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Mali Biodiversity and Tropical Forests 118/119 Assessment



November 2008

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MALI BIODIVERSITY AND TROPICAL FORESTS 118/119 ASSESSMENT

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FRONT COVER: Boucle de Baoulé Biosphere Reserve, Mali
BATS /Brian App

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ACRONYMS

ARC	Africa Rice Center
CBFM	community-based forest management
CBO	community-based organization
CSO	civil society organization
DNACPN	<i>Direction Nationale de l'Assainissement et du Contrôle des Pollutions et des Nuisances</i> (National Direction for Sanitation, Pollution, and Nuisance Control)
DNCN	<i>Direction Nationale de la Conservation de la Nature</i>
DRCN	<i>Direction Régionale de la Conservation de la Nature</i>
EIA	environmental impact assessment
FAO	Food and Agriculture Organization
FIDA	<i>Fonds Internationaux pour le Développement Agricole</i>
GEF	Global Environment Facility
GOM	government of Mali
GSTA	Global Sustainable Tourism Alliance
GTZ	<i>Gesellschaft für Technische Zusammenarbeit</i>
ICRAF	International Center for Research in Agroforestry
IER	<i>L'Institut d'Economie Rurale</i> (The Institute of Rural Economy)
IICEM	<i>Initiatives Intégrées pour la Croissance Economique au Mali</i> (Integrated Initiatives for Economic Growth in Mali)
IUCN	International Union for Conservation of Nature
KfW	<i>KfW Bankengruppe</i>
MEA	<i>Ministère de l'Environnement et l'Assainissement</i> (Ministry of Environment and Sanitation)
NGO	nongovernmental organizations
NRM	natural resource management
ONG	<i>organisation non-gouvernemental</i>
PAGEIT	<i>Programme d'Appui a la Gestion des Ecosystèmes Inondables Dans 4 Territoires du Delta Intérieure du Fleuve Niger</i> (Program in Support of the Floodplain Ecosystem in Four Territories of the Inner Niger River)
PC	Peace Corps
PCV	Peace Corps Volunteer
SCLN	<i>Service Local pour la Conservation de la Nature</i> (Local service for the Conservation of Nature)
UEMOA	<i>Union Économique et Monétaire Ouest-Africaine</i> (West African Economic and Monetary Union)
UNDP	United Nations Development Programme
UNF	United Nations Foundation
USFS	U.S. Forest Service
WI	Wetlands International

EXECUTIVE SUMMARY

The purpose of this Mali 118/119 Biodiversity and Tropical Forest Assessment is to synthesize information on the institutional and legislative structures in Mali that relate to biodiversity, report on the state of biodiversity resources in Mali, identify threats to biodiversity, review current USAID program activities, and identify opportunities for biodiversity conservation. To help conduct this assessment, a team of local and international experts engaged in a three-week mission that included interviews and field visits in northern and southern Mali.

Mali has a complex and established array of institutions, laws, and policies that address natural resource management and biodiversity conservation issues. Among them is a decentralization policy that sets the stage for local communities to gain more control over planning and management of the resources on which they depend. Critical gaps between policy and implementation have resulted in biodiversity loss and habitat degradation throughout the country.

Key threats to biodiversity in Mali include overexploitation of wildlife resources; habitat loss, degradation, and fragmentation; invasive species; pollution; limited institutional capacity and institutional oversight; weak civil society with limited participative planning and management activities; and climate change. This report documents general recommendations for mitigating these threats to biodiversity in Mali.

Despite gaps between policy and implementation and current threats to biodiversity in Mali, high-priority biodiversity areas are still relatively intact in both the northern and southern regions, with great potential for conservation activities. The Niger Delta and northern region lakes are essential migratory bird and fish habitat. The southern region forests and protected areas include large tracts of biologically diverse forest cover and wildlife habitat.

This assessment includes discussions and field visits with the three major USAID/Mali programs that directly engage natural resource management: agricultural value chain improvement with *Initiatives Intégrées pour la Croissance Economique au Mali* (IICEM), Shea Butter Production with the Peace Corps (PC), and the Global Sustainable Tourism Alliance (GSTA) — Dogon country projects. Although all these projects are natural resource management activities, none contain strong biodiversity conservation components. This report identifies and discusses opportunities for bolstering biodiversity actions within each project. Further opportunities for biodiversity conservation activities are also suggested throughout the country, particularly in high-priority biodiversity areas. Suggestions for national-level and local-level support are provided in specific recommendations in Chapters V and VII.

INTRODUCTION

A. 118/119 Legislation and Purpose of this Assessment

The environmental requirements of USAID Operational Plans and Country Assistance Strategies are specified in ADS 201.3.8.2, Mandatory Technical Analysis for Developing Strategic Plans, Environmental Analysis, and are derived from the Foreign Assistance Act and 22 U.S. Code of Federal Regulations 216.

The Foreign Assistance Act addresses tropical forests and biodiversity in Sections 118 “Tropical Forests” and 119 “Endangered Species.” These sections require all country plans to include an analysis of the actions necessary to conserve biological diversity and tropical forests of the country in question and require a description of the extent to which current and proposed USAID actions meet those needs. Section 118/119 analyses are requirements of all USAID Operational Plans and Country Assistance Strategies and should be conducted in preparation for the strategic planning process.

These assessments identify biodiversity and forestry assets within a country, discuss the impact of USAID activities there, and determine ways for current and future USAID programs to promote biodiversity conservation and sustainable forest management. In addition to responding to the requirement, a 118/119 analysis can help guide proposed programs toward a more sustainable use of the country’s renewable natural resources.

B. Methodology of this Assessment

This Mali 118/119 assessment was conducted by a five-person team made up of three international consultants and two local consultants: Shelley Saxen of the U.S. Forest Service (USFS); Brian App and Sarah Cooper of Chemonics International; and Seydou Bouaré and Alamir Sinna Touré of Mali. The team first reviewed the available literature and then conducted on-the-ground interviews to assess USAID/Mali programming related to biodiversity and tropical forests in Mali.

From August 18 through September 6, 2008, the team conducted interviews and meetings with key stakeholders, including representatives of the government of Mali, nongovernmental organizations (NGOs), community-based organizations (CBOs), community members, and USAID/Mali project staff. With guidance from initial conversations and an orientation meeting in Bamako with USAID/Mali on August 18, 2008, the team split into two sub-teams to cover more ground in the field in southern and northern Mali. The teams explored relationships between current USAID/Mali projects and biodiversity conservation activities. Additionally, they identified potential sites for biodiversity conservation interventions. The threats analysis and recommendations provided in this report cover the entire country and range of USAID programs.

The two teams conducted 12-day field visits in *Boucle du Baoulé* National Park; Sikasso; Ségou; the Niger Delta wetlands, fishing villages, and migratory bird habitat; Dogon Country Ecotourism sites; the Lake Oro Ramsar site; the Gourma elephant conservation project; sites related to dune stabilization activities in Timbuktu; and sites related to

USAID/Mali-PC partnership activities engaged in shea butter production. On completion of the fieldwork, the team conducted additional Bamako-based interviews, reviewed documents obtained in-country, collaborated on recommendations, debriefed USAID on preliminary findings, and drafted the report.

C. Mali Background

Located in West Africa, the land-locked country of Mali is bordered on the west by Mauritania, to the north by Algeria, to the east by Niger, Burkina Faso, and Guinea, and to the south by Côte d'Ivoire and Senegal. The most productive agricultural area lies along the banks of the Niger River between Bamako and Mopti and extends south to the borders of Guinea, Côte d'Ivoire, and Burkina Faso. Mali is ranked 173 out of 177 countries on the latest Human Development Index — only measuring a higher quality of life than Niger, Guinea-Bissau, Burkina Faso, and Sierra Leone.¹ Mali also has the world's highest percentage of people living on less than a dollar a day.² About 70 percent of Mali's population of 13.5 million people (2007 estimate)³ are engaged in agriculture and depend on natural resources for their livelihoods, economic development, and food security. Mali is a poor country whose agriculturally based economy remains under-diversified and susceptible to external shocks. Continued depletion of its finite natural resources will compromise the nation's health, food security, and economic development.

C1. Physical Background

Mali has a land area of 1,241,000 km² and is subdivided into five main ecosystems presenting a wide range of agro-ecological environments: 1) Saharan — desert in the north, 2) Sahelian — semi-arid, 3) Niger Delta — fresh water wetland, 4) Sudanian — savanna, and 5) Guinean — moist/humid forest. The five ecosystems make up 14 regions, of which these five are paramount: the Mandingue Plateau, the Upper Bani Niger, the Niger Delta, the Gourma, and the Ifoghas Ridge.

- The Mandingue Plateau stretches across Mali's Sudanian and Guinean zones. *Baoulé* National Park and Reserve is in the northern part of the plateau, while impressive hills and butte formations exist in the south. A natural arch rock formation exists in



Map of Mali
Source: CIA World Factbook

¹ Human Development Index: http://hdrstats.undp.org/countries/country_fact_sheets/cty_fs_MLI.html

² USAID/Mali Strategy Statement: http://www.usaid.gov/locations/sub-saharan_africa/countries/mali/

³ U.S. Department of State: <http://www.state.gov/r/pa/ei/bgn/2828.htm>

this southern area. The arch marks the faunal migration corridor between Mali and Guinea.

- The Upper Bani Niger is situated in the moist/humid Guinean zone — bordered by the Mandingue Plateau to the north, by the Koutiala in the north east, and by Plateau de Foniokoulou, which continues into Guinea, to the east.
- The Central Niger Delta is the largest and the most populated humid zone in West Africa. The very nature of the delta, in the habitats formed by the various pond depths and water levels, converges to create a high-biodiversity area.
- The Gourma region is in the Sahelien zone, which has an arid to semi-arid ecosystem. Most of the Gourma region is flatland cut intermittently by *wadis*, or oases.
- The Ifoghas Ridge is located in Mali's Saharan zone. Within the Sahara Desert, this zone receives intermittent rains of less than 100 mm a year. The Ifoghas Ridge and the neighboring areas, in particular Tamesna, are important locust breeding grounds.⁴

C2. Population

Estimated at 13.5 million people, nearly 50 percent of the population are younger than 15⁵. Life expectancy at birth is 49.4 years and overall population growth is 2.2 per cent. According to the latest statistics (2003), the HIV/AIDS adult prevalence rate measured 1.9 percent, with 140,000 people living with the virus. The Mande people (Bambara, Malinke, and Soninke ethnicities) comprise 50 percent of the population, the Peul represent 16 percent, and the Voltaic, Songhai, Tuareg, Moor, and others represent the remaining 34 percent. All but 10 percent of Malians are Muslim; one percent are Christian and nine percent are animists. In 2003, Mali had a literacy rate of 46.4 percent (53.5 per cent for males and 39.6 percent for females). The most recent statistic estimates that 40 percent of the population lives below the poverty line (2005).

C3. Economy

The economy of Mali is largely based on the fertile floodplains of the Niger River. Agriculture accounts for 45 percent of gross domestic product, with 80 percent of the population engaging in farming or fishing. Services (38 percent) and industries (17 percent) including gold and oil mining, represent the remaining 55 percent of gross domestic product. The agricultural and fishing sectors are threatened by unsustainable practices and periodic drops in gold and oil prices. Although Mali is affected by low cotton prices — its main export — the gold market is especially sensitive to fluctuations. Exacerbating the economic situation is Mali's continued dependence upon foreign aid.⁶

⁴ National Biodiversity Strategy, Tome 1, Government of Mali, 2001.

⁵ CIA Factbook: <https://www.cia.gov/library/publications/the-world-factbook/geos/ml.html>

⁶ Ibid.

C4. Politics

In 1960, at the time of independence from France, Mali was part of the Sudanese Republic with Senegal. The country became Mali (“alligator” in Bambara) when Senegal withdrew from the republic a few months later. In 1991, 30 years of dictatorship were brought to a close by a military coup led by Amadou Touré, setting the table for Mali to emerge as one of the strongest democracies in Africa. Alpha Konaré was the first democratically elected president, serving for the constitutional limit of two terms, and was succeeded by Touré in 2002. The next round of national elections is scheduled for May 2010.

II. LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

To understand the context of environmental protection and the capacity of Mali to handle present and future threats, it is critical to understand the country's legislative and institutional framework.

In general, although there is a robust system of laws, ministries, technical departments, and international assistance, there is still a significant disconnect between the theoretical frameworks and the reality on the ground. This divide between theory and practice can be attributed to many factors, pre-eminent among them the disengagement of the many governmental institutions involved in environmental issues, the non-functionality of the newly formed decentralized structures, insufficient coordination between partners, and the significant lack of human, material and financial means at the disposal of those charged with the protection of the natural resources.

A. Principal Environmental Institutions

The National Assembly. Charged to enact laws, the National Assembly can initiate all bills pertaining to environmental protection, if they lie within the scope of its jurisdiction envisaged in Article 70 of the Constitution. Charged with leading and implementing all national-level issues, including the environment, the assembly passes international conventions to be integrated into law, in accordance with constitutional procedures.

High Council of the Communities. Concerning the effects of national policies at the regional and local level, the High Council of the Communities, under the terms of Article 99 of the Constitution, is concerned with issues that affect development and environment at the regional and local level.

Social and Cultural Economic Council. With the general constitutional oversight on all economic, social, and cultural development issues, the Social and Cultural Economic Council can make proposals concerning environmental issues.

Ministries and institutions charged with implementing the national, regional, and local-level laws and regulations are discussed below.

A1. Central-Level Institutions

To implement the terms of the Rio Declaration on Environment and Development, which (in its first principle) affirms that “Human beings are at the centre of concerns for sustainable development” and “are entitled to a healthy and productive life in harmony with nature,”⁷ Mali set up a coordination body (Decree n°98-415 of December 24, 1998) to ensure integration of the environment into development. The coordination body is composed of the following:

⁷FAO: <http://www.fao.org/docrep/009/a0789e/a0789e16.htm>.

Inter-ministerial Departmental Committee. Designed to coordinate the work of the ministries comprising the committee. The committee is chaired by the minister of the environment and includes 10 ministers of sectors concerned with the environment, such as mines, public works, and rural development.

Consultative Committee. Responsible for organizing national actors' participation, particularly civil society, to safeguard the environment, fight against desertification, and review and critique environmental projects and legislation.

Permanent Technical Secretariat. The secretariat is the permanent technical body of support for the Consultative Committee.

Although the bodies noted above have been established, they have not functioned as well as envisioned, and have been marked by a lack of meetings (despite numerous attempts to establish a regular meeting schedule). For example, the Consultative Committee has met only three times out of 14 meetings planned, and the irregularity of the meetings has made it difficult to determine the principle actors and representatives, a pre-requisite to coordinating activities and discussing proposed actions.

A2. Ministries of Mali

Although there is a ministry concerned with the environment, none of the other ministries concerned by environmental issues (mines, tourism, handicrafts, small and medium-sized enterprises) has active environmental units responsible for monitoring project preparation and implementation. Although most projects integrate environmental and social considerations to various degrees, the individuals in charge do not generally give high priority to environmental and social issues when preparing technical dossiers.

Ministère de l'Environnement et l'Assainissement (MEA), or Ministry of Environment and Sanitation. Designs and implements national policy on environment and sanitation, and is in charge of natural resource conservation and biodiversity, the fight against desertification, development and the implementation of measures to prevent or reduce environmental threats, pollution prevention and reduction, policing and management of hunting, and environmental education.

Ministry of Livestock and Fisheries. This ministry designs and implements national policies on livestock and fishing (natural and farmed).

The Ministry of Agriculture. Designs and implements the national agricultural policy and is charged with plant protection, development of agro-hydro equipment and public works, farming system improvements, and agronomic and biotechnological research development.

The Ministry for Mines, Energy, and Water Resources. Designs and implements national policies for mining, energy development, water regulation and the developing drinking water resources.

A3. National-Level Technical Institutions

In addition to national-level ministries, there are technical directorates, which are configured sectorally and organized around activities such as forests, hydraulics, urban planning, and sanitation. Located within the ministries, the directorates take part in the development and implementation of ministerial policies, and generally have permanent on-the-ground activities appropriate to the sector in which they work. These directorates (especially those related to environmental protection), however, are largely constrained by the lack of human, material, and financial means to implement their mandates.

National Office for the Conservation of Nature (DNCN). Created and organized in 1998 per ordinance and decree dated respectively August 25 and September 8, 1998. This office is charged with biodiversity protection, classified forests and protected areas management, anti-desertification efforts, development and the implementation of measures to prevent or reduce threats to the environment, tree plantation establishment, environmental education, and provision of technical assistance on forestry to the public and private sectors.

Direction Nationale de l'Assainissement et du Contrôle des Pollutions et des Nuisances (DNACPN), or National Direction for Sanitation, Pollution, and Nuisance Control. A technical structure created by Ordinance n°98-027 of August 25, 1998 in charge of development and implementation of national policy for sanitation and pollution control. The DNACPN consists of four divisions: Studies and Planning (responsible among other things for validating environmental impact assessments (EIAs); Sanitation (solid and liquid waste management); Pollution and Nuisance Control; and Training and Communication. The role of DNACPN in the implementation of EIAs is discussed in Section C1 below.

Direction Nationale de l'Hydraulique, or National Direction for Hydraulics. Created from Decree 99-185 P-RM on July 5, 1999. The body is charged with designing, coordinating, and controlling public waterworks implementation.

National Direction of Urban Planning and Construction. Created by Ordinance n°99-014/P-RM on April 1, 1999, it is responsible for national policy on urban planning, housing construction, and urban parks and gardens.

