar region, 8,2% in the Tambacounda region, and 10, 3% in the Kolda region.

This classified forest notion, more legal than economic, must be updated. The State must evaluate the real situation of all protected areas, to see if the needs of classifying are always justified, if the situation of these forests is still applicable to classification, and, when appropriate, reclassify these zones. Any new classified domain should have, however, as a final objective the conservation of ecosystems and Senegal's most representative biotopes.

At the present time, all protected areas are threatened and deserve urgent action, but immediate actions must be taken to protect certain classified zones, especially:

1. Niokolo Koba National Park:
 - a) Control of invasive aquatic plants in marshes. These plants reduce the availability of water for wildlife in the Park, thereby causing population reductions of its fauna;
 - b) Construction of the Tambacounda-Dakar railroad. This should not follow the existing road right-of-way through the Park, since this could lead to further loss of fauna as has been noted since construction of the road. The railroad should be constructed outside the Park to prevent further loss of biodiversity within the park.
 - c) Increase capacity building of human resources, and improve facilities and infrastructure for the surveillance and management of fauna and its habitat in the park.

2. The Falémé ZIC:

- a) Adherence to existing mining and forest legislation to insure the preservation of endemic species and restoration of sections degraded by gold mining and processing;
- b) Preparation of strategic environmental assessments of mining exploitation in Senegal's protected areas, and the Falémé in particular, in order to minimize and/or to mitigate the negative impacts of these programs which appear to be unstoppable since they are driven by the GOS's short term need for resources for the public treasury.

A new policy for classification of natural areas must also take into account the important role which the private sector and other national and local socio-professional organizations can play in the conservation of Senegal's forests and biodiversity.

Real property rights must be granted to those actors who invest in and improve natural resources. The law must ensure complete security for all private actor, national or foreign, that guarantee environmental sustainability, plus the involvement of local populations in the co-management of new protected areas. As an example, all the classified forests should be the subject of participatory and co-management plans, thereby guaranteeing interests of the state in preservation of resources, the need for local populations to derive incomes from the sustainable exploitation of natural resources, and, finally, guaranteeing private sector investors a fair return on investment for developing the economic potential of natural resources. This win-win system must be based on a clear understanding of the rights and responsibilities of each category of actor.

It will be necessary to vary and to develop all devolved functions in the classified zones: the cultural, historic and recreational functions of these zones must be better evaluated and developed, especially with regard to environmental education to promote a conservation ethic among the citizenry; which is the only route to sustainability.

The State should continue to assume its functions of regulation and control, and yield to the private sector management functions and the improvement of conditions for conservation of biodiversity and forests on a mutually advantageous contractual basis.

5. STATUS AND PROTECTION OF ECOSYSTEMS, ENDANGERED OR THREATENED SPECIES

Due to its special geographical location in the southern Sahel, Senegal presents a relatively rich biodiversity. The southern Sahel is a transition zone between the Sudanese and more humid Guinean zones. Combined with a long coastline of 700 km, this creates conditions for a diversification of habitats and living organisms. Major components of this biodiversity are ecosystems, plus living plants and animals, both at the macroscopic and microscopic scale. However, fragility of the climate, combined with the biophysical context and forest degradation, are a huge constraint for the conservation of biodiversity. This chapter describes the current status of forests in Senegal, and then an overview of the condition of biodiversity in the different eco-climatic zones of the country.

5.1 COMMENTS ON THE CONSERVATION STATUS OF TROPICAL FORESTS AND BIOLOGICAL DIVERSITY

Forest degradation has affected the entire country and especially the woodlands, dry savannah forests and gallery forests, which constitute the habitat of many endangered wild species. The number of plant and animal species threatened in Senegal is probably higher than indicated by the current lists of threatened and endangered species (Appendix F). The inaccurate data on the number of threatened species is explained by deficiencies in our knowledge of these species. No endangered species have been reported amongst amphibians, insects and crustaceans. The best-known species currently of interest are plants and animals of economic, ecological or scientific importance.

Some plant and animal species most threatened today in Senegal are only partially protected - or not at all - by existing codes (Forest Code, Hunting Code, Fisheries Code). The list of 11 plant species considered to be fully protected under the Forest Code, as well as the 17 partially protected plant species, should be updated. Many plant species considered endemic in Senegal are not protected by the Forest Code. In addition, some plants and animals mentioned on the list of endangered species in the IUCN Red List are not on the lists of species fully or partially protected by the Forest Code, the Hunting Code or the Fisheries Code. For example, *Albizia ferruginea* which appears on the World List of Threatened Trees and the IUCN Red List of Threatened Species, does not appear on the Senegal Forest Code. *Aristida kuntbiana*, *Digitaria aristulata*, *Indigofera leptoclada*, *Maesa nuda*, *Pavetta cinereifolia* and *Striga bilabiata*, considered rare in Senegal by IUCN, WWF and WCMC (World Conservation Monitoring Center), are not included in lists of species considered to be protected under the Forest Code. The conservation of endangered plant and animal species should be strengthened by protecting their habitats and developing management plans for the generation of revenue for local communities. It should be noted that objects made from material from endangered and protected species such as ivory from elephant and hippopotamus or wood from *Dalbergia melanoxylon* are freely traded on markets in big cities like Dakar, Kaolack, Saint Louis.

The lists of plant and animal species protected in Senegal require updating to support more effective biodiversity conservation. Studies are needed to supplement or update the lists of endangered species and rare

species in Senegal. It is important to make an assessment of the local status of all species, including those whose qualities and potential values are not yet known. But updating the lists must be accompanied by strong measures to improve Senegal's institutional capacity and commitment to the conservation of biodiversity and forests

5.2 THE SAHELIAN ZONE

Forests found in the Sahelian zone are shrubby steppe (sandy part of the Ferlo) and shrubby savannah (lateritic part of the Ferlo) (see Annex G, Maps 3 and 4). These forests consist essentially of *Dalbergia melanoxylon*, *Pterocarpus lucens*, *Acacia tortilis*, *Acacia raddiana*, *Acacia senegalensis*, *Acacia seyal*, *Acacia albida*, *Balanites aegyptiaca*, *Grewia bicolor*, *Commiphora africana*, *Ziziphus mauritiana*, *Sclerocarya birrea*, *Pterocarpus erinaceus*, *Hyphaene thebaica* and *Aristida*, and grasses such as *Eragrostis* and *Cenchrus*. *Dalbergia melanoxylon* and *Hyphaene thebaica* are fully protected by the Senegal Forest Code and, *Dalbergia melanoxylon* is on the IUCN Red List (2007). *Acacia senegalensis* and *Ziziphus mauritiana*, both of great economic value, as well as *Acacia albida* and *Acacia raddiana*, whose value is mainly ecological, are partly protected by the Forest Code. In contrast, *Pterocarpus lucens*, a source of fodder for livestock, which has high mortality in the area, is not protected. *Crotalaria sphaerocarpa* is the only endemic species reported in this area. During the last decades, forests of this area have suffered a sharp drop in their potential productivity and diversity. Apart from the protected areas, the woody cover is spontaneous and limited to park-like forests dominated by a few acacias.

5.3 THE SUDANIAN ZONE

The Sudanian zone, located at the central and western part of the country, covers nearly 40% of the national territory. Rainfall exceeds 600 mm/year and can last 4 months or more. Natural forests are therefore more diversified and productive. Plant cover is currently characterized by a mosaic composed of shrublands, wooded savannahs, woodlands and a few remnants of open forests. The western and central part of this zone (traditional groundnut basin), once characterized by relatively dense vegetation, is now characterized by wooded man-made parks dominated by acacias (*Acacia albida* and *Acacia raddiana*). Vegetation of the southern and eastern part (Saloum and New lands) is heterogeneous - the result of colonization of this area for agriculture. Today, there is essentially a park of planted trees, characterized by an abundance of *Cordyla pinnata*, a forest relic species that used to cover this area. Only a few remnants of woodlands characterized by low numbers of species constitute the diversity that remains. Woody species of these woodlands are *Combretum glutinosum*, *Pterocarpus erinaceus*, *Bombax costatum*, *Sterculea setigera*, *Cassia sieberiana*, *Daniellia oliveri*, *Terminalia macroptera*, *Lannea acida*, *Sclerocarya birrea*, *Lonchocarpus laxiflorus*, *Stereospermum kunthianum*, *Celtis integrifolia*, *Diospyros mespiliformis*, and *Detarium senegalensis*. The economic potential of the most exploited species has declined, leaving room for perennial species, such as *Combretum*. The most threatened species are *Pterocarpus erinaceus*, *Bombax costatum*, *Sterculea setigera*, *Cassia sieberiana*, *Daniellia oliveri*, *Celtis integrifolia*, *Diospyros mespiliformis*, and *Detarium senegalensis*. Among these species, three are protected by the Forest Code. They are *Celtis integrifolia* and *Diospyros mespiliformis* (protected) and *Pterocarpus erinaceus* (partially protected). There are five endemic plant species reported in the area, including *Ceropegia praetermissa*, *Ficus dichranostyla*, *Bolboschoenus grandispicus*, *Rhynchosia albae pauli* and *Urginea salmonea*.

5.4 THE SUB-GUINEAN ZONE

This zone is confined to the southern part of the Tambacounda region and the regions of Ziguinchor and Kolda, where the annual rainfall is above 1000 mm. Vegetation is similar to the Guinean zone, and it is comprised of small relics of massive dry forests on sandy plateaus growing with deep soils and gallery forests found all along the rivers. Fish found in the waters of these dry forests are *Parinari excelsa*, *Erythrophleum guineense*, *Detarium senegalensis* and *Elaeis guineensis*.

Forests located in the eastern part of this area have long been a refuge for wildlife in Senegal, particularly for big mammals found in Niokolo Koba National Park, the last significant sanctuary that has been reserved for them. These are characterized by woodlands, open forests, degraded dry forests in the woody savannah areas, gallery forests and riparian forests located along the rivers, such as the Gambia River and the Niokolo River. Species diversity remains relatively high, and the protection of these forests allows for conservation of a large part of the genetic resources threatened by extinction in Senegal. Protected areas of this zone are part of the last ecosystems pertaining to the Sudanese zone that are legally protected in Africa. In recent years, many of the marshes occurring in Niokolo Koba National Park have been invaded by two introduced species, *Mimosa pigra* and *Mitragyna inermis*.

Invasion of marshes leads to the obstruction and drying up of these very important water sources for the wildlife. The level of obstruction of some marshes now poses a problem for wildlife to access water. The dry forests of this area are also disappearing because of climate change and pressures from human activities. The potentially threatened plant species in this area are as follows: *Pterocarpus erinaceus* (wood), *Cordyla pinnata* (wood), *Adansonia digitata* (fruit), *Tamarindus indica* (fruit), *Bombax costatum* (wood), *Azizelia africana* (wood), *Khaya senegalensis* (wood), *Sterculia setigera* (gum), *Parkia biglobosa* (fruit), *Anogeissus leiocarpus* (wood), *Pterocarpus lucens* (leaves), *Sclerocarya birrea* (wood), *Lannea acida* (wood), *Borassus aethiopum* (wood, leaves and sap), *Raffia sudanica* (leaves and sap), *Oxythenthera abyssinica* (wood), *Saba senegalensis* (fruit), *Grewia bicolor* (bark), *Celtis integrifolia* (leaves), *Diospyros mespiliformis* (wood), *Vitellaria paradoxa* (fruit), *Mitragyna stipulosa* (drought), *Albizia ferruginea* (wood). Those species considered to be fully protected under the Forest Code in this zone are *Vitellaria paradoxa*, *Celtis integrifolia*, *Mitragyna stipulosa* and *Diospyros mespiliformis* (Appendix F). The eleven species listed below are among those partially protected by the Forest Code: *Adansonia digitata*, *Azizelia africana*, *Borassus aethiopum*, *Cordyla pinnata*, *Acacia albida*, *Prosopis africana*, *Pterocarpus erinaceus*, *Khaya senegalensis*, *Sclerocarya birrea*, *Tamarindus indica* and *Grewia bicolor*. Some species such as *Khaya senegalensis*, *Azizelia africana*, *Vitellaria paradoxa*, and *Albizia ferruginea* are on the IUCN Red List (2007). *Albizia ferruginea* was also mentioned on the World List of Endangered Trees. *Azadirachta indica*, a species introduced in the 1960's, has completely invaded the valleys of small islands located in of the Saloum Delta Biosphere Reserve, at the expense of some threatened species found in these valleys.

The western part of this zone (Casamance) hosts dry forests that are characterized by dominant trees with more or less contiguous crowns and a dense herbaceous layer. These forests are the habitats of many scarce and endangered plant and animal species. Among the fully protected plant species found here are *Anthocleista nobilis*, *Anthocleista procera*, *Anthocleista djalonensis*, *Calamus deeratus*, *Pandanus candelabrum*, and *Raffia sudanica* (Appendix F). Plant species protected under the Forest Code in this area include: *Abiztia adianthifolia*, *Alstonia boonei*, *Daniellia ogea*, *Mitragyna stipulosa*, *Piptadeniastrum africanum* and *Holarrhena floribunda*. *Ceiba pentandra*, *Chlorophora regia* and *Khaya senegalensis* are partially protected.

There are 17 endemic plant species that have been inventoried in this area. These are *Acalypha senensis*, *Alectra basserei*, *Andropogon gambiensis*, *Berhautia senegalensis*, *Bolboschoenus grandispicus*, *Ceropegia praetermissa*, *Cyperus lateriticus*, *Digitaria gentilis*, *Cissus gambiana*, *Cissus okoutensis*, *Lipocarpa prieuriana*, *Nasaea dodecandra*, *Panicum calocarpum*, *Polycarpea linearifolia* var. *Racemosa*, *Rhynchosia albae pauli*, *Scleria chevalieri* and *Spermacoce phyllocephala*.

5.5 FRESHWATER ECOSYSTEMS

Consisting mainly of riparian forests, these ecosystems have a high plant and animal species diversity due primarily to high levels of available moisture. Scarce and or endangered species, as well as endemic terrestrial and marine plants and animals, are reported. These ecosystems are located in the Senegal, Saloum, Gambia and Casamance River basins, as well as watercourses such as the Kayanga, lakes such as Guiers Lake, and some ponds. Under the effects of the droughts and human activities in recent decades, *Acacia nilotica* trees, which used to form huge riparian forests extending along the Senegal River, have suffered high mortality.

Fisheries resources of the rivers have also suffered severe degradation. Endemic species reported include: *Abutilon macropodum*, *Acalypha senensis*, *Andropogon gambiensis*, *Crotalaria sphaerocarpa*, *Cyperus lateriticus*, *Digitaria gentilis*, *Najas welwitschii*, *Nesaea dodecandra*, *Panicum calocarpum*, *Polycarpon prostratum* var. *Coastal*, *Salicornia senegalensis*, *Spermacoce galeopsisdis* and *Urginea salmonea* (Appendix F).

5.6 COASTAL, ESTUARINE AND MARINE ECOSYSTEMS

Numerous vegetative species, particularly those with Guinean affinity, are threatened with extinction. Within the Senegal River estuary, vegetation occurring on dry ground characterized by *Acacia tortilis* and *Acacia senegalensis* is also threatened. On the Saloum Delta, mangroves and vegetation occurring on sandy islands are subjected to drought and strong pressures caused by human activities.

Marine ecosystems occurring on a vast continental plateau of 31,000 km² are equally affected by the high exploitation of saltwater resources. These are mainly located along the “Big Coast” (Niayes zone) and in delta and estuarine areas (Senegal, Saloum and Casamance rivers) that are characterized by wetlands with a large diversity of species having Guinean traits, and in the Niayes zone by mangroves consisting of *Rhizophora*, *Avicennia*, *Conocarpus* species plus *Laguncularia* occurring in the estuaries.

The Niayes zone is home to some 419 plant species of which 80 are woody or sub-woody. This diversity represents nearly 20% of all the flora of Senegal and cannot be found anywhere else in Senegal north of 13 ° latitude. The richness of the bird populations and fisheries resources has been the basis for creation of many protected areas in the estuaries (i.e., Djoudj, Langue de Barbarie, the Saloum Delta). Endemic species reported here are: *Ceropegia praetermissa*, *Ceropegia senegalensis*, *Crotalaria sphaerocarpa*, *Digitaria gentilis*, *Salicornia senegalensis*, *Scleria chevalieri*, *Bolboschoenus grandispicus* and *Ficus dicranostyla*.

In recent decades, these ecosystems have suffered an accelerated degradation under the pressure of multiple factors that undermine their future. Recurrent droughts, rapid urban growth and multiple uses that do not take into account ecological and population thresholds seriously threaten these ecosystems. Not a single estuarine depression has been found in its natural state since the 1970's drought.

