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BURUNDI ENVIRONMENTAL THREATS AND OPPORTUNITIES ASSESSMENT (ETOA)



September 2010

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DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government

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ACRONYMS

AfDB	African Development Bank
ABO	Association Burundaise pour la Protection des Oiseaux
ACVE	Green Belt Action for the Environment
ADICN	Association pour le Développement Intégré et la Conservation de la Nature
AfDB	African Development Bank
AFEB	Association of Women for the Environment in Burundi
APB	Abattoir Public de Bujumbura
AWF	African Water Facility
BIF	Burundi francs
CARPE	Central African Regional Program for the Environment (USAID)
CBD	Convention on Biological Diversity
CEPGL	Plant Protection Convention in the Great Lake Economic Community members
CERADER	Development Research Center
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
CNDD FDD	Conseil National pour la Défense de la Démocratie-Forces pour la Défense de la Démocratie
CNTB	Commission National Terre et Autres Biens,
COGERCO	Compagnie de Gérance du Coton
COMIFAC	Central African Forest Commission
CRS	Catholic Relief Services
DAFA	Directorate of Animation and Agricultural Training
DCA	Development Credit Authority
DEPP	Directorate of Water, Fishery and Fish Farming
DFPS	Directorate of Fertilization and Protection of Soils
DGE	General Directorate of Livestock
DGHER	General Directorate of Hydraulics and Rural Energies
DGMAVA	General Directorate of Mobilization for Self-Development and Agricultural Extension

DPAE	Provincial Directorates of Agriculture and Livestock
DPPA	Directorate for the Promotion of Animal Production
DPSP	Directorate for the Promotion of Seeds and Plants
DPV	Directorate of Plants Protection
DRC	Democratic Republic of Congo
DSA	Directorate of Animal Health
EAC	East African Community
EIAs	Environmental Impact Assessments
ETOA	Environmental Threats and Opportunities Assessment
EU	European Union
FAA	Foreign Assistance Act
FAO	United Nations Food and Agriculture Organization
FNL	National Liberation Forces
GDA	Global Development Alliance
GDP	Gross Domestic Product
GEF	Global Environment Facility
GGE	Greater Gombe Ecosystem
GHG	Greenhouse Gases
GIS	Geographic information system
GoB	Government of Burundi
GTZ	German Technical Cooperation
IDPs	Internally displaced persons
IGCP	International Gorilla Conservation Programme
IGEBU	Geographic Institute of Burundi
INECN	National Institute for the Environment and Nature Conservation
IPPC	The International Plant Protection Convention
IRAZ	Institut de Recherche Agricole et Zoologique (Zootechnic Research Institution)
IUCN	International Union for the Conservation of Nature
IUCN-LLS	World Conservation Union Living Landscapes Strategy project,
JGI	Jane Goodall Institute
LACA	Laboratory of Control and Chemical Analysis

LLS	Landscape and Livelihoods Strategy
LTA	Lake Tanganyika Authority
MCC	Millennium Challenge Corporation
MEEATU	Ministère de l'Eau, de l'Environnement, de l'Aménagement Territoire, and de l'Urbanisme (formerly MINATET [Ministère de l'Aménagement du Territoire, de l'Environnement et du Tourisme])
MEO	Mission Environmental Officer
MINAGRIE	Ministère de l'Agriculture et de l'Elevage
MINATET	Ministère de l'Aménagement du Territoire, de l'Environnement et du Tourisme (known as MINEATP Ministère de l'Environnement, de l'Aménagement du Territoire et des Travaux Publiques in 2007 and named MEEATU in 2009)
MOU	Memorandum of Understanding
MYAP	Multi-Year Assistance Program
NAPA	National Action Plan for Adaptation
NBI	Nile Basin Initiative
NELSAP	Nile Equatorial Lakes Subsidiary Action Program (NBI)
NGO	Non-Governmental Organization
NRM	Natural Resource Management
NTEAP	Nile Transboundary Environmental Action Project
OCIBU	Office du Café du Burundi
ODEB	Organisation de défense de l'environnement au Burundi
OHP	Office Burundais de l'Huile de Palme
ONATOUR	The National Peat Office
ONT	National Tourism Office
OTB	Office du Thé du Burundi
PA	Protected Area
PABV	Project implementation on reforestation and protection of watershed (Watershed Management Project [AfDB])
PNLAE	Programs to fight against erosion is ongoing
POPs	Persistent Organic Pollutants
PRASAB	Agricultural Rehabilitation and Sustainable Land Management Project (UNDP/GEF)
PRSP	Poverty Reduction Strategy Paper
RdB	Republique du Burundi

REDD	Reducing Emissions from Deforestation and forest Degradation
REGIDESO	The Board of Production, Distribution of Water and Electricity
RoB	Republic of Burundi
SETEMU	Institute for Waste Management
SO	Strategic Objective
SODECO	Société de Déparchage et de Conditionnement du Café
SOGESTAL	Sociétés de Gestion des Stations de Lavage du Café
SOW	Scope of Work
SRD Imbo	Société Régionale de Développement Imbo
SVP	Shared Vision Program
TKTIWRDP	Transboundary Integrated Water Resources Development Project
UNCCD	United Nations Convention to Combat the Desertification
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USF IP	United States Forest Service, International Programs
WCS	Wildlife Conservation Society

EXECUTIVE SUMMARY

Burundi is a small landlocked country that straddles the Congo and Nile divide in the Great Rift Valley and is bordered by Rwanda, Tanzania, and the Democratic Republic of Congo. With one of the densest populations in Africa, over 90% of its population is dependent on subsistence agriculture. Burundi recently emerged from a destructive civil war, but shows much promise in moving towards democratic processes. The civil war destroyed much of what little environmental conservation strides had been made in the 1980s and 1990s, in effect putting efforts on hold for 15 years. The country joins the East African Community alongside Rwanda with high aspirations for economic and rural development.

Although most of its natural habitat has been converted or destroyed, Burundi still retains some key ecosystems in the Rift Valley that are essential to conserve. The Kibira National Park is one of the last remaining intact stretches of Afro-montane forests in the region; the Ruvubu Park in the east is a unique region of woodlands and savannah and related fauna; the Northern Aquatic Landscape (*Lacs du Nord*) is an important bird habitat for migrating species; and Lake Tanganyika, as one of the largest lakes in the world, presents food for thought in all sectors. Burundi is home to thousands of bird species, charismatic chimpanzee populations, roaming buffalo, the popular Sangala, colorful cichlid fishes, crocodiles, hippos, and many other animal species.

Simultaneously, its land faces enormous population pressures for agricultural expansion and the repatriation of refugees. Land conflicts abound in a patchwork of ever-diminishing property for cultivation. No functional land use planning or management system is in place at any level to properly coordinate development and conservation. The growing population places increasing stress on the country's natural resources, compounded with the high vulnerability to the effects of climate change of many areas in Burundi. The Government of Burundi has made great strides in institutional development, but has far to go to repair the damage of a lost generation of legal/technical/regulatory governance and management structures. Despite the development of revised policies and codes relating to the environment, the implementing regulations, authority, and monitoring systems are missing, making the legal/regulatory framework incomplete and thus rendering those laws largely ineffective.

Opportunities should be approached from an integrated natural resources management (NRM) standpoint that examines the entire health of the ecosystem and intimately involves populations dependent on the land. Institutional capacity building of relevant government agencies is identified as a significant opportunity to improve NRM and mitigate conflict. Agricultural production projects should use integrated approaches to watershed management, aggressively incorporating reforestation, soil conservation, climate change adaptation techniques, and alternative livelihood development. National NRM policy and law revisions need to be supported in their enactment at national and local levels. A lack of effective land use planning is a primary driver of land conflict, requiring focused reform and inter-ministry coordination. Transboundary coordination and collaboration is also essential to Burundi's development.

It is hoped that this Environmental Threats and Opportunities Assessment will be used by USAID and its partners to orient their current and future programming to better address the identified threats to the environment and prioritize opportunities for intervention.

RÉSUMÉ EXÉCUTIF

Le Burundi est un petit pays sans accès à la mer, à cheval sur la ligne de partage entre le Congo et le Nil dans la vallée du grand rift. Il est entouré du Rwanda, de la Tanzanie et de la République démocratique du Congo (RDC). Ce pays est l'un des plus densément peuplés d'Afrique avec 90% de sa population tributaire de l'agriculture de subsistance. Le Burundi sort d'une récente guerre civile destructrice mais les promesses d'un processus démocratique sont tangibles. Cette guerre civile a détruit une grande partie des réalisations dans le domaine de la conservation de l'environnement dans les années 1980 et 1990 et a suspendu pendant 15 ans les efforts entrepris. Le pays a rejoint la Communauté d'Afrique de l'Est, en même temps que le Rwanda avec de grandes aspirations de développement économique et rural.

Si le milieu naturel a été en majeure partie converti ou détruit, le Burundi conserve quelques écosystèmes clés dans la vallée du rift pour lesquels la préservation est indispensable. Le Parc national de Kibira est l'une des dernières étendues intactes de forêts de l'Afromontane dans la région ; le parc de Ruvubu à l'est est une région unique de zones boisées et de savanes avec la faune associée ; les Lacs du Nord constituent un habitat important pour les oiseaux migrateurs tandis que le lac Tanganyika, l'un des plus grands du monde, est à prendre en considération dans tous les secteurs. Le Burundi abrite des milliers d'espèces d'oiseaux, des populations emblématiques de chimpanzés, des troupeaux de buffles, le populaire sangala, des cichlides colorés, des crocodiles, des hippopotames et de nombreuses autres espèces animales.

Les terres sont par ailleurs soumises à une énorme pression démographique liée à l'expansion agricole et au rapatriement de réfugiés. Les conflits liés à ces terres sont nombreux dans un contexte où les propriétés consacrées aux cultures sont en diminution constante. Il n'existe aucune planification foncière opérationnelle ni système de gestion de l'utilisation des terres, à quelque niveau que ce soit, qui permette de coordonner le développement et la conservation. La croissance démographique est une source de pression de plus en plus forte sur les ressources naturelles du pays, aggravée par la forte vulnérabilité aux changements climatiques de plusieurs régions du Burundi. Le gouvernement du Burundi a fait de grands progrès en termes de développement institutionnel, mais il doit faire d'importants efforts pour réparer les dégâts d'une génération qui n'a pas connu de structures juridiques/techniques/réglementaires de gouvernance et de gestion. Malgré l'élaboration et la révision de politiques et de codes dans le domaine de l'environnement, il manque les règlements, les autorités et les systèmes de suivi qui permettraient leur mise en œuvre. Ces lois restent donc largement sans effet.

Il faudrait envisager des approches intégrées de gestion des ressources naturelles (GRN) qui prendraient en compte la santé de l'écosystème dans son ensemble et impliqueraient étroitement les populations tributaires de la terre. Le renforcement des capacités institutionnelles des agences gouvernementales concernées est une opportunité majeure d'amélioration de la GRN et d'atténuation des conflits. Les projets de production agricole doivent impliquer des approches intégrées de la gestion des bassins versants, incluant de manière active le reboisement, la conservation des sols, les techniques d'adaptation aux changements climatiques et le développement de moyens alternatifs de subsistance. L'application des lois et des politiques de GRN révisées au niveau national doit être soutenue aux niveaux national et local. L'absence d'une planification effective de l'utilisation des terres est un facteur majeur de conflits fonciers et requiert une réforme ciblée et une coordination entre les différents ministères. Une coordination et la collaboration transfrontalières sont également indispensables au développement du Burundi.

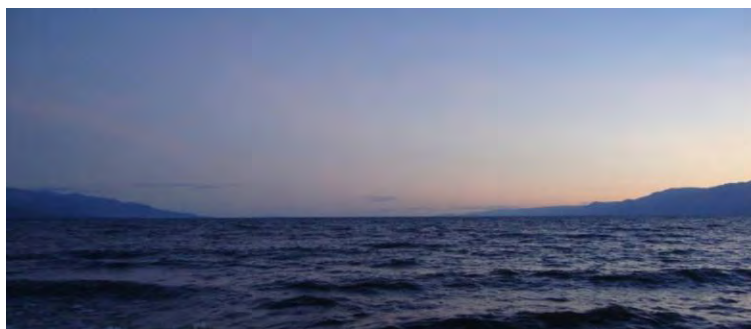
Nous espérons que cette évaluation des menaces et des opportunités environnementales sera utilisée par l'USAID et ses partenaires pour orienter leurs programmes actuels et futurs, afin d'apporter de meilleures réponses aux menaces identifiées pour l'environnement et de déterminer les priorités quant aux opportunités d'intervention

I. INTRODUCTION

I.1 PURPOSE

The purpose of this work is to deliver to the U.S. Agency for International Development (USAID) Burundi Program (USAID/Burundi) a countrywide Environmental Threats and Opportunities Assessment (ETOA) with a special focus on forestry, biodiversity conservation, climate change, water, land use, and transboundary needs and related issues analysis that will inform the USAID/Burundi Operational and Strategic plans in the coming years. This assessment will provide recommendations to USAID/Burundi on how to efficiently contribute to the conservation needs identified, and plan for environmentally sound development and humanitarian interventions in its programming portfolio in the short and medium terms. The last ETOA of USAID/Burundi was conducted in 2003, and the last update on 118/119 analysis was in 2005.

The United States Department of Agriculture (USDA) Forest Service International Programs office (USFS IP) has a long history of promoting sustainable natural resource management throughout Africa. USFS IP links the skills of its 35,000 domestic technical experts with partners through short-, medium-, and long-term technical assistance assignments to apply sound natural resources management principles. USFS IP currently works in more than 15 African countries in collaboration with host country governments and USAID, including past missions in Burundi, Rwanda, Tanzania, the Democratic Republic of Congo (DRC), and other eastern and central African countries in the areas of forest management, land use planning, extractive industries, community-based natural resources management, recreation, biodiversity and habitat conservation, watershed management, and grazing. At the request of USAID, USFS/IP executed the 2010 Burundi ETOA.



Sunset on the northern shore of Lake Tanganyika, with Burundi on the left and DRC on the right.

I.2 METHODOLOGY AND ORGANIZATION

The 2010 ETOA field interviews were undertaken from April 21 to May 5, 2010 by a team of four experts, led by USFS IP. USAID/Africa Bureau in Washington, DC, USAID/East Africa, and USAID/Burundi provided valuable background, direction, and support. A work plan was designed based on the Scope of Work (SOW) put forward by USAID, and a meeting itinerary was drafted based on background reading. This itinerary was approved by USAID. The team spent 14 days in Burundi conducting field interviews with various individuals, Government of Burundi (GoB) entities, NGOs, donor agencies, field agents, and community associations (a complete list of the meetings schedule is detailed in **Annex 5: ETOA Itinerary and Key Contacts**). Upon completion of the field interviews, the team compiled and analyzed relevant documents (see attached CD-ROM and **Annex 6: Bibliography**). A draft report was delivered to and reviewed by USAID; comments and edits were incorporated into the final report. A public version of this document will be circulated to USAID partners in order to facilitate collaboration and cooperation.