Research Institutions. The Institute of Rural Economy or *L'Institut d'Economie Rurale* (IER) is the government of Mali's (GOM's) research agency on agriculture, livestock, fisheries, and rural systems. The institute conducts research and is divided into three areas: Regional Commission of Users; Regional Technical Committee, and a Regional Scientific College. The scientific college's role is to guarantee quality results and research proposals before they are tendered to the regional authorities. The International Center for Research in Agro-forestry (an autonomous international organization created in 1977), and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), established in 1989, also maintain research institutions in Mali.

Higher-Learning Institutions. Several learning institutes in Mali are also involved with agronomic and environmental research, including the University of Bamako (through the Technology and Faculty of Science), the Higher Institute of Training and Industrial

Research, and the Rural Polytechnic Institute (which includes training and research activities in the fields of biological diversity).

B. Regional and Local-Level Institutions

In 1991, more than 700 communes were created in the country, and the first local elections were held in 1999, creating the rural councils. Law No. 95-034 AN-RM of April 12, 1995 decentralized national power and gave local authorities (Regional Assembly, Circle Council, community councils) responsibility for environmental management, land-use planning and development, land-title management, creating and running municipal infrastructures, organizing rural activities (including agro-forestry-pastoral production), and enforcing regulation. Environmental management structures exist at regional and local levels and include state institutions, decentralized authorities, and private structures. The general process of decentralization, however, has been slow.

The decentralization process and new legislation aim to protect the natural environment through increased citizen involvement in management, conservation, and protection of those resources — in particular hunting and fishing. There are fishing and hunting councils at the local and national levels. In the same way as professional associations, hunters or hunting guides are recognized and take part in researching infringements within their territory.

Theoretically, natural resource administration and management has moved to the local level with decentralization. However, there is the legal problem that there has been no actual transfer of natural resources ownership to the communes, and there is often a lack of capacity at the local level with youth and the lack of experience with the newly created structures.

More than any other directorate, the DNCN maintains a large organization at the regional and local levels (Regional Directorate for Nature Conservation and the Local Service for Nature Conservation). These sub-organizations are in place to enforce national policies, direct management of state lands, and provide technical assistance to public and private actors at regional and local levels.

C. Laws and Policies

The legislative framework for the environment can be split into “laws,” which include laws, decrees, and ordinances passed by the national legislature, and “policies,” which include strategies, programs, and policies adopted by the government and national ministries. It is important to note, that despite the existence of legal texts and regulations, there are often gaps in their effective application. When looking at the EIA legislation (described below), for example, although detailed procedures are described in the laws, Mali has few qualified agents able to ensure the monitoring and implementation of EIA recommendations. This continues to be the case, despite the ever-increasing number of environmental impact assessments.

C1. Laws

The principal framework for environmental management and impact assessment in Mali is established by the Environmental Protection Law, Law No. 91-047/AN-RM of February 23, 1991, which is supplemented by various laws, decrees, and orders as discussed below.

Law No. 02-006 of January 2002, the Water Code, regulates the use, conservation, protection, and management of water resources. Discharge of substances that may negatively affect water resources and aquatic fauna and flora is forbidden. Polluting industries must take necessary measures to prevent pollution at their own cost, and groundwater abstraction requires a permit from the cabinet. Industrial effluents must be treated prior to discharge, and where it is technically and economically feasible, water should be recycled. The Commission of Regulation of Water and Electricity is an independent entity that works with the Ministry of Mines, Energy, and Water to develop water and sanitation plans and ensure that mining operators respect regulations. The commission has the authority to impose regulations on any department, contracting authorities, users, and legally recognized operators.

Law No.04-005 of January 14, 2004 regulates the fauna, classifies and creates protected habitat, and establishes a fund for its protection. The fund consists of four types of revenue streams: hunting permits, live animal capture, wildlife tourism revenues, and royalties for skins and animal trophies.

Law No. 95-004 of December 1994 sets out the general conditions for conservation, protection, valorization of forestry resources in the national forestry domain, and defines protected zones. The law requires that bush clearance in erosion-susceptible areas, along watercourses and around water points follow resource conservation measures. Article 17 of the law lists 11 protected tree species as *Elaeis guineensis*, *Borassus aethiopicum*, *Pterocarpus erinaceus*, *Azelia Africana*, *Acacia Senegal*, *Parkia biglobosa*, *Butyrospermum paradoxum*, *Bombax costatum*, *Kaya senegalensis*, *Acacia albida*, and *Anogeisus leiocarpus*.

Law No. 95-031 of February 1995 and its associated Decree No.96-050/P-RM cover fauna and habitat management, and hunting regulations. Two categories of protection are defined by this law: totally protected fauna such as chimpanzees, which may not be hunted or captured other than for reasons of scientific research; and partially protected species, which may be hunted under specific conditions and in specific numbers.

Environmental Impact Assessments. The Council of Ministers, in its June 25, 2008 session, adopted a new decree on environmental impact assessments, which classifies all projects requiring an environmental and social impact assessment according to their impact on nature and the company, establishes rules and impact study procedures, and monitors and enacts sanctions in the event of a violation of the rules. Table 1 below displays Mali's EIA committee members by unit and ministry.

Table 1. Mali Environmental Impact Assessment Committee Members

Specific Unit Assigned to Committee	Ministry
National Direction for Sanitation and Pollution Control	Ministry of Environment and Sanitation
National Office for the Conservation of Nature	Ministry of Environment and Sanitation
Niger River Basin Agency	Ministry of Environment and Sanitation
Permanent Technical Secretariat of the Inter-ministerial Committee of the Management of Environmental Questions	Ministry of Environment and Sanitation
National Agriculture Office	Ministry of Agriculture
National Industry Office	Ministry of Industry
National Office of Urban Affairs	Ministry of Equipment & Transportation
National Direction of Communities	Ministry of Land Tenure
National Office of Civil Protection Direction	Ministry of Interior Security
National Office of Geology and Mines	Ministry of Mines and Energy
National Transport Office	Ministry of Equipment
Malian Association of Environmental Impact Studies	Civil Society
Association of Malian Architects	Civil Society
<i>Secrétariat de concertation des ONG Maliennes</i>	Civil Society

The original decree No. 03-594/P-RM of December 2003 laid down the basic procedures and the legal basis for environmental assessment in Mali. According to Article 3, the assessment must study effects on “the human milieu, fauna and flora, soils, water, air, climate and landscape, including the interactions between these factors, cultural heritage and other material goods.” Under Article 4, an EIA is obligatory for any project (industrial, agricultural, mining, artisanal, and commercial or transport developments) whose activities could be a source of pollution, nuisance, or environmental degradation. Overall, this decree aims to:

- Evaluate and prevent environmental risks related to development projects and programs
- Achieve and maintain equilibrium between project implementation, socio-economic betterment and environmental protection
- Undertake quality control of technical dossiers to support and optimize decision-making
- Take environmental and social considerations into account at all stages of a project, from planning through operation to post-closure
- Inventory all vectors of change in the project area
- Identify all negative and/or positive effects and propose appropriate sustainable mitigation measures in a management plan which must be implemented

Draft Inter-ministerial Order No.5/MEA-MATCL on public consultation requires a three-phase public consultation for all EIAs. The opinion of the administration is required in the event of an environmental impact note. The aim of public consultation is to inform the public and all stakeholders, and collect their opinions and concerns about mitigation and compensation of projects’ potential negative environmental impacts. Public consultation is

organized by a state representative in the area where the project will be implemented and requires that the project sponsor participates.

It is important to note that within the structures responsible for EIAs in Mali, there is coherence between the missions with which they are entrusted and environmental objectives. However, at the level of inputs, the means for actually carrying out their work are either insufficient or non-existent, and output quality is hampered by lack of experience. In practice, the Malian EIA system presents a number of weaknesses, which reduce its effectiveness to well below its potential and the level required to attain standardization.

Weaknesses include the non-application of the EIA procedure by the state itself, the diminution of the scope of application of the decree with respect to the actual range of projects, haphazard/inconsistent supervision and monitoring of approved projects, lack of implication by affected authorities, and appropriation of the procedure by other affected parties. Moreover, companies do not always disclose the EIAs they produce and do not advocate/engage local populations in discussion. As discussed above, Mali has few sufficiently qualified EIA agents, despite the ever-increasing number of assessments. Audit reports are the property of the person requesting the audit and are confidential.

Environmental Audits. Decree No.06-258/P-RM of June 22, 2006 fixes the conditions for carrying out environmental audits in Mali. Any work, development, or activity, including industrial establishments, mines, irrigation developments, dams, and artisanal, commercial, and transport establishments that are potential sources of pollution, nuisance, or environmental degradation must undergo an environmental audit every five years. The audit is conducted by experts/specialists recruited by the promoter/sponsor and aims to ensure conformity with environmental norms and regulations, prescribe corrective measures, and contribute to the maintenance of environmental conformity.

The auditing team is required to obtain approval for an audit plan, which must include:

- Audit aims, scope, and criteria
- Functional and organizational units to be audited
- Functions and/or responsible persons for the activity under audit
- Procedures and documents to be used in the audit
- Pertinent laws and regulations
- Time required
- Schedule of meetings to be held
- Requirements in terms of conformity
- Planned date for completion of the audit report
- Distribution list, which must include the competent administration

Agricultural Protection Development. The framework of the agricultural policy is most recently set down in the Agricultural Law of Orientation (No. 06-40/ANRM) initiated by the president and adopted by the National Assembly on August 16, 2006. This law covers the whole range of economic activities in the agricultural and fishing sectors, including particular agricultural production, fishing and aquaculture, apiculture (beekeeping),

hunting, forestry, and the gathering, transformation, transport, trade, and distribution of agricultural goods (including social and environmental functions). This law was derived through a lengthy and participative process intended to bring about a major transformation of rural development.

The legislation's objectives include economic and social promotion of women, youth, and rural and peri-urban populations; food security; rural poverty reduction; modernization of family agriculture and development of the agricultural processing industry; environmental protection and sustainable natural resource management; and increasing the rural sector's contribution to economic growth and rational land planning. Objectives relating to the environment and water include increasing forest and herbaceous cover, restoring and/or safeguarding biodiversity, and controlling and protecting water resources.

C2. Policies

National Policy for the Protection of the Environment. This 1998 policy followed creation of the 1992 National Environment Action Plan. The policy has two goals: to guarantee a clean and sustainable environment, and to counter desertification, ensure food security, prevent pollution, and combat poverty. In addition to local and regional actions, the nine national programs focus on town and country planning, natural resource management, water resource collection, improving living standards, developing new and renewable energy sources, compiling environmental information, developing a communications program that disseminates environmental information and education, ensuring adherence to the United Nations Framework Convention on Climate Change, and research on environmental protection and combating desertification.⁸

National Biodiversity Strategy Action Plan. In accordance with its participation with the Convention for Biological Diversity, Mali created this action plan in May 2001. The national action plan, based on five programs, provides a political framework to mobilize actors at the national, regional, and local level to implement a biodiversity conservation strategy by adhering to the following guidelines:

- Reinforcing protected areas and their capacity to conserve biodiversity
- Support for the sustainable management and rational use of biological resources
- Valorization of traditional knowledge and practices
- Safeguarding threatened local varieties of crops, plants, and domestic animals
- Reinforcing the human capacity to preserve biological diversity

Principal challenges to biodiversity conservation in the action plan include ecosystem degradation, restoration of degraded zones, safeguarding species threatened with extinction, and adopting biotechnologies. The strategy tries to create the conditions to make it possible for local authorities to have the tools, training, and human capacities for effective conservation and sustainable use of biologically diverse resources.

⁸ "Climate Change and CDM Activities," http://www.unido.org/fileadmin/import/47530_Mali_report_English.pdf.

In addition to policies aimed at the conservation of biodiversity, several sectoral development policies have links to environmental protection, as discussed below.

National Policy on Livestock Development. Adopted by the Council of Ministers in January 2004, the policy aims to increase the growth of the rural sector, while reducing poverty of the populations engaged in the sector. This policy consists of six strategic areas of intervention, including natural resource management. It emphasizes the importance of managing local animal varieties and environmental protection.

Sectoral Transportation Policy. The transport policy aims to improve the effectiveness of the medium-term operation of the transport sector. Although the construction and use of transportation infrastructure continually increases pressure on the environment, it does not take into account environmental impact. Although the internalization of the costs of environmental protection would be in line with Principle 4 of the National Policy of Environmental Protection, the transport policy objectives do not guarantee these actions will be carried out, and do not take into account social and environmental aspects of transport.

Investment Plan. In contrast to the transport policy's objectives and strategies, the investment plan considers environmental impact and includes an action plan to identify the principal mitigation measures to reduce unfavorable potential impacts. Measures include: sensitizing investors to potential environmental problems, safeguarding arable lands, limiting instances of deforestation, and safeguarding natural zones and protected areas such as classified forests, animal reserves, or archaeological places of interest.

Industrial Development Policy. To address the lack of industrialization in Mali, the government started a process of industrialization to support the emergence of the middle class. Among the sectors targeted for industrial development by the policy are agriculture, silviculture, and pastoralism. To this end, the government supports policies to create and preserve an enabling environment to allow the private sector to become a true source of employment and wealth to power the economy at large. This policy acknowledges the financial constraints faced by the private sector in Mali and has adopted financial incentive measures to encourage national resource exploitation from internal and external investments. Nowhere, however, does the policy take into account potential environmental impact, and no provision for environmental protection is included.

C3. International Conventions

International environment conventions constitute important legal instruments for the environmental management on the international and national levels. Indeed, the countries party to these conventions commit themselves to respect the terms and obligations defined. In Mali, many activities were undertaken within the framework of these conventions, particularly those related to the Rio Declaration (as previously discussed). These activities can be organized into three high-level groups: negotiations within the framework of the Parties Conferences; integration of the conventions' obligations into the state laws, policies, and institutions; and design, implementation, and management of the international projects.

Below is a sampling of the 30 international environmental conventions to which Mali is a signatory:

- United Nations Convention to Combat Desertification (Paris, 1994)
- Convention on Biological Diversity (Rio de Janeiro, Nairobi, 1992)
- Framework Convention on Climate Change (New York, 1992)
- Bamako Convention on the Ban of the Import into Africa and the Control of Trans-boundary Movements and Management of Hazardous Wastes within Africa (1991)
- Convention for the Protection of the Ozone Layer (Vienna, 1985), including the Montreal Protocol on Substances that Deplete the Ozone Layer (1987) and its London amendment (1990)
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (1989)
- Bonn Convention on the Conservation of Migratory Species (Bonn, 1979)
- Convention on International Trade of Endangered Fauna and Flora Species (Washington, 1973)
- Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)
- African Convention on the Conservation of Nature and Natural Resources (Algiers, 1968). This policy applies to all member states and defines procedures for information-sharing to coordinate national environmental policies.

D. Natural Resource and Environmental Projects in Mali

Most development partners (donors, multilateral and bilateral aid agencies, and international NGOs) intervene in the environmental sector and natural resource management in Mali via exclusively environmental projects or programs with specific environmental and social components. All recognize the importance of the issues related to natural resource conservation during implementation of sectoral programs. Given the extent of needs in environmental protection and management and the lack of financial capacity (at the national, regional, and state level, including NGOs), it is evident that help from development partners will continue to be necessary.

Currently, Mali largely receives aid from countries in accordance with its first Growth and Poverty Reduction Strategy Paper. In light of the anticipated increase in foreign donors, Mali is collaborating with donors on the creation of its second Growth and Poverty Reduction Strategy Paper (2008-2011). The goal of the Malian government and its donors is to continue supporting the common adopted principles of budget support to the country.

The table on the following pages outlines environmental activities in Mali and provides information on donors, implementers, budgets, dates, locations, and objectives of specific projects.

Table 2. Donor-Funded Environmental Projects in Mali

Donor	Implementer	Project	Budget	Dates	Location	Overview/Objective
African Development Bank (France)	MEA-DNCN	Integrated Management of Invasive Plants In West Africa (GIAAP)	1,200 million FCFA	2006-2011	International	GIAAP focuses on reducing the residual effects of invasive plants in water masses in nine West African countries, including Mali.
African Development Bank	Committee of village associations	Anti-trapping program in Bafing	30 million euro	2005	Bafing National Park	
African Development Bank	DNCN	Project to promote sustainable development of classified forests	1.5 million euro	2004-2006	Mandingue, the Faya, and Sounsou and Bamako region	
Belgian Technical Cooperation	MEA	Sikasso Sanitation Project	731 million FCFA	2001-2005	Sikasso	
Belgian Technical Cooperation	Local communities and NGOs	GIREDDIN (Integrated Development of Water Resources in the Inner Niger Delta)	1.2 million FCFA	2004-2008	Mopti	
Dutch Embassy	Near East Foundation	BORKO	205 million FCFA	2006-2007	Mopti	Build capacity of the regions of Mopti and Douentza in land-use planning, namely by contributing in the Dangol Boré and Korombana communes to increase income, improve the business climate, and restore the natural environment.
Dutch Embassy	MEA via the DNCN	<i>Plan d'Action National des Zones Humides du Mali</i> or National Action Plan for Humid Zones in Mali ⁹	488 million FCFA	2004-2008	Mopti, Ségou, Tombouctou	The project's objective is to promote the conservation and sustainable use of Mali's wetlands to maintain the ecological, social, and economic functions of these zones for future and present generations.

⁹*Plan d'Action National des Zones Humides du Mali, 2004-2008.*

Ministère de l'Environnement et de l'Assainissement. Direction Nationale de la Conservation de la Nature, Octobre 2004.