5.7 FAUNA

Wildlife is essentially concentrated in protected areas, particularly in national parks and wildlife reserves. The best known systematic groups are Fishes, Reptiles, Birds and Mammals. Greater effort needs to be made to gain a better understanding of the amount of biodiversity that exists in lesser known groups

including Helminth, Nematodes, Annelids, Acanthocephales and Microsporidies, which are pests of various groups. The lists of threatened species in this chapter are suggestive, and should therefore be supplemented and updated.

5.7.1 ANIMALS CONSIDERED AS EXTINCT

With deteriorating conditions of ecological niches, many species have disappeared in Senegal, including species probably not yet known to science, especially invertebrates. It is usually the disappearance of vertebrates that is recorded and monitored because of their large size. Thus, the disappearance of *damalisque* (*Damaliscus lunatus*), the Scimitar-horned Oryx (*Oryx dammati*), the damma gazelle (*Gazella dama*) and giraffe (*Giraffa camelopardalis*) were reported. The damma gazelle and giraffe were recently reintroduced.

5.7.2 SCARCE ANIMAL SPECIES OR THREATENED BY EXTINCTION

Of 400 species of fish reported in Senegal, at least 10 species are considered as threatened with extinction by over fishing or habitat destruction. Nearly all reptiles (crocodiles, snakes and turtles) are in danger of extinction due to various reasons. Of the 100 species reported on the IUCN Red List, 38 are threatened. Over harvesting and destruction of habitat are regarded as the major causes of threats to these species, particularly species of turtles and crocodiles. Snakes are systematically killed because of the fear they inspire.

Fourteen of 192 species of mammals are threatened with extinction. Among the species at risk in Senegal (Red List of IUCN 2004) are *Pan troglodytes* (chimpanzee), *Procolobus badius* (Colobe bai), *Gazella dama* (Dama Gazelle) and *Lycaon pictus* (Lycaon). The Chimpanzee and Colobe bai are forest-dependent species found in galleries and dry forests, whose state of deterioration in eastern Senegal is quite high and constitutes a real threat. The list of other endangered species is as follows: *Loxodonta africana*, *Profelis aurata*, *Acinonyx jubatus*, *Dorca gazelle*, *Felovia vae*, *Phocoena phocoena*, *Eptesicus platyops*, *Panthera leo*, *Gazella rufifrons*, *Barbastella barbastella* and *Trichechus senegalensi*. *Taurotragus derbianus* would also be more likely to Senegal than the species mentioned above. Endangered species of birds include *Accipiter erythropus*, *Acisoma panorpoides*, *Achrocephalus arundinaceus*, *Actitis hypoleucos*, *Aethriamanta rezia*, *Agriocnemis exilis*, *Alaemon alaudipes*, *Alcedo cristata*, *Alopochen aegyptica*, and *Anastomus lamelligerus* (Appendix F). During interviews the Assessment Team learned that a few ostriches still survive in the northern Wildlife Reserve of Ferlo. An aerial and field inventory of fauna conducted in August, 2006, by MEPN and African Parks Conservation documented a tremendous decline in wildlife populations in the Niokolo Koba National Park (MEPN, 2006).

5.7.3 ENDEMIC ANIMAL SPECIES

The most abundant endemic species of animals reported for Senegal are fish, found mainly in freshwater or brackish rivers (Protopterus) and rivers (*Heterotis niloticus*, *Mormyrus sp.*, *Mormyrops*, *Gymnachus*). Conservation of these species depends on the amount of rainfall, as well as a reduction in the impact of human activities including over fishing and pollution. *Heterotis niloticus* in particular is raised as an aquaculture species for human consumption.

5.7.4 ANIMALS OF SPECIAL IMPORTANCE

Many marine species, mostly fish and shellfish, are harvested for food. These are usually overexploited for trade and for food. Several species of snakes are overexploited for trade of their skins (e.g., *Python regius*, *Python sebae*). Sea turtles are overexploited for their flesh and their eggs, which are sought after by local populations.

Insects, which constitute the largest class in terms of number of species, have a considerable economic value. Among molluscs, the *Cymbium* and *Crossostrea* genera, and *Donax officinalis* species are commonly consumed in

Senegal. In particular, *D. officinalis* is subject to industrial fishing. Among Crustaceans, the *Penaeidae* family has a very important economic value as a source of human food. Migratory birds arrive in very large numbers from December to February in the national parks of Djoudj, the Langue de Barbarie, Iles de la Madeleine and the Saloum Delta.

Greater attention should be given to the conservation and management of genera and species consumed by people because of the level of poverty, as well as the demand for medicines. Pressures on ecosystems that include these animals, as well as the role of some species of insects for the pollination of agricultural crops, and birds for dissemination of plant seeds, should also be taken into consideration.

5.7.5 RELATIONSHIP BETWEEN SOME SPECIAL ANIMAL SPECIES AND THEIR HABITATS

In Senegal, chimpanzees (*Pan troglodytes*) can be found in the east (*Senegal Oriental*), while West Africa Colobe Bai (*Colobus badius*), Mone Campbell (*Cercopithecus campbelli*), Mangabé Smoky (*Cercocebus atys*) and the Galago of Demidoff (*Galagoides demidoff*) live mainly in Casamance and the Saloum Delta National Park. The degradation of gallery forests and dense forests caused by illicit mining, bush fires and illicit wood exploitation, which are habitats for these monkeys and apes, are the main threat to these primates. The largest population of West Africa Colobe bai that do not survive in captivity is found in the Saloum Delta National Park. The Colob bai monkey is normally dependent on tall trees of the dense humid rain forest, but interestingly in Saloum Delta National Park, where degradation of its habitat does not allow it to move over from tree to tree, it has adapted to moving on the ground. Additionally, this is the most northern range of the chimpanzee and one of the few areas they live in open savanna, which has led to different behavior traits and cultures.

6. THREATS TO BIODIVERSITY AND TROPICAL FORESTS AND THEIR CAUSES

Significant changes have occurred in the country's diverse vegetation types, both through outright conversion to agriculture and through reduction in woody cover, as well as changes in climate. Tappen et al. (2006, op. cit.) noted the clear loss of more than half of Senegal's forests (cover types with over 80 percent canopy closure) in just 35 years. Likewise, changes observed in the species composition of forests provide concrete proof that climate change is occurring, and this is also contributing to changes in vegetation types. A complex set of causes is emerging, and they vary in intensity from place to place, as do the local circumstances that determine specific vulnerabilities. Many of the major causes are physical ones, often occurring in combination—drought, livestock concentrations at local scales, sloping surfaces, and fragile soils that are susceptible to water and wind erosion. Humans are probably the most important agent of change, responsible not only for the agricultural transformations but also the great modifications occurring in Senegal wooded savannas and woodlands.

Several plant species and ecosystems are endangered in Senegal. These threats relate particularly to the habitats of many endangered species including the relict dry forests, gallery forests, and wetlands where mangroves grow. The causes of these threats are natural, human, and institutional.

6.1 NATURAL THREATS (I.E., FIRE, PESTS, CLIMATE CHANGE, DESERTIFICATION)

Rainfall deficits and widespread droughts in recent decades have resulted in widespread consequences including the lowering of water tables, premature evaporation of surface water causing salinization and acidification of soils, as well as wind erosion of soil. These hazards have strongly affected the vitality of ecosystems, and they have been responsible for a high mortality of plant species less resistant to drought, as well as the threat of extinction of animal species dependent on certain types of vegetation.

There are examples of successful responses to these threats, including:

- Rehabilitation of vegetation and wildlife in the “Forêt Classée de Dankou” (Kaolack region) through participatory management by local communities who benefit from the resource;
- Rehabilitation of the vegetation of Bandia Reserve by fencing and introducing wild animal species by a private firm;
- Dune stabilization planting of *Casuarina equisetifolia* on the Niayes between Dakar and St Louis by DEFCCS;
- The planting and management of *Borassus aethiopum* (a useful palm tree) populations by local communities in the Thiès region (Fandène) and the Fatick region (Keur Issa Diarra); and
- Rehabilitation of *Acacia senegalensis* populations in the Senegal River valley by private and local communities who benefit from this resource.

6.2 HUMAN CAUSES AND THREATS (I.E., AGRICULTURE, CONTAMINATION, CHARCOAL)

Within the Sahelian zone, the main anthropogenic threats to tropical forests and biodiversity are human occupation (e.g., conversion to agriculture, urbanization), sinking of well shafts and grazing herds (high concentration of cattle, sheep and goats), pruning of trees and shrubs (fodder for livestock), firewood cutting, bush fires and poaching. These threats, combined with natural factors, have been the source of a profound ecological degradation of habitats marked by disappearance of many species and loss of biodiversity. Among the species most affected are various plants (*Sclerocarya birrea*, *Pterocarpus erinaceus*, *Pterocarpus lucens*, *Grewia bicolor*, *Dalbergia melanoxylon*, and *Acacia senegalensis*), as well as numerous animals (*Loxodonta africana*, *Profelis aurata*, *Acinonyx jubatus*, *Dorca gazelle*, *Felovia vae*, *Phocoena phocoena*, *Eptesicus platyops*, *Panthera leo*, *Gazella rufifrons*, *Barbastella barbastella* and *Trichechus senegalensis*).

In the Sudanian zone, the expansion of peanut, millet and cotton cultivation, plus the expansion of settlements, have degraded the Sudanian forest, including protected areas. The cutting of trees for commercial production of charcoal, regular and severe pruning of trees for fodder, poor harvesting practices for medicinal purposes, bush fires and poaching, as well as mining exploitation (limestone in Thies classified forest) and the construction of roads, have contributed to the degradation of forests and loss of biodiversity. Although the relative impact of these factors is not well established, the production of charcoal appears to be a highly visible and important threat. In the “peanut zone”, much of the charcoal production occurs in areas where land owners are given permission to clear the forests, which they subsequently convert to charcoal. This is a loophole in how charcoal is produced since some people ask for the permit to clear land, not to plant but to produce charcoal.

This area contributes significantly to the supply of charcoal in the country, since timber resources in the northern part of the country have been depleted. However, it should also be noted that people have been able to “create natural capital” in the Peanut Basin at scale by investing in natural regeneration of perennials on abandoned lands. This shows (a) that land is resilient, (b) that natural products (including fuelwood) can generate revenue, and (c) that certain “enabling conditions” are critical in increasing incentives and lowering barriers to people investing in the land.

In the Sub-Guinean zone, the main causes of biodiversity and forest degradation linked to human activities are extensive agriculture (peanut and cotton cultivation), bush fires, logging and charcoal production, transhumance, poaching, wildlife habitat degradation by mining (Zone Intérêt Cynégétique [ZIC], or “Zones of Hunting Interest”, in the Falémé), construction of roads, and armed conflict (Casamance). Many people interviewed by the assessment team viewed mining in protected areas as a potentially significant factor for degradation of forests and biodiversity. The ZIC Falémé in particular, as well as the Niokolo Koba National Park, appear to be under threat of invasion by mining interests according to the interviewees. Park authorities pointed out that two invasive plant species (*Mimosa pigra* and *Mitragyna inermis*), threaten marshes within Niokolo Koba National Park. These marshes, which are a major source of water supply for big game animals, are being filled or disappearing because of these invasive plants, and the resulting lack of water is probably one of the main reasons for the decline in animal populations.

6.3 INSTITUTIONAL AND POLITICAL CAUSES AND THREATS (I.E., FAILED POLICIES)

6.3.1 THE CAUSES AND INSTITUTIONAL THREATS

The weakness of institutional capacities, as well as decentralized government is a limiting factor in the management of forests and biodiversity. The state institutions (DEFCCS and DPN) responsible for the management of classical protected areas (classified forests, National Parks, integral reserves, Special Reserves, Sylvo-pastoral reserves, Zones of Hunting Interest [ZIC]) have fairly limited human, financial and material resources available to maintain the number and extent of protected areas under their jurisdiction. The weakness in the implementation of regulations and supervision of logging is due primarily to lack of staff on the ground (rangers). Consultation and coordination for coherent and effective management is limited despite the significant efforts to address this problem.

It is not clear that authorities responsible for the management of forests and biodiversity treat logging as a business. At the local level, training of local people on sustainable use of forest products is not sufficient. Wula Nafaa is addressing this by training local people on how to develop multi-use forestry plans where sustained yield harvests are important for the success of management plans. The exclusive use of wood as the primary forest product fails to promote sustainable use of forests and biodiversity. Additionally, training of foresters must take better account of the development of integrated and participatory management plans for sustainable use of forest resources and biodiversity.

The lack of an efficient system for monitoring and evaluation of achievements does not allow for a good understanding of the impacts of actions and tendencies on the status of resource conservation.

As for the institutions responsible for the management of Community Natural Reserves, Marine Protected Areas, and resources of local areas in general, these remain virtually the same in terms of poor human, technical and financial resources. Support for the management of natural resources by local communities on forest lands transferred to these communities is still very limited. The low level of training of local people and their understanding of legal texts also limit suitable management of forest resources. The value of local knowledge, expertise and socio-cultural values in the management of natural resources is inadequate.

Weak human resources capacity and skills, especially at the level of decentralized structures is therefore a serious problem. Instability (change in the structure of the Ministry for the Environment), fast turnover of agents (problem of continuity in the management of protected areas) and the lack of long-term vision are also strong deterrents for the management forest and biodiversity. Thus, centralized management of protected areas, such as the management of community forests, have rather mixed results.

6.3.2 CAUSES AND POLITICAL THREATS

These are linked to the failure to update and harmonize legislation, difficulties in the implementation of international conventions, slow administrative procedures and the failure to take into account impact assessments, lack of management plans for protected areas, weak involvement of the private sector, non-compliance with specifications, failure to manage quotas, weak knowledge of the forest potential, and low research achievement.

LACK OF UPDATED AND HARMONIZED LEGISLATION

The lack of updated and harmonized legislation, in particular the Forest Code, the Hunting Code and Fishing Code, which are the main instruments for the management of biological resources on the one hand, and the Mining Code on the other hand, does not favor good forest management and conservation of biodiversity. In

particular, the failure to take into account endemic species and threatened species at the national or international level (Red List of IUCN and The World List of Threatened Trees) by the Forest Code creates a gap in Senegal's biodiversity. Another problem affecting forests and biological diversity lies in the understanding, interpretation and dissemination of legal codes at the local government level. The lack of a clear framework for management of protected areas and biodiversity is also an obstacle to forest and biodiversity management.

This lack of context is reflected in the field by a lack of coordination and synergy of actions amongst the various actors involved in forest management and biodiversity conservation (Wula Nafaa, PROGEDE, PGIES, DEFCCS, DPN). It would be worthwhile to compare the results and impacts of WN with those of PROGEDE in terms of land management, revenue generation, local control and decision making, etc. The decommissioning of protected areas without compensatory reclassification in accordance with the Forest Code (e.g., decommissioning of forests for the benefit of religious authorities) is another impediment to the conservation of forests and biodiversity in Senegal.

DIFFICULTIES IN THE IMPLEMENTATION OF INTERNATIONAL CONVENTIONS

Lack of funds for the implementation of international conventions signed and ratified by the GOS (e.g., CBD, the Convention to Combat Desertification) is another strong constraint to the proper management of forests and biodiversity conservation. The team believes this lack of funding for the implementation of these conventions is a real problem in developing countries. The government of Senegal should organize and report all available information on progress and lessons learned from projects like Wula Nafaa, PAGRENA and others which provide donor support for the implementation of these conventions. But reviewing and reporting on progress in these projects will not be enough to free Senegal from the need for funding for implementation of these conventions.

SLOW ADMINISTRATIVE PROCEDURES AND INADEQUATE IMPACT STUDIES

The red tape (lengthy procedures) in decision-making and disbursement of funds for carrying out forest resources and biodiversity conservation activities is another factor that negatively affects forests and biodiversity. Arbitration by the state in favor of mining in protected areas that house most of the biodiversity (e.g., Classified Forests of Thiès and Niayes, the Falémé ZIC, Niokolo Koba National Park) is also a real threat to biodiversity. The same is true for the inadequate preparation, or non-compliance with, impact assessments (e.g., mining operations, construction of roads, construction of railroads, installation of high-tension power lines, irrigation or hydroelectric projects, capture or introduction of new species in protected areas.)

LACK OF MANAGEMENT PLANS FOR PROTECTED AREAS

Most of the protected areas in Senegal have no management plan. Furthermore, some management plans already developed have no financial means for their implementation. The Team agrees that in addition to the lack of management plans for most of the protected areas in Senegal, the low quality of management plans developed is a more serious problem (i.e., objectives of the plans, approaches advocated, complexity and feasibility, costs for their implementation, and so on). The most basic problem is the lack of an approach for simple land management plans that provide for self-financing, as well as the conservation of natural capital. This explains the difficulties in implementation of several plans that have been developed. Senegal has some good management plans, such as WN and PAGERNA - participatory management plans which, unfortunately, have not been replicated.