The primary sectors identified to focus on for the 2010 ETOA were: Forestry, Biodiversity, Climate Change, Water Resources, Land Use, and Transboundary Issues. Following the introduction, which gives a synopsis of the context and framework in Burundi, the ETOA details for each primary area focus:

- 1) General overview of the issue
- 2) Primary threats identified
- 3) Actions of non-GoB initiatives and a Sector Gap Analysis
- 4) Opportunities for future program and project intervention

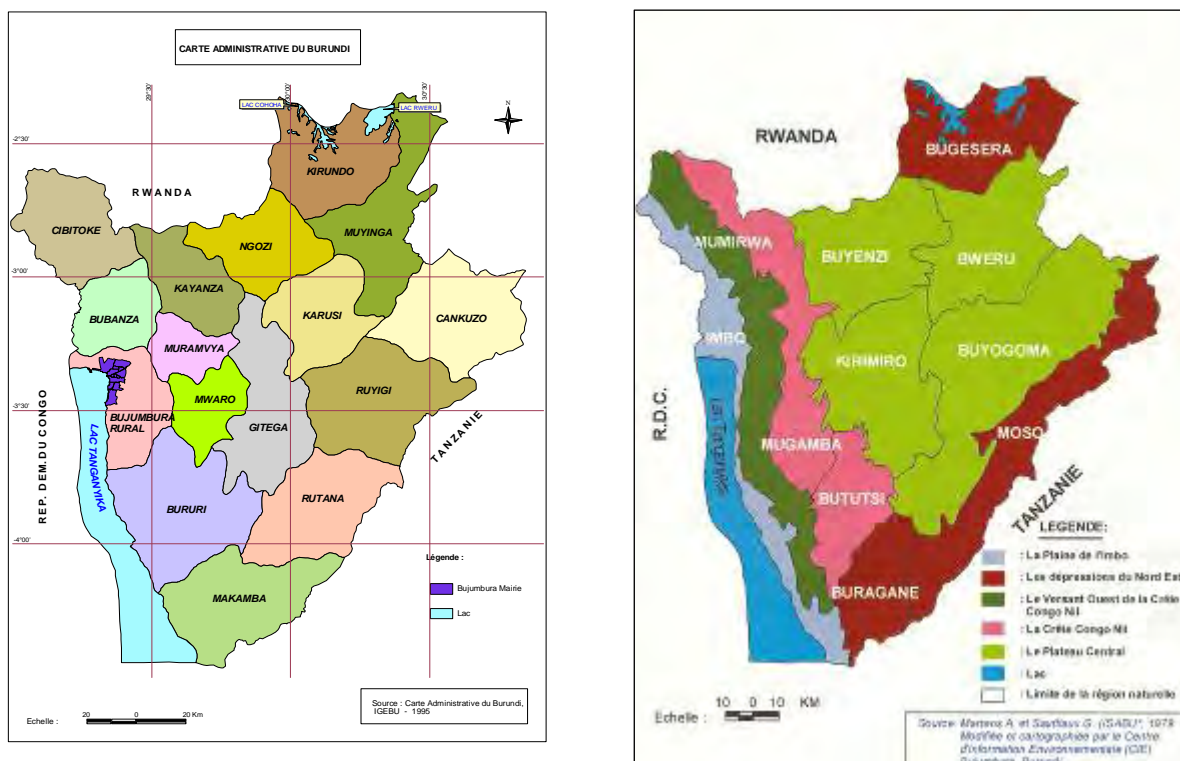
The opportunities within the primary focus sectors are summarized, prioritized, and synthesized (see Section 9), and subsequently analyzed within the context of USAID past, current, and future programming (see Section 10). Relevant additional information is attached in annexes at the end of the ETOA.

I.3 HISTORICAL/POLITICAL/SOCIO-ECONOMIC CONTEXT

Burundi is a small country of 27,834 km² of which 25,200 km² are terrestrial. It is located in the Great Lakes region of Africa between the meridians 29°00 and 30°54' East and the parallels 2°20' and 4°28' South. Without access to the sea, Burundi is located between the Republic of Rwanda to the north, the Democratic Republic of Congo to the west, and the United Republic of Tanzania to east and south. It borders Lake Tanganyika, covering 32,600 km², of which 2,634 km² is within Burundian waters. The overall climate is tropical humid with rainfall and temperature heavily influenced by altitude in this region (see Table 1). The rainy season typically occurs between October-May with a dry season between June-September, and a short period of rain for two weeks in January. The rainfall varies from 2,000 mm in higher altitudes to 1,000 mm in the depressions. Water and the hydrological system are abundant while the country's forest cover is low (less than 5%). The climate and soils are generally favorable to agriculture, allowing a wide range of food and cash crops.

Burundi's relief is typical of the Great Rift of eastern Africa, which gave place to the formation of Lake Tanganyika. The country is divided into 11 natural regions that can be grouped into four ecological zones: the western plain of Imbo; the Congo-Nile divide; the Central Highlands; and the Kumoso depression to the east and the Bugesera basin to the northeast. This diversity of ecological conditions confers a great richness of natural ecosystems and plant and animal species over its expanse. Indeed, natural ecosystems provide many services to the people of Burundi, including firewood, timber, medicinal plants, food crops, drinking water, irrigation, etc.

Figure 1: Burundi political and environmental maps



RECENT ENVIRONMENTAL HISTORY

Unfortunately, due primarily to high population pressure on natural habitats and biological resources, there has been a gradual disappearance of much of the original natural forest ecosystems with associated impacts on the biodiversity, namely extirpation of several large mammals (e.g., elephants *Loxodonta africana* and gorillas *Gorilla gorilla*). After independence, the environment in Burundi has been characterized by destruction, land cover, and use change due to agriculture extension and the massive exploitation of forests and wildlife. The high population growth (2.7% per year) continues to lead to high pressure on natural resources. In a country where the economy is based on agriculture, any degradation of these resources has serious impacts on the nutrition of the population.

Following the Stockholm Conference on the Environment in 1972, on March 3, 1980 Burundi established several National Parks and Nature Reserves along with the National Institute for the Nature Conservation (INECN) for implementation of the decision on protected areas (PAs). In October 1989, the Ministry of Environment was created; INECN moved under the management of this Ministry and expanded its scope of activity on the environment in general.

Since 1980, INECN has created 14 protected areas, expropriating the population,¹ resulting in high levels of conflict and tension between the surrounding population and the protected areas. Thus, of these 14 protected areas, only four have legal delimitation. From 1993, the country faced social and political crisis, and degradation of the environment has worsened with increased population settlement

¹ Often without prior consent or compensation or with insignificant amounts paid late, based on an old law of 1956.

and the distribution of properties within and around protected areas, State-owned forests, sensitive watersheds, and natural areas by provincial and communal administrative officials. Despite the existence of land and property commissions,² the return of refugees in 1972 and 1993 exerted great pressure on protected areas.³ Households have settled inside and continue expanding agricultural fields in violation of the law governing protected areas and the environment in general with the support of the administration, which no longer knows where to put returnees or who speculate to acquire land for agriculture or house buildings.

POLITICAL CONTEXT

During the last 10 years, Burundi has evolved on a regional level, in an area of the Great Lakes region that was characterized by a situation of insecurity, armed conflicts, and population movements. At the national level, an environment of uncertainty and instability, exacerbated by the weather and natural disasters, has led to a fall in food production, so that Burundi periodically faces starvation in the provinces of Kirundo and Muyinga.

Burundi has passed important markers in peace-building with the support of the international community. In 2005, elections were held and brought to power CNDD FDD,⁴ a former rebel group. The National Liberation Forces (FNL), the last armed rebel movement, has abandoned war and was approved as a political party in April 2009 and integrated into the defense and security bodies and institutions.

It is important to note that the first crisis of 1972 was an ethnic slaughter that resulted in the displacement and death of many Hutus, especially in the south, where many fled towards Tanzania. The second crisis was triggered by the death of the first democratically elected President in 1993.

SOCIO-ECONOMIC CONTEXT

In 2008, the population of Burundi was estimated at 8,038,618, with approximately 51.1% women and 48.9% men (République du Burundi (RdB), 2008 Census). With 289 inhabitants/km², the density of the population of Burundi is among the highest in Africa, and it can reach 400 to 500 inhabitants/km² in some areas. Burundi is very young; children under five years account for 22% of the population, and 47% are under 15 years. Life expectancy is 44 years. The average annual growth of the population was 2.7% in 2008, and this rate could continue to grow doubling the population in 20 years. (MEEATU, 2009-Second Communication Nationale sur les Changements Climatiques du Burundi).

Burundi's Gross Domestic Product (GDP) was 318 billion Burundi francs (BIF) in 2006 (US\$ 255 million) with a growth rate of 5.5% (MEEATU 2009-Second Communication Nationale sur les Changements Climatiques du Burundi). The growth perspectives for the economy are more optimistic with the new national context of recovery of fundamental principles of the economy and the gradual consolidation of the functioning of democratic institutions. Annual income per capita has been declining since 1990: from \$214.40 to \$182.10 in 1995, and to \$109 in 2006 (MEEATU 2009-Second Communication Nationale sur les Changements Climatiques du Burundi), a decrease of more than half in 10 years primarily because of the fall in production due to the crisis experienced by the country since 1993.

² The Commission National Terre et Autres Biens, (CNTB) is responsible for: (1) pending litigation relating to land and other property, (2) identifying and retrieving land that have been improperly allocated, and (3) assigning new land to refugees.

³ Especially the nature reserves of Rumonge, Vyanda, and protected landscape of Makamba.

⁴ CNDD FDD : Conseil National pour la Défense de la Démocratie-Forces pour la Défense de la Démocratie.

A predominantly agricultural country, agriculture and livestock account for 40% and 60% of GDP (RdB, 2006). Agricultural exports (coffee, tea, cotton, etc.) represent 70-85% of export revenues. Since 2000, the country has gradually risen from a decade of negative growth (-1.8% average per year in the 1990s (United Nations Development Program (UNDP) 2009 – Rapport National sur le Développement Humain du Burundi 2009), as a result of more favorable weather conditions, recovery of coffee production, and other factors.

Practiced by more than 90% of the working population, agriculture occupies 50% of the land area of Burundi (MINAGRI 2008 - Document de Stratégie Nationale Agricole 2008-2015). The farmers exploit individual private land acquired following the customary laws, and traditionally, the average farm size per capita is less than one hectare. Due primarily to the socio-economic crisis that began in 1993, agricultural production has declined significantly, but general degradation of land and inefficient farming techniques are also strong factors.

Livestock production also declined following vandalism and the reduction of pasture space during the 1993 crisis. The lakeside populations of Lake Tanganyika and the northern lakes practice small-scale fishing, most often with unsuitable nets, reducing the fish stocks.



Smallholder agriculture dominates the landscape of Burundi

2. INSTITUTIONAL FRAMEWORK

The field of environmental conservation (both international and domestic) falls within the responsibility of several national institutions involved at various levels. General coordination is carried out by the Ministry of Water, Environment, Land Management and Urban Planning (MEEATU), which also implements the Government's policy in this area. Below, the primary ministries related to the environment, their relevant interactions, and organization are described. Please also reference **Annex 3: Relevant Environmental Laws and Strategy Documents**.

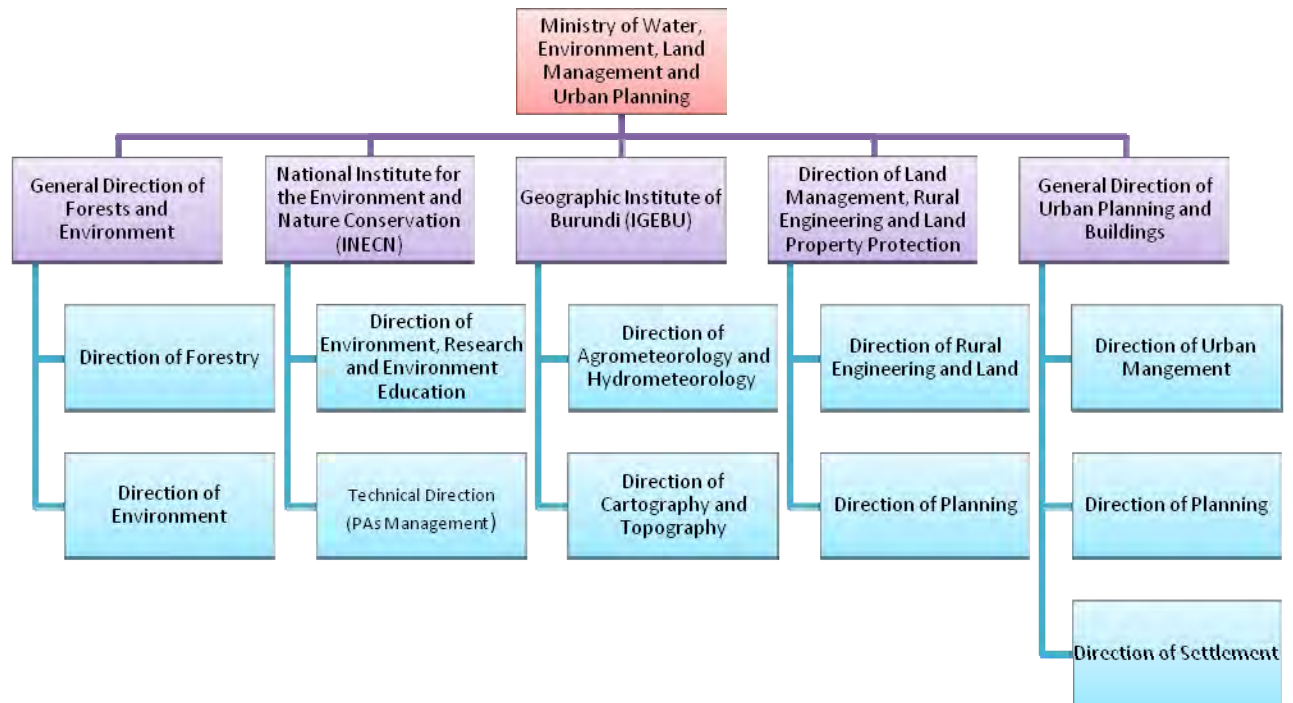
2.1 MINISTRY OF WATER, ENVIRONMENT, LAND MANAGEMENT AND URBAN PLANNING

The Ministry of Water, Environment, Land Management and Urban Planning was reorganized by Decree No. 100/108 of November 22, 2005. This Ministry was known as MINATET (Ministère de l'Aménagement du Territoire, de l'Environnement et du Tourisme) at its inception in 2005, changed to MINEATP (Ministère de l'Environnement, de l'Aménagement du Territoire et des Travaux Publiques) in 2007, and since 2009, has been known as MEEATU. Although this Ministry has changed its name several times because of some departments moving or being added, its basic responsibilities have remained the same. It is empowered for everything that concerns the development and implementation of national policy in the field of water, environment, land management, and the urban sector. It has the following objectives: promoting a coordinated management of the environment; sound management of land, water, forests, and air; preservation of ecological balance; and conservation of biodiversity.

The ministry comprises three General Directorates (see Figure 2):

1. **The General Directorate of Forests and Environment**, comprised of the Directorate of Forestry and the Directorate of Environment.
2. **The General Directorate of Land Management, Rural Engineering and Land Property Protection**, comprised of the Directorate of Planning and the Directorate of Rural Engineering and Land.
3. **The General Directorate of Urban Planning and Buildings**: This General Directorate takes care of the design and execution of Government policy in urbanization. It provides management, land allocation and designation, and declared urban land use. It coordinates all activities undertaken by other stakeholders in urban center development. This General Directorate used to be under the Ministry of Public Works; on January 29, 2009 it was moved to the Ministry of Environment (for urban centers).

Figure 2: MEEATU Organization Chart



* In 2008, the Government designated MEEATU as the governing authority of water; thus, a General Directorate of Water is currently being established.

Public institutions of an administrative nature are also placed under supervision of MEEATU:

- **Geographic Institute of Burundi (IGEBU):** The mission of IGEBU is to promote geographical activities in Burundi, namely cartography, topography, meteorology, and those relating to water resources. As far as its organization is concerned, the IGEBU comprises:
 - The Directorate of Cartography and Topography
 - The Directorate of Agrometeorology and Hydrometeorology
- **The National Institute for the Environment and Nature Conservation:** INECN has the mission of safeguarding the environment and nature conservation. To this end:
 - It collects and interprets data related to the control of the state of environment provided by different agencies, national as well as international.
 - It enforces environmental standards to combat pollution of any kind through administrative and judicial monitoring.
 - It cooperates with the authorities concerned to ensure the sound management of natural resources.
 - It creates, develops, and manages parks and nature reserves to ensure sustainability and exploitation for tourism purposes.
 - It initiates and encourages research and accompanying measures for the maintenance of biodiversity.

- It ensures the implementation of National and International Conventions relating to trade and exchange of specimens of wild fauna and flora as well as the Convention on Biological Biodiversity (CBD) and Convention on Migratory Species (CMS).
- It contributes to the promotion of environmental education in collaboration with organizations and institutions concerned.