Donor	Implementer	Project	Budget	Dates	Location	Overview/Objective
Swedish International Development Agency (SIDA)/ Dutch Embassy	International Union for the Conservation of Nature (IUCN)	<i>Programme d'Appui a la Gestion des Ecosystemes Inondables Dans 4 Territoires du Delta Intérieure du Fleuve Niger</i> (PAGEIT) or Program in Support of the Floodplain Ecosystem in Four Territories of the Inner Niger River ¹⁰	514.965 euro	2004-2007	Niger Delta	IUCN is managing the project, which supports decentralized and sustainable natural resource management of the Inner Delta.
Swedish, Dutch Embassy, Wetlands International (WI)	IUCN, Near East Foundation, <i>Association Maliennne pour la Protection et le Développement de l'Environnement au Sahel</i> , CARE International, and DRCN	<i>Programme d'Appui a la Conservation et Gestion des Ressources Naturelles en 5eme Région, Cercles de Douentza et Mopti</i> or Program in Support of Conservation and Management of Natural Resources in the 5 th Region, Douentza and Mopti.	675 million FCFA ¹¹	2004-2007	Inner Niger Delta	WI is collaborating with partners to safeguard the Niger Delta — a site of over-population, poverty, and unsustainable fishing and farming practices — against further degradation. To counteract the effects of increased dam formation and irrigation, <i>Association Maliennne pour la Protection et le Développement de l'Environnement au Sahel</i> and CARE compensate villagers for changed environmentally positive behaviors. Women, for example, receive WI funds to start vegetable gardens in exchange for protecting one or two wetland trees. WI provides boats to fishermen, with the stipulation that they monitor and report on the status of endangered fish species. ¹²
European Commission (EC)	Christian Aid	Sectoral Sahelian Program for improved food security in the context of decentralization	574 million FCFA	2006-2009	Mopti	Contributes to the food security of populations negatively affected by their nomadic practices. Reinforces mobilization of resources at the local level with respect to decentralization.

¹⁰European Commission: http://ec.europa.eu/development/icenter/repository/Mali_CEP_2006.pdf, pages 24/53.

¹¹European Commission: http://ec.europa.eu/development/icenter/repository/Mali_CEP_2006.pdf, pages 22/53.

¹²Wetlands International:

<http://www.wetlands.org/Whatwedo/Projects/WetlandsandPovertyReductionProjectWPRP/Demonstrationprojects/MaliInnerNigerDelta/tabid/1045/Default.aspx>

Donor	Implementer	Project	Budget	Dates	Location	Overview/Objective
EC, <i>Fonds Européen de Développement</i>	MEA and MEN	Environmental Program Supporting Anti-desertification Program (PEALCD)		2001-2006	Mopti, Ségou, Tombouctou	The project's aim is to prevent desertification by advocating for sustainable natural resource use of the Niger River valley and strengthening environmental education at the national level.
EC	MEA-DNCN	Support for the Integrated management of Natural Resources in the Niger and Gambia Rivers	2 million euro	2000-2005		
EC, <i>Deutsche Gesellschaft für Technische (GTZ)</i>	<i>Le Comité Permanent Inter-Etats de lutte contre la Sécheresse dans le Sahel and State Members</i>	<i>Programme Régional de Promotion des Energie Domestiques et Alternatives au Sahel</i> or Regional Promotion of Domestic and Alternative Energy in the Sahel		DND	International	Continued research of sustainable natural resources management and combating poverty in the Sahel by ensuring the poorest populations can secure wood/energy at low costs.
Food and Agriculture Organization (FAO)	MEA-DNCN	Support to put in place institutional reforms and standards for decentralizing natural resource management	171 million FCFA	2003-2005	National	Support the government in implementing institutional reforms and applying approved standards that relate to natural resource management.
<i>Fonds Internationaux pour le Développement Agricole (FIDA), Global Environmental Facility (GEF)</i>	Ministry of Agriculture	<i>Programme Fonds de Développement en Zone Sahélienne</i>	3,540 million FCFA	2000-2010	Ségou, Mopti	Reduce levels of household poverty in the Sahel zone through providing opportunities of economic growth and improving living conditions, aiding village communities in the region to evaluate their needs, and identifying small projects to which they could contribute their time or personal skills.
GEF/United Nations Development Programme (UNDP)	<i>MEA-Secrétariat Technique Permanent du Cadre Institutionnel de la Gestion des Questions Environnementales</i>	<i>Renforcement des capacités pour améliorer la qualité des inventaires des gaz à effet de serre</i>	118 million FCFA	2006-2008	International	Assist in decision-making policies to better adapt to measures and interventions necessary and appropriate to reduce the greenhouse gas effect in the forestry, energy, agriculture, pastoralism, and waste sectors The goal is to identify the main sources of gas emissions.

Donor	Implementer	Project	Budget	Dates	Location	Overview/Objective
GEF, IBRD (WB)	MEA-DNCN	Project for the Conservation of the Gourma Biodiversity	3 million FCFA	2005-2011	Mopti	Conserving the elephant habitat in the Gourma region. ¹³
GEF, World Bank	<i>Ministère des Mines, de l'Énergie et de l'Eau</i> or Ministry of Mines, Energy, and Water – <i>Agence Malienne pour le Développement de l'Énergie Domestique et de l'Électrification Rurale</i>	<i>Projet Énergie Domestique et Accès Aux Services de Base en Milieu Rural</i> or Project of Domestic Energy and Access to Basic Services in Rural Areas	28,000 million FCFA ¹⁴	2004-2008	National	Expand modern energy access to rural and peri-urban areas to improve the productive capacity of small and medium enterprises; and promote the quality and efficacy of health centers and health education, improve living standards, reinforce the process of alternative energy and institutions interested in creating a favorable investment environment for greater participation by the private sector in providing energy to rural and peri-urban zones.
GEF, numerous financial partners		<i>Programme de Petites Subventions du Fonds pour l'Environnement Mondial</i> (Program of Subsidies for the World's Environment)	525 million FCFA	Since 1993	National	The project provides technical and financial support to community projects that contribute to conservation and restoration of the global environment. It directly provides grants and subsidies to community groups and NGOs.
GEF, UNDP	<i>MEA-Secrétariat Technique Permanent du Cadre Institutionnel de la Gestion des Questions Environnementales</i>	<i>Auto Évaluation des Capacités Nationales pour une Meilleure Gestion de l'Environnement au Niveau Mondial et National</i>	118 million FCFA	2006-2007	National	The project aims, based upon self-evaluation, to 1) reinforce national capacity at the central level and decentralize authority to coordinate government efforts pertaining to the environment and 2) integrate sustainable development and anti-poverty actions into the country's national strategies
GEF, University of Oslo	MEA-DNCN	The Management of Indigenous Vegetation for the Rehabilitation of Degraded Grounds in the Arid and Semi-arid Regions of Africa Project	1383 million FCFA	2002-2007	International	This project is a pilot demonstration of biodiversity conservation and climate change reduction through biodiversity rehabilitation and increased carbon fixation in Africa's arid area.

¹³ GEF: <http://www.gefonline.org/projectDetailsSQL.cfm?projID=1253>

¹⁴ European Commission: http://ec.europa.eu/development/icenter/repository/Mali_CEP_2006.pdf. pg. 24/53

Donor	Implementer	Project	Budget	Dates	Location	Overview/Objective
GEF/UNDP/United Nations Environment Programme	DNM	<i>Projet d'adaptation aux effets néfastes des changements climatiques</i> or Adaptation Project to the Harmful Effects of Changing Climate ¹⁵	105 million FCAs	2005-2006	National	To develop a national plan that contains immediate adaptive measures to counteract the harmful effects of current activities affecting climate, and measures to pre-empt the negative effects.
Government of Switzerland's Direction of Development and Cooperation	InterCooperation	Jèkasy ¹⁶ and Jèkagnini ¹⁷		2002-2008	Sikasso	The Swiss NGO provides program support to country organizations for the valorization of natural resources. IC Sahel executes two projects in Mali: Jèkasy and Jèkagnini. Both are based in Sikasso. Jèkagnini focuses on agricultural extension methods and strategies for pastoralists, while Jèkasy focuses on agricultural product processing, watershed management, and conflict management on common properties.
Government of Switzerland/IUCN	IC Sahel	Youwarou Communities Program	128 million FCAs ¹⁸	2004-2007	Mopti	The IUCN Youwarou Communities Program aims to reinforce the capacities of Inner Niger Delta local governing bodies in sustainable natural resource management use. The rules established by participating communities on access to and use of local resources has restored biodiversity and led to alternative income-generation activities. ¹⁹ The money women earn from fish-drying and market gardening reduces natural resource pressures.

¹⁵ European Commission: http://ec.europa.eu/development/icenter/repository/Mali_CEP_2006.pdf. pg.24/53

¹⁶ InterCooperation: <http://www.intercooperation.ch/projects/p37>

¹⁷ InterCooperation: <http://www.intercooperation.ch/projects/p38>

¹⁸ European Commission: http://ec.europa.eu/development/icenter/repository/Mali_CEP_2006.pdf. pg.23/53

¹⁹ IUCN: http://cmsdata.iucn.org/downloads/progress_assessment_2002.pdf

Donor	Implementer	Project	Budget	Dates	Location	Overview/Objective
Government of Switzerland	Union of Community Associations	Support of Rural Organizations in the Region of Tomini for the Protection of Natural Resources	332 million FCAs ²⁰	2004-2009	Tomini	
GTZ	Ministry of Education	Advisory Services to the Economy and Finance Ministry		1994-2007		Assisting the Ministry of Economics and Finance in allocating and transparently using funds for its national strategy and action plan ²¹
GTZ	<i>Direction Nationale de l'Hydraulique</i>	<i>Programme d'Appui aux Collectivités Territoriales</i>	3 million FCFA	2000-2007	Throughout Mali	Advisory services to <i>Direction Nationale de l'Hydraulique</i> . Enhancing the water regulation system, improved planning of integrated water resources use and a public relations campaign encompassing Malian Water Days. The event occurs every two years to highlight the improved water situation. ²²
GTZ	Ministry of Government Real Estate and Land	Municipal Land Management		2003-2010	Bamako	Training state and municipal institutions in land registration to assist in land-use planning, increase knowledge of the land market, and increase transparency in levying local taxes. ²³
GTZ, Deutscher Entwicklungsdienst, KfW Bankengruppe (KfW)	Ministry of Land Administration and Public Areas	<i>Programme d'Appui aux Collectivités Territoriales</i>	1,500 million FCFA	2002-2005 2006-2009	Ségou	Advises municipal stakeholders (citizens, private and public organizations, authorities, and associations) in operating weekly markets, and provides financial, natural resource, and wastewater management.
GTZ	Execution is ensured by MEA, DNCN, DNACPN, <i>Agence du Bassin du Fleuve Niger</i>	<i>Projet d'Appui à la Politique Environnementale</i> , or Environmental Politics Support Project	3.25 million FCFA	2005-2011		Supports coordination of intra-ministerial co-operation, in particular among the four structures within MEA in creating a national strategy for sustainable natural resource use.

²⁰ European Commission: http://ec.europa.eu/development/icenter/repository/Mali_CEP_2006.pdf, pages 23/53.

²¹ GTZ: <http://www.gtz.de/en/weltweit/afrika/mali/17779.htm>

²² GTZ: <http://www.gtz.de/en/weltweit/afrika/mali/15373.htm>

²³ GTZ: <http://www.gtz.de/en/weltweit/afrika/mali/13262.htm>

Donor	Implementer	Project	Budget	Dates	Location	Overview/Objective
GTZ, FAO	MEA-DNCN	Mali/FAO/Norwegian Partner Program. Composite Phase II	236 million FCFA	2005-2007	Ségou, Mopti	Support the Malian government effort in defining and implementing a multi-sectoral national environmental protection policy — an integrated strategy for management of natural resources — in favor of participatory dialogue and decentralized decision-making at all levels.
GTZ, KfW, World Food Programme	MEA (since 2002)	Mali North	24 million FCFA	1994-2009	Timbuktu	Support stabilization of intervention zone following the Touareg rebellion (1990-1994) and develop economic potential of the Niger River Valley by constructing small irrigation plants in the Niger River Valley to increase yields, and establishing small banks for farmers. The goal is to ensure self-sufficiency of the zone in rice to strengthen the valley's economic potential.
Netherlands, Switzerland	IUCN	PAGEIT	3,378 million FCFA	1999-2002 2004-2007	Mopti	Rehabilitate water systems and maintain biological diversity, reinforce capacity of local institutions and community-based organizations in natural resource management, promote community development initiatives, and promote local development projects that incorporate local needs and are locally managed.
United Nations Foundation (UNF)	International Centre for Trade and Sustainable Development, Rural Hub of Western and Central Africa, and <i>Union Économique et Monétaire Ouest-Africaine</i> , or West African Economic and Monetary Union (UEMOA)	Blueprint for Action		2009-2011		Rural Hub produced a report that assessed the agriculture sector's potential for bio-energy production and identified constraints in UEMOA member countries. Jatropha oil and ethanol are promising potential energy sources in Mali. ²⁴

²⁴ United Nations Industrial Development Organization: http://www.globalproblems-globalsolutions-files.org/gpgs_files/pdf/UNF_Bioenergy/UNF_Bioenergy_full_report.pdf.

E. Regional Programs

In addition to donor-funded activities, Mali participates in regional initiatives that affect the environment and conservation issues.

Africa Rice Center (ARC). Mali is a member of ARC — an association of West African countries established in *Côte d'Ivoire* and dedicated to research and development of innovative planting techniques and rice seed varieties. When the political situation in *Côte d'Ivoire* became unstable in 2003, ARC was relocated to Bamako. The initial move to Mali allowed researchers to explore new rice-cropping systems and new products' niches for the genetic diversity of Malian rice. ARC is now based in Cotonou, Benin.

Union économique et monétaire ouest-africaine. The West African Economic and Monetary Union is an organization of eight West African states established to promote economic integration among countries that share the common currency of the CFA franc. UEMOA was created by a treaty signed at Dakar, Senegal on January 10, 1994 by the heads of state and the governments of Benin, Burkina Faso, *Côte d'Ivoire*, Mali, Niger, Senegal, and Togo. On May 2, 1997, Guinea-Bissau became its eighth member state.

Although UEMOA is essentially a customs and monetary union between member states, it also has a policy that defines guiding principles to improve environmental quality, which includes:

- Combating desertification
- Conserving natural resources and biodiversity
- Enhancing the rural and urban environment
- Using renewable energy, particularly solar energy
- Controlling coastal erosion

A specific impact of Mali's UEMOA membership is a three-year commitment with the Rural Hub to pursue bio-energies in sustainable wood fuels, bio-ethanol, bio-diesel, power generation, and biogas. Primary activities of the plan will be organized around capacity-building, policy support, finance, market development, and technology transfer and research and development.²⁵ Under UEMOA direction, the Rural Hub will implement the recommendations. The Rural Hub is based in Dakar and advises governments and international organizations developing sustainable bio-energy policies.

²⁵United Nations Industrial Development Organization: http://www.globalproblems-globalsolutions-files.org/gpgs_files/pdf/UNF_Bioenergy/UNF_Bioenergy_full_report.pdf.

III. STATUS OF BIODIVERSITY AND FORESTRY RESOURCES

Assessing the status of biodiversity in Mali requires a critical review of the ecosystems and habitats that constitute biodiversity. This section examines the ecosystems and portrays the status of aquatic, floral, faunal, forests, genetic biodiversity, and protected areas in Mali. A full list of the critically endangered, endangered, and vulnerable species in Mali, from the IUCN Red List, is provided in Annex C.

A. Status of the Flora

Mali's flora is composed of a large variety of species corresponding to the country's ecologically diverse conditions. With respect to vegetation, there are 1,739 species distributed among 687 groups derived from 155 families, among which Poaceae, Fabaceae, and Cyperaceae, respectively, are the three most important. Mali is home to eight known endemic plant species²⁶ and 41 fruit species, eight of which are of high economic value, including karate nuts (*Vitellaria paradoxa*), *néré* seeds (*Parkia biglobosa*), the oil palm fruits (*Eleais guineensis*), the tamarinier (*Tamarindus indica*, *Carapa procera*, *Lophira lanceolata*, and *Borassus aethiopum*), and baobab leaves (*Adansonia digitata*).²⁷

The country also possesses the first known species of African rice. *Oryza glaberrima* rice was cultivated at least 1,500 years before it was discovered in the inner Niger Delta.²⁸ Varieties of millet, sorghum, and fonio resistant to drought, diseases, and insects still exist in the wild. Despite the fact that Mali's vegetative resources are regarded as important components of economic development and biological diversity, there remain areas of the country where the floral biodiversity is unknown, or is dispersed and has been poorly preserved.

The Saharan zone covers 632,000 km² or 51 percent of Mali's territory — extending through the regions of Akklé-Azaouad, Azaouk, and Iforas Ridge. As the zone receives less than 200 mm of precipitation a year, there is an insignificant amount of woody vegetation. What do exist are 1) plant species and shrubs with short life cycles in oases and water holes and 2) species such as *Cornulaca monocantha*, *Panicum turgidum*, *Aristida pungens*, *A. longiflora*, *Calligonum comosum*, *Capparis decidua*, and *Leptadenia spartium* — all which have adapted to dry conditions. The flora diversity in the Iforas Ridge region and neighboring Tilemsi and Tamesna regions is relatively rich, with some 40 species of woody plants. These regions combined cover 57 percent of the country and are the natural habitat of the *Acacia raddiana*, *Cenchrus biflorus*, *Panicum turgidum*, and *Aristida* species.²⁹ Although spiny shrubs exist in water depressions of the Telemsi Valley, severe droughts in the 1970s largely destroyed the area's vegetation. Without vegetation, sedimentation and dune shifting have become problems for agriculturally dependent Lac Oro/Timbuktu dwellers. The DNCN conducted dune stabilization projects in two sites and

²⁶ *Maerua of waillyi*, *Elatine fauquei*, *Pteleopsis habeensis*, *Hibiscus pseudohirtus*, *Acridocarpus monodii*, *Gilletiodendron glandulosum*, *Brachystelma medusanthemum*, and *Pandanus raynalii*.