WEAK INVOLVEMENT OF THE PRIVATE SECTOR AND NON-COMPLIANCE WITH SPECIFICATIONS

The National Domain Law (Loi sur le Domaine National) limited, in some respects, involvement of the private sector, which might have the means for rehabilitating forests and biodiversity. Private tourism operators (“amodiataires”) often give priority to satisfying local needs (health, education, etc.), over conservation needs, and this has led to a further degradation of wildlife habitat. However, the Amodiataires frequently do not treat the rural population like partners in carrying out their enterprises. Too often management plans for concession areas focus on the narrow interests of the Amodiataires rather than providing for the overall conservation needs and the needs of the community. It would be to the benefit of the "Amodiataire", the community, and the land to have: (a) a multi-purpose land management plan, and (b) a negotiated agreement with a representative body of the local population on rules of the hunting concession.

According to some of our sources of information, non-compliance with concession provisions by some tourism operators could have had a very negative impact on biodiversity conservation.

FIXING QUOTAS ON PRODUCT DEVELOPMENT AND THE PRACTICE OF ENCOURAGING QUOTAS

Fixing charcoal quotas without charging stumpage fees for the trees has not encouraged farmers to practice sound management of resources. Even within Wula Nafaa, the problem of wasteful charcoal production has not been solved. At the site visited in Tambacounda (Community Forest of Koulor), the waste of resources is compounded by significant losses of energy during the carbonization process (predominance of the “Casamance” process), which accentuates deforestation. Even though the "Casamance" process is more efficient than more traditional practices, more efficient carbonization technology is available and should be introduced. The team noted a need for training of operators throughout the sector, especially in terms of marketing. Such training should promote sustainable exploitation methods. Reforestation must be an obligation for operators and should not be accompanied by bonuses for operators who have established plantations, especially in view of the fact that operators commonly overcharge for their limited reforestation efforts.

With regard to hunting quotas, Senegal promotes small game hunting via hunting concessions, and still allows large game hunting. Additionally, hunting quotas are apparently fixed with no wildlife censuses being done, and they have no scientific basis. Large game hunting should be immediately stopped, and the government should be more stringent about insisting that concessionaires conduct surveys of small game before concessions are granted.

WEAK KNOWLEDGE OF FOREST POTENTIAL AND INADEQUATE RESEARCH

The limited knowledge of plant and wildlife potential or their dynamics does not promote good understanding of the threats to flora and fauna or their rational use. This has accelerated the degradation of forest and biodiversity resources. Forest resource management is severely constrained by inadequate research, particularly in terms of reforestation (choice of species, low utilization of local species, seed quality, biotechnology, plantation management). Poor harvesting techniques of non-woody forest products, plus the difficulties of conservation and inadequate organisation of markets for these products, also affects the renewal of forest resources.

6.4 TRANSBOUNDARY CAUSES AND THREATS (IE, MIGRATION OF LIVESTOCK)

The position of certain cross-border protected areas (Niokolo Koba National Park, Saloum Delta National Park, Djoudj National Park) promotes ecosystem degradation and poaching. Indeed, some protected animal species (mammals, birds and fish) have significant migrations at the border areas in different countries whose laws and regulations are not necessarily aligned. In addition, the contiguous areas *amodiées* with protected areas is not conducive to the conservation of biodiversity, including migratory species. The movement of livestock is also an important factor in degradation of forests and biodiversity. The migration to eastern Senegal of large herds from Ferlo results in high pressure on gallery forests of this area, as well as the remnants of dry forests in Niokolo Koba. In particular, pruning of woody species for fodder production by shepherds is a factor that negatively affects woody vegetation. The conflict between the herdsmen and indigenous populations has also resulted in forest fires in areas of transhumance. Nonetheless, the creation of transboundary protected areas (Transfrontalière Biosphere Reserves of Niokolo-Badiar, Delta Saloum-Niumi, Djoudj-Diawling) as well as community nature reserves, has reduced pressure on the biological resources of these important biodiversity reserves.

7. SCOPE AND EFFECTIVENESS OF CONSERVATION EFFORTS

For nearly five decades, many stakeholders have made significant efforts to conserve forests and biodiversity in Senegal. These stakeholders include the government and its development partners, i.e., donors, international organizations, non-governmental organizations, the private sector and the local communities. Today, the state of conservation of forests and biodiversity shows that the impact of these efforts is rather mixed. Indeed, despite good legislative and institutional framework, the State of Senegal and its development partners have been confronted with many impediments to the implementation of the policies formulated and the management plans and strategies developed, as well as the numerous international conventions that have been signed and ratified.

7.1 GOVERNMENT ACTIVITIES

The use of various management tools (codes, action plans, strategies, conventions) have not ensured the effective conservation of forests and biodiversity. In general the government has not shown the political will necessary to implement progressive policies. While many laws and policies use progressive language, their implementation often lacks commitment. Fortunately, there have been progressive NRM champions in Senegal that have pushed for reforms. And, there have been progressive programs that have put the reform language into action which have demonstrated on a modest scale what could be produced if the reforms were fully supported. Furthermore, most of these instruments need to be updated, and better harmonization is necessary to allow for a synergy of actions in the field. The implementation of most of the conventions is hindered by a lack of adequate framework and financial resources. However, these instruments have fomented the inclusion of environmental concerns in the management of terrestrial, marine and avian biological resources.

Many changes made in various Codes, including the recent creation of Marine Protected Areas, and the recent requirement of vessel registration for operation and exploitation of marine resources are examples of taking greater account of the interests of local people, better resource management, and more effective conservation of biodiversity. One important achievement of the government and its partners has been meeting national demand for charcoal from the forests of Tambacounda and Kolda, which is attributed to the successful design and implementation of sustainable forest management programs under the Wula Nafaa and PROGEDE projects.

Other important achievements include the re-introduction of certain extinct species (Dama gazelle and red front gazelle) by the DEFCCS and DPN, reduction of poaching in park borders with the creation of transboundary protected areas (Niokolo-Badiar, Delta Saloum-Niumi, Djoudj-Diawling), and ex-situ conservation of threatened plant species and endemics in Hann botanical gardens and University Cheikh Anta Diop in Dakar

7.2 DONOR ORGANIZATION ACTIVITIES

International donor organizations began important efforts to conserve biodiversity and tropical forests conservation after 1970. These programs were implemented in all of Senegal's ecological zones, and they resulted in capacity building for all technical services, university institutions, and local communities. Numerous projects have been conducted supporting reforestation, dune stabilization, wildlife management, integrated forest management, forest fire control, mapping, forest and vegetation inventory, community level training, and the development of teaching materials.

Support provided by donors has enabled the establishment of projects that led, in collaboration with the GOS, to consistent results in forest and biodiversity conservation. Among the many results are: the development and implementation of several participatory management plans for the sustainable management of protected areas (management plans for the Saloum Delta Biosphere Reserve and Djoudj, the Paniates Ouli and Giarama classified forests, the Community Forests of Koulour, Missira and Saré Bidji, etc. Community Natural Reserves, Community Biodiversity Reserves and Marine Protected Areas). Important achievements include:

- Training and involvement of communities and local people in forest resource management and biodiversity conservation through the development of preservation and income-generating activities (e.g., beekeeping);
- Development of sustainable forest management practices which have made it possible to produce as much as 50% of the nation's charcoal needs on a sustainable basis from managed forests (PROGEDE and Wula Nafaa community forests. The establishment and implementation of community-based rules has resulted in local populations changing their attitudes about mitigation of the forest degradation process and biodiversity conservation.
- Reduction of pressures on protected areas through the creation of cross-border biosphere reserves (Niokolo-Badiar, Saloum-Niumi Delta, Djoudj-Diawling), and natural community reserves at the periphery of protected areas;
- Recovery of degraded forests (Populations of *Acacia senegalensis* in the Ferlo zone with FAO, PAGERNA in the Fatick region plus the classified forest of Dankou and the community forest of Sambande in the Kaolack region with GTZ, and PGIES) and threatened wildlife species habitats (Community Natural Reserves of PGIES, PROGEDE Community's Biodiversity Reserves); and
- Establishment of Marine Protected Areas for rebuilding stocks of fish resources, and promoting nature based ecotourism through the development of community run eco-villages (Marine Protected Area of Bamboung, MPA of Kayar, etc.).

All five major achievements cited above take into account concerns related to forest and biodiversity conservation and sustainable development, as well as instances where the rights for local users of resources have not been secured.

As noted under the key recommendations in the Executive Summary and again in Chapter Nine, the promotion of donor collaboration amongst all organizations and parties involved in the management of biodiversity and tropical forests is viewed as being essential for the successful conservation of protected areas. The Senegal National Environmental Action Plan (NEAP), along with a Comité Permanente created under the CONSERE, was established several years ago for the purpose of facilitating this collaboration. However,

the Comité lacks the necessary technical and financial support to be able to fulfill this role, and it is felt that means must be found to revitalize the Comité.

7.3 UNIVERSITY ACTIVITIES

Academic institutions conduct numerous research activities in the forests in general, and particularly in protected areas (National Parks, Classified Forests, Natural Reserves), which are regarded as field laboratories. The National Parks of Niokolo Koba and Saloum Delta constitute the main search sites. Ongoing research focuses on knowledge of the state and dynamics of forest ecosystems and biodiversity. Starting in 1993, a network of monitoring plots to study the dynamics of vegetation and plant diversity has been installed in these two parks. This monitoring should make it possible to identify efficient local species for reforestation. Other studies underway in outlying areas of the biosphere reserves should help to propose alternatives to reduce human pressure on the full protection areas. A major study funded by the Draft Integrated Management of Ecosystems of Senegal (PGIES) was also conducted on endemic species of Senegal.

Medicinal species are also the subject of much research. Unfortunately, the popularization of information generated by research on biological resources (scientific publications, reports, etc.) remains very limited. This information, which is not always accessible to technical services and NGOs, could be used for the implementation of development projects. Lack of access to such information has led research institutions and technical services to establish databases in order to optimize their use. A large database on protected areas of Senegal is being prepared at the Ministry for the Environment. Another database on biodiversity is being developed throughout the West African sub-region by academic institutions in the North (mostly Europe) and Africa. Such databases should help encourage the dissemination and use of scientific information and limit its loss.

Examples of findings and achievements include:

- Training people for the sustainable use of medicinal plant species in the community forest of Sambandé (Kaolack region) by the Faculty of Pharmacy (IDRC funding);
- Development and implementation of a participatory management plan for the *Forêt Classée* of Patako (Fatick region) by the Institute of Environmental Sciences (EU funding);
- Training people at sites of high biodiversity concentration on the recognition and conservation of endemic plant species of Senegal by the Institute of Environmental Sciences (GEF financing);
- Training local communities in the area of Nguindir (Department of Sédhiou) on management and conservation of biodiversity of their region by the Institute of Environmental Sciences (GEF financing); and
- Training local communities on sustainable use of *Borassus aethiopum* products in the peripheral zone of Niokolo Koba National Park by the Institute of Environmental Sciences and the Department of Geography (Belgian Cooperation financing).

The preparation of national reports on biodiversity was coordinated by academic institutions, which also play an important role in the training of human resources for the Department of National Parks. Furthermore, this research supports the technical services in the implementation of forestry projects through the representation of academic institutions on scientific committees of the various projects. These institutions also support local communities in the management of community resources by means of training seminars.

A study of the endangered species in Senegal is needed to update the list of these species.

7.4 NGO ACTIVITIES AND ASSOCIATIONS

The main non-governmental organizations active in the management of forest resources and biodiversity are IUCN, WWF, Wetlands International, ENDA, and Rodale International. In addition to these major international organizations, others tend to work at the national or local level, and they assist local communities especially in the management of resources which are transferred to them by the government. Such is the case with WAME, Océanium, Friends of Nature, and so on.

Non-governmental organizations are very active in the development of plans and strategies to manage forest resources, marine resources and wetlands, but also in the implementation of conservation projects in collaboration with the technical services and research institutions. Among the many achievements of these partners of the state include:

- Financial support to research institutions and local organizations active in the management of biological resources;
- The development and implementation of management plans for Biosphere Reserves of the Saloum Delta and Djoudj;
- Strengthening the capacity of local communities in the management of mangrove forests (eco-training, training women in the sustainable use of resources from mangrove forests);
- The reduction of bushfires and raising incomes of people in the Biosphere Reserve of the Saloum Delta, in Community and Natural Reserves, and in Community Biodiversity through the development of beekeeping (improved hives);
- The establishment of a framework for dialogue (state, local communities, NGOs, private organizations) to ensure better coordination of actions of the various players at the Biosphere Reserve of the Saloum Delta;
- Setting up many community reservations for local management of natural resources and biodiversity (development of local conventions and redeployment of wildlife); and
- The conversion of old poachers in eco-guards in the periphery of the Niokolo Koba National Park.

The examples of achievements cited above demonstrate that NGOs contribute significantly to the conservation of ecosystems and biodiversity.

7.5 LOCAL COMMUNITIES

The sacred forests preserved by local people for a variety of reasons are now significant reserves of biodiversity in Senegal. In addition to these sites characterized by generally reduced acreage, some local governments have invested in the creation of new protected areas through deliberations approved by the government departments (e.g., Community Reservations, Community Natural Reserves, Community Biodiversity Reserves), thereby contributing significantly to increases in the protected area network of Senegal, with the support of projects funded by donors (PGIES, PROGEDE, Wula Nafaa, etc.).

Other communities involved in the management of Classified Forests or Marine Protected Areas, with the assistance of technical services of the State (Department of National Parks), donors and NGOs (GTZ, IUCN, WWF, Océanium, etc.), and research institutions (IRD, universities, etc.). The application of conventions developed by local communities has enabled better management of forests and biodiversity at the local level. In particular, these agreements have enabled local people to preserve habitats and endangered species, such as chimpanzees. In the area of Ferlo, local populations have invested with the support of the Draft Management Ecosystem of Senegal in the rebuilding stands of *Acacia senegalensis*. It has been found that in areas with high biodiversity and a resulting production of non-timber forest products (NTFP), people have the incentive to be more vigilant about fire and other threats to biodiversity. In rural communities in the Tambacounda region, through which the transhumants from Ferlo migrate, youth groups organize campaigns against transhumants that degrade vegetation in areas crossed.

7.6 PRIMARY CONSERVATION NEEDS LACKING SUPPORT

The constraints to proper management and conservation of forests and biodiversity are of several kinds:

WEAKNESS OF THE HUMAN RESOURCES IN THE SERVICES OF THE STATE AND LOCAL GOVERNMENT

- Establishment of sufficient skilled human resources, especially in the Department of National Parks and local authorities in the field of wildlife management;
- Strengthening the capacity of civil society through the development of pressure groups in local communities dependent on resources and biodiversity (Fatick, Tambacounda and Kolda Ziguinchor); and
- Strengthening the capacity of human resources responsible for management of new protected areas (Marine Protected Areas, Community Natural Reserves, Reserves Community Biodiversity) including different types of eco-guard

WEAKNESS OF FINANCIAL AND TECHNICAL SERVICES OF STATE AND LOCAL GOVERNMENT

- The establishment of adequate financial and technical resources for national government agencies responsible for the management of classical protected areas (e.g., National Parks, Classified Forests, Integral Reserves, Special Reserves, Wildlife Reserves, Sylvo-pastoral Reserves, Biosphere Reserves, Zones de Intérêt Cynégétique [ZIC, Zone of Cynegetic Interest]) to local agencies where these resources are needed and used.
- Potential funding mechanisms that could be explored include using a portion of the revenues to invest back into the management of the reserve; active solicitation of private sector partnerships including international firms to go into public-private partnerships with the government for the larger, international class sites, and national firms or communities for co-management of forest/biodiversity resources.

WEAK CAPACITY OF RESEARCH INSTITUTIONS

- Establishment of a database on biodiversity in West Africa; and
- Updating the list of threatened plant and animal species.

8. PRIVATE SECTOR CONSERVATION ACTIVITIES

8.1 NORMS AND STANDARDS FOR THE MANAGEMENT AND USE OF FORESTS AND PROTECTED AREAS

The private sector is in a position to be one of the most serious partners of the state and local communities in the biodiversity conservation strategies of Senegal.

The plans for management of protected areas, particularly classified forests and national parks, define activities to be led by the private sector. Protocols and contracts define the implementation modes of these activities:

FORESTRY

- Forest harvesting: charcoal and non-wood products (gum, resins, pharmaceutical products, etc., as demonstrated through the leadership of projects such as Wula Nafa), reforestation (gum arabic in Ferlo and gum mbepp) and fencing (plots of the clergy in Ngazobil who received funding to build fences), and products such as mangrove poles for construction and seafood mariculture (oysters). WN experiences with the baobab value chain and other products show that it's more beneficial for producers to be active players in the entire chain. For charcoal, PROGEDE is preparing producers to be more active, particularly in transportation, production and wholesale trade. Producers and their organizations need to be adequately trained in order to improve their effectiveness in the whole process.