INECN has two Directorates: the Technical Directorate, in charge of Protected Areas Management, and the Directorate of Environment, Research, and Environment Education

2.2 MINISTRY OF AGRICULTURE AND LIVESTOCK

The MINAGRI's missions are reflected in the Presidential Decree No. 100/38 of January 3, 2006 and include:

- The design, planning, coordination, and implementation of national policy on agriculture and livestock
- The organization and monitoring of agro-food processing
- The establishment of the population's sustainable food security system
- The development and implementation of national policy on protection and fertilization of soils
- The development and implementation of crop protection strategies
- The definition and implementation of national policy of mobilization for self-development and agroforestry-zootechnic popularization
- The promotion and supervision of the exploitation of water, of fishing and fish farming products, in collaboration with other concerned ministries

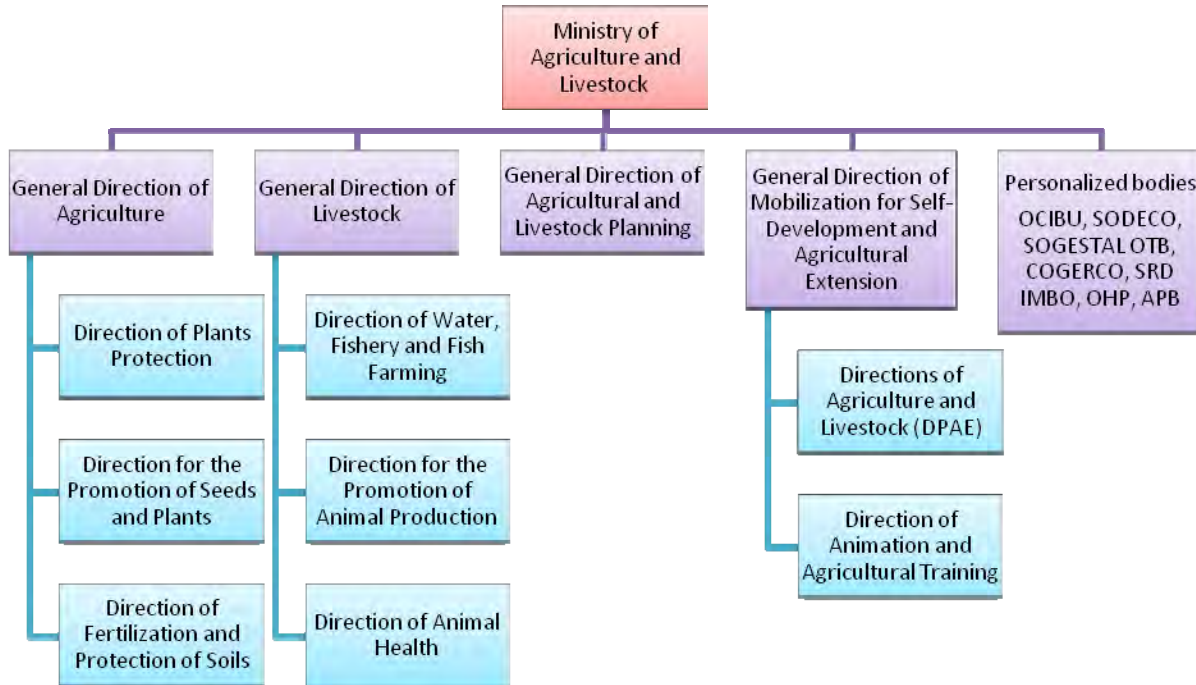
This ministry has four General Directorates(see Figure 3):

1. **The General Directorate of Agricultural and Livestock Planning**
2. **The General Directorate of Mobilization for Self-Development and Agricultural Extension (DGMAVA)** which itself has two directorates: the Directorate of Agricultural Training and Animation (DAFA), and **16 Provincial Directorates of Agriculture and Livestock (DPAE)**, which are the structure in the heart of implementation of Agricultural and Livestock Projects with a central role of outreach, coordination and monitoring.
3. **The General Directorate of Agriculture** with three Directorates (Directorate of Fertilization and Protection of Soils (DFPS), Directorate for the Promotion of Seeds and Plants (DPSP), and Directorate of Plants Protection (DPV)), technical and regulatory oriented structures in charge of the National Policy on agricultural inputs (fertilization, protection of plants and seed/seedlings).
4. **The General Directorate of Livestock (DGE)** and its three Directorates: the Directorate of Animal Health (DSA), the Directorate for the Promotion of Animal Production (DPPA), and the Directorate of Water, Fishery and Fish Farming (DEPP).
5. Autonomous managed organizations under the Ministry: Companies linked to coffee sectors (parastatal companies: OCIBU,⁵ SODECO,⁶ and SOGESTAL⁷) and the sectors of tea, cotton, rice,

⁵ OCIBU: office du Café du Burundi

and palm oil or the public slaughterhouses (public joint-venture companies: OTB,⁸ COGERCO,⁹ SRD IMBO,¹⁰ OHP,¹¹ and APB¹²).

Figure 3: MINAGRI Organizational Chart



2.3 MINISTRY OF ENERGY AND MINES

The Ministry’s mission is to design and implement government policy in geology, mining, and energy matters; promote research of geological and mining industry activities; promote the research of hydrocarbons and their exploitation; plan and supervise the actions of rural development through hydropower and electrification; promote renewable energy; and ensure the planning, construction, and management of hydraulic and energy infrastructure in collaboration with other ministries concerned.

This Ministry has two directoratea (see Figure 4):

1. **The General Directorate of Water and Energy**, comprised of the Directorate of Hydraulic Resources and the Directorate of Energy.

⁶ SODECO: Société de Déparchage et de Conditionnement du Café

⁷ SOGESTAL: Sociétés de Gestion des Stations de Lavage du Café

⁸ OTB: Office du Thé du Burundi

⁹ COGERCO: Compagnie de Gérance du Coton

¹⁰ SRD Imbo: Société Régionale de Développement Imbo

¹¹ OHP: Office Burundais de l’Huile de Palme

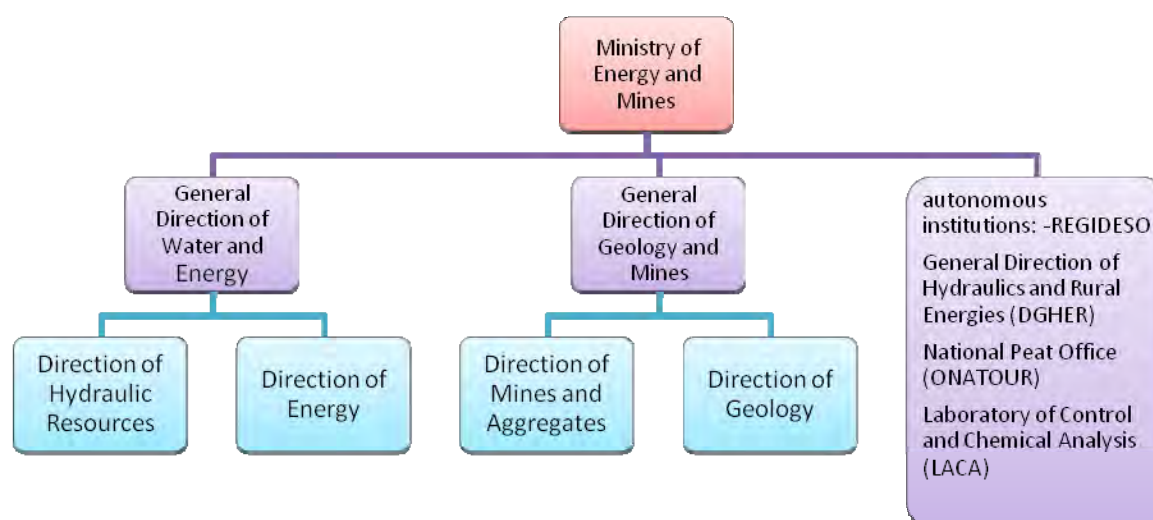
¹² APB: Abattoir Public de Bujumbura

2. **The General Directorate of Geology and Mines**, comprised of the Directorate of Geology and the Directorate of Mines and Aggregates.

The Ministry also has autonomous managed institutions under its authority:

- **The Board of Production, Distribution of Water and Electricity (REGIDESO)**, whose mission is to produce, transport, distribute and sell water and electricity in urban-oriented centers.
- **The General Directorate of Hydraulics and Rural Energies (DGHER)**, whose mission is to supply water and electricity in rural areas.
- **The National Peat Office (ONATOUR)**, which exploits and sells peat and its derivatives.
- The **Laboratory of Control and Chemical Analysis (LACA)**, which carries out the geological and mining inventory and physico-chemical analyses.

Figure 4: Ministry of Energy and Mines



2.4 MINISTRY OF PUBLIC HEALTH

The Ministry of Public Health has the mission of improving the population's health. It does many things to achieve this, but regarding the environment, we would highlight Directorate of the Promotion of Health, Hygiene, and Sanitation

The Directorate of the Promotion of Health, Hygiene, and Sanitation. This Directorate's mission is to promote public hygiene as well as environmental hygiene for sustainable human environment; contribute to the establishment of a monitoring system of water quality in collaboration with institutions in charge of supplying drinking water; mobilize the population to adopt behaviors, attitudes, and practices conducive to health; and contribute to all activities related thereto.

2.5 BUJUMBURA MAYORSHIP

The mission of the Mayor's office is to manage Bujumbura Town. It is responsible for many things, but regarding the environment, we are highlighting the Institute for Waste Management (SETEMU).

Institute for Waste Management. SETEMU is a municipal public institution in charge of the management of the municipal sanitation infrastructure. It is currently placed under the primary supervision of Bujumbura City Mayor and also responsible to the Home Affairs Minister.

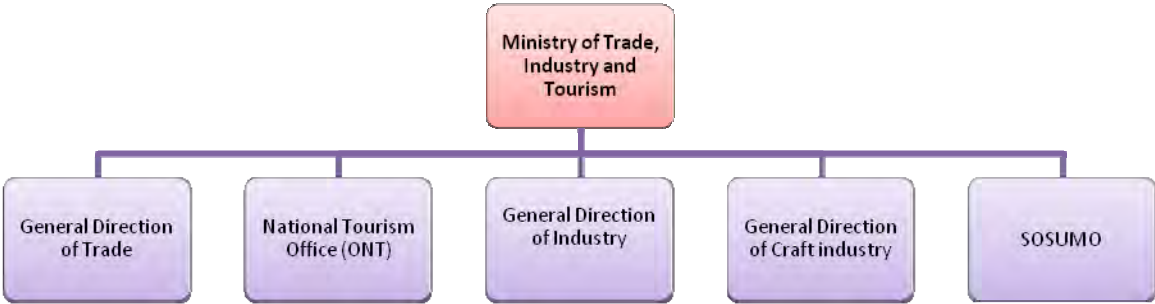
The SETEMU was created by the decree of July 12, 1983 with the following main tasks: the purification of wastewater and rainwater in Bujumbura City, the removal of solid waste, the management of urban highways, the construction and maintenance of collective facilities, and studies and other investment projects on behalf of the Mayor, the State or third parties;

2.6 MINISTRY OF TRADE, INDUSTRY, AND TOURISM

The main tasks of the Ministry of Trade, Industry, and Tourism are the design and implementation of government policy on trade, industry, and tourism, and the development of strategies of promotion and development of these different sectors. (See Figure 5)

National Tourism Office (ONT). As the official body representing the GoB in tourism, the National Tourism Office’s main mission is the promotion and formation of the tourism product, its promotion inside and outside the country, and quality control of services in hotel and tourism institutions. All these actions are aimed to stimulate public and private investment initiatives. Over the last 20 years, the ONT has been moving between the Ministry of Trade, Industry, and Tourism and the Ministry of Environment. It has been under the Ministry of Trade since November 14, 2007.

Figure 5: Ministry of Trade, Industry, and Tourism Organization Chart



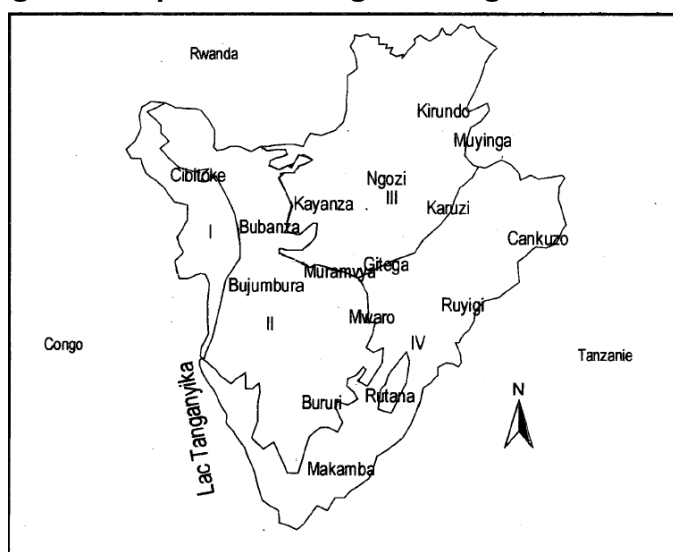
3. FORESTS

3.1 OVERVIEW

FOREST ECOLOGICAL TYPES AND CHARACTERISTIC SPECIES

The forests of Burundi fall within Africa’s most biologically rich region – the Albertine Rift ecological region. The natural forests cover four distinct ecoregions: the Imbo Plain, the Congo-Nile divide, the central plateau, and the Kumoso and Bugesera depression, as shown in Figure 6 (Bigendako et al., 2009). Nearly 3,000 species of higher plants have been identified in Burundi with more than half found within the Congo-Nile divide. Table 1 presents the dominant vegetation assemblages in each of the four ecoregions.

Figure 6: Map of the four agro-ecoregions of Burundi



I – Imbo plain ; II - Congo-Nile divide ; III – Central plateau ; IV - Kumoso and Bugesera depression

Table 1: Representative tree species by agro-ecoregion

Ecoregion	Representative tree species
Imbo plain	Acacia polyacantha, Tephrosia vogelii, Vernonia amygdalina, Cordia Africana
Congo-Nile divide (Afromontane)	Albizia gummifera, Cassia didymobotrya, Entandrophragma excelsum, Ficus thonningii, Podocarpus usambarensis, Prunus africana
Central plateau	Acacia sieberana, Acacia polyacantha, Sesbania sesban, Trema orientalis
Kumoso and Bugesera depression	Azelia quanzensis, Carissa edulis, Cordia Africana, Entadaabyssinica, Pterocarpus tinctorius, Sapium ellipticum

Due to heavy pressure on the forest resources, the vast majority of forests has been converted to other land cover and land uses, including “artificial” plantation forests. These plantation forests were originally established throughout the country on hill tops and steep slopes. These forests are composed primarily

of exotic species such as Eucalyptus, Cupressus (Cedar), Grevillea, and Pine (Schlaifer M. and P. Ntahompagaze, 2007).

BASIC FOREST STATISTICS AND TRENDS

It has been estimated that various natural forest types once covered 30-50% of the national territory (USAID/REDSO, 2003). Pressure on the resource (see “threats” below) over time has greatly reduced the forest cover, currently leaving a largely degraded landscape, its vast majority converted to subsistence agriculture with a few pockets of non-native tree plantations and isolated and scattered natural forests. Indeed, during the 1990s, it was suggested that Burundi was experiencing the highest deforestation rate in the world, at 9% (Athman et al., 2006).¹³

Currently, differing estimates of total forest cover vary significantly between 4.6% (128,375 ha) of the national territory to 6% (180,000 ha) to 7.4% (206,000 ha) (RdB and UNDP 2008; RdB, 2009f; RdB 2008 respectively). These are best estimates based on limited data as there has been no national forest inventory carried out since at least 1992 (USAID/REDSO 2003) if not the 1980s (Directorate of the Department of Forests, personal communication), further underscoring the point that inventory and monitoring data are spotty at best.