²⁷ Wymenga, E, B. Kone, J. van der Kamp et L. Zwarts.

²⁸ Warshall, Peter.

²⁹ European Commission: Environmental Profile of Mali, May 2006, page 16.

planted quick-growing eucalyptus trees to mitigate erosion along the riverbank and satisfy demands of a growing populace.

The Sahelian zone covers 320,000 km², or roughly 26 percent of the country, extending from the Senegal-Mauritanian border to the frontier of Niger and Burkina Faso, encompassing Mali's Gourma, Bandiagara-Hombori Plateau, Gondo-Mondoro, Hodh, and Guidimagha regions. The area receives 200 to 600 mm of annual precipitation and has a vegetation density less than 10 m³ of wood per hectare.³⁰ This zone of arid and semi-arid ecosystems consists mostly of grassy steppe (trees and shrubs are practically absent) and raised and/or



Dogon village, Bandiagara
(Sarah Cooper)

shrubby steppe (trees and shrubs present). The thorny *Acacia* tree is the principal tree species found in the zone, coupled with areas of *Combretum* and *Boscia* species. In the southern regions of the Sahel — *Guirea senegalensis*, *Balanites aegyptiaca*, *Acacia albida*, and *Borassus aethiopicum* exist, as well as woody species particular to the Bandiagara cliffs and Mondoro's sand dunes. Due to climate change, certain areas of the zone, such as the Farimaké dead forest, vary in states from degraded to severely degraded. A large portion of the zone consists of scrub, *combretacea* and *Pterocarpus lucens*. In northern Niono and east of Bambara Maoundé, this vegetation is in poor state. Offering anecdotal evidence on the condition of the area, Barry Diakite, natural resource manager of Global Sustainable Tourism Alliance's (GSTA) sustainable tourism project in Dogon Country, told our team there are no longer any swaths of young trees around Bandiagara.³¹ Through a community survey of traditional plants, the GSTA discovered 20 endemic plant species and thinks that, if properly preserved, endemic species can be salvaged over 10 to 20 years.

The Sudanian zone. This is the area where annual rainfall varies from 600 mm to more than 1,100 mm. In this zone of 215,000 km², or 17 percent of the country, the rainy season lasts three to five months in the north and five to seven months in the south.³² The Sudanian zone constitutes a mosaic of savannah with gallery forest areas — and includes the Mandingue Plateau, the Koutiala Plateau, and the Falémé region. Species characterizing these zones (*Vittelaria paradoxa*, *khaya senegalensis*, *Bombax costatum*, and *Isoberlinia doka*) are more or less in the same state today that they were 30 to 40 years ago. That said, large tracts of forests are being cut to accommodate the timber needs of neighboring Bamako, Kita, Keyes, and surrounding Koutiala — where forested land has become scrubland. Rare species like *Isoberlinia doka*, *Bombax costatum*, and even shea tree, are the drivers behind notable variations of floristic composition and, in particular species, abundance.

³⁰ National Biodiversity Strategy, Government of Mali, 2001, Section 2.2.1.2.

³¹ Diakite, personal interview, August 22, 2008.

³² National Biodiversity Strategy, Government of Mali, 2001, Section 2.2.1.3.

The Guinean zone. This sub-humid zone of Mali constitutes 6 percent, or 75,000 km², of the country and is the site of Mali's remaining forests.³³ The area receives annual rainfall of 1,100mm, with torrential rains lasting five to seven months. Major water sources in this ecosystem are the Niger and Senegal rivers, complemented by a number of smaller permanent rivers. As this is Mali's most hydrated zone, it is an important production site. The favorable conditions of the zone allow a mosaic of wooded savannah and natural forest to exist. Forty to 90 percent of the ground has vegetative cover, with gallery forests in valleys creating a continuous dense band of vegetation. The High Bani Niger and the southern part of the Mandingue Plateau exist in this area. Although vegetation in parts of the zone is well conserved, pockets of degradation exist in gold sites and industrial mining sites, such as Siama, Finkolo, Kalana, and Fabouloa.

The Niger Delta. Covers 64, 000 km² and represents a unique humid zone in the sub-region.³⁴ This flood zone is classified as a Ramsar site and contains aquatic ecosystems with great native biodiversity. Decreased water levels caused by sedimentation, however, threaten vegetation and create a cycle that diminishes aquatic bird habitats, decreasing bird-based nutrients available for plant growth. This limited plant growth results in limited habitat creation for the fish that birds and humans rely upon. Vegetation cover of the West Delta, a part of which is in the Office of Niger, consists of degraded to very degraded *Accacia Seyal* and *Accacia spiny forest*. "Climate change, coupled with excessive river channeling, is threatening the area's biodiversity," said Youssef Konate, regional director of the Fisheries Department.³⁵

B. Status of the Forests

The national forest covers 100 million ha, on which only 21 million ha have a real forest production. The majority of Mali's intact forest cover exists in the Guinean and Sudanian regions in the south. Forest cover is marked by a continuous degradation, in part due to climate change, but largely from unsustainable resource extraction. Rural communities rely on forest products for fuel, medicinal plants, home construction, and forest area to be cleared for grazing land and farms. Large-scale consumption, coupled with little to no regeneration, threatens the ability of the country to satisfy present and future generation's needs. Of Mali's large ecological regions (Central Niger Delta, Gourma, Mandingue Plateau, and Iforas Adrar), 1,266,000 ha are classified forests, 3,813,000 ha are faunal reserve, and 25,000,000 are pastoral lands.³⁶ That said, Mali's vegetative cover diminishes by a minimum of 100,000 ha a year³⁷ (and DNCN figures from 2000 cite a forest degradation rate of 8.3 percent for past 10 years.) Even in the absence of actual figures, a growing urban population and associated increasing energy demands exacerbate forest degradation.

³³ National Biodiversity Strategy, Government of Mali, 2001, Section 2.2.1.3.

³⁴ National Biodiversity Strategy, Government of Mali, 2001, Section 2.2.1.5.

³⁵ Konate, personal interview, August 22, 2008.

³⁶ Wymenga, E., B. Kone, J. van der Kamp et L. Zwarts.

³⁷ European Commission: Environmental Profile of Mali, May 2006, page 18.

The classification of forests is a means of protecting and safeguarding certain forest surfaces. This statute must adhere to certain management rules and procedures. Table 3 below presents the categories of classified forests in Mali.

Table 3. Protected Forests in Mali

Forest Categories	Area (ha)	% of Productive Forests	Notes
119 classified forests	1,300,000	4%	Nominally managed area in varying states of protection with a large area of cultivated land
Protected areas and Ramsar sites	3,900,000	12%	1.5 million ha of reserve area found in the Saharan zone in the Gao region.
Protected forests	11,400,000	36%	Sylvo-pastoral zones where management can be transferred to collective territories.
Agro-forestry park	15,700,000	49%	Fields and fallow lands younger than 10 years that are outside of the forest area.
Wooded land in the south of the Saharien zone	32,300,000	100%	An area with an average timber-felling rate of 26%

Source: National Biodiversity Strategy, Government of Mali, 2006.

Given the significance of the shea tree (*Vitellaria sp*) to USAID programming (through the Nuts Where They Fall program) and the economic value of its products to Mali, it deserves special mention. With its importance and abundant surface distribution, the shea tree serves an important ecological role and satisfies rural populations' food, medicinal, economic, and cultural needs. One of largest constraints of the shea tree is its random production, because trees grow wildly and are not maintained or cultivated. Malian law awards no tree ownership rights, but property owners are able to exploit the trees for its fruit, as long as the tree is on or borders their fields. Fruit access rights only apply to a limited circumference of the tree, so the majority of shea trees remain at disposal for public fruit collection. Parasites, drought, brush fires, land pressure, old age, and lack of regeneration are the major threats to Mali's shea tree. Due to the prevalence of parasitism in western Mali, the Forest Service is hesitant to devote large areas of land to shea tree production. If regeneration is not thwarted by bush fires, young trees interspersed within cultivated spaces are often cut by mechanized ploughs or trampled by oxen.

C. Status of Faunal Biodiversity

Mali is characterized by its faunal biodiversity throughout the country's various climatic zones. There are at least 136 species of mammal, including 70 species of large mammals. These mammals live in the savannas of the western Sudanian zone and the Sahelian zone.³⁸

A 1978 study on the impact of hunting revealed a negative effect on large ruminants. The study showed that certain species of mammals, reptiles, and birds had disappeared or were in danger of extinction. In addition, it showed a disturbance and reduction of the natural habitat of several species of wild fauna in the *Boucle de Baoulé* and Gourma zones. Of the

³⁸European Commission: Environmental Profile of Mali, May 2006, page 16.

four small herds of elephants that once roamed in Mali (in the *Boucle de Baoulé* and Gourma), only one herd in Gourma remains. This reduction is linked to habitat degradation, development of trade circuits, modern poaching practices, and the growing population's increased protein demand. The situation is similar for giraffes in the Sahel, chimpanzees in the Fina zone, Derby eland in *Baoulé*, and gazelles, antelopes, and manatees elsewhere.

At least 640 species of birds are known to exist in Mali, of which 15 are designated rare. Some are of particular interest due to their nutritional, scientific, aesthetic, or tourist value. Many studies carried out in the Delta have highlighted important bird populations. The number of birds tagged in the Delta makes it possible to note their migrating patterns between Mali and more than 18 European, African, and Asian countries. The principal migrating bird species are: the summer teal (*Anas quesquedula*), the pintail (*Anas acuta*), the Shoveler duck (*Anas clypeata*), and Filicule nyroca (*Aythya nyroca*). The Ethiopian species number less than the palearctic species, which mainly consist of the fawn-colored Dendrocygne (*Dendrocygna bicolor*), widowed Dendrocygne (*Dendrocygna viduata*), Gambian goose (*Plectropterus gambiensi*), Egyptian goose (*Alopochen aegyptiaca*), and the helmeted duck (*Sarkidiornis melanotos*).

In addition to migrating species (pale-arctic and afro-tropical), certain birds are nomadic and move irregularly across the continent. This is the case of the red-nuzzled worker bird (*Quelea quelea*) and the red-headed worker bird (*Quelea erythropus*). The ostrich, in particular, (*Struthio camelus*) is becoming increasingly rare. It is hunted for its eggs (more than 1,000 eggs are sold each year to tourists), which are given as wedding gifts or function as hearth or mosque decorations. Although the ostrich is officially protected in Mali, the animal is hunted for its skin; ostrich-skin shoes are a major commodity on the international black market.

Specific information on fauna is presented below by ecological zone, and a more comprehensive list of species for each zone is provided in Annex C.

The Saharan zone. Animals of the Saharan zone are well adapted to the high temperatures and lack of water. Most are nocturnal and avoid dehydration by living underground. Threatened animal species include the dama and dorca gazelles, red-fronted gazelle, oryx, giraffe, desert hedgehog, Libyan cat, sand fox, and sand cat. Reptiles in the Saharan zone include the grass snake, horned viper, whiptail lizard, monitor, and gecko. The Ifoghas Ridge and neighboring areas, in particular Tamesna, are important sites of the locust pilgrim (*Schistocerca gregaria*).

The Sahelien zone. In this zone, the faunal populations have been substantially reduced. The dorca gazelle, rammed gazelle, red-fronted gazelle, antelope, oryx, and elephant still exist, however, all but the rammed gazelle are endangered. Although there is a considerable amount of mottled and striped hyenas remain in Mali, jackals and other cat species, (lion, panther) are rare. Grass snakes, vipers, cobras, pythons, monitors, and tortoises comprise the zone's reptile population.

The Sudanian zone. The abundant water sources in the Sudanian region create diverse habitats for a variety of fauna. A wide assortment of mammals, rodents, and primates exist in this zone, including baboon, red monkey, green monkey, antelope, impala, lion, striped hyena, jackal, civet, hippopotamus, and manatee. Porcupines, hare, ground squirrels, and Gambian rats comprise the rodent population, while grass snakes, vipers, cobras, pythons, lizards, crocodiles, and tortoises are reptiles found in the region. The area is also home to a variety of troublesome insects. Tsetse flies are carriers of *trypanosomiasis*, (African sleeping sickness), and locusts cause considerable damage to fruit and cotton crops.

The Guinean zone is similar to the Sudanian zone with respect to faunal type and diversity. Although illegal trapping in the Wassoulou area proves a small animal population exists, Mali's large mammal population has disappeared. Abundant animal species include hippopotamus, Buffon cob (waterbuck), python, baboon, and green and red monkeys. Abundant reptiles and rodents include cobra, green Mamba, ground squirrel, and Gambian rat. Rare species include antelopes, lion, Grand Calao/hornbill, crocodile, vulture, common jackal, turtle, and tortoises. The gecko is a threatened species in this zone while the leopard, manatee, chimpanzee, Derby Eland, and giant Pangolin leopard are near extinction.

The Niger Delta zone is Mali's most concentrated area of faunal biodiversity. The Niger Delta, perhaps Mali's largest biodiversity hot spot, is one of the country's three Ramsar sites. The delta supports more than one million migratory birds (intra-African and Eurasian) that make three migratory treks throughout the year.³⁹ Decreasing water levels, pesticide/herbicide polluted water, over-fishing, illegal bird-trapping, and sedimentation are a confluence of factors negatively affecting biodiversity. As mentioned in the section on floral biodiversity, diminishing water levels limit land for plant, fish, and consequent bird habitats. M. Mamadou Tiero, Regional Program Coordinator of Sahel Development Fund (*Programme Fonds de Développement en Zone Sahélienne*) estimated the Niger to possess 350 fish species and to attract 150 bird varieties.⁴⁰ Bird-trapping by local communities poses a serious threat to the migratory bird population. In light of the reduced fish stock, communities trap migratory birds to supplement their diet or household income. Birds sold illegally on the export market reap a large profit for a rural farmer.

D. Status of Aquatic Biodiversity

J. Daget (1954) in his work "Bio-ecology of Fish of the Niger" counted 143 species belonging to 67 kinds and 26 families.⁴¹ The *ichthyofaune* of the Niger River is common to other river systems of the Sahel-Sudanian zone. According to F. Clark Howell and François Bourlière (1963), the endemic species of the Nile (26) and Niger (24) have close family ties, thus indicating the probable existence of common ancestors and connections between the basins, perhaps as far back as the Miocene and Pliocene ages. The inventoried species of the Niger fauna belong to the *osteichthyens* class — that is, fish with osseous skeletons.

³⁹ National Biodiversity Strategy, Government of Mali, 2001, Section 2.2.15.

⁴⁰ Tyro, M., personal interview, August 21, 2008, Mopti.

⁴¹ European Commission: Environmental Profile of Mali, May 2006, page 16.

Three subclasses of different importance exist in the Niger fauna:

- *Dipneuste*: represented by one species belonging to the only African family of *Protopteridae*.
- *Neopterygiens*: which consists of only one existing family.
- *Polypteridae*: represented in the Niger by four species belonging to the fresh water *Polypterus*: This family, *Polypteridae*, is endemic to Africa.
- *Actinopterygiens*: encompassing 27 species of which more than half (16) are of classes with only one species type.

The 10 fish species below are endemic, rare, or sensitive to environmental changes (Lévêque and Al 1990, 1992):

- *Polypterus annectens annectens* (Owen, 1839): *sajégué* (in Bambara)
- *Polypterus endlicheri endlicheri* (Heckel, 1849): *sajégué* (in Bambara), an endemic delta species
- *Gymnarchus niloticus*: *sôdjégué* (in Bambara)
- *Hepsetus odoe* (Bloch, 1794): *zangan* (in Bambara)
- *Pollimyrus petricolus* (Daget, 1954): *chick* (in Bambara),
- *Malapterus electricus* (Gmelin, 1789): *tigui* (in Bambara),
- *Siluriforme Tetraodon lineatus* (Linné, 1758): *dodo* (in Bambara)
- *Synodontis resupinatus* (Baker, 1904): *konkon* (in Bambara)
- *Synodontis gobroni* (Daget, 1954): *konkon* (in Bambara)
- *Arius gigas* (Baker, 1911): *soumè* (in Bambara)

The dwarf hippopotamus (*Choeropsis liberiensis*) and the manatee (*Trichechus senegalensis*) are other endangered aquatic fauna.

E. Status of the Protected Areas

According to the World Resources Institute, 3.7 percent of the land area of Mali is on IUCN Category I-VI protected areas (see Table 4 for detailed figures), and like the forest cover, are largely in the Guinean and Sudanian regions in the south.

The DNCN, which manages Mali's parks and reserves, is subdivided into representatives at the regional level. For example, the *Boucle du Baoulé* National Park Management Operation manages the *Boucle du Baoulé* Biosphere Reserve, while the Gourma benefits from implementation of the Gourma Biodiversity and Elephant Conservation Project. In addition, the new decentralization law mandates that government partner with local community collectives in managing Mali's natural resources. As communities best know their local needs and constraints, the decentralization code authorizes them to be entirely responsible for management, planning, conservation, and safeguarding of stakeholders' needs.

Despite having protected areas of international importance (three Ramsar sites and a Biosphere reserve), these areas are largely protected in name only, and safeguarding the remaining assets remains difficult with limited management resources. In many of the protected areas, reserves, and classified forests in Mali, the resources they were set up to protect have largely disappeared, calling into question their continued status as protected areas.