HUNTING AND WILDLIFE MANAGEMENT

- Establishment of wildlife parks and private reserves (Bandia, Fathala, etc.): Bandia Private Reserve in particular has been quite successful in wildlife management and the creation of suitable habitats for animals through a system of natural forest regeneration. Various native animals (several species of antelopes, birds, wild hogs [“facoher”], and land tortoises), as well as introduced animals (giraffes, ostriches, rhinoceros, and crocodiles) are flourishing and reproducing within their well maintained habitats. In addition, a well established “nature guide” program has trained several knowledgeable and courteous guides who lead visitors and tourists throughout the private reserve, and provide them with detailed and accurate information concerning the habits and reproductive cycles of various animals, the identification and uses of plants, etc. Additional attractions are the clean and well maintained restaurant and dining facilities, toilettes and nature trails.

Fathala, on the other hand, has not been as successful due primarily to its inaccessibility. Roads to the Sine-Saloum Delta region are not well maintained, and their poor condition is a strong deterrent to all but the hardiest of tourists. Additionally, hotels and tourist facilities around Fathala are rustic, whereas those in the Bandia region are vastly superior (some five star hotels) and much more

accessible. Similar to Bandia, non-native species of animals have been introduced into the Fathala habitat, but with limited success.

- Establishment of hunting seasons; and recreation and management areas *amodiées* for hunting in conjunction with local communities: Hunting and the system of leasing to private individuals and clubs (*chasse amodiée*) has been successful in Senegal. This system is particularly popular amongst European hunters who come to Senegal for the “African hunting experience”. Here again accessibility and facilities are considerably better in the Bandia/ Sine-Saloum Delta region, when compared to the area around Nikolo-Koba National Park.
- In some instances, it has been found that the *chasse amodiée* system benefits local communities through capacity building and income generation. However, there is a great deal of variation in how the various operators interact with local communities. In some cases, there is a partnership where local communities are active players in deciding the types of benefits that accrue to communities. In others, they are passive recipients of whatever the operator decides to give them. The Wula Nafaa Project is working with the DEFCCS to improve this system of hunting leases, and to increase involvement of local communities in the management of natural resources.

It is recommended that new agreements between local communities and “amodiataires” be established, instead of the existing “chier des charges”. These new agreements should take into account management of the rented area to improve the habitat for fauna, as well as their contribution to economic and social development of the area.

TOURISM

- Ecotourism-camps (Bamboung): The recently established system of Marine Protected Areas (MPAs) shows considerable promise for promoting eco-tourism, as evidenced in the Bamboung MPA. This is a 7,000 ha area located in and around the Bamboung River, which immediately borders the Sine-Saloum National Park. Mangrove forests in this area are quite extensive and healthy, and these form a pristine habitat for birds and fish. (This attracts many tourists who come to Senegal to experience “sport fishing” and “birding”.) There is also a well maintained and attractive “eco-village” within this MPA that is managed by a group of 14 villages, who have established a governing council to run this facility. Technical assistance is provided by the World Bank GIRMAL Project and the “Océanium” local NGO, but local people take great pride in noting that it is they who manage and run the “eco-village”.

An additional thing worthy of noting is the fact that “eco-guards” have been trained to serve as guides, and to run a strategically located watch tower at the mouth of the Bamboung River, which serves to monitor tourist traffic, as well as control potential poachers. Technical assistance is also provided by the GIRMAL Project to train people in oyster culture, fish farming, and mangrove reforestation. (A local women’s group manages the oyster culture and fish farming operations, as well as the mangrove nursery and reforestation programs).

- Tourism – sight seeing (Delta saloum, Djoudj, Niokolo); sport fishing (Saloum Delta): Tourism and “sport fishing” is also quite popular in and around Sine-Saloum National Park. It is interesting to note that a well maintained and attractive hotel (“Gîte Touristique de Bandiala”) is located within the park, and a considerable number of tourists who visit the park stay in this hotel. (The fact that a hotel is located within a National Park is not unique, since many European and American national parks have hotels and tourist facilities that have been “grandfathered” in these parks owing to the fact that they were already in the park before it was established.) It is also interesting to note that

that a research station run and maintained by the DPN is also located within the park, and that significant research is conducted there by students from the Université Sheikh Anta Diop, Institut des Sciences de l'Environnement in Dakar, under the guidance of Dr. Bienvenu Sambou. As previously stated, Senegal has no tourism based on any key species as other African nations do. Chimpanzees, Eland d'Arby, manatees, dolphins and sea turtles are all highly visible species that could be used to promote tourism and a higher conservation ethic within the country.

8.2 POLICIES PROMOTED BY THE GOVERNMENT

Facing the lack of financial means, the State initiated a policy aimed at increased involvement of the private sector in activities related to the conservation of forests and biodiversity. WN supports a tax called a "management fund" that is invested back into the forest. The amount of this tax (between 5 and 10%) on products harvested could be very important for future management by local communities, and it should be very carefully managed. For this purpose, a joint committee should be established between WN, local communities and the Forest Service to monitor management of this fund.

It is necessary to note that this policy derives from the policies of disengagement of the state from merchant activities initiated in the 80's at the time of the structural adjustment. This first started, in the forestry sector, in production activities, mainly charcoal, through a system of approved private cooperatives.

In terms of protected areas, the process began with leasing, which is to grant the right to hunt animals (hoteliers, economic interest groups or individual with small capacities) on the basis of specifications in which the recipient agrees to invest in the conservation of wildlife habitats. After the adoption of the forestry code of 1998, the option of private involvement has been emphasized. Provisions have also been made in the code to allow the State and local governments to enter into contracts with individuals or legal entities in the field of forest management.

Following adoption of the 1998 forest code, this option of involvement of the private sector has been reinforced and broadened to include biodiversity conservation activities. This is why the private sector has been involved in management and conservation activities through the creation of animal parks and wildlife reserves (Bandia, Fataha), in order to contribute to the *ex situ* preservation of threatened or endangered flora and fauna. The code allows state and local communities to sign contracts with physical or moral persons on the national forest which they manage.

Currently, the private sector has shown its ability in the conservation of biodiversity, and it is reinforcing this position and moving towards increased collaboration in a win-win partnership

8.3 PRIVATE SECTOR MANAGEMENT OF PROTECTED AREAS

The private sector's involvement in protected areas began with leasing - the granting of hunting rights to individuals (hotel managers, economic interest groups, or individuals) on the basis of specifications where the recipient agrees to invest in the conservation of wildlife habitats. Another experience of private sector involvement in forest and biodiversity conservation is in the rehabilitation, through reforestation, of damaged populations of *Acacia senegalensis* in the Ferlo zone. Since the 1990's, the private sector, which had remained reluctant to participate in the management of protected areas, has shown enthusiasm in the development of wildlife through the creation of private reserves (Bandia, Fathala, etc.).

These days, the GOS receives many requests from private operators who want to be involved in the creation of other private reserves similar to Bandia, where wildlife management has resulted in the generation of income (i.e., tourist and leisure areas in Fatick, Kaolack, Tambacounda, Saint Louis, private reserves in Koussanar, Ferlo, etc.). This strong demand from the private sector, however, raises many questions, and it has resulted in a real national debate (“Panel Report on the Transfer of Wildlife”, 2005). The specific case of the Bandia private reserve is quite positive since private sector investments have resulted in a complete rehabilitation of a deteriorated protected area (Classified Forest of Bandia), and the creation of a fully protected zone where wildlife is flourishing. This is in contrast to the Fathala private reserve, which is located in one of the best-preserved areas on the periphery of Sine-Saloum National Park and Biosphere Reserve, but the rehabilitation of vegetation and wildlife has not been as successful. In addition, the fact that a Dutch foundation named “African Parks” has recently submitted an application for the long-term management of a part of Niokolo Koba National Park is also the subject of much discussion. Private sector involvement in forest and biodiversity conservation has been limited by the State of Senegal, which has not made a clear decision in the absence of a well defined policy.

8.4 INCREASED INVOLVEMENT OF THE PRIVATE SECTOR

The involvement of the private sector in natural resource and environment management could constitute an asset in the sustainable conservation of biodiversity. However, this involvement must be organized within a framework that sets out respective responsibilities of the State, the private sector and local populations, and which guarantees environmental sustainability, harmonious development of the local communities, and sustainable benefits for the private sector. The reforestation program with *Acacia senegalensis* in the Ferlo area for the commercial production of gum arabica is an example of successful cooperation between the private sector, local communities and the Forest Service, and this demonstrates that similar cooperative efforts can be replicated in other parts of the country.

Reinforcement of private sector involvement could be done through the granting of medium-term and long-term concessions by the State and/or the local community for protected areas under their control. These concessions could be implemented in zones where biodiversity has been impoverished following excessive pressures on the environment. The objective of these concessions is to allow the State, which lacks sufficient means, to permit a private investor with adequate means to invest in the area, to improve wildlife habitats, and to increase the economic value of the conceded zone. As previously stated, the Bandia Reserve provides an excellent example which effectively demonstrates the benefits of establishing these concessions involving the private sector, local communities and the State. Similarly, the Botswana and Namibia Wildlife-based enterprises managed by communities in collaboration with private operator may offer another model.

These concessions must be governed by a clear legal framework that offers some guarantees to the private sector for acceptable return on investments, environmental sustainability to the State and to the community, and better services from the ecosystems. The granting of concessions must be preceded by an inventory of the biodiversity within a zone, and the definition of a point of reference plus indicators that will serve to measure the effectiveness of conservation efforts made thereafter.

On the other hand, the national private sector, and in particular those associations existing at the local level (forest cooperatives, groupings of economic interest, etc.), must also be encouraged in the natural resource management of their terrain. This could contribute to the creation of a dynamic local private sector that will play a positive role in development of the terrain, as well as poverty reduction and alleviation of rural migration.

9. ASSESSMENT OF CURRENT PROGRAM & RECOMMENDATIONS

9.1 ASSESSMENT OF CURRENT BIODIVERSITY AND TROPICAL FORESTS USAID PROGRAM

The major USAID/Senegal program that addresses BD-TF issues is the Agriculture and Natural Resources Management Program (AG/NRM) which is currently being carried out under the Wula Nafaa project. This project was evaluated in 2006 before its final year, and the BD-TF Evaluation Team concurs with the findings that “project activities have been, in general, quite successful” (USAID, 2006). The project evaluation also found that the Nature, Wealth and Power approach is working in Senegal. “The Wealth and Nature nexus is providing economic benefits to poor communities which, in turn have realized the value of protecting their resource base. There is good initial progress with the community participation and community empowerment aspects of the Power and Governance element of the paradigm, but this could be derailed by the lack of progress on policy reform and devolution of financial responsibilities.” However, it was further found that “most elements of the program are just now moving into the implementation phase, and the young institutions fostered by the project are not yet sustainable”. The evaluators recommended that another five years of support be provided to bring new institutions and initiatives to a point that they can be continued without outside donor support. During this second phase, consideration should be given to adding Resource Councils (RCs), expanding the project area, and adding other elements. These elements would include:

- expansion into the mangrove forests in Ziguinchor region;
- adding new products such as wood for construction and furniture making (bois d’oeuvres);
- giving priority to the credit component to support producer groups, processors and exporters;
- finding ways to ensure greater GOS financing for project activities;
- encouraging closer, practical linkages between SAGIC and the Phase II project;
- testing the Forest Service’s capacity to take the lead in preparing and executing at least one community and one classified forest management plan;
- encouraging dissemination of project models (e.g. economic groups) for adoption by other donor projects in Senegal; and
- considering a concentrated effort to broadly support Rural Councils in selected project regions if DG funds are available (USAID, 2006, Ibid).

9.2 ASSESSMENT OF CURRENT PROGRAMS OTHER THAN ENVIRONMENT

The USAID/Senegal portfolio consists of four DA-funded programs (Peace and Security; Governing Justly and Democratically; Investing in People [Health and Education]; Economic Growth and Private Sector Development) plus a small program in Humanitarian Assistance. (Humanitarian Assistance is now being provided through the SeneGambia Program, since this program has been discontinued in Senegal.) Of the four Mission programs, only the Economic Growth and Private Sector Development Program currently provide funding for work in the Environment and Natural Resources Management sector.

Environmental processes and concerns are cross-cutting, affecting all sectors, and there are possible synergies that can be pursued through collaboration between the various Mission programs. The Peace and Security program aims to reintegrate the potentially productive Casamance region, and this logically includes increasing agricultural and natural resources productivity. Health concerns related to the environment include water quality, elimination of stagnant water where malaria vectors reproduce, pollution control, etc. The Mission should consider accessing the USAID Water for the Poor program and the water earmark to access resources that would make it possible to address issues concerning water quality and water accessibility. Education should include increasing the awareness of basic environmental functions (e.g., hydrologic cycle, effects of deforestation and fire, implications of global warming, pollution control, potential effects of plant and animal species losses, etc.) taught at the primary and secondary school levels, as well as adult education programs. Agricultural productivity is intimately connected to the availability of water, soil fertility, soil erosion control (i.e., watershed management), desertification, pollution control, etc. Marine and aquatic resources management and their availability are vitally important in Senegal, and USAID private sector activities should address the development and management of these resources. USAID/Senegal should consider accessing the USAID/ EGAT “Fisheries Opportunities Assessment” conducted by the Sustainable Coastal Communities and Ecosystems Program (SUCCESS) and Global Water for Sustainability Program (GLOWS), and specifically request information concerning the establishment of sustainable fisheries management in Senegal.

9.3 EXTENT TO WHICH PROPOSED STRATEGY AND PROGRAM MEET NEEDS IDENTIFIED

9.3.1 PROMOTING COMMUNITY BASED NATURAL RESOURCES MANAGEMENT AND DECENTRALIZATION

The lack of training for members of local communities has been cited as a major deterrent to affective implementation of the GOS decentralization policy. The classification/declassification process of classified forests (FCs), which is currently authorized under the existing Forest Code, has also caused major problems in the Toubaounda area (e.g., Fattalah Reserve and Sine-Saloum Delta National Park), as well as other parts of the country. The model for promoting co-management of forests and other natural resources developed under the WN project, that empowers local communities through training and natural product development and marketing, provides an excellent means for addressing these problems.

An “Idea Paper” prepared by the Mission entitled “Integrated Coastal Resources Management, Challenges and Opportunities in Senegal” (USAID/Senegal, 2007) presents an excellent proposal for expansion of the “Wula Nafaa II” project into marine resources management. Currently, a local institution - “le Concil de Pêche a Kayar” - is exploring ways of decentralizing rights in that area. Lessons learned from the process in Kayar and the model of the decentralization of forest rights from the WN project could be used to guide the

co-management and the decentralization of coastal rights. Additionally, an Integrated Coastal Resources Management (ICRM) program applied toward the USAID biodiversity earmark could be accessed for this activity, and this could assist with Senegal's economic growth, promote good governance, and maintain relative stability in the region.

9.3.2 HONORING EXISTING COMMUNITY AGREEMENTS

On numerous occasions, the Assessment Team was told that Senegal has excellent policies and laws concerning the conservation of biodiversity and tropical forests. The problem is that these policies and laws are not being adequately implemented, and the basic reason for this is inadequate knowledge and expertise at the community level to effectively do this. In addition, the team became aware of a trend for the Government to ignore existing community agreements. An example of this is the Local Conventions on Management of Natural Resources and Environment (Les Conventions Locales de Gestion des Ressources Naturelles et de l'Environnement) (see The Constitution of the Republic of Senegal, Article 102 concerning Administration of Local Communities; and the « Convention locale pour une gestion durable des ressources de la forêt de Djiffa, Réserve de Biosphère du Delta du Saloum (RBDS), Cadre de Concertation des Communautés de la RBDS. » As shown below, the team reviewed several newspaper articles (“Le Soleil”, 23 May 2000) which discussed the Government Population Transmigration Project (“Projet de Repeuplement de la Forêt”) within the Fathala Forest (Forêt de Fathala), and the effect that ignoring existing community agreements had on local populations and natural resources they depend on for their livelihoods. Moreover, other newspaper articles (“Sud Quotidien” No. 2133, 15 May 2000) cited the issue of “Privatization du Parc National du Delta Saloum” and the profound effect this privatization will have on plant and animal natural resources in the Park. More recently, an article in the “Weekend Magazine” (31 October 2007, No. 25) discussed the privatization of a “Forêt Classée” near Dakar, which further exemplified the detrimental effect not honoring existing community agreements has on local people.

To address this problem, the Team recommends that USAID work with the GOS to make certain that existing and future community agreements are recognized as legally binding by both national and local government institutions, and that any potential change in these agreements (e.g., eminent domain) must be adjudicated in a court of law.