FOREST TENURE AND MANAGEMENT REGIMES

Currently, there are two primary functional forest tenure regimes governing the remaining natural and artificial forests: (1) National forested lands (central government owned) and (2) private “boisement” or woodlots (private ownership). Table 2 provides an impression of the relative importance of each forest type and management regime.



The Dukingiri Kibira Association tree plantation near Kibira National Park.

Broadly speaking, the former can be further subdivided between: a) the colonial and post-colonial era planting of exotic tree species and hilltops and steep slopes, and b) the national protected areas and other remaining natural forested areas. The national non-natural plantations were planted during the colonial era and then another similar large-scale push took place in the 1970s-80s through World Bank projects in which 55,000 ha were planted (Banderembako, 2006). These plantations were intended for the primary purpose of fuelwood for local consumption, soil stabilization, as well as for paper fiber to supply a national paper industry.¹⁴

Currently, these national forests are estimated to cover nearly 60,000 ha and are distributed in small plots (classed between <10ha and >10ha) across the country (though no official and current map or geographic information system exists).¹⁵ A recent

¹³ More specifically, estimates of forest cover in 1980s was 3%, expanded to 8% in 1993, and then progressively was deforested back to approximately 3% today (Directorate of Department of Forest, personal communication).

¹⁴ This “industry” was never developed for many reasons, not the least of which insufficient material to justifying significant capital investment in papermills. That is, plantations not at the scale to supply any papermills at scale to make economic sense.

¹⁵ Forests smaller than 10 ha are managed by the communes and those larger than 10 ha are managed by the Department of Forests. The Land Code of 1986 allows the Provincial Governor to allocate state land up to 4 ha, the Minister of Environment between 4 to 50 ha (rural land), and the Minister in charge of urban planning can allocate urban land up to 10 ha. Land larger than 50 ha (rural) and 10 ha (urban) is allocated by decree. The new pending code authorizes only Ministers and the President to allocate lands – the Minister of Environment not more

ministerial ordinance declared that pine could no longer be legally harvested in response to heavy pressure on the remaining state forests.

The formal protected areas are discussed in **Section 4. Biodiversity**. INECN staff suggested that all other remaining natural forest were to be protected and therefore were considered *de facto* protected areas according to the 2000 Environment Law. The management of the first category of national forests (state woodlots) has been negligible. That is, it seems they have not been managed in a systematic way in order to supply a steady stream of fuelwood or paper fiber, or any other uses. Rather, they were largely left to grow with little to no management. In the vacuum of management by the State, the trees have been ignored, burned, or given away by the Governor or the communal administration and harvested.¹⁶

Private woodlots are established and managed by individuals and community groups for fuelwood and timber. Typically, the same fast-growing exotic species are planted. Comparatively, these woodlots are more closely managed using firebreaks and other basic practices and are harvested once it is economically profitable. Moreover, smallholder agroforestry plots form an important land cover and land use throughout Burundi that continues to garner significant attention and assistance to stabilize agriculture, improve productivity, provide green fodder and manure, among other benefits.

Table 2: Forest Types and Trends

Forest Ownership	Forest Type	Surface Area 1992 (ha)	Surface Area 2001 (ha)
State	State Plantation Forest (<i>Boisements domaniaux</i>)	80,000	56,000
	Natural Forest (<i>Forêts naturelles</i>)	55,000	40,000
Private/Communal	Communal Forest (<i>Boisements communaux</i>)	11,000	3,000
	Agroforestry (<i>Plantations agroforestières et foresterie rurale</i>)	60,000	65,000
	Total	205,000	164,000

Schlaifer M. and P. Ntahompagaze. 2007

3.2 THREATS

The principle threats to the forest are largely similar to those for other resources and ecosystems in Burundi, with the foremost threat coming from **demographic pressure coupled with very few alternative economic opportunities for non-agriculture or land-based livelihoods**. This pressure invariably leads to conversion of forested areas to subsistence, extensive agriculture.

Clearing or degrading of forests likewise comes from the country's massive **wood-based energy demands** (~97% of fuel used) through fuelwood in the rural areas and/or production of charcoal for the urban centers (RdB, 2000; RdB and UNDP 2008).¹⁷ This harvest occurs both legally and more often, illegally, on state lands.

Fire has been cited as an important threat to the various forest types. Artificial woodlots are especially prone to fire damage as the species planted are not fire-resistant and otherwise significant fuels are typically built up, raising the chances of a severe fire if one occurs. Fires come from multiple sources,

than 25 ha, the Minister in charge of urban planning not more than 1 ha, and the President more than the either of these two, but only with approval of the National Land Commission.

¹⁶ Various informants highlighted that this practice of allocation of these State lands is illegal as defined by the Forest Code of 1985 and Environment Code of 2000 yet it seemingly continues.

¹⁷ Anecdotally, the Director of the Department of Forests suggested that the price of a bag of charcoal is a good indicator for better understand the pressure and state of the forests. Five years ago a bag in Bujumbura cost ~\$3 and today it can go for ~\$10-25.

including natural as well as accidental (fire in savannas for cattle grazing or slash-and-burn agriculture plots escaping beyond the intended area) and intentional, human-started fires (e.g., purposefully set fires on the State woodlots as acts of civil disobedience or similar reasons. Estimates on how much land was reportedly destroyed by fire and other causes during the crises vary from 8,000-32,000 ha (Banderembako 2006; USAID/REDSO 2003).

Another threat comes from the **low human, material, technical, and financial capacity of the mandated forest management authority**, the Forest Department in the Ministry of the Environment. Representatives at various levels in this Department (as well as others in the Ministry) indicated that there is no operational budget for any field activities, be it for forest management actions, monitoring, or law enforcement. This lack of capacity has resulted in, among other gaps, no national forest inventory or monitoring data since the 1980s; thus, there is no knowledge of the forest resource status or trends. Such information would provide the basis for any strategic and management decisions.



Bags of charcoal await transport to Bujumbura



Although everyone knows the boundaries, PA borders are not sufficiently enforced.

In addition to the threat brought on by low capacity at all levels to manage and monitor the forests is the prevailing **lack of physical demarcation of the different forest “ownership” and management areas**. With neither the State nor the citizens aware of the national forest boundaries, compared to the surrounding mosaic of state, local, and private lands on the landscape with their differing designated/ authorized uses, this lack of clarity opens the door to illegal and unsustainable uses of the forest.

Another related threat to the forest results from **inconsistent management decisions made at different levels of government** (Department of Forest, Governors, Communal Administrators). Each of these government actors has a different mandate and likewise, different constituencies and varying influences and opportunities, by law or practice over the same resource – in this case, forested land. This leads to an incoherent management regime that threatens the forests.

Moreover, another threat results from the **weakness or lack of legislative and/or regulatory framework** sufficient to enable sustainable forest resource use. The current Forest Code was developed in 1985 and, although national realities and visions have changed, the Code has not. Likewise, with the passage of the Environmental Code and imminent passage of a Land Code, certain significant adjustments for coherence and harmonization will be needed for the Forest Code. Lastly, regardless of the outdated status of the Forest Code, there are few, if any, implementing regulations, standards, and guidelines that elucidate the high-level strategic vision of the Code in practical and operational terms.

Neglect of forested areas, particularly the State woodlots, as well as unclear or inappropriate use rights for the forests is a also threat to the forest, as people do not perceive – or do not have access to – the benefits of maintaining natural forests or otherwise harvesting woodlots. Thus, simply put, forests are converted to other land cover and uses that produce more immediate and/or clear economic benefits. Many of these compounding factors lead to limited incentives for sustainable forest management for production or conservation by the State, local authorities, private sector, communities, or individuals.

3.3 SECTOR GAP ANALYSIS

There are a multitude of donor and NGO-driven initiatives that directly or indirectly influence the state of the forests, although strikingly, few are focused on forest resources per se. That is, over recent years, there is seemingly no big push for reforestation or expanded protected areas in Burundi, which is likely due to land availability and/or real or perceived land constraints.¹⁸ While there exists a national reforestation strategy and corresponding Government structures/institutions, little progress has been made in stemming the tide of pressure to convert forest to other land cover and uses, let alone reverse the trend of reforesting previously degraded land.

Current government, NGO, and/or donor forest resource related programs/projects can be grouped into two loose categories: (1) large-scale integrated watershed management, and (2) small-scale reforestation and woodlot establishment.

Many NGOs and donors are promoting watershed management through some common approaches such as contour line planting on hillsides with agroforestry species (agro-sylvo-pastoral techniques promoted). More specifically, the African Development Bank (AfDB) – Watershed Management Project (PABV), World Bank/Global Environment Facility (GEF) – Agricultural Rehabilitation and Sustainable Land Management Project (PRASAB), UNDP/GEF – Lake Tanganyika Authority, Nile Basin Initiative, and French cooperation projects include such approaches as a central component of a broader program. These projects are typically designed to minimize erosion, improve soil quality and fertility, stabilize agriculture, produce green fodder for livestock, produce fuelwood and possibly some timber, and other similar objectives. An operating assumption or expected secondary benefit is that improving and stabilizing agriculture in this way integrated with multiple benefit agroforestry will decrease pressure on remaining forested areas (natural and artificial).

The second category of forest-related interventions focuses on small-scale reforestation and woodlot establishment. This is principally carried out by many small, short-term, and principally environmental NGO-led efforts. The approach is generally to develop tree nurseries for reforestation with natives or a mix of natives and exotics primarily targeting areas in and around protected areas. For example, USAID (CARPE and Multi-year Assistance Programs), GEF, the World Conservation Union Living Landscapes Strategy (IUCN-LLS) project, Green Belt Action for the Environment (ACVE), and United Nations

¹⁸ The Northern Burundi Protected Aquatic Landscape covers some 30,000 ha and was recently launched in 2006 and thus suggests otherwise. Although this important step by INECN lays the groundwork for future actions on the ground, to date the protected landscape concept remains just that – a concept.

Development Program (UNDP) initiatives has promoted such an activity. However, despite the intervention of various NGOs in watershed management and reforestation, their actions are scattered and therefore the lack of coordination among stakeholders in the sector is the major threat.

3.4 OPPORTUNITIES

Despite the significant challenges and currently limited donor/NGO/government attention on the forest, a certain number of opportunities to address the previously mentioned threats emerge.

Promotion of community tree nursery development and financing. Many Burundians are involved and seemingly skilled at tree nursery management and outplanting of trees. Additionally, over the short term, many projects are creating the need/market for saplings of some native tree species as well as exotics. Regardless of what led to this apparently widespread or at least common skill, there appears to be an opportunity to benefit from this capacity to achieve multiple objectives (reforestation, fuelwood/charcoal provision, environmental protection, small business development, etc.). Moreover, in view of the anecdotal success of private woodlots and the fact that such capacity exists, it would appear that reforestation could quickly take off once the crucial and cross-cutting land tenure, management, and governance challenges are addressed. This is also more likely to succeed as there already exists widespread recognition among land management ministries, NGOs, donors, that tree planting for erosion control, if not also for wood supply, is a critical element in any comprehensive development strategy for Burundi. While this does not translate necessarily into forest restoration of native landscapes, this recognition and current action arguably create space for ultimate planting of other tree species and ultimate uses.

Revise Forest Code and clarify use rights of forested lands. Coupled with broader and ongoing land related legal and regulatory reform, the Forest Code should be revised to harmonize it with the 2000 Environment Code as well as the ultimate new orientations of the next Land Code. In particular, the opportunity is now to ensure forests are recognized as a valued resource by updating the Code upon which capacity needs for the forest management authorities can be better understood and strengthened.

Institutional strengthening of forest management authorities. A clear need was observed to support the comprehensive development of a forest management authority that is trained, staffed, and equipped to tackle the threats to the forest resources in Burundi. Once the legal and regulatory framework is updated to be responsive to the current realities and constraints, a specific opportunity exists to work on a suite of actions, including: law enforcement, plantation management for fuel and fiber, national forest inventory to understand the status of the resource, monitoring to understand the



A tree nursery funded by USAID/Central African Regional Program for the Environment (CARPE) lies below artificial forest managed by the Dept of Forests and natural forest managed INECN.

trends of the resource in view of adopting adaptive management strategies, fire management, boundary demarcation, and other actions. The GoB is limiting the use of charcoal and firewood while there is no other alternative source of fire energy.

Forest sector investment through climate change issues of adaptation, clean energy and technology transfer, and mitigation. Another opportunity for forest conservation and sustainable use is linked to the new public/donor climate change-related funds coming online. (See Section 5 Climate Change for complete discussion.)

A critical mass of nations at the 2009 United Nations Framework Convention on Climate Change (UNFCCC) meetings in Copenhagen decided that in the coming years a surge in donor funding is warranted to support developing countries such as Burundi in becoming more resilient in the face of a changing climate (adaptation), developing cleaner energy sources (clean energy and technology transfer), and reducing their emissions (mitigation). Arguably, Burundi could access such public/donor funding in all three streams, although recognizing the current and historical context adaptation will most likely be the most important. All three funding streams could also logically support some important forest sector investment. It has been suggested that assuming the rules and institutions are agreed upon and established (post-Kyoto climate convention) and that developed and developing countries live up to their pledges, by 2020 a mix of public and private investment will channel even more funding towards developing countries for these activities. Critical to any success in this opportunity will be building government and civil society capacity, institutions, and policies to appropriately integrate climate into national and local level vision and planning in order to best allocate these climate funds for lasting impacts.

Foster community involvement in forest resource conservation, management, and reforestation efforts. The fact that some natural forests in and out of formally protected areas remain intact and are respected by local communities against all odds (see “threats” above) suggests that going forward, there is something upon which to build. It is likely a result of a whole host of complicated and interdependent social, cultural, historical, and economic factors. Something keeps people from completely converting the forest, which clearly presents an opportunity to learn from in future engagements around forest resource conservation, management, and reforestation.

4. BIODIVERSITY

4.1 OVERVIEW

Burundi's fauna includes 716 bird, 215 fish, 163 mammal, 56 amphibian, and 52 reptile species; vascular flora comprises 2,909 species with a high endemism rate for species found at higher altitudes (RdB 2009b). Fifty species native to Burundi are currently threatened with extinction: two critically endangered, 15 endangered, and 33 vulnerable (see **Annex 2: Threatened Species**). Another 39 are considered near threatened, indicating they are close to qualifying for or are likely to qualify for a threatened category in the near future.

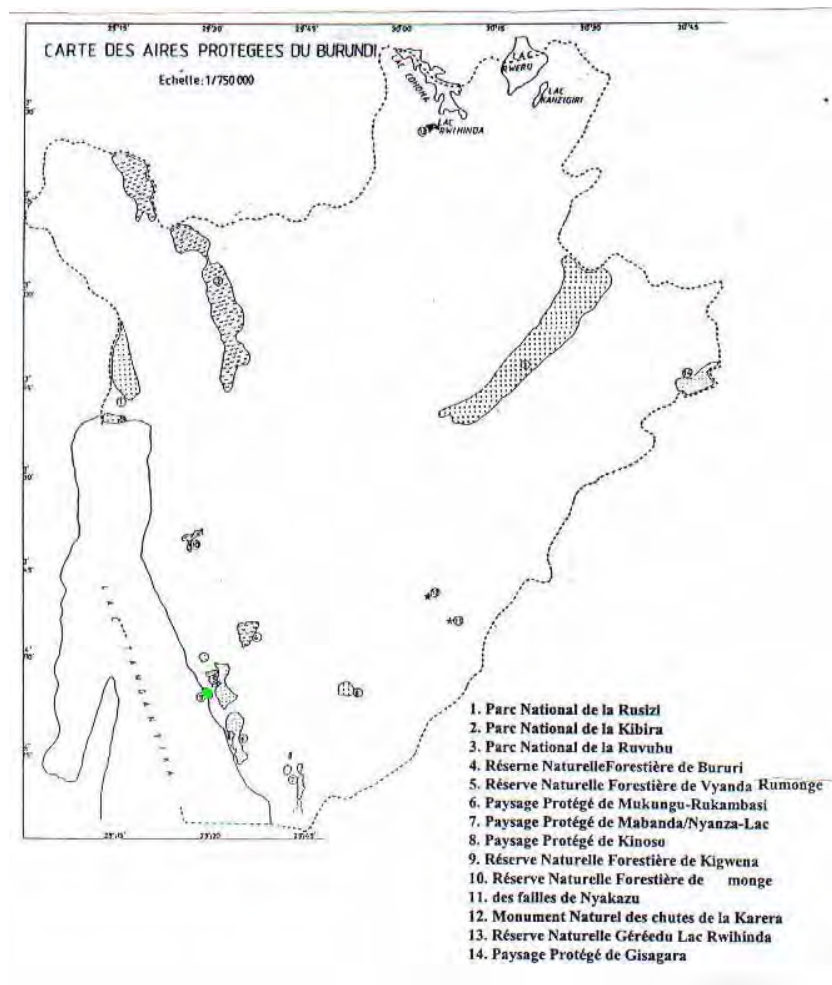
Burundi has 14 protected areas, which represent a wide array of representative and diverse ecosystems: Guinean and Afromontane forest types, Miombo woodlands and unique palms, savannah and grasslands, and large wetland complexes. These PAs are the last vestiges of larger forests and savannahs that once dominated the landscape and therefore serve as critical refuge for many threatened flora and fauna.