Table 4 – Protected Areas of Mali

Protected Areas in Mali		Area (ha)
Total Land Area		124,019,000
Protected Areas - Extent of Protected Areas by IUCN Category, 2003:		
Nature Reserves, Wilderness Areas, and National Parks (Categories I and II)		350,000
Natural Monuments, Species Management Areas, and Protected Landscapes and Seascapes (Categories III, IV, and V)		4,182,000
Areas Managed for Sustainable Use and Unclassified Areas (Category VI and "other")		135,000
<i>Total Area Protected (all categories)</i>		<i>4,667,000</i>
Protected Areas as a Percent of Total Land Area, 2003		
Number of Protected Areas, 2003		16
Number of Areas >100,000 ha, 2003		8
Number of Areas > 1 million ha, 2003		2
Wetlands of International Importance (Ramsar Sites), 2002: Number of Sites		
<i>Total Area</i>		<i>162,000</i>
Biosphere Reserves, 2002 Number of Sites		
<i>Total Area</i>		<i>2,500,000</i>

Source: WRI 2003, Earth Trends: Biodiversity and Protected Areas – Mali.

Below is the description and status of selected protected areas in Mali.

Boucle du Baoulé Biosphere Reserve. The *Baoulé* marks the intersection between the region of the nomadic pastoralist Moors and Peuls and sedentary farmers groups. Between 1993 and 1998, the reserve received financial support from the European Union, UNDP, UNESCO, the World Bank (WB), and the Malian government to create the reserve's land management plan. The Malian government adopted the land management plan on November 5, 1999 (*Arrêté N° 99/2607 /ME - SG*); its strategy is radically reoriented towards the integration of the area's permanent sedentary populations.

Although the management plan has been approved, on the ground, managers interviewed for this assessment said they had neither the equipment nor the financial support to properly implement it, and described the fauna of the reserve as being largely depleted. This degradation is largely attributed to encroaching cotton cultivation, where agricultural activities of communities living on the reserve's border are negatively affecting the area's fauna. Furthermore, despite its status as a World Biosphere Reserve, tourism is practically non-existent and there is virtually no infrastructure to visit and stay within.

Bafing National Park. Bafing National Park, and the Bafing-Famélé region is characterized by the presence of many mammal species (31 species of mammals were recorded in 2002). The northern zone still contains fauna characteristic of the Sudanian savanna, which took refuge in the area following the creation of a 500 km² lake introduced in the Bafing by the Manantali Dam. The artificial lake flooded 37 villages and 20,000 ha of forest. The zone shelters the most northern African chimpanzees, Derby elans (*Taurotragus derbianu*), dwarf savannah buffaloes (*Syncerus Caffer Nanus*), and lycaeon (*Lycaon pictus*), as well as lions. The most important animal populations also include red monkeys (*Cercopithecus aethiops*), vervets, baboons, and warthogs (*Phacochoerus africanus*). The jackal (*Canis aureus*), wildcat (*Felis silvestris lybica*), chive, squirrel, harnessed guib, antelope (*Hippotragus equinus*), hare (*Lepus sp*), and porcupine are present and found throughout Mali. There are 58 species of birds in the Bafing-Famélé zone.

Given its relative proximity to the *Baoulé* complex, and the presence of diverse species that have largely disappeared from its neighbor, there is a great potential to link the separate areas to help with conservation of numerous species. This potential, as well as the viability of the species within the Bafing itself, however, may be threatened by development of a major road between Bamako and Dakar, which will run through the park itself. The impact of this road has been a major concern of environmentalists in Mali, but remains to be seen once the project is complete.

Gourma Elephant Reserve. Apart from the elephants, the predominant fauna in the Gourma Elephant Reserve are the rare Dorcas gazelle (*Gazella dorcas*) and the more common russet-red fronted gazelle (*Gazella rufifrons*). The *cynocephalus*, the red monkey, and daman (*Procavia capensis*) are far from abundant. The striped hyena (*Hyena hyena*), the common jackal, serval (*Felis serval*), caracal (*Caracal caracal*), genet, honey badger (*Mellivora capensis*), zorille (*Ictonyx striatus*), and wildcat exist in the Gourma. The greater bustard, the small bustard, guinea fowl, francolin, and turtle doves comprise the terrestrial birds.

Human activities increasingly threaten the ecosystems traversed by the Gourma elephants. Gossi Lake, located 160 km southwest of Goa is the site of an original elephant watering hole and the growing town of Gossi. According to Peace Corps Volunteer (PCV) Natalie Grillon, who works with the Gossi Guide Association, the town is only 30 years old, established when the droughts in the 1970s and 1980s forced the current residents, once northern-based nomads, to relocate to Gossi Lake.⁴² These current Gossi inhabitants, the first generation to practice sedentarism, recall this time as a period when there were year-round watering holes and a Norwegian church providing food and supplies. Today, the entire circumference of Gossi Lake is inhabited by humans. The lack of open space deters the migrating elephants from approaching the water source. “Only male elephants come within 10 km of the town,” says Grillon. “Female elephants stay further away.”

Another threat facing elephant habitat is climate change. Increased temperatures are drying-up watering holes the elephants depend upon as they make their way through the Gourma to and from Burkina. The Malian and Burkina governments have joined forces to launch

⁴² Personal interview. Natalie Grillon, August 25, 2008, Douentza.

several initiatives safeguarding the elephant herds — the most important of which is the conservation and biodiversity valorization project of Gourma elephants (financed by GEF and *Fonds Français pour l'Environnement Mondial*.)

Nienendougou Fauna Reserve. Created in 2001 and originating from a classified forest (created in 1984), the Nienendougou Fauna Reserve is adjacent to the hunting zone of Nienendougou. This area of 40,402 ha was classified by decree N°04 2762/MEA SG on December 14, 2004, but has not yet established hunting concessions. The reserve contains a range of wild animals, of which some are large mammals (hippopotamus, *cob Defassa*, antelope, *cob de Buffon*). It is one of the last refuges of large antelopes, which are endangered.

Tamesna Fauna Reserve of Kidal. The Kidal Reserve is in the creation phase. Formerly, fauna in this zone were rich and diversified. After long years of dryness, the majority of the species are at the edge of extinction. The rammed gazelle (*Gazella dama*) and the Dorcas gazelle are endangered, while the cuffed moufflon is an isolated species in the Iforas Ridge. The cheetah, on the other hand, is thought to still exist.

Sousan Fauna Reserve. The Sousan Fauna Reserve, created on April 15, 1959 by decree N°89/MA-EF, is contained within a classified forest. There is legal confusion on its official status, as it is a classified forest with a natural resource management plan for extraction. This decimated reserve, formerly rich in fauna, is home to fields of cultivated cotton. The most current information on the state of the fauna dates is from the last inventory in 1991.

Ansongo-Ménaka Fauna Reserve. The special reserve of *Girafes d'Ansongo-Ménaka* was created to shelter giraffe populations, which today are extinct. Nevertheless, the area remains an important ecological zone; Tilemsi contains a landscape of broad plains bordered by dissected plates.

F. Genetic Resources

As in the case of the Macina sheep, N'dama and Azaouak zebu, Mali has a large pool of endemic animals able to withstand various diseases, adapted to arid climatic conditions, or able to produce large quantities of milk. The last livestock census, in 1992, indicates that Mali possesses several types of bovines, sheep, goats, humped animals, horses, and porcupines.

Mali is an important center of domestication of many plants species, for which there are several local ecotypes and varieties. This variety pertains to rice, sorghum, legumes, and the voandzou, a grass with underground seeds used as animal feed. Several of these species have biotechnology potentialities.

- **Millet.** Some local species have components that make them resistant to bird attacks, stem borers, and mildew. The drought-resistant gene could be introduced to other plant varieties.

- **Sorghum.** The granular qualities of the local varieties and wild sorghum's adaptability to fluctuations of ecological conditions are assets worthy of development.
- **Rice.** Wild rice (*Oryza longistamina* and *Oryza barthii*) has a resistance to rice blast fungus (*Pyricularia*). In addition, the technological quality of *Oryza glaberrima* grains and their robust nature are assets to be exploited.
- **Cotton.** Local plant varieties' long fibers and resistance to insects and disease produce improved cotton plants and reduce the need for extensive pesticide use.

Traditionally, local Malians preserve several local varieties of seeds to practice a variety of techniques. It is common practice to use a variety of natural resources in diverse ways, by developing specially adapted techniques. This inherited knowledge and expertise is transmitted from generation to generation. For agricultural seed conservation, older generations know to anticipate needed resources, and how to obtain equipment and materials adapted to conservation practices in keeping with their environment and lifestyle.

The acquisition of seeds is not solely a financial transaction. Seed exchange occurs between farmers according to marriage, vicinity, and family relations. It takes place in the markets, generally by men and sometimes by women. In villages, the multiplication and/or seed production is based on socio-professional categorization. There is a specific family member, typically the patriarch, who possesses knowledge of local varieties. Of the seed varieties these men collect for cultivation, a portion is set aside to create private "gene banks." These seeds will be used planted in the event of food shortages.

Institutionally, under the National Seed-bearer Plan, Mali is focusing on the institutional, operational, financial, and legal aspects of seed-bearer questions. The International Center for Research in Agroforestry (ICRAF) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) work on the conservation of local crops varieties, and several NGOs bring technical support to local communities. Among the active NGOs in Mali, the Unitarian Service Committee of Canada has been particularly invested in conserving Mali's phyto-genetic resources.

New technologies could also play a role in conservation of Mali's genetic diversity. Micro-propagation techniques constitute a guaranteed means of replicating local potato, mango, banana, forest, and fodder species. The practice can preserve wild grasses, threatened medicinal plants, and other endemic species. With respect to the gum tree, micro-propagation techniques make it possible to obtain clones of strong performing plants for gum production. Biotechnologies could also contribute to waste processing by using micro-organisms genetically transformed to degrade pollutants. Certain genetically modified micro-organisms can be used to produce yeast for local products like the "Soumbala," local beers, cheeses, and milk. Concerning the conservation of genetic resources, stockbreeders use selection criteria to constitute the reproduction base of their herd.

IV. THREATS TO BIODIVERSITY AND TROPICAL FORESTS AND ACTIONS FOR CONSERVATION

This section describes threats to biodiversity and tropical forests in Mali and recommends general mitigating actions. These actions could be implemented by a number of actors, including the government of Mali, NGOs, international donors, research institutions, CBOs, the private sector, and collaborative partnerships between the above-mentioned groups. Specific recommendations, including those for USAID programs, will be made in Chapter V.

Primary threats to Mali's biodiversity, tropical forests, and natural resources include: overexploitation of wildlife resources; habitat loss, degradation, and fragmentation; invasive species; pollution; limited institutional capacity; weak civil society and limited participatory planning and management activities; climate change; and population growth and increasing resource needs.

A. Over-exploitation of Wildlife Resources

Wildlife populations, including mammals (e.g. manatees, chimpanzees, gazelles, and lions), migratory birds, and fish stocks in the Niger Delta, are increasingly threatened by unsustainable fishing practices, hunting, and the bush meat trade. Numerous species of reptiles, mammals, and birds have already become extinct, with many on the verge of extinction due to over-harvesting of wildlife stocks for human consumption and trade.

Although traditional hunting practices included numerous checks on overexploitation of wildlife, these traditional systems have broken down over time. Current legislation governing hunting restrictions and allowances is difficult to implement, frequently poorly understood, not respected, and does not adequately address population needs for protein sources and livelihood activities. Reports of commercial-level exploitation of bush meat are common. In these cases, residents of urban areas commission hunters for bush meat kills that far exceed subsistence needs. Bush meat from these commissioned hunts is then consumed and sold by the individual who commissioned the hunt, satisfying urban demand for bush meat and skins. In Bamako, for example, skins and bush meat of threatened species are easily found for sale in public markets. Bush meat in urban areas is more expensive than other meat, and its consumption is generally seen as a status symbol and not a sustenance activity. The bush meat sector extends outside of Mali as well, with exports to neighboring countries (especially Mauritania), as well as Europe.

Threats from hunting have also been linked to nomadic pastoralists who normally travel with guns and are reported to hunt without discrimination the animals they encounter. Although the nomadic pastoralists have the means and opportunity to hunt in remote areas with wildlife, there is a strong cultural tradition of hunting in Mali in general, and many Malians will take wildlife when there is an opportunity.

In the Niger Delta, many communities rely almost exclusively on fishing (personal consumption and trade) for their livelihoods. In Mali, fish have high market value and demand stems not only from Niger Delta villages, but also from demand by the growing urban populations in Bamako, Ségou, Mopti, and Timbuktu. As fish harvests have diminished over time with overexploitation in the Delta, fishermen have begun using techniques such as smaller-sized nets, multiple dams, and increased numbers of traps in lakes and rivers, resulting in catches that include all sizes and ages of fish. Consequently, fish populations struggle to recover their numbers due to simple over-harvesting and a reduction of fish of appropriate breeding age. Many fish species have already disappeared in Mali, and those that remain face continued threat by increased, intensive, and unsustainable fishing practices.



Traditional fishing traps
(Brian App)

Migratory bird species have also come under threat from uncontrolled hunting. Lake Oro, for example, situated about 200 km west of Timbuktu, hosts more than 20 migratory bird species each year and a high percentage of biodiversity in the Sahara ecological zone in northern Mali. As populations continue to increase around the lake, natural resource and nutritional needs follow in kind. Migratory birds are threatened by subsistence hunting in the Lake Oro area and demand for exotic bird meat in neighboring urban areas such as Timbuktu. Bird meat has a high market value, thus many individuals build or supplement their livelihoods on this trade.

Recommendations for Conservation:

To address overexploitation of wildlife resources in Mali, a collaborative partnership between government actors such as the DNCN and local communities is essential. In addition to supporting increasing decentralization of the DNCN so that increased and improved services are provided to local communities, donors should encourage participatory approaches to wildlife planning and management throughout the country. This should include the following:

- Technical assistance in aquaculture
- Sustainable fishing techniques
- Support to professional societies of fishermen and hunters
- Conflict negotiation over conflicting land tenure claims and systems (traditional versus legal)
- Support to diversifying economic opportunities in the rural milieu
- Support to participative management contracts that provide rights to communities to harvest and sustainably manage wildlife (Guinea and Ghana, for example have

successful models of community-based wildlife management and participative NRM contracts.)

- Awareness-raising of communities in rural and urban sectors
- Support to national, regional, and local policy reform where appropriate, to harmonize legal and traditional harvesting and land tenure systems
- Support to enforcement of fishery harvest and bush-meat hunting policies, particularly at the market or consumer level

B. Habitat Loss, Degradation, and Fragmentation

Biodiversity in Mali is highly threatened by large-scale habitat loss, degradation, and fragmentation. Habitat loss affects charismatic mega fauna, migratory bird species, reptiles, insects, and micro-biotic species. Elephant populations, for example, are threatened by habitat loss; they have been reduced from four troupes found in *Boucle du Baoulé* and the Gourma to one troupe remaining in the Gourma.

Deforestation stemming from the high dependence and demand for firewood as a primary energy source for the majority of the population is a key issue affecting habitat loss in Mali. Firewood is the least expensive and most accessible energy source for most Malians. Demand for charcoal is also high and is preferred to firewood, as it burns cleaner within a home. About 5 kg of firewood are required to produce 1 kg of charcoal, the preferred fuel source for urban dwellers, who create the highest demand for resources. Reports of having to seek timber sources further and further away from villages to harvest fuelwood are common, and the remaining fuelwood has become a source of conflict in areas with higher populations and villages close together. As forest and tree resources needs increase at an unsustainable rate, sustainable harvesting techniques that preserve part of the forest and tree resource base are frequently no longer practiced.

Brush fires were commonly cited as threats to biodiversity in Mali. Primarily human-caused and accidental, during the dry season, brush fires can destroy large tracts of productive and bio-diverse land. Although the DNCN has prioritized awareness-raising of the dangers of bush fires and has supported local fire management brigades, it is unclear how effective these techniques have been in preventing bush fires and the destruction to biodiversity and natural resources relied upon by local populations.

Habitat is also threatened by increased agricultural encroachment and land conversion, within and outside of protected areas and classified forests. Soil fertility loss and population growth are also inherently linked to such agricultural encroachment and intensification. Agricultural intensification not only fragments fragile habitat and wildlife corridors, but in



Truckload of firewood, Doentza, Dogon country
(Sarah Cooper)

some cases also contributes chemical pollutants and environmental externalities that threaten habitat integrity.

Grazing is largely unmanaged throughout Mali, and poses a significant threat to vegetative cover, habitat, and biodiversity. Overgrazing in the northern regions has begun to put increased pressure on the Sudanian savanna ecosystem found further south, as herds of animals seek out resources no longer easily found close to home. This movement of northern herds into more savanna regions has also lead to increasing land tenure conflicts and usufruct rights disputes between agriculturalists and pastoralists.

Overgrazing near water sources is particularly common, which contributes to a loss of protective vegetative cover, leading to detrimental effects on water levels, flow, and availability for human and animal use. A denuded landscape also renders the environment more susceptible to large-scale devastation by brush fires, which are becoming increasingly common.



Cotton field near Koutiala
(Brian App)

Habitat degradation due to cotton cultivation is also a major issue in certain areas of Mali. The cultivation of cotton has gradually migrated from early centers of production such as Fana and Koutalia, west along an axis from Bamako to Kita, and south from Koutalia toward Sikasso. The soils have been depleted so much that cultivation is no longer possible. Given current agricultural practices in cotton cultivation in Mali, fields are often no longer suitable for cotton after two to three years, leaving millet as the only viable alternative for a few seasons. The land is then abandoned entirely. It is important to note that the cultivation cycle with cotton is not part of the traditional fallow system (where land is left to regenerate). Cotton-cultivated land requires a much greater time to recover from a destroyed soil structure and legacy of inputs.

Sand dune shifting and desertification in the northern regions of Mali also threaten vegetation, water sources, and migratory bird habitat. This issue is addressed further in the section that follows on Climate Change.