9.3.3 THE REALITY OF CLIMATE CHANGE

The effects of climate change can be seen quite readily in various locations throughout Senegal. Within the Fathallah forest reserve located in the Sine-Saloum Delta and the Niokolo Koba National Park for example, the team observed changes in species composition that are attributed to climate change (e.g., tree species from the more arid northern plateau replacing native species in the closed savanna forest). In addition, it has also been noted that two trends in the loss of vegetation have been observed in the long-term studies conducted by USGS/EROS in Senegal (Tappen, 2007, op. cit.), which further demonstrate that climate is occurring. One is the clear loss of more than half of Senegal's forests (cover types with over 80 percent canopy closure) in just 35 years. A second trend, not reflected directly in land cover change, is the decline in woody cover throughout Senegal being caused by selective harvesting for charcoal production, as well as other uses. The team notes that sustainable management of natural regeneration, such as that being promoted and practiced under the WN Project, does help to improve canopy closure and improve the density of woody cover, and are regarded as counter measures to address climate change.

It is also worth noting that examples do exist where forest regeneration will occur – even in the most degraded areas – and increased forest density plus resulting temperature and moisture amelioration are concrete counter measures for combating climate change. The PAGERNA Project, which ended about three years ago, was funded by the German GTZ over an 8-10 year period, and *inter alia* it helped communities around the Kaolack and Fatick regions establish and manage naturally-regenerated woodlands. It was the first

forestry project that worked to empower communities to manage their own forest resources. PAGERNA also provided organizational training and helped communities organize, prepare and implement management plans. They proved that using the same WN principles that communities can regenerate forest stands through *mis en defens* without resorting to fencing.

9.4 RECOMMENDATIONS AND PRIORITIES FOR FUTURE ACTIONS

9.4.1 PROMOTING DONOR COLLABORATION

The team maintains that collaboration amongst all organizations and parties involved in the management of biodiversity and tropical forests greatly enhances the chances for the successful conservation of these natural resources. The National Environmental Action Plan (NEAP), which has been a very effective means for fostering this collaboration in other countries (e.g., Madagascar, Kenya, Tanzania), but is apparently no longer functional in Senegal. There are vestiges of the NEAP in the Ministry of Environment and Natural Resources Protection (i.e., the CONSERE), but funding for this entity to continue functioning is virtually nil. Key questions become:

- Can donor collaboration contribute, cost effectively, to the conservation of biodiversity and forests in Senegal, and, if so
- How to promote this collaboration.

There is an informal organization that involves donor organizations which have ongoing programs and projects and/or interests in the environment and natural resources management sector. This organization was chaired for several years by the Dutch Foreign Assistance Program, but chairmanship has been rotated to USAID/Senegal. Being aware of the changes that have occurred in the environment and natural resources management (E/NRM) programs currently being funded by other bilateral and multilateral donor organizations, as well as NGOs, the team recommends that USAID/Senegal use this chairmanship position to revitalize the NEAP process and coordinate donor and NGO activities in the E/NRM sector.

At the present time, a proposal has been put forward by The World Bank (World Bank, 2007) to replace the NEAP with a Country Environmental Assessment (CEA). The Bank suggests two options in this CEA for coordination of donor activities, as well as the coordination of all Government of Senegal (GOS) entities plus NGOs and other parties active in the sector. The first option is to create a super ministerial agency (“supra-ministérielle”) that will have oversight authority for all government agencies active in the environment sector, as well as all environmental and natural resources programs and projects conducted by other organizations. A distant second alternative is to strengthen the existing MEPN to carry out this oversight and coordination function. The team recommends a third option, based on using the existing SP/CONSERE of the Primature, which coordinates activities amongst the various GOS Ministries and Institutions, to promote collaboration between the various organizations and institutions involved in conducting environmental and natural resources management programs and projects (e.g., donors, NGOs) and the GOS. The team believes this option is preferable because it works with an existing governmental entity, and, presumably, will not lead to an increase in the level of bureaucracy.

The availability of funding on a continuous basis is a key issue regarding the ability of the SP/CONSERE to provide oversight of the environment and natural resources sector. Based on experience gained through other NEAP Programs (e.g., Madagascar), the team recommends that consideration be given to establishing an independent foundation that will enable the SP/CONSERE to function, as well as provide long-term funding for small-scale projects and programs in this sector. Donor agencies could provide initial funding and guidance to establish this foundation, but it would be expected to pursue grants and other sources of

funding available on the open market. This foundation would work closely with the Primature, but it would be an independent organization that would eventually have its own sources of funding. Donors, NGOs and other environmental organizations would continue to fund and manage their own projects, and funding for smaller scale projects implemented by national NGOs, universities, research organizations, etc. would be provided on a competitive basis by the foundation.

9.4.2 PROMOTING DONOR AND GOVERNMENT COLLABORATION AT THE COMMUNITY LEVEL

Donor collaboration is important on the ground, in order to avoid duplication of effort and maximize the use of financial resources and technical expertise. The team recommends that USAID take concrete steps to assure there is communication amongst donors, and that lessons learned be shared to assure that conflicting messages are not communicated to people within local communities. In and around the Niokolo Koba National Park, for example, there are three projects being implemented by three donors (i.e., the USAID WN Project and UNDP PGIES Project outside the Park, and the WB PROGEDE Project both outside and inside the Park), and several people interviewed noted there appears to be a lack of collaboration amongst the three donors. Methodologies for training villagers being implemented by each donor appear to be different, and the exchange of information concerning the various techniques and materials used could enhance the work being done and reduce potential confusion amongst villagers. Differences in forest management techniques (e.g., WN emphasis on natural regeneration and forest management for charcoal production compared to PGIES and PROGEDE tree nursery establishment and reforestation methodologies) could also be causing confusion amongst villagers. Agricultural practices being promoted are also different, (e.g., WN emphasis on management and production of minor forest products; PROGEDE utilization of classical crop rotation plus plant selection and genetic improvement; and PGIES pond construction and water conservation practices), and the sharing of these various techniques and methodologies could be of benefit to all communities around the Park. The sharing of lessons learned concerning the formulation and implementation of effective land use and resource management policies, plus lessons learned concerning methodologies for working with local communities, would help to alleviate threats to BD – TF both within and outside the Park, as well as reduce confusion amongst local communities.

9.4.3 INSTRUMENTS FOR MITIGATING POTENTIAL NEGATIVE IMPACTS OF PROJECTS AND PROGRAMS

The team recommends that greater use be made of environmental reviews (e.g., Environmental Impact Assessments), as well as other instruments available for controlling potentially negative environmental, social and economic impacts of projects and programs, to help mitigate negative impacts of programs and projects on the environment. Considerable expertise exists within USAID, amongst other donors, and the international NGO community for conducting environmental reviews, as well as training people to conduct environmental reviews, and the team further recommends that greater use be made of these resources to strengthen capability within the GOS for this purpose.

When properly done, Environmental Impact Assessments (EIA) can provide guidance for the implementation of projects and the reduction of possible negative impacts on the environment, while encouraging the participation of parties affected by these projects. Currently the DEEC (Direction de l'Environnement et des Etablissements Classés) within the MEPN has the responsibility for review and approval of all Environmental Impact Assessments (Etude d'Impact Environnemental - EIE) within Senegal. A proposed program where an Environmental Impact Assessment has been prepared (and apparently approved by the DEEC) is the "Grande Cote Zircon Project" on the coast north of Dakar (Mineral Deposits Limited, 2007). If properly followed, the guidelines given in this EIE will make it possible to retain the existing dune stabilization measures already in place and reduce the potential negative impact on ground water quality. A second example of an instrument for controlling the possible negative social, economic and environmental impacts of a program is the Regional Environmental Evaluation (REA) prepared by a consultant firm for the World Bank "Programme de Relance des Activités Economiques et Sociales en Casamance (PRAESC)". This latter REA is a superb example of an impact assessment instrument that

describes existing conditions, as well as measures recommended for the mitigation of potential negative impacts of, this project on the environment.

The team observed two road building projects which have become dams curtailing the natural flow of water. These two activities would have profited immensely from good EIAs. The first project is a road built from Sokone to Toubakouta in the Sine-Saloum Delta, which has effectively become a dam that inhibits the natural fluctuation of tidal waters, thereby resulting in a high rate of mortality in the mangrove forests of that area. The second project is a road built north of the Simenti Lodge within Niokolo Koba National Park, which has obstructed the natural flow of water from the Gambia River into marshes that are critical wildlife habitats, and the DPN has resorted to using scarce resources to pump water from the river to the marsh to maintain this habitat. In both these instances, an environmental impact assessment could have predicted the negative impacts caused by building these roads, and measures could have been suggested to mitigate problems caused by obstructing the natural flow of water. The irony of this is that in both instances these problems could be solved by building bridges or putting in culverts where natural channels have been obstructed, and the natural flow of water could be restored. It is the team's assessment that problems of this nature could be avoided or mitigated if USAID would work with the GOS to strengthen the DEEC and assure that adequate resources and support are available to conduct and enforce viable EIAs.

9.4.4 DEVELOPMENT OF POLICIES FOR ADDRESSING FUTURE THREATS TO THE ENVIRONMENT

The team recommends that USAID work with the GOS to help address numerous activities on the horizon that will require the formulation of policies to mitigate potential negative impacts on the environment, while maintaining favorable conditions for private sector development. In this context, a two-pronged effort is recommended that first provides short-term measures that are rapid and visible to treat existing symptoms, and secondly, long-term measures which address basic natural resource management concerns (Paul Siegel, WWF WAMER Program, Per. Comm.). These long-term measures include: 1) Guidelines for the exploration and exploitation of heavy petroleum deposits on the border with Guinea Bissau, which could become commercially viable as world oil prices increase. 2) International tourism is growing at an accelerating rate in Senegal, and policies are needed that promote transparency in the pricing of goods and services offered at all levels, thereby reducing the likelihood of inflated prices at the local level and economic inflation on the national level. 3) Commercial fishing by international conglomerates is increasing in Senegalese waters, and policies are needed to reduce the likelihood of over-fishing that could threaten existing commercial and artisanal fisheries. 4) Mineral deposits of gold, iron and diamonds have been discovered in and around Niokolo Koba National Park, as well as Zirconium deposits on the beaches north of Dakar, and policies are needed to protect the environment and promote rational exploitation of these resources.

9.4.5 PROMOTING NATURE TOURISM

The team recommends that USAID work with MEPN, DEFCCS and DPN, as well as other donors and NGOs (e.g., the Bamboung AMP; local NGOs, WWF AMP "Program for West Africa") to encourage the formulation of national policies that promote transparency for all parties interested in nature tourism and insure that local communities benefit substantially from tourism. There is definite potential for successful nature tourism in Senegal, but much of the current tourism has not benefited organizations responsible for managing protected areas (e.g., DPN, DEFCCS), nor has it contributed to the national economy or local economies. There appear to be two reasons for this: 1) most international tourists travel directly to the parks and protected areas bypassing national airports and major cities; and 2) the lack of adequate facilities for tourists at the parks and protected areas. (The Assessment Team would add that accessibility limited by inadequately maintained roads is also a significant constraint to nature tourism in Senegal.) Our Team visited the private Bandia Nature Reserve, which is a successful enterprise managed for nature tourism by entrepreneurial individuals from Europe and South Africa, and this reserve attracts a large number of international tourists who come to see the well preserved forests, as well as flourishing populations of both native and introduced animals. Additionally, the Team visited the Sine-Saloum National Park, as well as the

Bamboung Aire Marine Protégé (AMP) located on the border of the Park, where “birding” and sport fishing attracts numerous tourists. The Team was privileged to visit the attractive and highly functional Bamboung Eco-tourism Camp, which is successfully managed and maintained by Rural Council representing 14 local communities with technical assistance provided by the World Bank-funded GIRMAC Project and a local NGO, “Océanium”.

9.4.6 ECONOMIC DIVERSIFICATION IN RELATION TO MANAGEMENT OF BIODIVERSITY

The team recommends that USAID support the formulation of a national plan that encourages economic diversification and industrialization of natural products and resources. Both the WN Project and the Bamboung Marine Protected Area Program (co-funded by the GIRMAC/World Bank Project) have demonstrated that there are a wide range of biodiversity and tropical forest products that can be developed. The IUCN-funded “VALEURS” project has also been quite effective in promoting the development of natural products while encouraging the conservation of threatened species. Moreover, the WWF AMP program for West Africa has demonstrated that training of local communities to promote marine resources management (e.g., shrimp and oyster aquaculture) has been quite effective in the eradication of poverty.

9.4.7 CAPACITY BUILDING

Many interviewees cited the lack of human capacity as a deterrent to implementation of national policies and laws concerning the conservation of biodiversity and tropical forests. To address this, the team recommends that USAID work with the GOS to help implement the following measures:

- Reinforce the capacity of technical services charged with managing protected areas and genetic resources (i.e., DEF and DPN agents) in the field.
- Promote increased training and capacity building at the community level to ensure transfer of the capability to manage natural resources and biodiversity (e.g., knowledge of texts, basic human capacity [i.e., reading, writing, mathematics] , financial techniques business/enterprise management methodologies) to ensure effective application of policies and laws, such as the decentralization policy, on the ground.
- Support the duplication and expansion of successful programs in the management of natural resources, such as WN, PROGEDE, Dankou, etc.

9.4.8 HARMONIZATION OF POLICIES AND LAWS

There are several policies and laws concerning the protection of biodiversity and tropical forest conservation that require harmonization to enable their successful application. To address this, the team recommends that USAID work with the GOS to help implement the following measures:

- Support the endowment and putting in place of plans for management of protected areas under the Stratégie Nationale de Gestion des Aires Protégées that is currently being elaborated.
- Promote harmonization of the lists of animal and plant species that are listed as fully and partially protected by international conventions with those lists maintained by the DEF and DPN (e.g., integration of the lists of threatened and endangered species under international conventions [IUCN Red List] with those species that are fully or partially protected in the Code Forestier and the Code de la Chasse, as well as the evaluation of those species presently considered to have socio-economic importance or ecological significance). (In Appendix F the team recommends concrete changes that can be made to achieve this measure.)

- Promote the actualization and harmonization of instruments used for the management of biological resources (e.g., actualize the Code de la Chasse, revision of certain articles in the Code Forestier taking into consideration both conservation needs and the satisfaction of human needs, harmonize both the codes with the Code Minier, Code de la Pêche, etc.) One example of this need for harmonization that was pointed out to the Team on numerous occasions was the tendency for the Code Minier to be given precedence over the Code Forestier for the sake of promoting income generating projects and activities.

9.4.9 PRIVATE SECTOR INVOLVEMENT

The team recommends USAID interact with the GOS to implement the following additional options to enhance participation of the private sector in the management of natural resources include:

- Encourage the clarification of a framework for interventions by the private sector into protected areas (need to clarify options for the state, as well as for all parties in general).
- Promote better participation of the private sector and local communities for the management of biological resources in protected areas, taking into account the oversight of charge accounts and monitoring of activities by different partners, thereby assuring economic returns to local people for conservation efforts.

9.4.10 MINING EXPLORATION

Given the significant potential for mining operations to affect the status of biodiversity and tropical forests, the team recommends that USAID work with the GOS to implement the following:

- Encourage the formulation of policies that provide guidelines for the long-term development of potential new industries, such as petroleum exploitation, mining, tourism, and commercial fishing, to protect biodiversity and tropical forests.
- Encourage the development of a safeguard and defense process for controlling mining exploitation within protected areas.

ANNEX A. SCOPE OF WORK

The contractor will provide relevant technical services to support USAID/Senegal's new country strategy statement for its assistance to Senegal. The assignment will be carried out in Washington, D.C. and Senegal, and it will include no more than three priority site visits, which will supplement understanding of USAID's program in Senegal. In undertaking this Scope of Work (SOW), the contractor will complete the following tasks.

Tasks

- Conduct pre-travel informational meetings with the USAID/AFR BEO and other key stakeholders in Washington, D.C., as well as gather and get acquainted with existing background information on Senegal.
- Conduct an overview and general analysis of the country's biodiversity and tropical forests current status by meeting with USAID/Senegal to get a solid understanding of Mission program goals and objectives, meeting with knowledgeable donor organizations, relevant government agencies plus other organizations, and conducting priority site visits.
- Assess and summarize the needs for biodiversity and tropical forest conservation in Senegal based on the key threats and opportunities plus an analysis of country, donor and NGO responses to meet these needs.
- Prepare a report on the status of biodiversity and tropical forest conservation efforts in Senegal and potential implications for USAID and other donor programming which define actions and opportunities necessary for conservation.
- Prepare a draft report for review by the MEO, USAID staff, and host country partners, and deliver two presentations of findings, one for an internal USAID audience and one for a broader body of GCP and conservation partners.

Key Reference Documents

- USAID/Senegal's Mission Strategy 2007-2012
- Senegal's preliminary 118/119 analysis (2005)
- USAID's Definition of Biodiversity Programs:
http://www.usaid.gov/our_work/environment/biodiversity/code.html
- USAID's Biodiversity Conservation Guide for Staff & Partners
http://www.usaid.gov/our_work/environment/biodiversity/usaids_pubs.html

Stakeholders

- USAID Washington Bureau
- Key Stakeholders in Washington, D.C.
- Donor organizations, NGOs, relevant government agencies and other knowledgeable organizations in Senegal

Deliverables

Specific deliverables will include the following:

- Draft methodology and timeline.
- Final methodology and timeline, including site visits agendas.
- Draft report with additional associated appendices and supporting materials as outlined in the SOW.
- All reports shall be in English and French
- Presentation of findings in PowerPoint format to be delivered for an internal USAID audience and a broader body of conservation partners
- Final report submitted in paper and electronic copies not more than one week after comments are due.