Burundi's PAs can be classified into four categories: National Parks, Nature Reserves, Natural Monuments, and Protected Landscapes (see **Annex 1: Protected Areas**). Of these, five are also classified as Important Bird Areas and one is designated as a wetland site of international importance by the Ramsar Convention on Wetlands. Together, these PAs comprise a total surface area of 157,700 ha or roughly 5.6% of the country. All protected areas are managed by the INECN, with its headquarters located in Gitega and a staff of approximately 300 personnel (mostly guards) stationed throughout the country.

The creation of Burundi's national parks and nature reserves dates back to 1980 (see section 1.3 and 2.0). However, this legal decree did not recognize the rights of uses by local communities. The laws associated with this decree, which predate the Convention on Biological Diversity, did not foresee the participation of local populations and the larger citizenry in protected area management. It should also be noted that the category "protected landscape" remains ignored by the national law (UNDP/GEF 2008). As defined by the International Union for the Conservation of Nature (IUCN), protected landscapes are areas managed mainly for landscape conservation and recreation.¹⁹ This conservation management approach is similar to the multiple-use sustained-yield policy applied to National Forest System lands in the United States.

Lake Tanganyika is considered to be of great local, regional, and even international importance. Lake Tanganyika is Africa's second largest inland fishery and has high biodiversity value, with over 1,500 recorded aquatic plants and animal species (LTBP 2000b). It contains at least 250 species of fish (201 endemic, mostly cichlids), of which 138 are found within the Burundian section of the lake (Baer 2001). A relatively small portion of the lake is used by Burundian fisherman; however, catches from Lake Tanganyika alone comprise approximately 95% of the country's annual fishery production, with the other 5% derived from the northern lakes (RdB 2008).

¹⁹ http://www.unep-wcmc.org/protected_areas/categories/



4.2 THREATS

A majority of Burundi's species on the IUCN Red List are considered to be most at risk from extinction by **habitat alteration or degradation**. For example, chimpanzees used to migrate freely between the mountain forests of southwestern Burundi and Tanzania. Continual deforestation and conversion of land to agriculture has relegated a once-large native forest to the tiny reserves of Bururi, Rumonge, and Vyanda and it is estimated there are less than 150 individuals occupying these small forests today. Fragmented by farms and villages, chimpanzee populations become isolated from one another, increasing their risk of genetic impoverishment. To the north, the larger Kibira National Park is bordered by the even larger protected Nyungwe Forest in Rwanda; both support larger chimpanzee populations and are likely to offer the best long-term survival conditions of this species in Burundi.

Targeted removal and overexploitation of flora and fauna also threatens biodiversity. In 2005, only four hippos were documented at Lake Rweru and they have disappeared altogether from Lake Rwigyira since 1989, a result of habitat decline and hunting pressure. Hunting and trapping has also led to the

recent disappearance of crocodiles from the northern lakes (Benoit et al. 2005). Elephants used to frequently migrate from DRC to Burundi across the Rusizi and eat the fruit of the native palms, but due to persistent hunting and trapping, the last known elephant in this area was killed in 2005.²⁰

Of the 17 species listed as critically endangered or endangered for Burundi, only the chimpanzee is also listed on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to protect it from illegal or uncontrolled trade. Meanwhile, populations for both the endangered Tanganyika lates (*Lates angustifrons*) and forktail lates (*Lates microlepis*) have declined by more than 50%, specifically from fishing pressure (Ntakimazi 2006). The government estimates that at least 2% of the country's fishery catches are comprised of three specialty fish with high commercial value: Tanganyika, forktail, and bigeye lates (RdB 2008). Indeed, *sangala* (Kirundi name for both the Tanganyika lates and bigeye lates) is often seen on the menu at restaurants in Bujumbura and upcountry. Bigeye lates (*Lates mariae*) is considered vulnerable due to a dramatic decline in its fishery catches over the last 15 years and a predicted decrease of another 30% in the next 10 years (Ntakimazi 2006). Currently, there are no controls or limits placed on the number or types of fish caught from any water source in the country. Non-selective or destructive gear, such as mosquito nets are commonly used to catch fish. Additionally, excessive or uncontrolled extraction of ornamental fish from Lake Tanganyika is a threat to biodiversity because the targeted species are often endemic and rare (LTBP 2000b).



Even the once plentiful *Dangala* are now growing scarce due to unregulated fishing.

Exotic species introduced into Burundi can become invasive and out-compete natural vegetation. For example, *Lantana camara* has begun to dominate natural savannah in the Rusizi delta in less than a decade and water hyacinth continues to proliferate in Lake Rweru (Nkezabahizi 2009). At this time, Burundi does not have any national policy to combat or control invasive species. According to the fourth national report on biodiversity, almost all food crops grown in Burundi have been introduced and only four indigenous species are still grown today, at a very small scale (RdB 2009b). Other local species adapted to the geo-climatic conditions of the country have disappeared. This trend is the result of relaxed controls on the import of exotic agricultural plants and livestock breeds and much-needed gene diversity was also lost during the most recent crisis in Burundi. Genetically modified organisms are still controlled in Burundi. Exotic species also pervade the forestry sector where preference was given to reforest state-owned lands in the 1980s with fast growing and marketable *Pinus* and *Eucalyptus* spp.

Poor land practices can alter or degrade habitat. Habitat for most threatened fish is being degraded from excess water turbidity (Ntakimazi 2006), which is directly linked to sedimentation from agriculture and other human activities originating in the catchment areas of Burundi's mountains. In addition to hillside erosion, inorganic fertilizers and pesticides applied to farms eventually wash downstream and accumulate in basins causing pollution. Currently there are no national or local effluent standards for any waterbodies in the country. Unmanaged mineral extraction also degrades habitat. This has been witnessed in several protected areas: gold washing in Kibira, sand sampling in Rusizi, and coltan and cassiterite extraction in the Murehe Reserve (UNDP/GEF 2008).

²⁰ Interview with Geoffroy Citegetse

Fluctuations in water levels – both natural and human-induced – can also alter or degrade riparian vegetation that is important habitat for amphibians and aquatic-dependent birds and mammals. For example, a marked decrease in water levels has been observed in areas where thirsty bananas and taro have been planted in marshes, swamps, and lake edges (Benoit et al. 2005).

Bush fires used to stimulate forage growth for grazing temporarily stresses natural vegetation and also increases the likelihood for invasive species to become established. In anticipation of the rainy season, fires are set between August-October, which are also the hottest and driest months, with greater potential to get out of control. Uncontrolled fires can displace both humans and wildlife and cause long-term damage to sensitive habitats.

There are **legal deficiencies** with Burundi's PA system. While the amount of land under formal protected status has gradually increased over the past 30 years, most of Burundi's PA boundaries are not demarcated on the ground nor is there consistent law enforcement. Furthermore, only one national park and five reserves are legally delimited: Kibira, Rusizi, Bururi, Kigwena, Rumonge, and Vyanda (Decree N° 100/007, January 2000). There is currently an important mining interest in the nickel deposits located immediately south of Ruvubu National Park in Muremera (Ntungumburanye et al. 2008). Exploratory studies initiated by a private mining company began in 2007 and identified six potential ore sites, all of which flank Ruvubu's southern border. Nothing has progressed since 2008; however, Ruvubu remains a national park by name only, a legal loophole that leaves Burundi's largest PA vulnerable to irreversible impacts resulting from resource extraction.

The decree that legally delimited six PAs in 2000 also reduced the surface area of the original Rusizi National Park by almost half, from 10,000 to 5,280 ha, and reclassified it as a Nature Reserve. Natural palms were cut down in the former protected area and lands converted to rice production. As the population continues to increase, protected areas remain susceptible to encroachment from farming, grazing, human habitation, or extractive uses that slowly whittle away intact native habitat.

Low management capacity also threatens the integrity of PAs. According to the fourth national report on biodiversity, none of the PAs have management plans and thus, there are no specific objectives or goals for the administration of these areas or criteria and indicators for measuring change or effectiveness. Baseline species inventories carried out in the 1980s for Kibira, Bururi, and Ruvubu with assistance from the U.S. Peace Corps have not been updated and there are no plans or schedules in place for continued monitoring. While there seems to be an adequate number of staff allocated (for example, Kibira and Ruvubu employ at least 50 guards each), park funding only covers salary – no training, vehicles or equipment to carry out inventory and monitoring, infrastructure improvements, law enforcement, or public outreach and education. Most tourist infrastructures in the national parks were also destroyed during the war and enormous efforts are needed to reestablish them (RdB 2009b).

4.3 SECTOR GAP ANALYSIS

The following is a compendium of recent and ongoing activities and efforts aimed either directly or indirectly at protecting and promoting biodiversity.

There is currently a **draft bill for the establishment and management of protected areas** in Burundi awaiting adoption by parliament (see section 2.2). If adopted, this bill would address many of the current legal deficiencies pointed out earlier: measures to protect flora and fauna, including the prevention of invasive species; formalizing buffer zones; recognizing State-managed, co-managed, and privately-managed governance schemes and rights of use; requiring development of management plans in consultation with stakeholders; outlining procedures for prosecuting violations; and specifying the delineation of PAs by decree.

With financial assistance from the UNDP/GEF, a multi-year project in support of the **CBD Program of Work on Protected Areas** began in Burundi in 2008. To date, management plans are being drafted for two pilot PAs.²¹ Phase 2 of the project will investigate the involvement of indigenous and local communities in conservation and incentives that support the integrity and maintenance of PAs.

A proposed 9,000 ha PA encompassing the Malagarasi River and its wetlands is expected to go before parliament this year for formal designation. The Malagarasi is the nation's largest wetland and considered the most diverse, with over 140 bird species recorded. **Burundi Nature Action** and others have been working with INECN for the past two years collecting information to support this effort.



A tree nursery in Bururi National Reserve, co-managed by INECN and local populations.

The **National Office of Tourism** is developing a National Tourism Strategy (due August 2010) to promote tourism in Burundi around five key themes: ecotourism activities in Kibira, wildlife-based activities in Ruvubu and Rusizi, birding and scientific exploration in the northern lakes, beach and water-based activities in Tanganyika, and cultural tourism.

The **INECN** is now producing a quarterly scientific bulletin to disseminate information on the biodiversity of protected areas targeted towards the scientific community, students, NGOs, and journalists.

Since 2007, from their office in Rwanda, **Wildlife Conservation Society (WCS)** has been working with INECN to help facilitate transboundary management of Kibira and Nyungwe national parks. A memorandum of understanding between Burundi and Rwanda is in place and a transboundary plan has been drafted (WCS 2009).

Association of Women for the Environment in Burundi (AFEB) sensitizes populations located near Kibira on forest protection and other initiatives for the conservation of forests, water, and soil so as to prevent over-exploitation of Kibira's natural resources. Activities include projects which integrate crop-growing, forestry, and animal production practices (mixed farming, goats, cows, and trees for afforestation, multipurpose trees, and fruit trees).

A sub-group of AFEB, the **Association of the Women of Bugarama (Muramvya) "Dukingirikibira"** has 1,500 members promoting tree planting, agroforestry, and integrated farming and animal husbandry in the vicinity of four villages located near the southern extent of Kibira. Since its formation in 2001, members have begun witnessing people moving out of the park and animals coming back in, notably chimps. More recently, the group purchased phones to help report problems or infractions to park officials since there are only two guards assigned to this part of the park.

Two pilot **IUCN Landscape and Livelihoods Strategy** projects – one located outside Kibira and another outside Bururi Natural Forest Reserve – are in the early stages of development, with assistance

²¹ <http://www.protectedareas.org/show/93C8E657-F203-1EE9-B5082515613FC1DD>

from ENVIRO PROTEC, Association Burundaise pour la Protection des Oiseaux (ABO), Organisation de défense de l'environnement au Burundi (ODEB), Association des Femmes pour l'Environnement au Burundi, Association pour le Développement Intégré et la Conservation de la Nature (ADICN), and Centre de Médecine Traditionnelle de Buta.



The borders of Kibira National Park are easily discernable next to the government tea plantation.

The **UNDP**, the **United Nations Food and Agriculture Organization (FAO)**, and **CARITAS-Belgium** are funding a project through March 2011 to have the local population help plant trees marking the limits of Ruvubu near Muyinga. The **League for the Protection of Birds**, a French-based NGO, is collaborating with INECN and ABO to provide staff training and improved management at Ruvubu. The European Union is also financing a capacity building project for the

staff of Ruvubu. **Reseau Burundi 2000 Plus** with UNDP Small Grants Program funding through September 2011 is helping to protect the biodiversity of Ruvubu by providing improved wood stoves and economic alternatives for local populations in Mutumba.

Discussions have begun with the **United Republic of Tanzania** on the ecological connectivity and transboundary management opportunities between Ruvubu and the adjacent forest in Tanzania (RdB 2009b).

The **Nile Transboundary Environmental Action Project (NTEAP)** was one of the eight projects under the Nile Basin Initiative (NBI) Shared Vision Program. Launched in May 2004, the project supported the development of a basin-wide framework for actions to address high priority transboundary environmental issues.²² Within this framework, activities for Burundi are focused on the northern lakes under the objectives of strengthening institutions; promoting community-based land; forest, water management; environmental education and awareness; wetlands and biodiversity conservation; and water quality monitoring. With NTEAP financing, the 50 ha Butaganzwa Arboretum featuring indigenous species was established in the province of Kayanza and is being co-managed by the INECN and waterfront community.

The **INECN** is moving forward with an effort to restore the nature reserve of the Rusizi. A legal decree would reestablish some of the old boundaries and create a protected corridor around the Rusizi River to connect the delta sector (RdB 2009b). A 50 m border was marked around Lake Rwhinda in 2009 and

²² <http://nteap.nilebasin.org>

the UNDP Small Grants Program is helping to finance a project in 2010 to mark the boundary of Lake Rweru and plant select species in the protection zone.

The **Lake Tanganyika Authority (LTA)** was established in December 2008 by the governments of Burundi, Democratic Republic of Congo, Tanzania, and Zambia to promote regional cooperation for socio-economic development and sustainable management of the natural resources in the Lake Tanganyika basin.²³ The LTA coordinates the implementation of the 2000 Convention on the Sustainable Management of Lake Tanganyika and also coordinates and oversees the implementation of the Regional Integrated Management Program, which focuses on establishment of sustainable fisheries, catchment management, pollution control, climate change adaptations, and monitoring programs. The LTA, in partnership with the French Cooperation (Region Pays de la Loire), Association Burundaise pour la Protection des Oiseaux (ABO), ACVE, and INECN, is beginning a new watershed conservation approach focused on the eight primary rivers that feed northeast Lake Tanganyika in and around Bujumbura, the largest urban center on the Lake.