Recommendations for Conservation:

Habitat loss, degradation, and fragmentation can be addressed through collaborative efforts among government agencies, NGOs, and communities. Actions to mitigate such threats include:

- Community-based dune stabilization and plantation management around lakes threatened by desertification in the northern regions (Lake Oro, for example)
- Support to a national and local-level energy strategy development and implementation that reduces dependence on fuelwood and diversifies energy sources

- Support to sustainable harvesting techniques of timber and timber products
- Support to low-impact mining practices and rehabilitation efforts
- Support to awareness-raising and viable energy alternatives in the urban sector
- Support to conflict negotiation and harmonization of land tenure systems (legal and traditional) that address sustainable grazing and timber harvesting activities
- Support to participative reforestation and forest management projects
- Support to agricultural intensification that is not reliant on chemical inputs

C. Invasive Species

Non-native species in Mali can keep local and endemic species from flourishing. Further, they can, in the case of water hyacinth (*Eichhornia crassipes*) for example, overtake an ecosystem such that other species can no longer survive. The water hyacinth was brought to Mali in the 1990s and planted in water sources around Bamako. Without natural ecological checks in its host environment, dominance of the water hyacinth has been linked to ecological imbalances in lakes and swamps, aquatic diseases, and has become a threat to hydropower plants. Reports of the detrimental impacts of *typha* on waterways in the northern regions of Mali are common.

Recommendations for Conservation:

Addressing invasive species requires learning from the past and planning for the future simultaneously. Support to the DNCN and NGOs to remove invasive species that threaten water sources and reintroduce native species is a first step. Concurrently, awareness-raising and careful selection of non-native species introduction should be a priority of proactive, long-term biodiversity planning and conservation. Support to West African regional knowledge sharing fora related to invasive species and habitat conservation is an additional resource worthy of investment that would allow Mali to capitalize on experience and knowledge within the sub-region.

D. Pollution

Nationwide pollution of water sources, soil, and air are critical threats to biodiversity in Mali. Agricultural chemical inputs reduce long-term soil fertility and poison waterways, and thus degrade habitat and biodiversity. Insufficient sanitation in rural and urban areas also contribute to large-scale pollution. Mining activities and their externalities can pollute, fragment habitat, and negatively affect vegetative cover, thus threatening biodiversity. An ethic of corporate social responsibility is neither cultivated by the government nor demanded by civil society. As a result, the Niger River, for example, is polluted with more than 2,200 m³ of industrial waste from tanneries, soap, and oil factories every day.⁴³ The Niger is further subject to pollution from household wastewater (32,000 m³ per day) and wastewater containing dyes, chemical pollutants, and heavy metals (16,000 m³ per day) that degrade aquatic and terrestrial ecosystems and the biodiversity contained within them.⁴⁴ Pollution is a key environmental externality that frequently goes unaccounted for by those

who benefit from industries that produce the most dangerous waste, while local populations and ecosystems suffer the consequences without recourse. In addition to industrial pollution, agricultural chemical products, including pesticides and chemical fertilizer, also contribute to soil acidification, soil fertility loss, and water pollution.

Recommendations for Conservation:

National strategies for managing industrial pollution, water treatment facilities, and domestic wastewater are critical. National-level policy reform and implementation related to corporate social responsibility for appropriate industrial practices merit attention. With regard to air pollution, support to government institutional capacity to design a strategy and implement emissions requirements for motor vehicles could be promising. As a complementary effort in urban areas, design and management of a lower-emissions public transportation system could also be effective. This could, for example, include emissions requirements for taxis, buses, and motorcycles. Litter, frequently clogging waterways and sewers, could also be addressed, perhaps first in urban areas with awareness-raising campaigns, policy restrictions and enforcement, and urban clean-up programs that include long-term street cleaning and waste disposal. At the national and local level, support to sustainable, organic agricultural techniques is warranted. Capacity building of civil society organizations that includes raising awareness of the consequences of pollution on the resources on which communities depend, improved practices at the local level for managing waste, protecting the integrity of water sources and forests through participative planning and management are key leverage points for donor activities. At the local level, communities must be fully engaged in participatory planning and management to provide the social capital, political will, and viable alternatives required for effective implementation of any national-level policy reform that addresses pollution.

E. Limited Institutional Capacity

Mali benefits from having multiple ministries and technical agencies equipped with highly qualified experts trained in cutting-edge biodiversity and natural resource management. This individual capacity, however, breaks down at the local level, where field staff may be less likely to have the technical and managerial skills needed to most effectively pursue institutional objectives. In addition to gaps in capacity and expertise, a lack of government-generated funding for the Ministry of the Environment inhibits the agency's ability to engage in activities and plans. This lack of financial resources can result in not only limited capacity to engage in biodiversity conservation activities, but may also contribute to a "project mentality" whereby public servants focus time exclusively on seeking and working for donor-funded projects. DNCN staff interviewed during field visits were frequently unable to describe any activities they engaged in outside of project-related and donor-funded tasks. This reliance on donor-related activities creates challenges for institutional ownership of national and local-level conservation activities.

Natural resource management in Mali is characterized by a gap between policy and implementation. During interviews, implementation was frequently characterized as a lack of financial resources to patrol or enforce laws and policies. Although funding may be limited, implementation is generally not fundamentally a problem of funding or traditional

enforcement; it is more accurately a lack of political will and true involvement and ownership by the local populations in sculpting and adopting laws and policies. Successful NRM implementation around the world is characterized not by large numbers of patrols and classic top-down style enforcement, but by engaged populations that largely self-regulate, self-enforce, and fundamentally own and support governmental policies.

Decentralization in Mali began in the 1990s with legislation and commune-level structures that allow decision-making power at the local level. However, in the field, true and full community engagement in NRM was uncommon. The national-level discourse of the DNCN states they view themselves as a partner with communities, yet that view breaks down as one moves further and further down the decentralization chain. At the field level, concerns over the need for more patrols and enforcement were most commonly expressed with a notable absence of discourse or action in actual partnering, providing services to communities, and facilitating innovative systems for improved NRM from which community benefits could flow.

Recommendations for Conservation:

At the national level, sustainable financing should be a top priority. Further emphasis should also be placed on securing a more solid political will within the government to seek long-term sustainable solutions to biodiversity conservation challenges. Within the DNCN, focus on transferring knowledge within the DNCN from the national level to the field levels would be of tremendous benefit in building overall implementation and managerial capacity of the entire agency. As the DNCN places more emphasis on true partnerships with communities and transforms its role into one that is providing service to communities, this could also include a component that allows communities to invoke the rule of law to combat illegal activities and poor management. Additional efforts on the part of the DNCN to truly engage communities in planning and managing natural resources is essential and has much further to go to achieve longer-term sustainable results.

F. Weak Civil Society and Limited Participative Planning and Management Activities

Although many local NGOs and big international NGOs exist in Mali, civil society is still relatively weak. Coupled with this is a minimal establishment and implementation of bottom-up development and conservation approaches at the national and regional level. There is a great need for technical assistance to be provided to communities and in support to CBOs and local NGOs. Mali has begun this process with the support and establishment of local conventions, which are agreements entered into between communities and the government of Mali, but these agreements are new, still relatively weak, frequently untested, and inconsistently designed and planned.

Recommendations for Conservation:

The DNCN could play a role in building capacity of civil society by more strongly engaging in participative planning and management with communities. Using local conventions as a promising tool, communities should be engaged from the start in planning

these conventions. Coupled with this, the DNCN could provide skilled staff to assist local communities with the implementation of their plans as needed. Awareness-raising of rights and responsibilities is also an essential component of strengthening civil society in Mali to improve biodiversity conservation throughout the country.

G. Climate Change, including Desertification and Drought

Climate change and seasonal variability is a factor that Malians have been accustomed to throughout history. Climatic variability and longitudinal change have been documented in literature that is frequently cited by government actors and NGOs. Interview data during field visits included references to communities recognizing climatic changes and trends and thus driving new practices in adaptive management of their natural resources. Dune-shifting and drought were the most commonly cited types of climatic change throughout the country.

Recommendations for Conservation:

At the national level, a national climate change strategy should be developed with viable implementation avenues. On a local level, it may be beneficial to gather information on current and historical adaptation techniques that local communities are and have been using during periods of climatic change. This information could be analyzed for sustainability, benefits, and threats to biodiversity conservation to be shared within Mali. The same information could also benefit other countries in the sub-region. Further strategies to use forest management and conservation as a means of mitigating global climate change could also be included in national and local natural resource management activities.



Dune-shifting along the Niger River
(DNCN, Timbuktu)

V. USAID/MALI PROGRAMMING

The portfolio of USAID/Mali consists of three of the four U.S. government strategic objectives (all but Peace and Security) and undertakes a wide range of activities that include economic growth activities ecotourism and natural resource management. This section examines USAID activities by strategic area, describing activities in the context of the threats and actions necessary for conservation as described in Chapter IV. This section then goes on to make specific recommendations on how conservation activities can be further integrated into current USAID/Mali activities and identifies future opportunities for biodiversity conservation.

A. Current and Planned USAID/Mali Programming

Current programming for USAID/Mali consists of activities in the following strategic areas: governance and communications, health, education, and economic growth. Each area is described below, with a focus on the activities, if any, which can be linked to biodiversity and forest conservation.

Governance and Communications. Activities in this area take elements from the former Democracy and Governance Unit and the Communications Unit to form one strategic area with the idea that good governance needs transparency and communications. Major activities in this area include a shared governance program, a radio station support program, and a community “tele-center” support program. The shared governance program supports communities to take on the increasing responsibilities that are being brought to their *commune* level through the process of decentralization and that works with community councils, mayors, civil society organizations (CSOs — including women and youth groups) in 150 of the 703 *communes* in Mali. The radio station program helps provide communities with new radio equipment to provide coverage of civic events, engender transparency in governmental operations, and provide community development messages and information to rural populations. The community “tele-center” works in more than 70 locations and helps communities set up local centers for Internet access and with information repositories for government law and forms, as well as information on development topics.

Health. USAID/Mali health activities aim to build capacity and support Malian public health care delivery systems, focusing on maternal childcare. Other activity areas include family planning, HIV/AIDS, malaria, nutrition, and community-based service delivery. Although there are some activities related to household water treatment (through social marketing), activities that deal with pollution and upstream water contamination are housed in the economic growth area.

Education. The focus of USAID/Mali is on basic education; the two major planned initiatives moving forward are within this focus. The first initiative focuses on increasing the quality of teacher training, and using radio and IT solutions to reach rural and nomadic populations in remote regions of the country. The second initiative focuses on the planning and management of education at the local level, and adequate infrastructure and materials

for rural schools. Although there has been some involvement in the past, USAID is not currently involved in curriculum development.

Economic Growth. USAID/Mali has economic growth programs in trade and investment-enabling environment, financial services, agriculture, livestock, fisheries, and natural resources and biodiversity. Under trade and investment, activities include improvement of the enabling environment, as well as training in intellectual property rights. Under financial services, USAID is helping develop relevant credit instruments to help finance agricultural, rural, and small and medium-sized enterprises, to create employment and aid in the growth of the formal business sector. Under agriculture, USAID supports government of Mali strategies and the poverty reduction strategy program. These activities promote development of agricultural commodities, institutional capacity-building, seed-sector policy development, and strengthening links among ministries involved in the agriculture sector (including environment, land, labor, finance, industry and trade, and investment).

Although USAID has been the primary U.S. institution involved with economic growth, the Millennium Challenge Corporation (MCC) is making large investments and has been heavily involved in the sector in recent years. Signed in November 2006, the five-year \$461 million MCC Compact seeks to increase the productivity of the agriculture sector and regional enterprises, including a focus on using the Niger River for irrigated agriculture.⁴⁵

Among natural resources and biodiversity activities, three important programs were a focus for the assessment team: Nuts where they Fall, Integrated Initiatives for Economic Growth in Mali, and the Global Sustainable Tourism Alliance Pays Dogon.

Nuts Where They Fall. Improving Supply Chain Links through Improving Parkland Preservation, Village Level Collection, Handling, and Marketing of Shea Nuts – Currently in its second year, this USAID program is managed by the PC in Mali and represents a partnership between the two U.S. government agencies. The primary objective of this activity is “to improve natural resource management while increasing incomes.” The conservation theory behind this activity is that if the shea (*Karité*) trees are sufficiently valued (primarily through returns from the sale of shea nuts and butter), it will encourage better management of the parklands where they are largely located. These parklands help diversify agricultural production systems while stabilizing soils, increasing soil fertility, and improving microclimates within the fields. In recent years, these areas have been severely degraded and marked by a lack of tree regeneration, but better improved natural resource management techniques can help to reverse the trend to the benefit of shea and other trees located in targeted regions.

To meet the goals of this program, the PC is working in partnership with IER, to 1) assist actors in the sector to adopt a value chain approach to shea production, 2) improve the quality of shea nuts and butter produced, 3) protect and improve the state of shea parklands, and 4) organize producer associations, cooperatives, and networks. PCVs in target areas throughout the shea parklands undertake specific activities, which include training in

⁴⁵ Links and further information can be found on the Millennium Challenge Corporation – Mali Homepage at: <http://www.mcc.gov/countries/mali/index.php>.

improved techniques for the gathering, preservation, and transformation of nuts, training in business and association formation, mapping of shea trees numbers and distribution (including age and health), and establishing links to markets for shea products.

Initiatives Intégrées pour la Croissance Economique au Mali. Beginning in September 2007, IICEM was the successor to the major trade, finance, and agricultural USAID economic growth programs of the recent past. By combining them, the IICEM is working to consolidate the work of USAID in these areas and create a synergy between them. The overall objective of the IICEM project is to “facilitate economic growth and increase producer incomes by increasing productivity, improving the efficiency of selected value chains, and increasing access to finance and markets.” IICEM has targeted five agricultural value chains (rice, mangoes, potatoes, shallots, and tomatoes), and strategic objectives include the following:

- Expansion/ rehabilitation of irrigated agriculture and intensification of agricultural production in target areas
- Enhancing access to finance
- Enhancing access to markets and trade
- Introducing, transferring, and applying improved technologies
- Increasing control of village associations over natural resources and the environment
- Enhancing the enabling environment for agriculture, trade, and investment
- Ensuring better coordination among programs

Increasing control of village associations over natural resources and the environment relates to the project’s Intermediate Result 6 for Improved Management of Natural Resources, and activities in this area most directly address conservation threats and actions. To this end, IICEM provides advisory support to increase the capacity of village organizations and encourage local participation in implementation of natural resource management plans and local conventions to permit the integration of agricultural, forestry, and pastoral activities.

These activities fall into four general categories: 1) review and finalization of natural resource management plans and local conventions; 2) support for agro-forestry and sustainable farming techniques, including windbreaks, live fencing, and terracing; 3) training local NGO agents in understanding natural resource legislations and regulations; and 4) equipping rural populations with improved natural resource management techniques, including reforestation and dune stabilization.

Global Sustainable Tourism Alliance — Dogon Country. Beginning in February 2008, the program was based on the findings of a four-month design phase that used the System-Wide Collaborative Actions for Livelihoods and the Environment process to determine demands of the sustainable tourism sector in Dogon country. This program implements activities under four thematic components, each with a different lead organization:

- *Conservation of the Environment.* Emphasizing the need for biodiversity conservation during all tourism development effort.

- *Social Development and Networking*. Increasing linkages within the sustainable tourism system through strategic communications interventions.
- *Private Sector, Competitiveness, and Market Access*. Promoting diversification and enhancement of the tourism product.
- *Workforce Development*. Providing tourism-related training for guides and service providers.

Of these components, Conservation of the Environment most directly addresses conservation threats and actions, although by increasing tourism revenues related to the natural environment, all activities encourage local populations to conserve and/or sustainably use valuable natural resources. Within this component, the following sub-components highlight conservation activities:

- Help locals diversify products they can sell, and develop non-timber forestry and agro-tourism products related to honey, traditional medicinal plants, and onions; explore potential for tree-planting carbon offset programs with ICRAF
- Work with the Ministry of Environment and villages to identify locations for environmental restoration projects and work with local communities, using the model created by those near the Bankass Forest, to manage natural resources more effectively
- Conduct training on analog forestry to introduce the concept as a practical tool for conserving, recuperating, and managing forests and biodiversity through the use of species that are ecologically, socially, economically, and culturally compatible with the environment
- Initiate Environmental Awards Program with several communities through the NGO network (trash management and clean-up programs with local associations and others)
- Enhance capacity of local associations and cooperatives/syndicates to assist *Direction Régionale de la Conservation de la Nature (DRCN)*, or Regional Direction of Nature Conservation, in managing forests and biologically sensitive areas

To this end, GTSA-PD has helped stakeholder workshops and meetings identify environmental and biodiversity conservation priorities in Dogon country; provided training for stakeholders, DRCN extension agents, community associations on improved natural resource management, sustainable productivity, biodiversity conservation techniques; conducted biodiversity research to identify micro-habitats and evaluate natural health of human-affected rural ecosystems; and developed activities, with DRCN and local community associations, that promote sustainable land management and restoration of natural ecosystems.

B. USAID/Mali Conservation Actions and Recommendations

Categorized by functional objective, the section below describes recommendations for current and future USAID programs. These recommendations include actions USAID has yet to take, as well as actions being undertaken but that could be scaled-up.

Governance and Communications. This program focuses on communications fostering the transparency necessary for good governance and offers potential points of synergy for conservation goals. Through the shared governance program, USAID supports government and civil society organizations to articulate the community's needs and to meet them as more responsibility falls to the local level through the decentralization process. These activities offer several points where USAID can take the support it is already giving and focus it to more conservation-minded goals by increasingly working with CSOs formed around important natural resource issues such as water point groups and farmer groups. With these groups, as well as other more general groups with natural resource issues, USAID could help identify natural resource management (NRM) issues of concern, such as fuel wood scarcity, decreasing soil fertility, or poor water quality, and facilitate a partnership with the *Service Local pour la Conservation de la Nature* to undertake initiatives such as sustainable forest management, reforestation and natural regeneration, agro-forestry, and watershed protection, all of which have conservation benefits and can decrease pressure on natural areas with high biodiversity value.