Key questions derived from the SOW that were addressed during all interviews conducted include:

1. What are the major threats and challenges facing declared and proposed protected areas in Senegal, including vulnerability to predicted changes in climate, and a brief summary of any recognized economic potential of these areas?
2. How do current efforts to mitigate pressures on declared and proposed areas - including the compliance with CITES and other international efforts - affect endangered species and important conservation areas?
3. In terms of national policies and the institutional capacities of government and private sector organizations, what are the recent, current and potential threats to biodiversity - whether ecological, related to human use, institutional, or transboundary - and how does/should the USAID program address and/or affect these?
4. What is the scope and effectiveness of current conservation efforts, and what are the most effective policies, institutions and activities for conserving biodiversity? How should these be modified or changed to increase their effectiveness? What are the priority conservation needs that lack donor or local support?
5. In terms of current legislation related to environment and biodiversity, which laws dealing with the protection of biological resources and endangered species require harmonization to enhance their effectiveness? What is the relationship of these laws to international treaties that Senegal has signed and ratified?
6. What are the major biodiversity and tropical forest conservation activities of the commercial private sector, and what steps can be taken to better foster private sector alliances?
7. How can synergies be improved and promoted to enhance the conservation of biodiversity and tropical forests between the four major strategic objectives in the new USAID/Senegal program (i.e., a) improving the health status of families; b) increasing economic growth through trade and agriculture/natural resources management; c) improving youth education; and d) advancing the Casamance peace process)? Which of these synergies best reflect the comparative advantages and capabilities of the U.S. program, and what are the priorities for immediate attention?

ANNEX B. BIODATA SKETCH OF TEAM MEMBERS

Carl M. Gallegos, Ph.D.; Team Leader – Dr. Carl M. Gallegos has a Ph.D. in Forest Genetics and Forest Soils, with a specialization in international environment and natural resources management. He is a versatile leader with extensive domestic and global experience in more than 40 countries throughout Africa, Asia and Latin America resolving resource management problems in both the public and private sector. He is skilled at program development, project management, organizing and conducting training, preparing environmental impact assessments, and creating partnerships between the public and private sectors. Having worked for USAID for nearly two decades, and specifically as the Africa Bureau Environmental Officer, Dr. Gallegos has a keen understanding of Senegal's biodiversity and forest concerns, and he has the necessary background to conduct a thorough assessment in accordance with Sections 117, 118, and 119 of the Foreign Assistance Act. Dr. Gallegos has over 40 publications in natural resources management.

Bienvenu Sambou

Professor Bienvenu Sambou is a Biologist, Senior lecturer at the University Cheikh Anta Diop of Dakar. He holds a Ph.D in forestry with a specialization in tropical forest dynamics and biodiversity conservation. He has a good knowledge of West Africa forests with a field experience of more than 20 years. Twenty-six postgraduate students were educated during this period in West Africa. Concerning research, his activities fit mainly in natural resources management and biodiversity conservation. These activities were mainly undertaken in the classified forests and the national parks. His current area of interest concern forest management and sustainable use, vegetation dynamics and regeneration, plant biodiversity assessment (threatened plant species, rare plant species and endemic plant species). Professor Sambou has over 30 scientific publications and 10 activity reports. He participated in the formulation of various national reports on forests and biodiversity in Senegal (Monograph on National Biodiversity, Strategy and National Plan of Action for the Conservation of the Biodiversity, Report on the endemic species) and in several seminars and workshops at national and international level. He was coordinator of several training and research projects in West Africa, member of several scientific and technique committees of projects, member of scientific associations, member of advisory and editorial board of scientific journals, member of the Senegal MAB committee, Chairman of the *African Tree Specialist Group*, member of the specialist group of West African aquatic Plant Assessment. As consultant, he worked for USAID, UICN, PNUD/GEF, EU.

Papa Mawade Wade

Papa Mawade WADE has a master of forestry sciences and has been working for more than 15 years in the field of environment and natural resources management, particularly land degradation and combating desertification. He has skills and qualifications in environmental planning, natural resources management, policy formulation, monitoring and evaluation, project management, participatory development, and environmental assessment.

He led the participatory and decentralized process of preparation of the National Action Plan (NAP) for combating desertification and poverty alleviation and was responsible for the technical team and coordinated the network of experts for the preparation of the National Environmental Action Plan (NEAP) of Senegal. As UNCCD National Focal Point during the past several years, he has participated to the negotiation's

process and the different Conferences of Parties (COP) of this convention, and also several meetings in the framework of its implementation in Africa and other continents.

As consultant, he assisted several African countries (Togo, Tchad, Niger, Cap Vert, Djibouti) either prepare their Environmental Action Plans or National Action Plans, or to put in place their environmental information system. With UNDP/GEF and UNOPS, he has formulated PDFA and Medium Sized Projects for the Democratic Republic of Congo, Sao Tome and Principe, Equatorial Guinea and Guinea. He has worked for UNDP/UNSO, FAO, GM/UNCCD, UNDP/DDC, UNDP/GEF, UNOPS, LEAD AFRICA, and the Embassy of the Netherlands.

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ANNEX D. LIST OF PERSONS CONTACTED

11/13/07

William Hand	SECID
Timothy Resch	USAID/AFR
Karen Towers	USAID/AFR
Michael McGahuey	USAID/EGAT
Mary Rowen	USAID/EGAT

11/14/07

Robert Winterbottom	IRG
Sarah Durso-Luche	IRG
Gray Tappen	USGS/EROS
Peter Veit	WRI
Jesse Ribot	WRI
Yves Prevost	World Bank

11/15/07

Oliver Pierson	MCC/US Forest Service
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11/16/07

David Gibson	Chemonics
Kate Woods	Chemonics
Brian App	Chemonics

11/19/07

Aminata Badiane	USAID/Senegal
Peter Trenchard	USAID/Senegal

11/20/07

Amadou Matar Diouf	IUCN/Senegal Coordinnateur des Programmes
Paul Siegel	WWF Africa & Madagascar Pogramme

11/21/07

Pape Momar Sow	USAID/SeneGambia/FFP
Dramon Mariko	USAID/Senegal/Education
Matar Camara	USAID/Senegal/Health

11/22/07

Amadou Moctar Niang	CSE, Directeur General
Aziz Toure	CSE, Directeur Technique
Babacar Salif Gueye	MEPN/USAID Programme
Mandiaye Ndiaye	AGRN - Wula Nafaa Parcs Nationaux

Daha Kane	Parcs Nationaux
Ndiawar Dieng Jan Hijkoop	MEPN, Planification reg. & Aménagement Netherlands Assistance Programme
11/23/07	
Matar Cisse	MEPN, DEFCCS, Directeur
Clement Diedhiou	MEPN, DEFCCS // CCS
Papa Ndiaye	MEPN, DEFCCS/DPF
Amadou Ndiaye	MEPN, DEFCCS/CCS
Cheikh Tidiane Ndiaye	MEPN, DEFCCS/CCS
Aba Sonko	MEPN, DEFCCS/DGF
Moussa Diouf	MEPN, PGIES
11/25/07	
Paul Ndiaye	University Cheikh Anta Diop, Prof of Geog.
11/26/07	Bandia Private Reserve
11/27/07	
Cheikh Sylla	DPN, Sine Saloum Delta
Eric Pouilles	Gite de Bandiala Hotel
Aboubackry Kane	IUCN-Sokone
Cheikh Niang	DPN, Bamboung
Adama Ndoye	Fatalah Reserve
Cheikh Senghor	Eco-Guards, PNDS
Maguette Lam Diop	
11/28/07	
Idrissa Mbaye	PGIES-Sokone
11/29/07	
Babacar Faye	IREF, Tambacounda
11/30/07	
Samuel Dieme	Conservateur PNNK
Cheikh Tidiane Toure	WN, Tambacounda
Youssou Lo	PROGEDE Project, World Bank
Ibrahima Toure	PGIES, Tambacounda
Souleymane Diallo	PGIES, Tambacounda
12/3/07	
Malick Ndiaye	PGIES, Ferlo

ANNEX E. SECTIONS 117, 118 AND 119 OF THE FOREIGN ASSISTANCE ACT

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

 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.

 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—

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

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.

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 660” 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.

 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.

(g) 77 Actions by AID. The Administrator of the Agency for International Development shall:

- (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.

(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.

ANNEX F. IUCN RED LIST FOR SENEGAL AND THE REGION

Table 1 : List of threatened / rare / endemic plant species in Senegal

Species	Biological type	Forest Code	IUCN Red List of threatened Species / WCMC List	CITES Species
<i>Abutilon macropodum</i>	Grass		ED (R)	
<i>Acalypha senensis</i>	Grass		ED	
<i>Alectra basserei</i>	Grass		ED	
<i>Andropogon gambiensis</i>	Grass		ED	
<i>Bolboschoenus grandispicus</i>	Grass		ED (R)	
<i>Bolboschoenus grandispicus</i>	Grass		ED (R)	
<i>Ceropegia senegalensis</i>	Grass		ED	Annex II
<i>Cissus okoutensis</i>	Grass		ED	
<i>Crotalaria sphaerocarpa</i>	Grass		ED	
<i>Cyperus lateriticus</i>	Grass		ED (R)	
<i>Cyperus lateriticus</i>	Grass		ED (R)	
<i>Digitaria aristulata</i>	Grass		R	
<i>Digitaria gentilis</i>	Grass		ED (R)	
<i>Eriocaulon inundatum</i>	Grass		ED (R)	
<i>Ilysanthes congesta</i>	Grass		ED (R)	
<i>LFPocarpha prieuriana</i>	Grass		ED (R)	
<i>Najas welwitschii</i>	Grass		ED (R)	
<i>Nesaea dodecandra</i>	Grass		ED	
<i>Panicum calocarpum</i>	Grass		ED (R)	
<i>Polycarpea gamopetala</i>	Grass		ED/undetermined	
<i>Polycarpeae linearifolia</i>	Grass		ED/undetermined.	
<i>Polycarpon prostratum</i>	Grass		ED (R)	
<i>Rhynchosia albae-pauli</i>	Grass		ED (R)	
<i>Salicornia senegalensis</i>	Grass		ED (R)	
<i>Scleria chevalieri</i>	Grass		ED (R)	
<i>Solanum cerasiferum</i>	Grass		ED (R)	
<i>Spermacoce galeopsidis</i>	Grass		ED	
<i>Spermacoce phyllocephala</i>	Grass		ED	
<i>Urginea salmonea</i> Berhaut	Grass		ED	
<i>Borassus aethiopum</i>	Palm tree	PP	LR	
<i>Hyphaene thebaica</i>	Palm tree	FP		
<i>Berhautia senegalensis</i>	Parasite ligneux		ED (R)	
<i>Acacia raddiana</i>	Shrub	PP		
<i>Acacia senegal</i>	Shrub	PP		
<i>Combretum trochainii</i>	Shrub		ED/undetermined	
<i>Dalbergia melanoxylon</i>	Shrub	FP		
<i>Grewia bicolor</i>	Shrub	PP		
<i>Holarrhena floribunda</i>	Shrub	FP		

<i>ZizFPPhus mauritiana</i>	Shrub	PP		
<i>Adansonia digitata</i>	Tree	PP		
<i>Azalia africana</i>	Tree	PP	VU	
<i>Albizia adianthifolia</i>	Tree	FP		
<i>Albizia ferruginea</i>	Tree		VU	
<i>Alstonia boonei</i>	Tree	FP		
<i>Ceiba pentandra</i>	Tree	PP		
<i>Celtis integrifolia</i>	Tree	FP		
<i>Chlorophora regia</i>	Tree	PP		
<i>Cordyla pinnata</i>	Tree	PP		
<i>Daniellia ogea</i>	Tree	FP		
<i>Diospyros mespiliformis</i>	Tree	FP		
<i>Fadherbia albida</i>	Tree	PP		
<i>Ficus dichranostyla</i>	Tree		ED	
<i>Khaya senegalensis</i>	Tree	PP	VU	
<i>Mitragyna stFPulosa</i>	Tree	FP		
<i>Moringa oleifera</i>	Tree	PP		
<i>PFPtadeniastrum africanum</i>	Tree	FP		
<i>Prosopis africana</i>	Tree	PP		
<i>Pterocarpus erinaceus</i>	Tree	PP		
<i>Pterocarpus santalinoides</i>	Tree		LR	Annex II
<i>Sclerocarya birrea</i>	Tree	PP		
<i>Tamarindus indica</i>	Tree	PP		
<i>Vitellaria paradoxa</i>	Tree	FP	VU	
<i>Ceropegia praetermissa</i>	Vine		ED (R)	Annex II
<i>Cissus gambiana</i> Descoings	Vine		ED (R)	

IUCN : The World Conservation Union ; WCMC : World Conservation Monitoring Centre ; ED : Endemic ; VU : Vulnerable ; LR : Low Risk ; PP : Partially Protected ; FP : Fully Protected ; DD : Data Deficient ; LC : Least Concern ; NT : Near Threatened ; NA : Non Applicable ; R : Rare

Table 2 : List of threatened / rare / endemic animal species in Senegal

Species	Classes	Hunting Code	IUCN Red List of Threatened Species	CITES Species
<i>Acinonyx jubatus</i>	Mammal	FP	VU	Annex I
<i>Adenota kob</i>	Mammal	PP		
<i>Alcelaphus major</i>	Mammal	PP		
<i>Anomaluroops beecroftii</i>	Mammal	FP		
Autres Félidées	Mammal	PP		
Bovidés	Mammal	PP		
Céphalophes	Mammal	PP		
<i>Cephalophus sylvicultor</i>	Mammal	FP		
<i>Cercocebus galeritus galeritus</i>	Mammal	FP		Annex I
<i>Cercocebus torquatus</i>	Mammal	FP		
<i>Cercopithecus campbelli</i>	Mammal	FP		
CETACEA	Mammal	FP		Annex II
<i>Colobus badius temmincki</i>	Mammal	FP		
<i>Damaliscus Korringum</i>	Mammal	FP		
<i>Felis leo</i>	Mammal	PP		Annex II
<i>Galago senegalensis</i>	Mammal	FP		
<i>Gazella dama</i>	Mammal	FP	CR (Reintroduces)	
<i>Gazella dorcas</i>	Mammal	FP		Annex III
<i>Gazella rufifrons</i>	Mammal		VU	
<i>Gazella rufifrons</i>	Mammal	FP		
Genres <i>Smutsia</i> et <i>Uremanis</i>	Mammal	FP		
<i>Giraffa camelopardalis</i>	Mammal	FP		
<i>HFPpopotamus amphibius</i>	Mammal	FP	VU	Annex II
<i>HFPpotragus equinus</i>	Mammal	PP		
<i>Kobus defassa</i>	Mammal	PP		
<i>Limnotragus spekei</i>	Mammal	FP		
<i>Loxodonta africana</i>	Mammal	FP	VU	Annex I
<i>Lycaon pictus</i>	Mammal	PP	EN	
<i>Monachus spp</i>	Mammal	FP		Annex I
<i>Orycteropus afer</i>	Mammal	FP		
<i>Oryx dammah</i>	Mammal		EW	Annex I
<i>Ourebia ourebi</i>	Mammal	PP		
<i>Pan troglodytes</i>	Mammal	FP	EN	Annex I
<i>Panthera leo</i>	Mammal		VU	Annex I
<i>Panthera pardus</i>	Mammal	FP		Annex I
<i>Potamochoerus porcus</i>	Mammal	FP		
<i>Procolobus badius</i>	Mammal		EN	
<i>Profelis aurata</i>	Mammal		VU	
<i>Redunca redunca</i>	Mammal	PP		
<i>Taurotragus derbianus</i>	Mammal	FP		
<i>Tragelaphus scrFPtus</i>	Mammal	PP		
<i>Trichechus senegalensis</i>	Mammal	FP	VU	Annex II
<i>Cypraea sanguinolenta</i>	Mollusque	FP		
<i>Acrocephalus paludicola</i>	Bird		VU	
<i>Alopochen aegyptiacus</i>	Bird	PP		
<i>Ardea goliath</i>	Bird	FP		