To support agricultural diversity, the **Institut de Recherche Agricole et Zoologique (IRAZ)** has re-established a legume, banana and potato gene bank. Meanwhile, a **USAID**-supported agro-research project at Ngozi University (Higher Education for Development Program funded through 2012) has evolved to include research on indigenous varieties of food crops. With financial assistance from IUCN, **ACVE** initiated a 14-month project in May 2010 on the Valorization of Native Woody Species, which is promoting indigenous tree-planting throughout the country.

4.4 OPPORTUNITIES

While much focus and attention from national and international parties is aimed at improving the management of and resource conditions in protected areas, several gaps or opportunities still exist to address threats to biodiversity.

Despite the draft bill on protected area management, the country's other **eight PAs will still need to be legally defined by order of decree**. Reforestation and planting in the PA buffer zones can provide a source of income to local communities. For co-management schemes to be more effective, they should be complemented with alternative livelihood activities such as small animal husbandry and fish farming to reduce resource pressure on PAs and select species.

To improve and build management capacity, **equipment and training in natural resource management and law enforcement** is necessary. The staff of INECN and other ministries in charge of Burundi's natural resources would benefit greatly from basic equipment such as global positioning system (GPS) units and training in geographic information system (GIS) and database management. If the draft PA bill is adopted, management plans will be required. In conjunction with these plans, there will be a need to update or establish new baseline inventories and develop resource monitoring plans and schedules.

There is a great partnership opportunity to promote **ecotourism** activities that complement PA management and provide alternative, non-extractive livelihoods for nearby communities, such as chimpanzee conservation in Kibira. Many of Burundi's parks and reserves will be featured in the forthcoming National Tourism Strategy, and the National Office of Tourism is willing to help with partial financing of resources and infrastructure.

Transboundary initiatives are underway for most of Burundi's borders (Lake Tanganyika, Malgarazi River, Kirbira-Nyungwe Forests) but may not yet be self-sustaining and would benefit from more

²³ <http://lta.iwlearn.org>

assistance. There is also an opportunity to establish formal transboundary protected area management with Rwanda in the Lake Cohoha and Rweru sub-watersheds of the Northern Burundi Aquatic Protected Landscape.

There is a need to update the 1937 hunting and fishing regulations (see Section 2.2) and identify substitute species to protect threatened fauna. At a minimum, **threatened fish (IUCN Red List) should also be listed on CITES** and prohibited from commercial and private take-and-trade until populations can rebound. This should be supported with a baseline inventory of current populations and monitoring to determine changes. Take of other near-threatened fish species needs to be more closely regulated to prevent further decline to endangered status. **Restrictions and limits**, rather than straight prohibitions, could be placed on catches of certain species to maintain viable populations. The focus would be on Lake Tanganyika and would obviously require coordination with DRC, Tanzania, and Zambia. Better oversight is also needed to prevent the use of non-selective and destructive fishing gear. Fish provides both an important protein source and livelihood for many in Burundi. Therefore, regulations and restrictions need to be accompanied by economic alternatives for fisherman, including more applied research and demonstrations in **aquaculture**.

Practically all national and internationally-funded projects are promoting agroforestry techniques, primarily the contouring of hillside farms and creating “micro-terraces” to better stabilize soil. However, **more aggressive, intensive agroforestry techniques** would better stabilize soils while also improving soil fertility. For example, planting rows of leguminous shrubs more frequently between food crops (every 3 m), cutting and incorporating green manure (shrub leaves) into the soil, and using fast-growing cover crops on uncultivated lands or during the dry season. Promoting **organic fertilizers** (manure and composting) can also help decrease use and dependence on chemical fertilizers.

Better and/or contained **livestock management** such as planned grazing schedules would help reduce soil compaction and erosion near water sources, eliminate unnecessary bush fires, and actually re-invigorate forage species if timed correctly. Where possible, more forage species could be planted, especially those that can be cut, dried, and fed in the dry season. This could lead to farms specialized in forage production.

5. CLIMATE CHANGE

5.1 OVERVIEW

The country is divided into five climatic regions: the lowlands of Imbo, the steep region of Mumirwa, the mountainous Congo-Nile divide, central highlands, and depressions of Kumoso and Bugesera (see Figure 1 in Section 1.3). The overall climate is tropical humid with rainfall and temperature heavily influenced by altitude in this regions (see Table 3). The rainy season is typically October-May and dry season June-September, with a short period of rain for two weeks in January.

Table 3: Distribution of rainfall and temperature as a function of elevation in Burundi

Eco-Climatic Region	Percentage of total	Elevation (m)	Average annual temperature (°C)	Average annual rainfall (mm)
Imbo Plains	7%	800-1,100	23	800-1,100
Mumirwa Slope	10%	1,000-1,700	18-28	1,100-1,900
Congo-Nile Divide	15%	1,700-2,500	14-15	1,300-2,000
Central Highlands	52%	1,350-2,000	17-20	1,200-1,500
Kumoso and Bugesera	16%	1,100-1,400	20-23	1,100-1,550

Based on data from the past 60 years, Burundi has experienced alternating cycles of excess or deficit rainfall nearly every decade and an overall increased mean temperature (RdB 2009f). Most notably, the dry season has become longer in the lowlands and central highlands. A continued increase of 1.7 to 3 C° in the mean temperature is predicted by 2050. Rainfall is also predicted to change, though by how much is less certain. However, models show a tendency towards more extreme weather cycles (floods, drought, etc.). Burundi endured significant economic costs from such extreme weather events: severe floods in 2006 and 2007 and severe drought from 1999-2000 and again in 2005. During this time, the northeast provinces were especially hard hit; this is an area which also supports a higher population density and resulted in a high loss of GDP, estimated between 5-17% (SEI 2010).

On the world scale and even in the Africa region, Burundi emits very small amounts of greenhouse gases (GHG) (RdB 2009f). Burundi's agriculture and energy sectors contribute more than 99% of the country's total emissions while the subsectors of land use and forestry together serve as an important sink (52%) for CO₂ sequestration (ibid). Even with an aggressive, global effort aimed at curbing carbon and other GHG emissions, reversed trends will not be realized for several decades.

Burundi ratified the United Nations Framework Convention on Climate Change in 1997 and the country's First National Communication was quickly prepared and presented to the 7th Conference of the Parties in Marrakech, Morocco in November 2001. Due to a lack of technical information and time constraints, the first communication did not sufficiently analyze or prioritize mitigation and adaptation options. In 2007, Burundi prepared a National Action Plan for Adaptation (NAPA) which was an opportunity to better assess the country's vulnerability to climate change and focus on adaptation options (RdB 2007). With support from UNDP/GEF, Burundi recently completed its Second National Communication (RdB 2009f) which includes: a comprehensive inventory on GHG and additional measures and policies to mitigate or adapt and identifies gaps and constraints as well as financial resources and technical capabilities needed.

5.2 THREATS

Due to the large number of people reliant on natural resources and the high likelihood of continued warming and extreme weather events, Burundi is highly vulnerable to the effects of climate change and variability. The sectors identified as most vulnerable are agriculture, water, energy, forestry, natural ecosystems, and health (RdB 2009f).

Heavier and more frequent rains can damage crops and would undoubtedly increase susceptibility to erosion and landslides, especially with the extreme topographical relief in Burundi. Roads and buildings could be damaged and siltation could negatively impact hydropower infrastructure. People now settled close to lake edges or near lowlands and marshes are likely to be flooded. Areas most vulnerable to heavy rains are the Imbo plain, steep slopes of Mimirwa, and the Bugesera depression. Excess rain can also increase the presence of pests or disease affecting food crops, livestock, and human lives. Water-borne diseases such as dysentery and cholera would likely increase. Meanwhile, aquatic and avian productivity would likely improve with the flooding of marsh areas (RdB 2009f).



Locals say that ten years ago, this new village on the shores of Lake Rweru was underwater.

Drought leads to increased evaporation of lakes and reservoirs and decreased aquatic ecosystem productivity. The IGEBU has recorded the northern lakes receding 1-2 m within the last 5-10 years.

However, there is speculation that climate may be playing a secondary role and receding waters are more linked to human action, i.e., drainage and cultivation of marshes linked with primary river valleys and lakes (Benoit et al. 2005). This would explain why lakes showed decline even in normal precipitation years such as 2004. Nonetheless, prolonged drought can lead to shortages in water available for domestic and agricultural use affecting crop and livestock production. Between 1998 and 2005, drought caused 35% livestock mortality and a widespread food crisis (RdB 2009f). The Bugesera depression is an area most vulnerable to drought. Vector-borne diseases such as meningitis and malaria can increase, as can other conditions related to malnutrition or lack of water. As noted earlier, the length of the rainy and dry seasons have gradually changed, with the rainy season generally becoming shorter and the dry season getting longer. Some food crops formerly grown twice a year can now only be grown once and some people are switching to shorter season crops, such as peas. The occurrence and extent of bush fire could increase with more dry vegetation present. **As Burundi also depends on hydro-power, drought has been a major cause of power shortages during some periods of the year.**

A general **warming trend** can affect biodiversity. Species adapted to cooler climates may not be able to adjust quickly enough while others adapted to warmer climates may proliferate. Natural temperature fluctuations are thought to impact the relative abundance of certain species in Lake Tanganyika; however, these changes and their effect on fish stocks are not fully understood (LTBP 2000b).

Increasing temperatures could threaten important cash crops that Burundi relies on for export, such as tea and Robusta coffee. There is widespread belief that the presence of malaria will increase in areas where it has not existed before due to a general warming trend (UNEP/GRID-Arendal 2009). Burundi and other East African highlands areas have seen an increased number of malaria outbreaks over the past decade; however, this may also be linked to a rising population and an increased number of humans exposed to mosquitoes (Hay et al. 2002). Respiratory diseases could also increase. Warmer temperatures

would likely increase the consumption of energy for cooling needs in the capital and other developed towns (SEI 2010). Emissions from traffic and industrial processes are expected to continue rising as the population expands and there is increased demand for manufactured products and crafts.

5.3 SECTOR GAP ANALYSIS

In general, climate change is not a threat addressed specifically, but most government programs and donor activities designed to improve other environmental or social situations often have the secondary benefit of providing an adaptation strategy to climate change. For example, agroforestry techniques have the multiple benefits of slowing erosion (contour farming) and improving crop yields while reducing emissions (substituting organically derived nitrogen-fixing plants and green manure for chemical fertilizer).

Under the NAPA process, 12 priority projects for adaptation to climate change were originally identified. These actions were carried forward into the Second National Communication and expanded into **36 adaptation and mitigation strategies** organized under 9 sectors or subsectors (see Table 4).

Table 4: Priority projects under the Second National Communication

Sector/ Subsector	Name of Project
Water Resources	Reinforce national capacity in controlling water for food production
	Reinforce national capacity in the evaluation of available and exploitable water resources
	Improve seasonal climatic forecasts
	Watershed management for water and soil conservation
	Reforestation of watersheds to help restore economic climate system
	Drinking water supply by solar photovoltaic
	Flood prevention program
Energy	Reforestation and management of existing forests
	Promote techniques in the conservation of wood energy
	Promote new and renewable energy (solar and biogas in public centers and households)
	Strengthen hydropower capacity
Terrestrial Ecosystems	Education in adaptation to climate change
	Preserve natural environments
	Rehabilitate degraded environments
Forestry	Massive reforestation of denuded watersheds in Burundi
	Reforestation and wise use of wood energy
	Education and awareness on the dangers of bush fires and deforestation
	National Forest inventory
Wet Ecosystems	Protection/restoration of wetland and dam buffer zones downstream of Bugesera lakes
	Management and conservation of biological resources in the wetlands and floodplain of Rusizi delta
	Planning and integrated management in coastal flooding areas of Lake Tanganyika
Landscapes	Protect watersheds against erosion and reforest steep and denuded areas in Mumirwa and Congo-Nile divide
	Integrated management of water resources in Bugesera (Bugabira, Busoni, Kirundo)
	Control dynamics of rivers and streams in the western slopes of Burundi (plains and slopes)
	Channel surface waters through the city of Bujumbura (stormwater and waterways)

Agriculture	Cultivate edible mushrooms (oyster)
	Develop mid-elevation wetlands as cultivation areas for rice and cash crops
	Promote banana cultivation
Livestock	Integrate agroforestry and livestock farming
	Watershed planning and development
Health	Community support for management of resources
	Promote the SANPLAT slab (improved latrine)
	Promote treated mosquito nets
	Prevention: early warning and response
	Education to promote behavior changes

5.4 OPPORTUNITIES

In addition to the priority projects identified in Table 4, other opportunities exist that can further help Burundi adapt to and mitigate climate change and variability. Agriculture interventions should be a priority for future action because of the large percentage of the population that relies on this sector.

Diversifying food and cash crops could buffer losses with the unpredictability of changing seasons and climate. This could be achieved by promoting **applied research on shorter season crops and drought-resistant varieties** and expanding the current USAID-funded agro-research project on indigenous varieties of food, as they may be more naturally resilient or can better adapt to climate variability. **Promoting drying and other food preservation techniques** can help prolong the availability of harvests during the dry season (also provides an opportunity to increase household incomes and diversify exports). **Promoting mulching, rainwater catchment, and drip irrigation systems** would help extend water resources during the dry season or periods of drought. A cadre of trained **agroforestry extension agents** would greatly assist with demonstrating and transferring this technique around the country.

Since existing trees and herbaceous vegetation serve as carbon sinks, there is no harm in initiatives that include **tree planting or revegetating denuded areas**. While Burundi lacks large expanses of forest cover compared to its Central African Forest Commission (COMIFAC) neighbors, opportunities to participate in **reducing emissions from deforestation and forest degradation (REDD) should be explored**. Assisted **regeneration of woody savannas and gallery forests through fire management** presents an interesting opportunity to achieve multiple benefits (carbon, biodiversity, fuelwood, etc.). **Maintaining biodiversity** can be an important adaptation strategy as research shows more biodiversity provides more resiliency and greater ability to maintain ecosystem function (Naeem et al. 2009). To increase cover more quickly in industrial woodlots, faster growing trees could be planted in appropriate locations (i.e., no eucalyptus near wetlands) and harvests managed sustainably. Fruit and other trees interplanted with crops increase carbon sink capacity while also providing secondary benefits of marking property boundaries and holding soil.

According to the Second National Communication, there is a good general understanding and acknowledgement of climate change in Burundi but the country lacks human capacity to build analytic models and good data to populate them. There is a need for more courses and specialized programs to **increase technical capacity of climate science and monitoring**. Other priority areas for climate change capacity building include: **public awareness, watershed management, promoting non-wood energy sources**, and collection, analysis, and dissemination of **agro-climate early warnings** (RdB 2009f). Current weather stations managed by IGEBU are old and inefficient, and most have been vandalized; these would need to be replaced to support an early warning system.