Furthermore, support to community radio and tele-centers offers a means of distribution for environmental messages and techniques for sustainable land management. With wide coverage in Mali, community radio is heard by urban and rural populations, and USAID-supported activities, especially on health, use this medium to expose the population to their message. Similar to the above work with CSOs, these messages can help communities recognize the issues, understand potential solutions, and connect them to resident technical experts to undertake community projects, such as plantations, dune stabilizations, and improved fallows (depending on community needs). By producing technical packages (informational disks) for these issues to be made available at community tele-centers, USAID could further enable communities to identify and address problems and solutions to natural resource issues.

Health. Focusing on building the capacity of Malian public health regarding delivery systems, and without clean water-specific initiatives (other than social marketing of water treatment tablets), the potential links with conservation activities are limited. Working with partners such as CARE, Save the Children, and the Helen Keller Institute at the community level may provide an entry point for reaching communities on environmental interventions. As established USAID partners who have on-the-ground knowledge of working with rural communities, these groups could partner with *Service Local pour la Conservation de la Nature* for technical expertise and help provide under-served communities with initiatives — and funding — for Economic Growth activities. Additionally, given the prevalence of water-based diseases, interventions with health-based partners could focus on relevant issues such as watershed protection and the reduction and elimination of pollution to water sources important to the communities and aquatic biodiversity.

Education. Focusing on school construction and the improvement of teaching skills, USAID is not currently working on curriculum development. Although this limits the ability to introduce environmental education into current USAID education programs, in working at the community level for infrastructure and teacher needs, it may be possible to talk about support for school *Les Amis de la Nature*-type groups, or establishment of gardens or school tree planting if relevant to current classes. Furthermore, tree planting programs and visits to natural areas can be recommended as tools for teaching practical science (biology or ecology, for example) with hands-on learning for cash-strapped schools.

Economic Growth. The USAID economic growth program contains natural resource management activities, yet biodiversity conservation could be more fully integrated into their projects. When considering biodiversity and forests in Mali, the Nuts Where They Fall Program: Integrated Initiatives for Integrated Growth in Mali, and the Global Sustainable Tourism Alliance – Dogon country projects have the most potential for bolstered biodiversity activities. Recommendations below build on the current activities, emphasizing those activities with the greatest potential impact for biodiversity conservation as well as identifying new opportunities for conservations focused program activities.

Nuts Where They Fall. In terms of conservation impact, activities with a more direct focus on sustainable farming systems — which in parklands, shea tree management can form a part of — and agro-forestry techniques can decrease land clearing and shifting cultivation (or at least lengthen the cropping years per plot) and improve the fallow fields (to decrease the time before the land can be re-cultivated or recovered to a healthy state). Additionally, for the future of shea parklands as a productive sustainable farming system and a source of shea product



Shea nuts drying, Bougouni
(Brian App)

revenues, it is critical to focus on regeneration of the trees, which by all accounts is lacking.

As a tree that is slow growing and consequentially slow to produce fruit, if regeneration is not addressed quickly, a lack of productive trees may cripple natural resource management and income-generation activities. To this end, PCV volunteers could train people in nursery techniques and support entrepreneurs and community associations in establishing village nurseries. To decrease the period before maturation and increase the quality and quantity of shea nuts, thereby increasing their value and efforts for their conservation, grafting techniques should be emphasized in these nurseries, to produce productive trees with local rootstock.

Partnering with ICRAF, a global leader in biodiversity conservation with expertise in restoring shea parklands and conserving biodiversity, would be an excellent expansion of the Nuts Where They Fall initiative and would certainly strengthen the biodiversity conservation component of the program. A partnership with ICRAF could bring in biodiversity conservation expertise and capacity for strategic planning and integrated partnerships that could include the Peace Corps, the DNCN, and local communities.

Recommendations include:

- Continue to support the volunteer's GPS readings of shea trees and link to provenances (ICRAF) to better identify important and threatened provenances/groves of shea to be protected
- Assist volunteers to help their communities understand and work with conventions, NRM planning, and to work effectively with DNCN; share experiences among volunteers on how to do this
- Support linking increased value-added of shea as a commodity to protection of the resource (the tree and its habitat) through NRM planning, awareness, threat analysis
- Assess potential for other wild and threatened natural products produce in agro-forestry parklands
- Gauge potential to support volunteers in *Baoulé* and directly on nature tourism (elephants, chimpanzees)

Integrated Initiatives for Economic Growth in Mali. Through activities under its “Increasing control of village associations over natural resources and the environment” objective, IICEM is working to support community natural resource management plans and local conventions, NRM and agro-forestry interventions, and building communities’ capacity to implement and oversee them. In the continued implementation of these activities, we recommend that the focus shift to building a strong relationship between the agents of the *SCLN* and communities so they can help communities plan, implement, and oversee similar work in the future. Too often, *SCLN* agents are seen by communities, and indeed themselves, as enforcers of, more than strategic partners with, the communities around which they are based. Supporting a stronger relationship between the parties can help improve the capacity of both to implement their plans, while providing a sustainable plan for biodiversity conservation under program activities. There is significant potential to work with communities on increased yield, low chemical input agriculture for each site where IICEM works. Support to local conventions that include biodiversity conservation and true participative planning, management, and integrating benefits to communities who practice sound NRM could also be incorporated into this project. Additional support to Social and Economic Development Program management to increase local ownership of project and resources could also include benefits to biodiversity conservation.

Recommendations include:

- Reorient Objective 6 to biodiversity for next two years; enhance capacity of the targeted village organizations to protect, improve, and manage the natural resource base, which leads to the enhanced capacity of targeted villages and communities to protect, improve, and manage biodiversity, ecosystems and the natural resource base

- Focus biodiversity work on delta and *Bas Fonds* (key biodiversity areas for Mali)
- Take a watershed approach to protecting biodiversity in these areas in terms of protecting the watershed for humans and biodiversity (birds, animals that use water, vegetation)
- Identify threats to biodiversity (key species and ecosystems) in selected landscapes with DNCN
- Develop NRM plans and assist with conventions in selected locations
- Pilot rice production systems that reduce pollution and erosion, which are threats to downstream aquatic biodiversity
- Assist in removal of alien invasive species (e.g., water hyacinth) in areas where these degrade natural resources and threaten biodiversity

Global Sustainable Tourism Alliance – Dogon country. The GSTA program has a “conservation of the environment” component under which it is undertaking biodiversity activities, notably protection and sustainable use of non-timber forest products and traditional medicines and support for community restoration projects. Many communities the project works with, however, do not fully understand what ecotourism is or the resulting financial gains and sustained natural resource base they could reap. Furthermore, although there are many conservation activities, they stand to be enhanced by further integration into the tourism product itself.



Dogon village near Bandiagara
(Sarah Cooper)

Some recommendations below are for new activities, while others call to reinforce ongoing activities that may need further support. Recommendations include:

- Promote the ecotourism route/axis
 - Dogon country – As successful, provide lessons to DNCN on ecotourism and wildlife tourism (Douentza—elephant; *Baoulé*, Mandingue—chimpanzee).
 - Forest, Ronier area – Work with DNCN and communities in Borko area, assist the area to become a key agro - and nature tourism spot; rehabilitate waterways for caiman; eliminate water hyacinth; work with USFS on elephant tourism as part of this ecotourism axis.
 - Sacred lakes and crocodile ponds of Borko “eco” tourist circuit that includes water resource management, natural regeneration, community-based wildlife

management, appropriate fuelwood harvesting techniques that Bara Hogon may already be supporting.

- Assist with planning activities
 - Assist with World Heritage Management Plan.
 - Development of co-management activity plans.
 - Assist Bara Hogon, HDS, Molibomo on RNA and conventions, measuring baselines and progress in terms of areas regenerated; identify key threatened species that are regenerated.
 - As much as possible, use matching funds for non-biodiversity activities.
- Support traditional medicine activities
 - Support medicinal healers and endemic species greenhouses to produce endemic and high-demand medicinal plants to reduce pressure on harvesting in the wild.
 - Develop botanical and traditional medicine tourism to provide further incentives for protection of endangered plants.
 - Work with therapists/local healers on conservation of medicinal plants in gardens linked to natural areas to ensure survival of plants in the wild.
- Teach sustainable NRM and forestry activities
 - Teach sustainable regeneration practices via trainer-of-trainer system.
 - Expand reach and success of reforestation projects to include participative management plans where local communities access and control benefits.
 - Use analog forestry approach for regeneration and any replanting to assure ecosystem-level gains; focus on regeneration and protection of threatened tree and bush species; explore potential for certification of key forests/natural areas.
 - Partner with and support Bara Hogon, Endé, Tele, and beyond, to expand and strengthen sustainable NRM practices and biodiversity conservation practices in Bandiagara.
- Work with communities
 - Engage communities not simply as volunteers or “pay-for-service” workers, but as owners and recipients of program benefits with management and use rights.
 - Work with communities and DNCN in and near classified forests to create participative management strategies and plans that include natural regeneration of forest resources.
 - Work with communities on how to manage invasive species like *Typha* that threaten water sources, perhaps piggyback with community-based forest management (CBFM) —forest management/ plantation management with support from DNCN.
- Integrate eco-tourism
 - There is a need to fully integrated work with all partners to bring “eco” into Dogon tourism; first step perhaps a workshop to discuss shared definition of ecotourism that includes ecological sites/information, but also a practice of

sustainable and low-impact tourism — behavior of tourists and service providers such as hotels, restaurants, and artisans.

- Educate tourists about nature in Dogon Country (Objective 3).
- With Cultural Mission of Bandiagara, expand ecotourism training for guides.
- Work to train all cultural guides in Bandiagara in incorporating ecological information into the info they pass on to tourists. This should not be a separate type of tour, but rather a mix of culture and ecology. Green tourism (expand on GSTA guide training model).
- Leverage efforts with GSTA /USFS to
 - Have shops and restaurants to introduce reusable cloth bags to replace black plastic bags.
 - Advertise availability and rationale behind initiatives in villages.
- Work with woodcarvers
 - Work with artisans on sustainable wood use and regeneration.
 - Examine the opportunity for “certified” wood for tourist market.
 - Establish a woodcarvers association; once established, association can provide training with help of Ministry of Tourism on creating art objects of exportable quality and proper identification of artifacts that should not be exported.
 - Replicate model for other ecotourism villages.

VI. ADDITIONAL OPPORTUNITIES FOR BIODIVERSITY CONSERVATION

In addition to current USAID activities described above, the following section includes recommendations for additional biodiversity conservation activities throughout Mali.

Niger Delta

The Niger Delta is a biologically diverse wetland, home to dozens of migratory bird species and fish. Multiple opportunities exist to mitigate threats from over-fishing and provide support to local DNCN agents and communities.



Erosion control efforts along the Niger River bank near

Recommendations:

- Support technical assistance to DNCN, NGOs (Walia), and local communities in aqua-cultural techniques, (including use of organic fertilizers/pesticides/herbicides and medicinal/endemic plant nurseries)
- Support conflict management on land tenure disputes and unsustainable usufructory rights abuses related to fishing
- Strengthen existing and create stronger local conventions; there is a need to incorporate true participatory NRM/fishing
- Support income-generating efforts already in place for female groups to deter migratory bird trade
- Investigate use of vetiver as a soil stabilizer; was naturally growing on the banks of the Niger River
- Community-based wildlife management and community-based protective area management training with USFS, National Conservancy Research Center Ghana, and STEWARD for DNCN staff and communities to protect Niger Delta birds

Gourma

The Gourma is home to one of the last remaining herds of elephants in West Africa. Ecotourism opportunities abound, as do options to integrate wider-scale biodiversity conservation activities.

Recommendations:

- Gourma ecotourism development in Boni and Gossi, CB ecotourism, elephant habitat conservation, wildlife viewing — USFS/USAID/GSTA/Ministry of Tourism/DNCN partnership opportunity.
- Work with Elephant /Biodiversity Conservation project to provide technical assistance in community-based natural resource management and ecotourism, and to establish conservation areas around Gossi Lake and Boni.
- Engage villagers certified in elephant tracking to provide training to interested and established guides. Tracking training could be incorporated into USFS guide training (contact: Derek Betts, Boni village outside of Douentza).
- Increased knowledge dissemination about the potential to protect Gourma biodiversity.
- Engage communities in long-term planning for elephant habitat conservation.
- Work with Elephant/Biodiversity project to support participative management plans. The Elephant project appears too classic, top-down with little benefit going to communities. How can DNCN provide services to communities and incorporate CBFM plantations?
- Support DNCN to train villagers to collect elephant dung for use in making natural fertilizer.
- Draw on land rights given to pastoralist populations in Mauritania. Law mentions pastoralists grazing rights within certain lands — specifically delineated. (refer to Mauritania 118/119).
- Support motivated communities on how to organize and run a CBO for collective funds/use rights.
- Consider creating an elephant festival in Boni — need to work with communities on realistic goals for this festival, ecological and economic impact, tourist circuits, maintenance of circuits and viewing areas, management of increased numbers of tourists; visitor management major capacity building need.
- Support ecotourism visitor center in Gossi, work with PC/DNCN/GSTA.
- Leverage funds/resources of PCV's tree nursery project (Gossi) for women (i.e. seeds for baobab, mango, and other trees).

Lake Oro/Timbuktu

Timbuktu and lakes within this region are threatened by overexploitation of wildlife resources (birds and fish) as well as desertification. Opportunities for greater community-based and participatory planning and management of natural resources could produce promising biodiversity conservation benefits.

Recommendations:

- Great opportunity for migratory bird habitat conservation project, perhaps even with other countries through USFS Migratory Bird Program.
- Support Lake Oro reforestation and plantation projects with a focus on improved participatory management and community benefits.
 - This could be complemented by more dune stabilization/water source protection that was begun by GTZ and not completed, which provides bird habitat, protects water resources, and — if implemented with poly-crop tree plantations and natural regeneration — includes additional biodiversity benefits.
 - Support improved relationships between DNCN and communities to increase biodiversity conservation results and consistency of successes.



Dune stabilization near community settlement Timbuktu (Sarah Cooper)

South

Southern Mali contains several key protected areas and forests, critical wildlife habitat, and several artisanal mining sites. Opportunities for conserving the resources that remain for the benefit of current and future Malian generations abound.

Recommendations:

- Support technical assistance to develop wildlife and protected area strategies where local communities are engaged in planning, management, and receipt of benefits.
- Partner with USAID/USFS STEWARD (regional program) to develop transboundary conservation areas w/Guinea and Senegal that include Baffing and *Boucle du Baoulé* National Parks.
- Community-based wildlife management and community-based protective area management training with USFS, National Conservancy Research Center Ghana, and STEWARD for DNCN staff for *Boucle du Baoulé*, Baffing, and classified forests.

- Technical assistance for DNCN in landscape-level land-use planning and management (USFS, WCS, WWF technical assistance partnership opportunity for Mali).
- Explore biodiversity offsets for mining USAID Business and Biodiversity Offsets Program).
- Support and technical assistance for DNCN monitoring of natural regeneration and biodiversity and for monitoring effects of agricultural chemical inputs on biodiversity.
 - This could include technical assistance for sustainable organic fertilizer use.
- Technical assistance to develop biodiversity and wildlife corridor between Mont Mandingue and *Boucle du Baoulé* and in Siby (corridor for wildlife between Mali and Guinea).
 - There could be a partnership opportunity with STEWARD.
- Could develop small-scale community-based ecotourism/World Food Program: wildlife viewing, trekking, and women’s shea butter cooperative in Siby.
- CBFM sales from plantations, agro-forestry shea parklands, and community forests and plantations.
- Support to improved management of *Forêts Classées* (community - and national - level support needed).
 - Management guidelines, contracts, local conventions, formal decentralization guidelines/policies.
- Support and technical assistance to Bamako Botanical Garden, link to USFS and U.S. botanical gardens, inventory capacity.
- Support to communities and DNCN related to low-impact mining, artisanal mining plans, restoration and rehabilitation of artisanal mining areas.

VII. CONCLUSION

Mali is undergoing rapid rates of deforestation and over-exploitation of wildlife resources. Despite these challenges, multiple opportunities remain to conserve the remaining forest and biodiversity resources. At the national level, the Ministry of the Environment has made great efforts to begin to address biodiversity conservation through policy reform and decentralization of natural resource management. Continued partnership with the DNCN at the national and local level, as well as with NGOs, research institutions, and local communities, could lead to great results for biodiversity conservation. Improved integration of conservation activities within USAID programming would buttress current government efforts, expand their reach, and build local and national capacity to manage and conserve biodiversity resources. A key focal point for biodiversity conservation activities in Mali should be improved community participation and local ownership over natural resource planning and management and land management activities. Ensuring that local benefits and viable alternative livelihood activities are incorporated into all biodiversity conservation actions is essential for success. Additionally, untapped opportunities to support biodiversity conservation within Mali's large system of protected areas abound in the southern region of the country, where potential synergies exist with neighboring countries and the USAID STEWARD regional program. Although biodiversity conservation faces many threats in Mali, numerous opportunities exist for conserving and enhancing biodiversity into the future.