<i>Balearica pavonina</i>	Bird	FP		
<i>Bubulcus ibis</i>	Bird	FP		
BUCEROTIDAE	Bird	FP		Annex I
<i>Choriotis arabs</i>	Bird	FP		
<i>Ciconia ciconia</i>	Bird	FP		
<i>Circaetus beaudouini</i>	Bird		VU	
<i>Criniger olivaceus</i>	Bird		VU	
<i>Dissoura episcopa</i>	Bird	FP		
<i>Egretta alba</i>	Bird	FP		
<i>Egretta garzetta</i>	Bird	FP		
<i>Egretta intermedia</i>	Bird	FP		
<i>EphFPpiorhynchus senegalensis</i>	Bird	FP		
<i>Eupodotis senegalensis</i>	Bird	PP		
FALCONIDAE	Bird	FP		Annex II
<i>Falco naumanni</i>	Bird		VU	Annex II
<i>Geronticus eremita</i>	Bird		CR	Annex I
<i>Hagedashia hagedash</i>	Bird	FP		
<i>Hallea stFPulosa</i>	Bird		VU	
<i>Ibis ibis</i>	Bird	FP		
LARIDAE	Bird	FP		Annex I
<i>Leptotilos crumeniferus</i>	Bird	FP		
<i>Lissotis melanogaster</i>	Bird	PP		
<i>Lophotis ruficrista salvilei</i>	Bird	PP		
<i>Marmaronetta angustirostris</i>	Bird		VU	
<i>Neophron percnopterus</i>	Bird		EN	
<i>Neotis cafra denhami</i>	Bird	FP		
<i>Pelicanus onocrotalus</i>	Bird	FP		
<i>Pelicanus roseus</i>	Bird	FP		
<i>Pelicanus rufescens</i>	Bird	FP		
<i>Phaëton aethereus</i>	Bird	FP		
<i>Phoeniconaias minor</i>	Bird	FP		Annex II
<i>Phoeniconaias reseus</i>	Bird	FP		Annex II
<i>Platalea alba</i>	Bird	FP		
<i>Plectropterus gambiensis</i>	Bird	PP		
<i>Plegadis falcinellus</i>	Bird	FP		
<i>Poicephalus robustus fuscicollis</i>	Bird	PP		
<i>Poicephalus senegalus</i>	Bird	PP		
<i>Porphyrio madagascariensis aegyptiacus</i>	Bird	PP		
<i>Porphyryla alleni</i>	Bird	PP		
<i>Psittacula Krameri Krameri</i>	Bird	PP		
<i>Pterodroma madeira</i>	Bird		CR	
<i>Rhinolophus guineensis</i>	Bird		VU	
<i>Rhynchops flavirostris</i>	Bird	FP		
<i>Sagittarius serpentarius</i>	Bird	FP		
<i>Sarkidiornis melanotos</i>	Bird	PP		Annex II
<i>Sphennorrhynchus abdimi</i>	Bird	FP		
Strigidés	Bird	FP		
<i>Struthio camelus</i>	Bird	FP		Annex I
<i>Thalassornis leuconotus leuconotus</i>	Bird	PP		
<i>Threskiornis aethiopicus</i>	Bird	FP		
<i>Torgos tracheliotus</i>	Bird		VU	
<i>Trigonoceps occFPitalis</i>	Bird		VU	

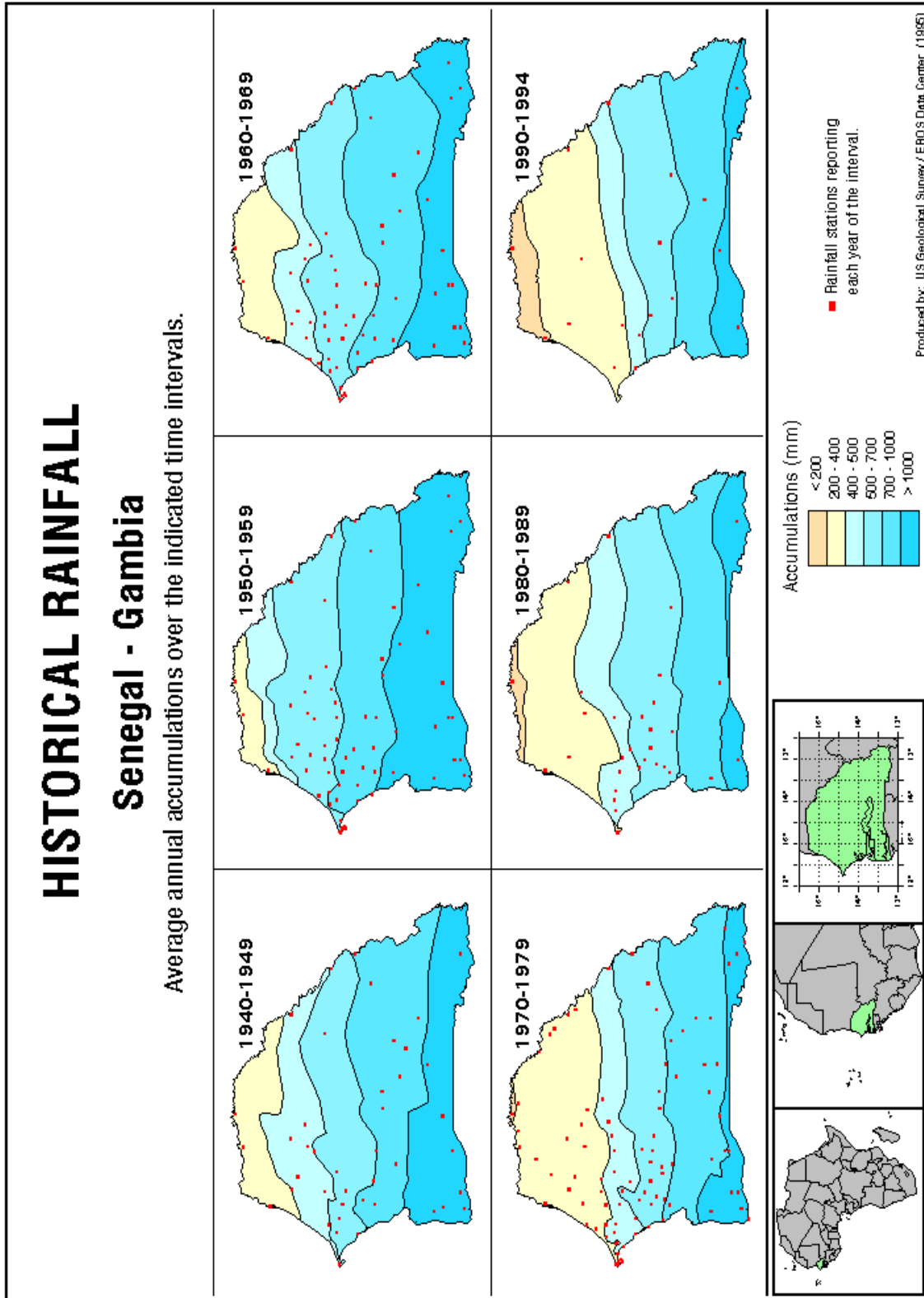
<i>Balistes vetula</i>	Fish		VU	
<i>Carcharhinus longimanus</i>	Fish		VU	
<i>Carcharhinus signatus</i>	Fish		VU	
<i>Carcharias taurus</i>	Fish		VU	
<i>Carcharodon carcharias</i>	Fish		VU	
<i>Centrophorus granulosus</i>	Fish		VU	
<i>Centrophorus squamosus</i>	Fish		VU	
<i>Cetorhinus maximus</i>	Fish		VU	
<i>Epinephelus itajara</i>	Fish		CR	
<i>Epinephelus marginatus</i>	Fish		EN	
<i>Galeorhinus galeus</i>	Fish		VU	
<i>Gymnura altavela</i>	Fish		VU	
<i>Oxynotus centrina</i>	Fish		VU	
<i>Pagrus pagrus</i>	Fish		EN	
<i>Phocoena phocoena</i>	Fish		VU	
<i>Pristis pectinata</i>	Fish		CR	
<i>Pristis perotteti</i>	Fish		CR	
<i>Pristis pristis</i>	Fish		CR	
<i>Rhincodon typus</i>	Fish		VU	
<i>Rhinobatos cemiculus</i>	Fish		EN	
<i>Rhinobatos rhinobatos</i>	Fish		EN	
<i>Rhynchobatus luebberti</i>	Fish		EN	
<i>Rostroraja alba</i>	Fish		EN	
<i>Sphyma mokarran</i>	Fish		EN	
<i>Squalus acanthias</i>	Fish		VU	
<i>Thunnus obesus</i>	Fish		VU	
<i>Urogymnus asperrimus</i>	Fish		VU	
<i>Squatina aculeata</i>	Fish		CR	
<i>Squatina oculata</i>	Fish		CR	
<i>Caretta caretta</i>	Reptile		EN	
<i>Chelonia mydas</i>	Reptile		EN	Annex I
<i>Chéloniidés</i>	Reptile	FP		Annex I
<i>Crocodylus cataphractus</i>	Reptile	FP		Annex I
<i>Crocodylus niloticus</i>	Reptile	FP		Annex I
<i>Dermodochelys coriacea</i>	Reptile		CR	Annex I
EMYDIDAE	Reptile	FP		
<i>Geochelone sulcata</i>	Reptile		VU	Annex II
<i>Lepidochelys olivacea</i>	Reptile		EN	
<i>Osteolaemus tetraspis</i>	Reptile	FP	VU	
<i>Python regius</i>	Reptile	PP		Annex II
<i>Python sebae</i>	Reptile	PP		Annex II
TESTUDINIDAE	Reptile	FP		Annex II
<i>Varanus exanthematicus</i>	Reptile	PP		Annex II
<i>Varanus niloticus niloticus</i>	Reptile	PP		Annex II

IUCN : The World Conservation Union ; CR : Critically Endangered ; EN : Endangered ; EW : Extinct in the Wild ; VU : Vulnerable ; PP : Partially Protected ; FP : Fully Protected

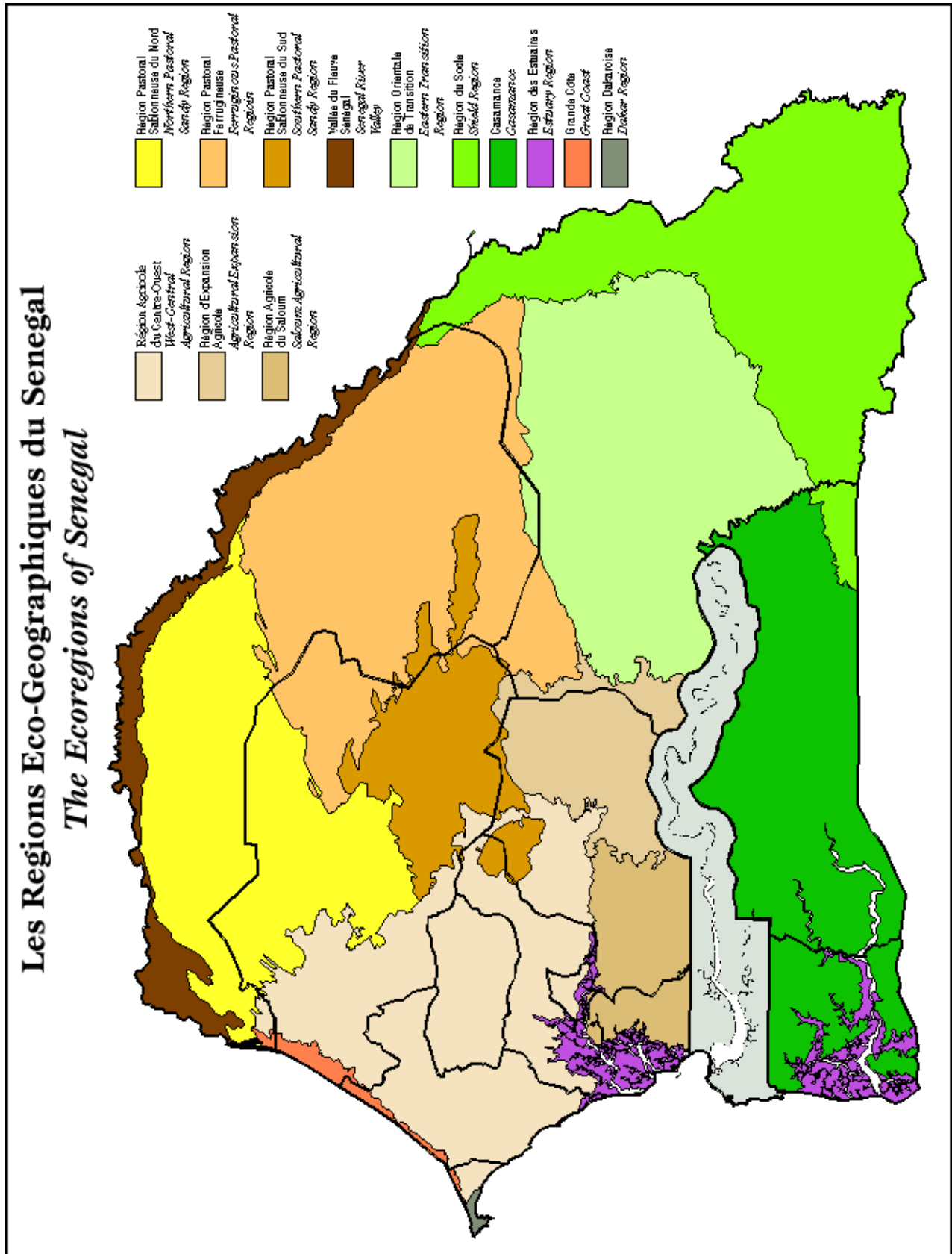
ANNEX G. POLITICAL, ENVIRONMENTAL AND NATURAL RESOURCES MAPS OF SENEGAL



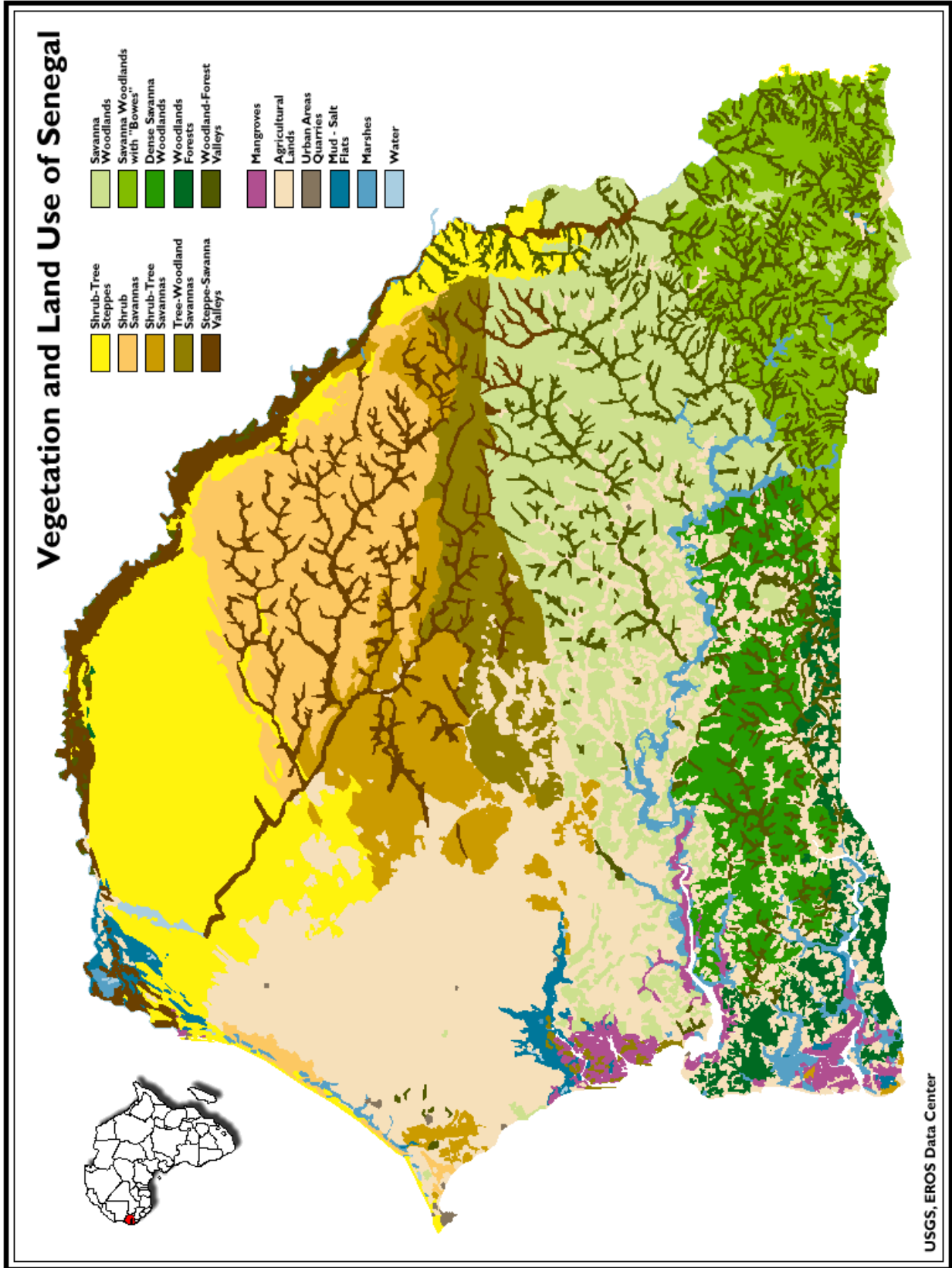
Map 1: Political Map of Senegal (UN, 2004)