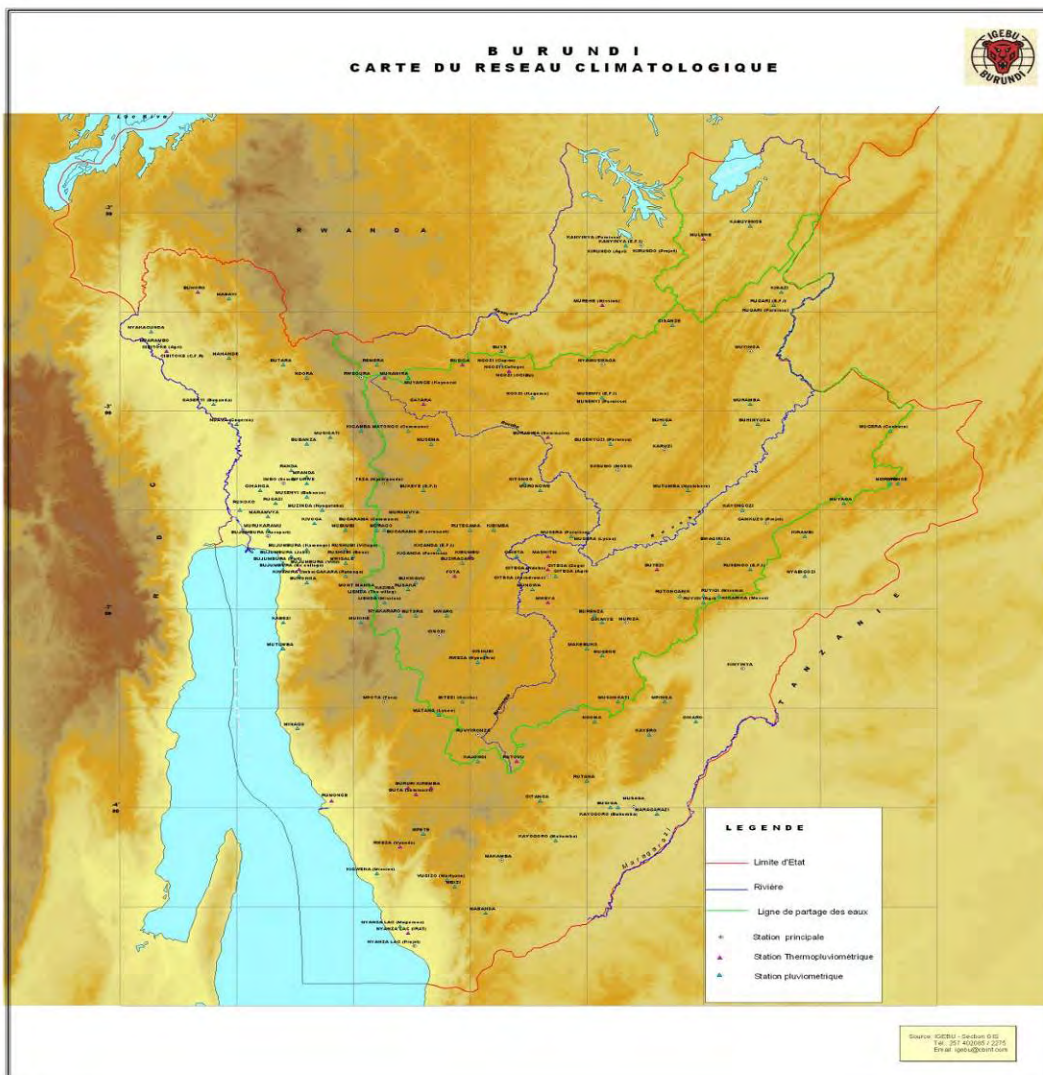
The best location of human settlements will be more critical as populations expand. Human exposure to floods can be reduced through **urban and rural zoning and planning**. New construction, especially critical facilities (water and sanitation, hospitals), should be sited out of floodplains. Development of wetlands should also proceed with caution as these areas provide a number of important ecosystem services, namely, absorbing and slowly releasing flood waters. Whether or not the increased prevalence of disease is directly attributed to climate change, there is also no harm in expanding current vector and water-borne disease prevention programs.

6. FRESHWATER RESOURCES

6.1 OVERVIEW

Burundi straddles the Congo-Nile Basin divide, with the western and southern province waters making their way towards Kinshasa and the Congo River Basin, and the northern and eastern provinces flowing to the Nile towards Egypt. Within Burundi lie four macro-watersheds,²⁴ three primary rivers (the Ruvubu, the Malagarasi, and the Rusizi), two main lake areas (Lake Tanganyika and the *Lacs du Nord*), and three important wetland areas (Rusizi, *Lacs du Nord*, and Malagarasi). (See Figure 7)

Figure 7: Watershed Map of Burundi



²⁴ Macro-watersheds are defined here as areas of common drainage within Burundi. Although, like the Ruvubu watershed, the two smaller northern watersheds also drain to the Nile, in Burundi they flow to different rivers. Many programs and projects also refer to watershed management, but this is usually in reference to a micro-watershed, a single valley, or system of drainage.

Lake Tanganyika. Lake Tanganyika is the largest rift valley lake and the second deepest lake in the world. From the north, the Rusizi River feeds Lake Tanganyika, which then drains south and west in Zambia before flowing back north towards Kisangani in DRC. With a surface area of 32,600 km², the lake can be divided into three sections: the northern basin (an approximate maximum depth of 1,500 meters), the central basin (300 meters), and the southern basin (1200 meters). Below the waters, up to 4,500 meters of sediment exists before hitting rock. Although Burundi occupies only 2,634 km² of the lake in the northern basin and shares the lake with DRC, Zambia, and Tanzania, with an estimated population of 600,000,²⁵ Bujumbura is the largest city on the lake coast and thus a significant influence.

Popular beaches for recreation and tourism are located 10 minutes west of Bujumbura. South of the capital city, the Congo-Nile mountain divide descends steeply with several smaller rivers towards the lake. The larger cities of Rumonge and Nyanza Lac lie in larger plains which support large palm oil, artisanal fishing, and fledgling tourism industries. Although no industrial scale commercial fishery industry exists in Burundi, Lake Tanganyika is a significant source of fish-based protein resources for local populations. It is also home to 1,500 species of plants and animals including crocodiles, hippopotami, migratory and endemic bird species, mollusks, crabs, shrimps, jellyfishes, and leeches, and holds at least 260 species of cichlid fish, a popular export for the aquarium trade. (The Lake Tanganyika Biodiversity Project 2006)

Lacs du Nord. The *Lacs du Nord* Aquatic Landscape Protected Area was created in 2006, expanding on the Lake Rwihinda protected area. This has resulted on paper in the conservation of more than 30,000 ha, increasing the level of conservation of the interior water mass of the country from 0.2% to 14.2%. This northern protected aquatic landscape integrates the following protected areas: the integrated Natural Reserve of Murehe; the managed Reserve of Lake Rwihinda; the managed Reserve of Lake Rweru; the managed Reserve of Lake Cohoha; and the integrated protected zones of Lakes Gacimirinda, Mwangere, Nagitamo, and Kanzigiri. In theory, this protected area landscape has the goal of integrated community management, agricultural production, and lake conservation.

With their marshy characteristics and an average depth of 2.5-5 meters, all eight of the lakes are important bird habitats, with 60 species identified in Lake Rwihinda alone. (Benoît 2005) The lakes provide a variety of fish to much of the surrounding populations, the wetlands leading out of and into many of the lakes are irrigated for rice and sugar cane fields, and the surrounding hillsides are developed for diverse agricultural production. The Kirundo Province in which the landscape is located has one of the higher population growth rates in Burundi, and neighboring Ngozi and Kayanza have the highest population densities in the country.



With an average depth of 3-7 meters, Lake Rweru is an important migratory bird habitat.

Rusizi River: The Rusizi River flows from Lake Kivu in Rwanda along the DRC-Burundi border into Lake Tanganyika. The mostly arid Rusizi plain ranges from 10-20 km in width, sitting between the Congo-

²⁵ INECN estimation, 2007

Nile divide and the Mitumba mountain range which quickly rises on the Congo side of the river. The National Reserve was halved in size and divided between the palm reserve and delta to expand development in 2000. The Rusizi delta is an important bird site and an official Ramsar site. Part of the Imbo plain (which runs south to Tanzania), the Rusizi plain, was heavily promoted by the government with limited success as an area to be developed for cash cropping, most notably rice and cotton. Cultivation development is still pursued here despite the infertile and salty soil left from past agriculture.

Ruvubu Watershed: The Ruvubu watershed encompasses much of central and eastern Burundi, including the southernmost source of the Nile River. This area, also known as the Central Highlands, has the highest population density in the country, notably in the north in the Ngozi and Kayanza Provinces. The area is at a high level of agricultural cultivation and there are also several nickel deposits near Gitega and Cankuzo. The watershed primarily flows to the Ruvubu River, which runs through the National Park of the same name and then north along the Tanzania border.

Malagarasi Wetland: The Malagarasi River runs northeast through the Kumoso depressions, dividing Tanzania and Burundi. The wetland is cultivated in the dry season when the hills are too arid, but then populations move back to the hills during the rainy season. There is a State-run sugar plant and accompanying large tracts of sugar cane planted in the upper area of the wetland. The Malagarasi wetland is currently in the process of being recognized as a protected area by INECN and the NGO Burundi Nature Action. Their hope is that Tanzania will extend the Ramsar site near Kigoma (Malagarasi-Muyovozi Wetlands) to the border to create a Transboundary Protected Wetland.

6.2 THREATS

With one of the highest population densities in Africa, a 2.7% growth rate, and an economy primarily based on subsistence agriculture, Burundi places heavy pressures on its water resources. The continued unregulated deforestation of State lands for charcoal, cooking fuel, and construction threatens watersheds through decreased ground water penetration and increased siltation downstream. The provinces of Kirundo, Muyinga, Cankuzo, and Ruyigi are among the most drought-sensitive leading local populations to place direct pressure on the Ruvubu and *Lacs du Nord* Protected Areas. Wetlands are increasingly being used for agriculture, which removes their natural role of maintaining lake water quality and levels as well as river flow rates during the dry season.

To compound these general threats, a clear mandate or authority does not exist in the government to regulate pollution, water usage, and wetland development. A new Water Directorate in MEEATU and upcoming Water Code promises to create coordination and clarity, but also potential inter-ministerial duplicity and confusion. Furthermore, INECN does not possess the necessary resources or capacity to sufficiently monitor protected watershed, lake, and wetland areas.

Lake Tanganyika. One of the primary environmental threats to Lake Tanganyika is the pollution and urban waste from Bujumbura and towns like Rumonge and Nyanza Lac. Of all the cities of the country, only Bujumbura has a network of sewage treatment although it covers less than one-third of the city and its maintenance has become problematic because of the limited capacity of SETEMU. The coastal marshes and especially the shores of the lake surrounding Bujumbura, are replete with trash. There is currently little, if any, regulation of industry in Bujumbura, brewery and textile factories are not monitored in their chemical discharge, and solid waste and pesticides from urban and agricultural areas are not properly managed nor monitored. While the industrial palm oil industry near Rumonge has made some efforts to reduce its pollution since 2006 (Sindakira 2009), the artisanal palm oil industry near Rumonge and southwards is unregulated in its disposal of by-products in the lakes and rivers that may harm fish habitats.

Additionally, the law requiring a 100 meter buffer zone around the lake shore is neither respected nor enforced, compounding the erosion and siltation problem from mismanagement of upstream watersheds. Fishing limitations are also non-existent, leading to the depletion of stocks and endemic species. Recent concession awards for oil exploration near Nyanza Lac and Bujumbura bring large potential environmental hazards if not properly mitigated and monitored. Although the exploration will be done on land, drilling at an angle, improper maintenance, and a resulting oil spill would devastate the lake ecosystem.



Fishing boats on Lake Tanganyika near Rumonge

Lacs du Nord (Bugesera). While the recent creation/expansion of the *Lacs du Nord* Protected Area Landscape is laudable, the Landscape is far from being a well-managed reality. The concept of integrated landscape management and planning has not thoroughly disseminated to the INECN field staff,²⁶ who do not possess a landscape vision past simple protection of the eight lakes and a 50 meter buffer zone, which in turn do not exist – except surrounding the previously

protected Lake Rwihinda – due to a lack of organization capacity. An integrated landscape vision would include the surrounding wetlands and communities which directly affect the health of the lakes. With the recent droughts, the lakes have lowered by more than one meter in depth and receded up to 50 meters in some areas. The significance of this cannot be overstated when the lakes have an average depth 3-10 meters. (Benoît 2005)

Multiple donor development projects are developing and rehabilitating wetlands in the Bugesera region. Population growth and increased land use conversion/development to agriculture (rice) place increased pressure on the wetlands and surrounding watersheds, which maintain lake levels and water tables. Without proper coordination, research, and regulation, the increased and comprehensive wetland development could destroy the ecological system where wetlands regulate water flow and maintain lake levels.²⁷ Erosion and siltation from poor development compound these problems.

Rusizi River. The halving of the Rusizi Protected Area in 2000 allowed for further intrusion by surrounding communities and agriculture. Land development concessions continue today and increase the existing salinization problem in the Rusizi plain. The border town of Gatumba has increased several fold in recent years, which, when combined with increased development along the beaches west of Bujumbura, places increased pressure on the Rusizi Delta Reserve. The Delta Reserve is one of the few functioning tourist destinations within the PA system, due largely in part to involvement by local NGOs. An invasive species, the *Lantana camara* shrub, has taken over much of the reserve, changing the face of its natural ecosystem to impenetrable bush. Oil exploration was tried in the past on the plain and could restart in the near future if bids and proposals are accepted.

Malagarasi Wetland. The Malagarasi Wetland (or Kumoso and Bweru depressions), due to its lower soil fertility and frequent flooding, traditionally has been less populated, but recent resettlement and repatriation of families from Tanzania and Rwanda in the area have led to some permanent cultivation,

²⁶ This lack of understanding of the concept of a protected area landscape is not limited to INECN staff around Bugesera, but widespread throughout the agency.

²⁷ Wetlands regulate flow, preventing floods and providing continuous flow during dry seasons. Wetlands also act as dams downstream from several of the Lacs du Nord.

where before it was seasonal. This increased pressure threatens to drain the marshes and degrade their ecological functions if pursued without proper planning, education, and regulation. The State-run sugar plantation supports the protected area designation of the Ramsar site, as it recognizes the need to sustainably manage the depression lest the wetland (and the cultivatable land for sugar) disappears.

6.3 SECTOR GAP ANALYSIS

Because of the broad scope of the water sector, many actors are present. This assessment has chosen to focus on water resource management related to lakes, rivers, and wetlands rather than water provision or water sanitation.

At a macro-level, a group of donors led by **GTZ** is working closely with the GoB in the **ProSecEau** Project (2007-2015) to: reform the water sector, its policies, laws, and regulation; further develop strategic planning; improve urban and rural water sanitation and provision; manage water resources in an integrated manner; and combat HIV/AIDS in the water sector. The **USAID** Policy Reform Program also contributed to this work in 2009 concerning water institutional framework harmonization and sectoral policy preparation.

The 10-member **Nile Basin Initiative** (1999-present) has been active since 1999 and has two primary components: the Shared Vision Program (SVP) and the NBI Investment programs (**NELSAP** in Burundi). The SVP projects are comprised of grant-based activities to foster trust and cooperation and build an enabling environment for investment. The NBI focuses on Applied Training, Confidence-Building and Stakeholder Involvement, Efficient Water Use for Agriculture, Nile Transboundary Environmental Action, Regional Power Trade, Shared Vision Projects Coordination, Socio-economic Development and Benefits Sharing, and Water Resources Planning and Management.

NELSAP is funding the Regional Rusumo Falls Hydroelectric and Multipurpose Project (RRFP) to dam the Kagera river in Tanzania which flows out of Burundi. The larger **NELSAP** Kagera River Basin Transboundary Integrated Water Resources Development Project (**TKTIWRDP**) has a component which the **African Water Facility** (AWF) of the **African Development Bank** is funding in the *Lacs du Nord* (Bugesera) that will focus on the preparation of integrated management plans for the lakes and the marshland based on comprehensive diagnostics of the water-bodies as well as build the capacity of stakeholders for better resource management through training and water resource monitoring.

In the *Lacs du Nord* and Bugesera area, many projects are involved in agricultural development. The **World Bank PRASAB** project (2004-2010), the **USAID** Food for Peace Project/Multi-Year Assistance Program (MYAP), the **GEF** small grants program, and an upcoming project supported by the **AfDB**. These interventions are very similar in their goal of infrastructure rehabilitation, especially in the wetlands, to increase rice production. Many also intervene on the surrounding hills with varying strategies of micro-terracing, livestock promotion, and installation of anti-erosion grasses. The upcoming World Bank **PRADEMA** project (follow-on to PRASAB) will focus uniquely on wetland areas and shift towards complete value chain strengthening (rice, banana, coffee, dairy, and meat) rather than just production.

The current **AfDB** PABV (2006-2010) is unique in that it is an integrated watershed management program with primary interventions focusing on watershed protection and reforestation from wetland to summit as a way to achieve increased agricultural and forest production. This project is active in the Kirundo, Cankuzo, Muyinga, Rutana, Bururi, and Gitega provinces.