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ANNEX A. LIST OF INDIVIDUALS INTERVIEWED

Contact	Organization	Title	Location
Modibo Abba Koussou	APSAGA	<i>Responsable Volet Environnement</i>	Goundam
Sarata Berté	<i>Association Tulu Na Fama</i>	President	Bougouni
Mohamed Traoré	<i>Conseiller municipal</i>	Tonka	Goundam
Binés Dougnon	Cultural Mission of Bandiagara	Manager	Bandiagara
Youssef Konate	Department of Fisheries	Director	Mopti
Adama Togo	<i>Direction National de la Conservation de la Nature</i>	<i>Chargé des aires protégées</i>	Bamako
Mamadou Tiéman Traoure	<i>Direction National de la Conservation de la Nature</i>	<i>Directeur Ajutant Park National de Boucle de Baoulé</i>	Bamako
Bourama Niagaté	<i>Direction National de la Conservation de la Nature</i>	<i>Directeur Park National de Boucle de Baoulé</i>	Bamako
Col. Alassane B. Maïga	<i>Direction National de la Conservation de la Nature</i>	National Director	Bamako
Namory Traore	<i>Direction National de la Conservation de la Nature</i>	<i>Spécialiste d'écologie appliqué/aménagement de la faune et de l'écosystème</i>	Bamako
Mamadou Adama Diarra	<i>Direction Régional de la Conservation de la Nature</i>	Regional Director	Mopti
Mamadou Sylla	<i>Direction Régional de la Conservation de la Nature</i>	<i>Chef Division Régulation et Control</i>	Ségou
Seydou Tangara	<i>Direction Régional de la Conservation de la Nature</i>	<i>Ingénieur des Eaux et Foret : Charge de Faune</i>	Ségou
Alhousseyni Maïga	<i>Direction Régional de la Conservation de la Nature</i>	<i>Chef Division Aménagement</i>	Sikasso
Amadou Diarra	<i>Direction Régional de la Conservation de la Nature</i>	<i>Chef Division Réglementation</i>	Sikasso
Zan Moussa Samake	<i>Direction Régional de la Conservation de la Nature</i>	<i>Regional Director</i>	Sikasso
Bocar Coulibaly	<i>Direction Régional de la Conservation de la Nature</i>	<i>Chef Division Aménagement</i>	Tombouctou
Tiémoko Coulibaly	<i>Direction Régionale de la peche</i>	<i>Chef Division</i>	
Orobo Diarra	<i>Direction Régionale de la peche</i>	<i>Chef Division</i>	Mopti
M. Maïga Ibrahima	DNCN	<i>Chargé du Controle</i>	Douentza
M. Adramane Bouaré	DNCN – Gourma	<i>Chef de Service</i>	Douentza
M. Mamadou Tiero	<i>Programme Fonds de Développement en Zone Sahélienne/FIDA – GEF</i>	<i>Coordinateur Régional du programme (President of the Malian Association section)</i>	Mopti
Barry Diakite	GSTA	Natural Resource Manager	Mopti
Abdoulaye Berthe	Minister of the Environment and Sanitation	<i>Secrétaire General</i>	Bamako
Madi Maténé Keta	<i>Ministère de l'Élevage et de la Pêche</i>	<i>Director National Adjoint</i>	Bamako
Seydou Guindo	Museum	President of the Association	Endé
Lassana Koné	Office of the Mayor	Representative of the Mayor	Fourou
Mamadou Tiero	<i>Programme Fonds de Développement en Zone Sahélienne – FIDA-GEF</i>	<i>Coordinator Regional du Programme</i>	Mopti
Abdrahamane Goita	<i>Projet d'Appui a la Gestion des Écosystèmes inondables dans Quatre Territoires du Delta</i>	Coordinator	Sévaré

Contact	Organization	Title	Location
	<i>Intérieur du Niger</i>		
Nomba Ganame	<i>Projet de Conservation et de Valorisation de la Biodiversité du Gourma et des Eléphants</i>	<i>Specialiste Aires Protégées</i>	Douentza
Benoit Doamba	<i>Projet de Conservation et de Valorisation de la Biodiversité du Gourma et des Eléphants</i>	<i>Spécialiste Aires Protégées</i>	Douentza
Souriba Camera	Rural Wood Market Group	Member	Mangaka
Sekou Troure	Rural Wood Market Group	Member	Mangaka
Mamadou Camera	Rural Wood Market Group	Member	Mangaka
Mamadou BA	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef Service</i>	Bandiagara
Abdoulaye Koné	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef Service</i>	Goundam
Sabaré Tiénorn	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef de Poste PNBB</i>	Guénékoro
Zanga Sylla	<i>Service Local pour la Conservation de la Nature</i>	<i>Charge d'Amenagement</i>	Kadiolo
Kamano Sanago	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef d'Antenne de Central Kita</i>	Kita
Idrissa Ousmane Maïga	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef d'Antenne de Sagaloary</i>	Kita
Fado Niambélé	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef du Poste Adjoint</i>	Mambiri
Bakary Diarro	<i>Service Local pour la Conservation de la Nature</i>	<i>Forest Guard PNBB</i>	Mambiri
Mahamadou Sow	<i>Service Local pour la Conservation de la Nature</i>	<i>Chargé de Control</i>	Naréna
Boubacar Bolde	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef d'Antenne</i>	Naréna
Bamarou Kané	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef du Poste PNBB</i>	Néguela
Mahamane Adamou	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef Secteur de Baoulé</i>	Néguela
Bisulbaba Tabouné	<i>Service Local pour la Conservation de la Nature</i>	<i>Spécialiste Faune et Chef Secteur</i>	Néguela
Amadou Diarro	<i>Service Local pour la Conservation de la Nature</i>	<i>Chef d'Antenne</i>	Siby
Seydou Tembene	Traditional Healers	Association President	Bandiagara
Kris Hoffer	U.S. Peace Corps	Associate Peace Corps Director for Environment	Bamako
Derek Betts	U.S. Peace Corps	Volunteer working with <i>Les Amis des Elephants</i>	Boni
Sophie Schneeberger	U.S. Peace Corps	Small Enterprise Development Volunteer	Bougouni
Natali Grillon	U.S. Peace Corps	Volunteer working with Gossi Guide Association	Gossi
John Stowell	U.S. Peace Corps	Small Enterprise Development Volunteer	Konobougou
Nicole Willams	U.S. Peace Corps	Environment Volunteer	Samabougou
Robert de Wolfe	USAID	Deputy Team Leader Health	Bamako
Natasha DeMarcken	USAID	Education Team Leader	Bamako
Dennis Bilodeau	USAID	Governance and Communications Team Leader	Bamako

Contact	Organization	Title	Location
Mamadou Augustin Dembele	USAID	Project Management Specialist/Agronomist/ Environment M&E	Bamako
Jean Francois Guay	USAID/Abt Associates	Director	Bamako (hq)
Souleymane Banba	Village Council	Representative of the Village Chief	Finkolo Daslian
Mamadou Kalapo	Village Council	Chief	Gueny Danga Ségou
Sidiki Kone	WALIA — Member IUCN ONG	<i>Chargé de Programme</i>	Walia

ANNEX B. LIST OF ANIMALS BY ECOLOGICAL ZONE

Name	Status (if known)
Saharan Zone	
Animal	
<i>Nanger dama</i> (dama gazelle)	threatened
<i>Gazella dorcas</i> (dorca gazelle)	
<i>Eudorcas rufifrons</i> (red-fronted gazelle)	
<i>Oryx gazella</i> (antelope)	
<i>Giraffa camelo</i> (giraffe)	near extinction
Cuffed gazelle of the Ifoghas Ridge	near extinction
<i>Gazella leptoceros</i> (leptocère gazelle)	near extinction
<i>Addax nasomaculatus</i> (screw-horn antelope)	near extinction
<i>Vulpes zerda</i> (fennec fox)	near extinction
Jackal	near extinction
<i>Mellivora capensis</i> (ratels/badger)	near extinction
<i>Paraechinus aethiopicus</i> (desert hedgehog)	near extinction
<i>Libyca ocreata</i> (Libyan cat)	near extinction
<i>Vulpes ferrilata</i> (sand fox)	near extinction
<i>Felis margarita</i> (sand cat)	near extinction
Bird	
<i>Struthio camelus</i> (ostrich)	near extinction
<i>Otididae</i> (bustard)	
<i>Falco peregrinus</i> (peregrine falcon)	
Courvite	
<i>Alaudidae</i> (lark)	
Reptile	
<i>Natrix natrix</i> (grass snake)	
<i>Bitis cornuta</i> (horned viper)	
<i>Aspidoscelis uniparens</i> (whip-tail lizard or uromastix)	
Monitor	
<i>Eublepharus macularius</i> (gecko)	
Insect	
<i>Mantes érémiaphiles</i>	
<i>Coléoptères</i>	
Pimelia	
Sphinx butterfly	
Pilgrim locust	
Sahélien Zone	
Animal	
<i>Alcelaphus bubalis</i> (antelope)	near extinction
<i>Nanger dama</i> (dama gazelle)	near extinction
<i>Gazella dorcas</i> (dorca gazelle)	near extinction
<i>Eudorcas rufifrons</i> (red-fronted gazelle)	near extinction

Name	Status (if known)
<i>Loxodonta africana</i> (elephant)	near extinction
Hyena	
Jackal	
<i>Panthera leo</i> (lion)	rarely seen
Panther	rarely seen
Bird	
<i>Otididae</i> (bustard)	
<i>Struthio camelus</i> (ostrich)	
<i>Numididae</i> (guinea fowl)	
<i>Pterocles alchata</i> (pin-tailed sandgrouse)	
Serpent-eater	
<i>Sarcorhamphus sacra</i> (vulture)	
<i>quelea quelea</i> (red-billed quelea)	
Reptile	
<i>Natrix natrix</i> (grass snake)	
Varan	
Monitor	
<i>Naja naja</i> (Cobra)	
<i>Morelia</i> (Python)	
<i>Testudinidae</i> (tortoise)	
Insect	
<i>Locusta migratoria</i> (migrating locusts)	
<i>Oedaleus, Ailopus, Acrotylus, Pockiloceru</i> (non-migrating locusts)	
Sudanian Zone	
Animal	
<i>Tragelaphus scriptus</i> (Guib harnessed)	
<i>Redunca arundinum</i> (reedbuck)	
<i>Ourebia ourebi</i> (antelope)	
<i>Phacochoerus aethiopicus</i> (warthog)	
<i>Kobus kob kob</i> (impala)	
<i>Panthera leo</i> (lion)	
<i>hyaena hyaena</i> (striped hyena)	
Jackal	
<i>Vivera civetta</i> (African civet)	
<i>Hippopotamus amphibius</i> (hippopotamus)	
<i>Trichechus senegalensis</i> (manatee)	
Primate	
<i>Simia hamadryas</i> (baboon)	
Red monkey	
<i>Cercopithecus aethiops</i> (green monkey)	
Rodent	
<i>Atherurus africanus</i> (porcupine)	

Name	Status (if known)
<i>Lepus capensis</i> (hare)	
<i>Xerus</i> (African ground squirrel)	
<i>Cricetomys gambianus</i> (Gambian rat)	
Bird	
Stork	
<i>Numididae</i> (guinea fowl)	
<i>Francolinus</i> (francolin)	
<i>Streptopelia turtur</i> (turtle-dove)	
<i>Otididae</i> (bustard)	
<i>Ploceidae</i> (weaver)	
Reptile	
<i>Natrix natrix</i> (grass snake)	
<i>Vipera berus</i> (viper)	
<i>Naja naja</i> (cobra)	
python	
lizard	
<i>Crocodylus</i> (crocodile)	
<i>Testudinidae</i> (tortoise)	
Insect	
<i>Glossina</i> (tsetse fly)	
<i>Acrididae</i> (puant locust)	
sorghum fly	
beetle	
<i>cétoïnes</i>	
butterfly	
<i>Aphis gossypii</i> (aphid)	
Guinean Zone	
Animal	
<i>Panthera leo</i> (lion)	rare
<i>Crocodylus</i> (crocodile)	rare
<i>Canis aureus</i> (common jackal)	rare
<i>Orycteropus afer</i> (aardvark)	rare
<i>Mellivora capensis</i> (ratels/badger)	rare
<i>Galago senegalensis</i> (bush baby)	rare
White-backed vulture (<i>Gyps africanus</i>)	rare
Turtle	rare
<i>Testudinidae</i> (tortoise)	rare
<i>Kobus ellipsiprymmus</i> (Defassa waterbuck)	threatened
<i>Panthera pardus</i> (leopard)	near extinction
<i>Bison bison</i> (buffalo)	near extinction
<i>Lycaon pictus</i> (wild dog)	near extinction
<i>Trichechus senegalensis</i> (manatee)	near extinction

Name	Status (if known)
<i>Pan troglodytes</i> (chimpanzee)	near extinction
<i>Eland Taurotragus derbianus</i> (derby eland)	near extinction
<i>Alcelaphus bubalis</i> (antelope)	near extinction
<i>Manis gigantea</i> (giant pangolin/reptile)	near extinction
<i>Potamochoerus porcus</i> (bush pig)	near extinction
Bird	
Grand duke	threatened
Fisher eagle	threatened
<i>Bucorvus</i> (ground hornbill/grand calao)	rare
Vulture	rare
<i>Falco peregrinus</i> (peregrine falcon)	near extinction
Niger Delta	
Animal	
<i>Panthera leo</i> (lion)	rare
Hyena	rare
Otter	rare
<i>Kobus ellipsiprymmus</i> (Defassa waterbuck)	rare
<i>Alcelaphus bubalis</i> (antelope)	rare
<i>Simia hamadryas</i> (baboon)	rare
Red monkey	rare
<i>Sylvicapra grimmia</i> (common duiker/antelope)	rare
<i>Tragelaphus scriptus</i> (harnessed guib)	rare
<i>Phacochère</i>	rare
<i>Trichechus senegalensis</i> (manatee)	threatened
<i>Eudorcas rufifrons</i> (red fronted/ruffed gazelle)	threatened
Turtle	threatened
<i>Damaliscus</i> (Damalisque antelope)	near extinction
<i>Gazella dorcas</i> (dorca gazelle)	near extinction
<i>Vulpes zerda</i> (fennec fox)	near extinction
<i>Acinonyx jubatus</i> (cheetah)	near extinction
Jabiru <i>mycteria</i> (Jabiru stork)	threatened
Black and white corbel	threatened
Bird	
<i>Ciconia abdimii</i> (Abdim stork)	rare
<i>Otididae</i> (bustard)	rare
Serpent eater	threatened
Fisher eagle	threatened
<i>Pelecanus</i> (pelican)	threatened
Crowned crane	threatened
<i>Leptoptilos</i> (Marabou stork)	threatened
<i>Falco peregrinus</i> (peregrine falcon)	threatened
Vulture	threatened

Name	Status (if known)
<i>Quelea quelea</i> (migrating birds from Mali to Europe)	
<i>Quelea erythropus</i> (migrating birds from Mali to Europe)	
<i>Hippopotamus amphibius</i> (hippopotamus)	rare
<i>Crocodylus</i> (crocodile)	rare
Important Fish Species	
<i>Alestes</i>	
<i>Synadontis, Hydrocyon</i>	
<i>Tilapia</i>	
<i>Labeo</i>	
<i>Lates</i>	
<i>Bagrus</i>	
<i>Mormyrus</i>	
<i>Citharinus</i>	

ANNEX C. IUCN RED LIST FOR MALI

The table below presents the Critically Endangered, Endangered, and Vulnerable IUCN Red List Species and population trends for Mali

Species	Population Trend
Critically Endangered (4)	
<i>Addax nasomaculatus</i> (addax)	decreasing
<i>Geronticus eremita</i> (northern bald ibis)	decreasing
<i>Nanger dama</i> (dama gazelle)	decreasing
<i>Pristis perotteti</i> (largetooth sawfish)	decreasing
Endangered (7)	
<i>Falco cherrug</i> (saker falcon)	decreasing
<i>Gazella leptoceros</i> (slender-horned gazelle)	decreasing
<i>Lycaon pictus</i> (African wild dog)	decreasing
<i>Neophron percnopterus</i> (egyptian vulture)	decreasing
<i>Pan troglodytes</i> (common chimpanzee)	decreasing
<i>Pteleopsis habeensis</i>	(needs updating)
<i>Vepris heterophylla</i>	(needs updating)
Vulnerable (19)	
<i>Acinonyx jubatus</i> (cheetah)	decreasing
<i>Acrocephalus paludicola</i> (aquatic warbler)	decreasing
<i>Afzelia africana</i> (afzelia)	
<i>Ammotragus lervia</i> (aoudad)	decreasing
<i>Aquila clanga</i> (greater spotted eagle)	decreasing
<i>Circaetus beaudouini</i> (Beaudouin's snake-eagle)	decreasing
<i>Eudorcas rufifrons</i> (red-fronted gazelle)	decreasing
<i>Falco naumanni</i> (lesser kestrel)	decreasing
<i>Gazella dorcas</i> (dorcas gazelle)	decreasing
<i>Geochelone sulcata</i> (African spurred tortoise)	(needs updating)
<i>Gilletiodendron glandulosum</i>	(needs updating)
<i>Hippopotamus amphibius</i> (common hippopotamus)	decreasing
<i>Khaya senegalensis</i> (dry zone mahogany)	(needs updating)
<i>Marmaronetta angustirostris</i> (marbled teal)	decreasing
<i>Panthera leo</i> (lion)	decreasing
<i>Pavetta lasioclada</i>	(needs updating)
<i>Torgos tracheliotos</i> (lappet-faced vulture)	decreasing
<i>Trichechus senegalensis</i> (West African manatee)	unknown
<i>Trigonoceps occipitalis</i> (white-headed vulture)	decreasing

Source: 2008 IUCN Red List of Threatened Species. <www.iucnredlist.org>. Retrieved November 12, 2008.

ANNEX D. BROAD VEGETATION TYPES OF MALI