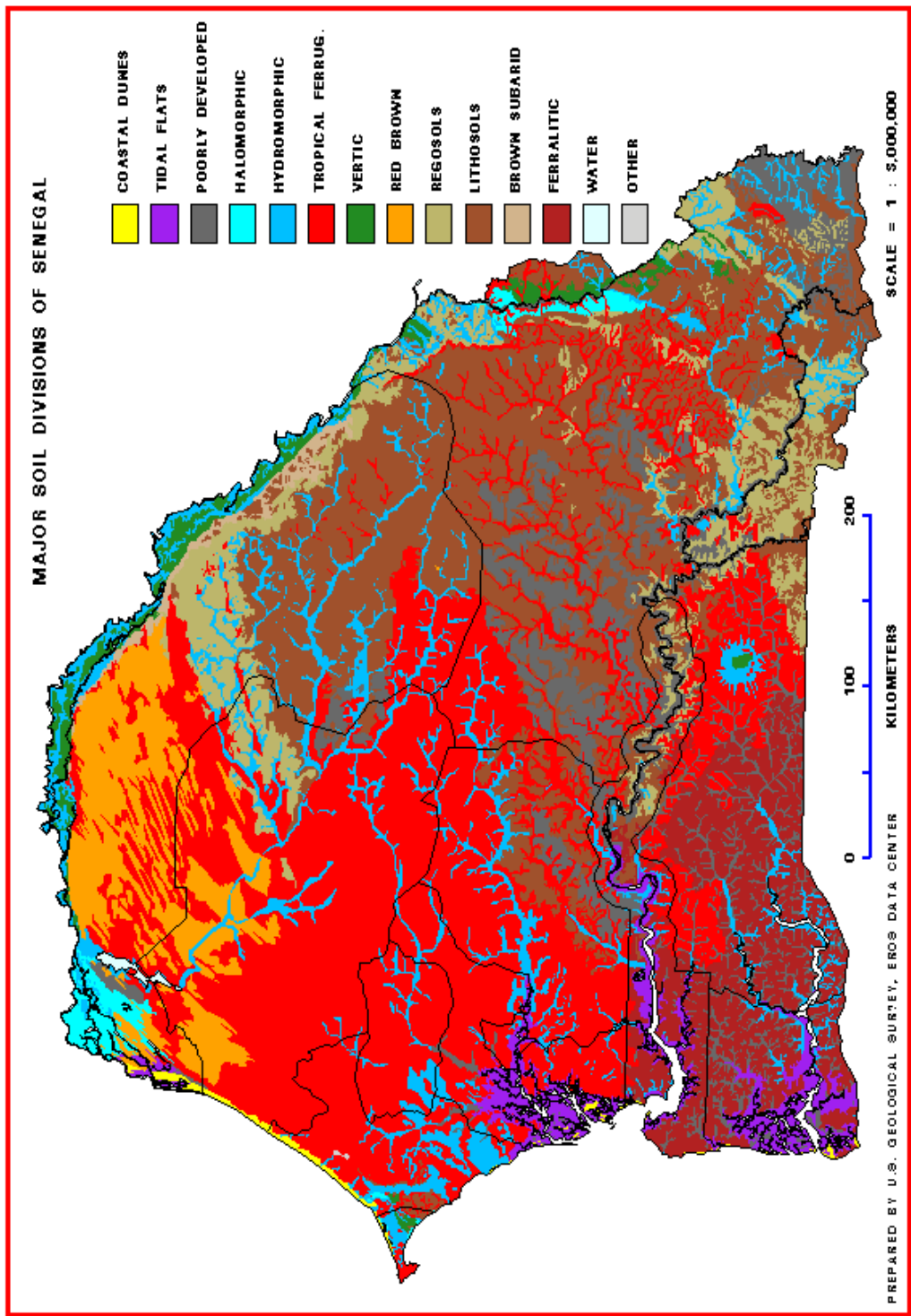
Map 2: Historical Rainfall for Senegal – Gambia (USGS/EROS, 2006)



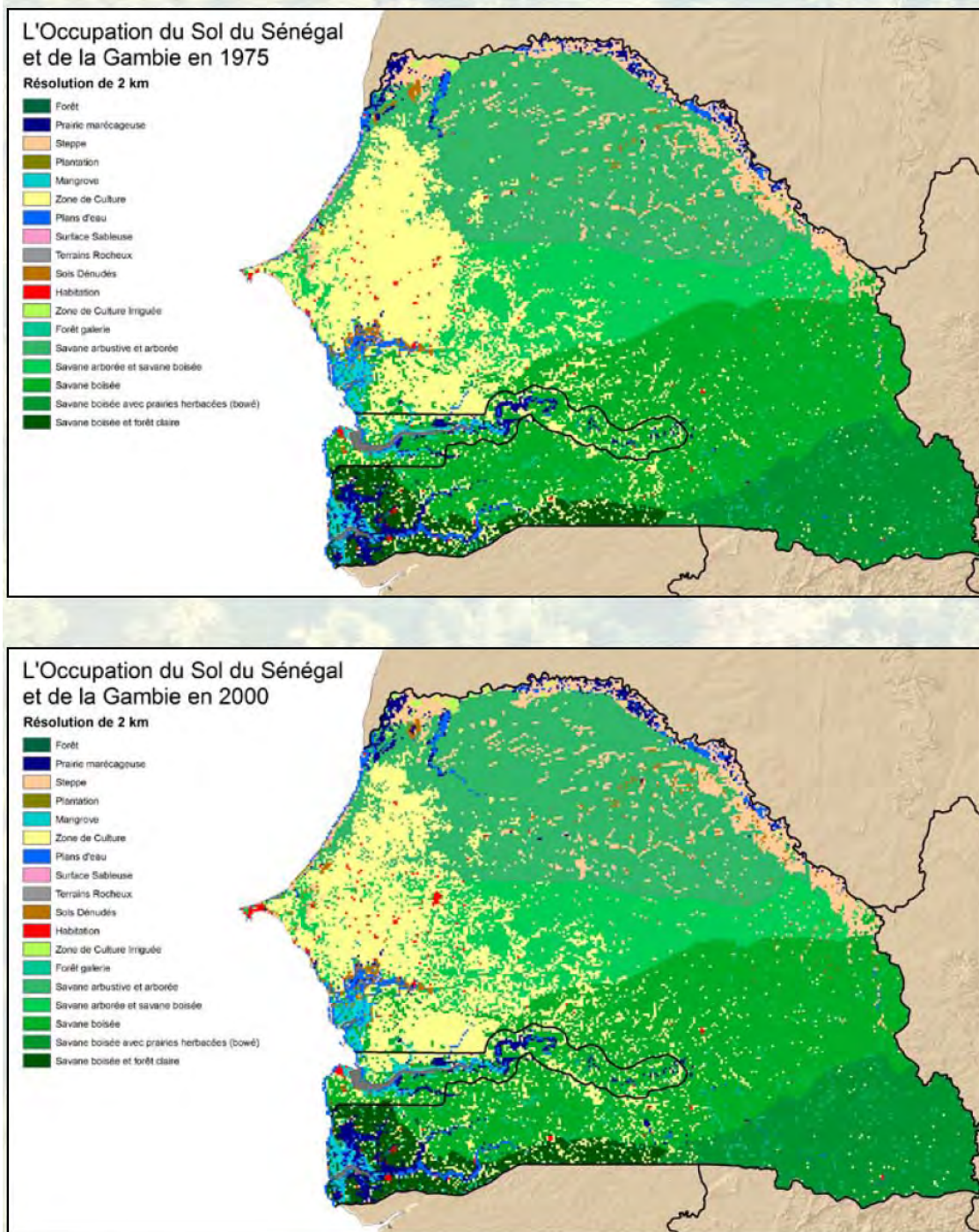
Map 3. The Eco-Geological Regions of Senegal (USGS/EROS, 2006)



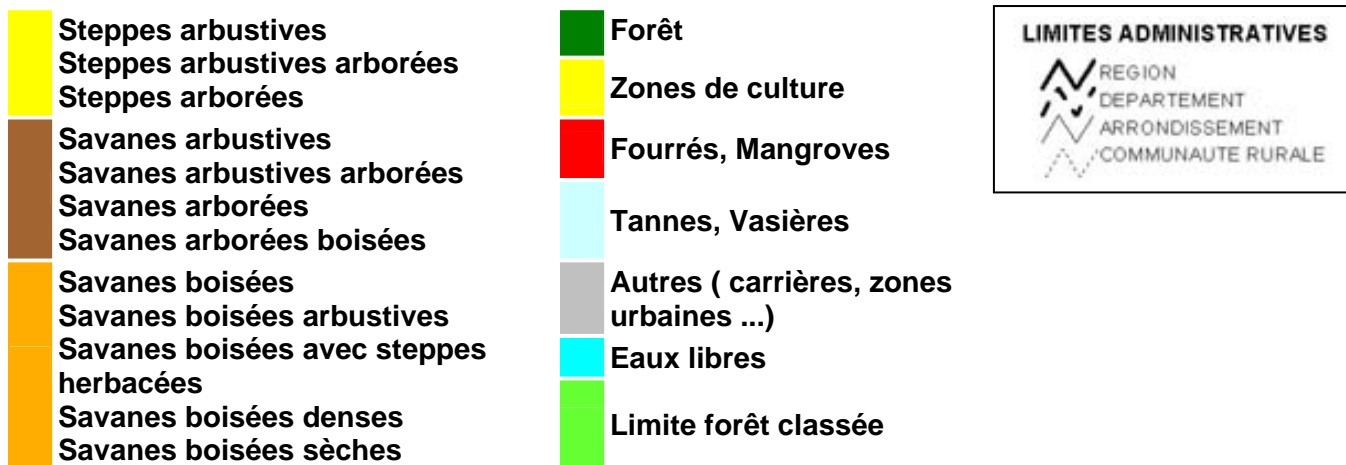
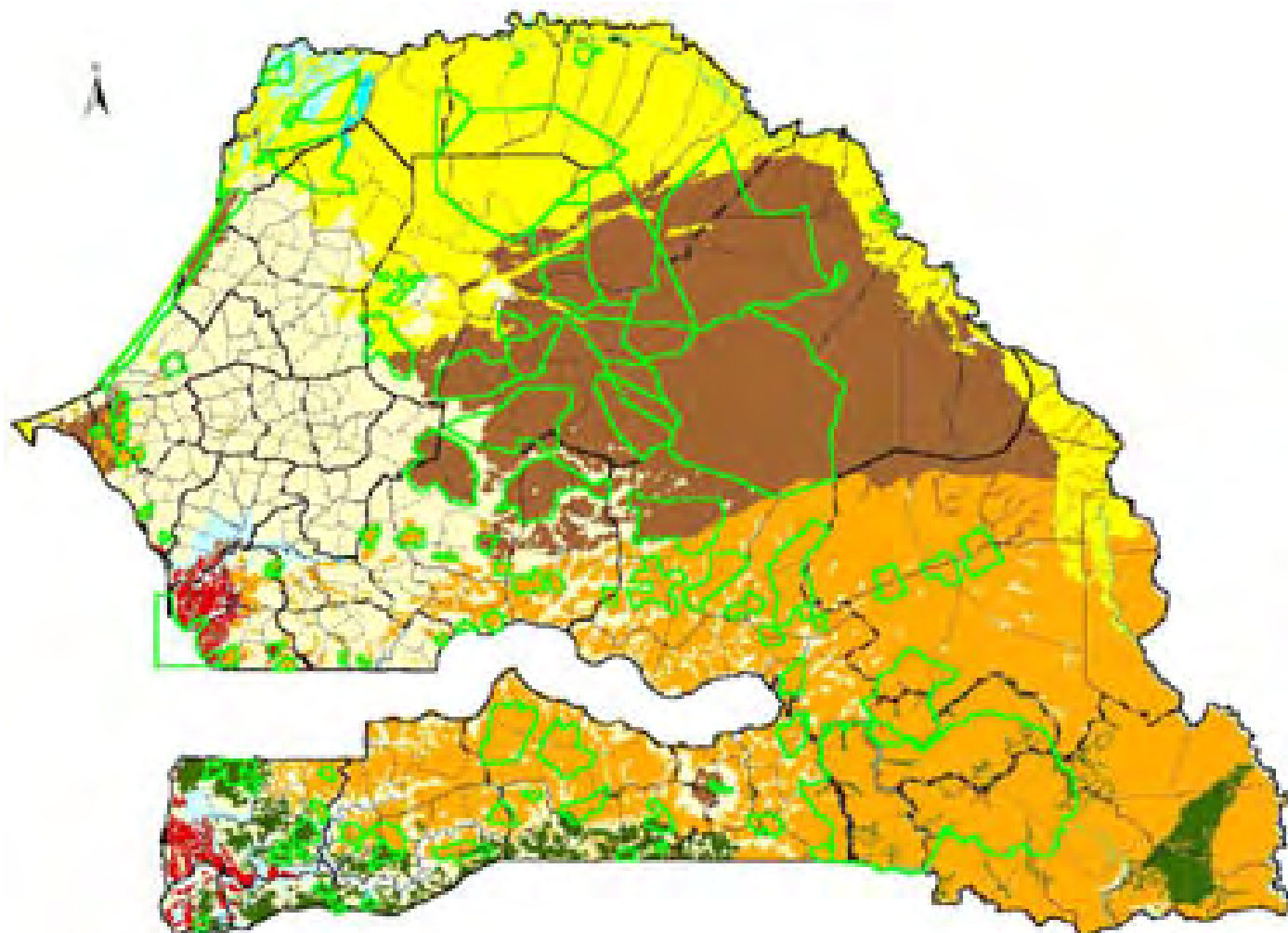
Map 4. Vegetation and Land Use of Senegal (USGS/EROS, 2006)



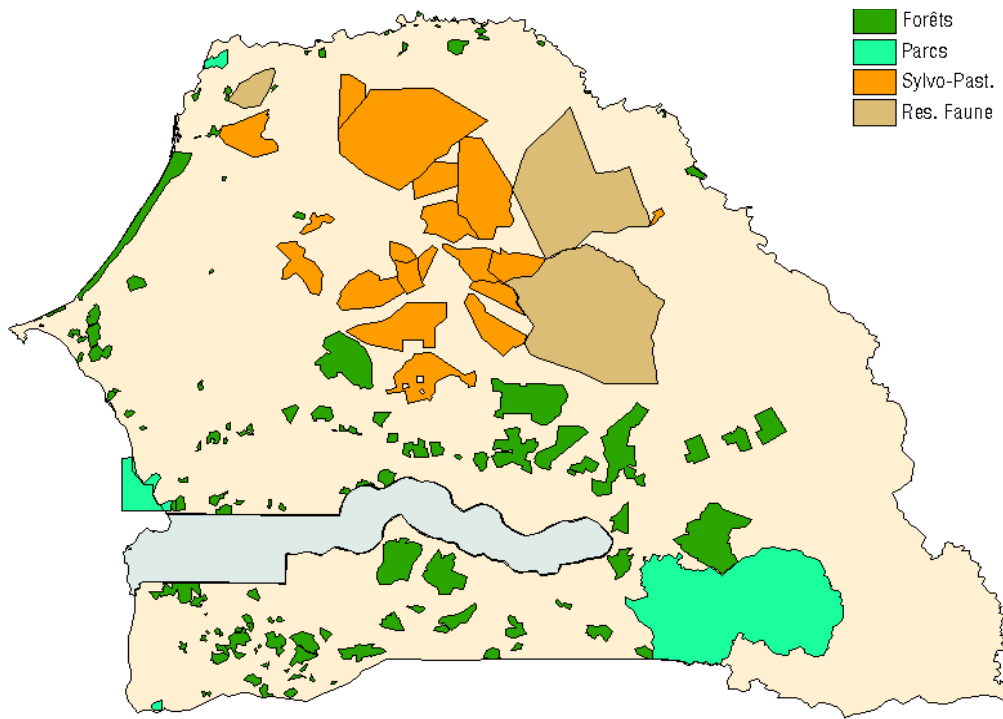
Map 5. Major Soil Divisions of Senegal (USGS/EROS, 2006)



Map 6. Soil Occupation of Senegal and The Gambia (Tappan, G. 2007, Pers. Comm.)



Map 7. Map of Soil Occupation (CSE, 2003)



Map 8. Map of Protected Areas (DPN, 1998)

Source : Direction des Parcs Nationaux, modifiée par Centre de Suivi Ecologique avec la collaboration de l'ISE