The **Lake Tanganyika Authority** is a regional governing organization comprised of the four country governments surrounding Lake Tanganyika (Burundi, DRC, Zambia, and Tanzania). Its mandate is to promote regional cooperation required for socio-economic development and sustainable management of the natural resources in the Lake Tanganyika basin through coordination and oversight of the

implementation of relevant projects and programs. Although conceptually more than 15 years old, the LTA has only been operational since 2008 with assistance from **UNDP**, the European Union (**EU**), and the **AfDB**. The UNDP **PRODAP** project is highly coordinated with the LTA with interventions in all four countries along the lakeshore. In Burundi, PRODAP is focused on pollution reduction and wastewater management.

The **French Cooperation**, through regional participation from the **Pays de la Loire** region, is involved in integrated watershed management focused on eight watersheds south of Bujumbura. They work with local communities (including fishermen and farmers) on food sector (fish conservation, tea and food processing) and livelihood development.

A **USAID/CocaCola Global Development Alliance** (GDA) project in the towns around the Rusizi Delta concerning water resources and waste water management will be starting soon.

6.4 OPPORTUNITIES

Government of Burundi Institutional Strengthening. The recently finished draft national water policy and accompanying codes, once validated and approved, should receive priority support for execution. The draft national water policy proposes, among other things, to create a number of mechanisms and national structures to assure the coordination and implementation of the policy itself. (Levin n.d.)

The new MEEATU Water Directorate should be promoted, supported, and used as a primary coordinating, regulating, and authoritative unit across ministries. Clear and coordinated institutional framework is a key to successful NRM, and these two initiatives provide timely and needed opportunities for interventions concerning much-needed governmental institutional strengthening.

The revised Land Code recommends the creation of a complementary Wetlands code. This would significantly aid the clarification and management of Burundi's wetlands and marsh areas.

INECN could greatly benefit from interventions focusing on organizational planning and capacity building. Field staff levels are likely sufficient, but lack proper resources, training, and vision to properly execute the mandates set forth in GoB strategy documents. In the *Lacs du Nord* Aquatic Landscape, INECN needs to transition from a reactive to a proactive strategy in their management of the protected areas. The complexity of a landscape philosophy demands more vision and planning beyond that of patrols around borders of the lakes. Specifically, the 2005 INECN strategy document needs to be



Miles from the nearest residence, trash from Bujumbura washes up on a secluded beach of Lake Tanganyika.

developed into a functional operational plan and work plan. (Benoît 2005) Enforcement needs to be strengthened concerning fishing, agricultural encroachment, and land conversion around the newly designated lakes and the surrounding population supported in their adaptation through alternative livelihood development.

The MEEATU Land Directorate should be supported/consulted with their inter-ministerial Land Use plans for the wetlands development/protection. Similarly, the MEEATU Environment Directorate should be developed in its role as a regulator concerning industrial pollution in Bujumbura as well as other coastal towns, such as Rumonge and Nyanza Lac. As Bujumbura develops into a larger city, institutionalized regulation of industrial sectors must be achieved before it becomes unmanageable and Lake Tanganyika becomes polluted to the extent that costly restoration efforts are needed to reestablish normal ecosystem function and services.

Donor Coordination. As described above in the *Lacs du Nord* wetlands, many donors are active in the same regions with similar projects. Projects should adopt more common approaches to watershed infrastructure management as neighboring communities need to be sensitized and educated with universal legal rights information and irrigation infrastructure management techniques. Additionally, the Lake Tanganyika Authority and new MEEATU Water Directorate should be utilized as coordinating entities to prioritize interventions and ensure appropriate coverage across the country.

Tourism promotion. As the developing northern shore outside of Bujumbura illustrates, Lake Tanganyika holds a comparative advantage for Burundi tourism and should be developed and maintained. Fledgling enterprises on the beaches (such as resort hotels, water sports, fishing, and ecotourism) present further opportunities for private investment and economic growth, but need to be supported by the GoB as a resource-managing authority to preserve and protect the natural beauty of the lake. In the Rusizi Delta Reserve and *Lacs du Nord* protected areas, the fauna-viewing potential is significant and should be further developed with activities such as river/lake tours and organized bird watching.



The Rusizi Reserve is plentiful for bird-watchers (and hippos), only 15 minutes from Bujumbura.

Transboundary Cooperation. Like COMIFAC in Central Africa and the Mano River Union in West Africa, the Lake Tanganyika Authority is essential for coordination and oversight of stakeholders' activities and should be supported in its development as a regional governmental entity. Oil exploration, overfishing, pollution, and climate change are all environmental threats to Lake Tanganyika that do not heed national borders.

The official designation and recognition of the Malagarasi Wetland should be pursued with vigor and coordinated with the Government of Tanzania to ensure collaborative management and preservation of the ecosystem. Once designated, proper planning should be instituted to insure sustainable management and use. A transboundary peace Ramsar wetland is achievable in the near future.

Cooperative enforcement with Rwanda should also be sought through collaborative patrols and international policy harmonization in the *Lacs du Nord* Landscape.

Research Studies and Assessments. A study of the impacts and tolerance of the wetlands surrounding the *Lacs du Nord* vis-à-vis agricultural development needs to be undertaken. It is not known how much

wetland can be converted and water irrigated without seriously damaging the already fragile lake levels and ecological services. This should be coordinated with Rwanda.

No current information exists on effects of the industrial pollution upon Lake Tanganyika, nor an inventory of aquatic species affected by fishing and this pollution.

7. OTHER LAND USES

7.1 OVERVIEW

Due to their relative importance and impacts on the environment, other key land uses such as agriculture, mining, and urban areas are further described here. Best estimated distribution of land uses are shown in Table 5 and Figure 8.

Table 5: Burundi Land Use

Land Use	% of Land Area
Natural vegetation (including swamps and forests)	8.6
Forests	4.6
Pastures	27.8
Food crops (outside of swamps)	43.3
Cash crops	3.7
Cultivated swamps	2.8
Lakes	9.9
Towns	0.9

(USAID/REDSO 2003)

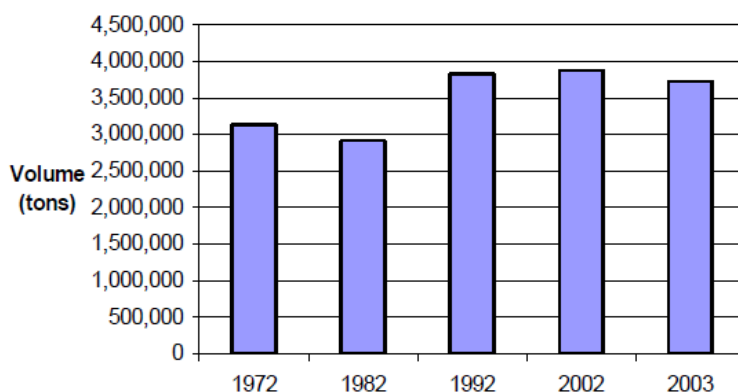
AGRICULTURE

With an estimated 90-95% of Burundians directly involved in agriculture for their livelihoods, agriculture is easily the most important (estimates vary from 24-50% of GDP) and prevailing land use covering over 50% of the total land of Burundi (Banderembako 2006; RdB and UNDP 2008; RdB 2008).²⁸ Agriculture is practiced in Burundi at the subsistence and smallholder farmer level as well as at the industrial/semi-industrial level, though much less so. Critical to subsistence agriculture is the securing access to arable land. With the crushing demographic pressure farmers have been forced to cultivate marginal areas (steep hill side slopes) and valley bottoms (*marais*). Subsistence farming typically focuses on staple crops such as cassava, bananas, corn, beans, rice, sorghum, and peanuts.

²⁸ Food crops (outside of cultivated marshes) cover approximately 1,210,000 ha, approximately 43.5% of the nation's total land area, while cash crops occupy 104,000 ha, which is 3.7% of the total national territory. Cultivated marshes make up approximately 81,403 ha, or 2.9% of the country's total land area (MINATTE 2000 as cited in RdB and UNDP 2008).

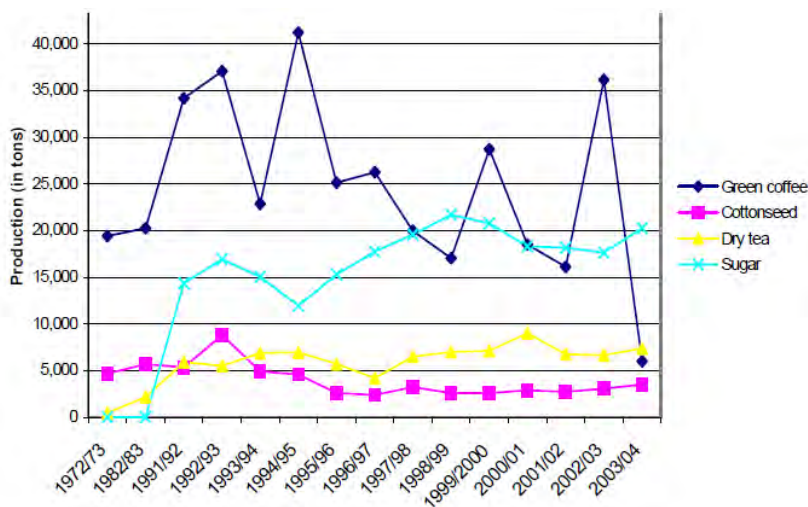
Trends in crop production can be seen in Figure 9. Although production appears rather stable, it has not kept up with population growth, with a 15% decrease in per capita production over a 10-year period (Banderembako 2006). In light of the continued food insecurity, limited land availability, and irregular precipitation (droughts and floods described) in Burundi, many projects and technicians are pushing for *marais* development (or rehabilitation where previously developed) to increase primarily rice production.

Figure 9: Trends in Total Crop Production (Banderembako 2006)



Industrial and semi-industrial agriculture has been developed with some success in Burundi although the multiple and extended periods of political/social unrest in Burundi since independence have hampered its expansion at the desired scale. Of particular importance historically has been export-oriented commodity production such as sugar cane, coffee, horticultural products, tea, rice, cotton, and oil palm. Trends in some of these key crops are depicted in Figure 10. Many medium- to large-scale agricultural enterprises are or were recently government-owned and managed businesses.

Figure 10: Trends in Production of Key Cash Crops (Banderembako 2006)



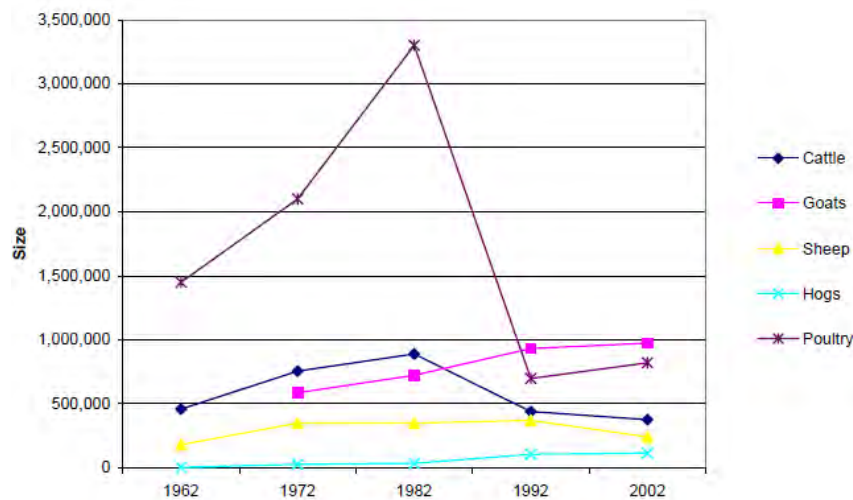
ANIMAL HUSBANDRY

Cattle, swine, goats, sheep, and poultry are raised primarily at the subsistence level but some current and historic industrial or semi-industrial production has occurred. At the subsistence level, individuals may

own a few head of hoof stock that are typically grazed on private, common, and state lands. Shepherds typically track and guide the movement of these livestock. Poultry are usually raised in the open without any enclosure. Due to land/water conflicts and overgrazed pastures, subsistence farmers are increasingly encouraged to raise their animals in enclosures (zero grazing system) with green fodder either gathered off nearby lands or harvested from their fields and brought back to the pen.

Industrial and semi-industrial animal husbandry has been focused on beef, goat meat, mutton, eggs, and dairy for national/local consumption. The trends of this sector are shown in Figure 11. Development of this sector to scale has been stymied by many of the same factors plaguing private sector investment (political/social/economic instability, significant tax burden, complex and corruption prone bureaucracy, etc.).

Figure 11: Trends in the Scale of Various Livestock

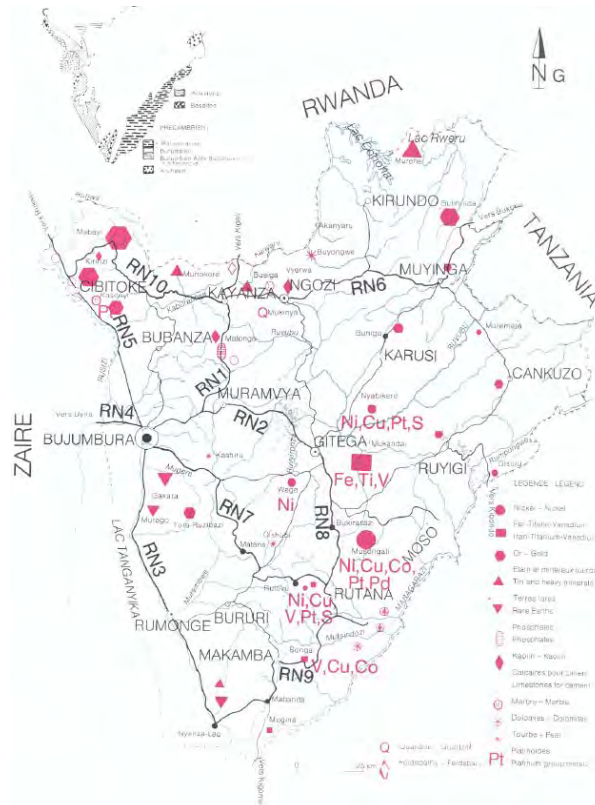


(Banderembako 2006)

MINING

Burundi has and continues to extract its mineral resources both at the artisanal and industrial scales. Deposits of gold, vanadium, nickel, platinoids, heavy minerals, rare earths, phosphate and carbonatite deposits, other industrial minerals, peat, and cement have been found and have and/or are currently being extracted (RdB 1991). The distribution of these resources can be found in Figure 12 as indicated in a state 1991 mineral extraction promotional investment brochure.

Figure 12: Geographic distribution of known and promoted mineral resources in 1991



(RdB 1991)

Artisanal mining has focused on gold; clay for bricks and roofing tiles; sand, gravel, and rocks for construction materials; and peat extraction among others. Very little is known about any artisanal activities in Burundi including mining. No data are available as to the actual quantities of materials extracted for artisanal use, productions rates, distribution across the country, nor the value chains for each artisanal activity. These basic sources of information are critical to understanding the potential environmental impact and proposing mitigation measure. At any rate, it is suggested that although mining remains underdeveloped in Burundi it can still have significant potential negative environmental impacts, such as encouraging desertification, soil erosion, land and vegetation degradation, landslides, and deteriorating water quality (RdB 2009g; RdB 2009h).

Industrial scale mining has been developed for the remaining minerals with notable recent deposits of nickel found and exploratory and exploitation permits allocated. The largest nickel deposits are near Gitega and Rutana, including what is lauded as the fifth largest in the world with an estimated 180 million tons spread over 170 km.²⁹ Another of these deposits occurs in close proximity, if not within, the Ruvumbu National Park (see section 4.2). Likewise, coltan deposits have been mined in recent years with both industrial and artisanal methods.

URBAN/INDUSTRIAL

Although an estimated 90% of the national population resides in rural areas, urban areas and their expansion continue to have important impacts on the environment (Schlaifer M. and P. Ntahompagaze. 2007). Notably, Bujumbura is the largest urban center on Lake Tanganyika and continues to grow. The

²⁹ Interview with RdB General Directorate of Geology and Mines

last 5-10 years have experienced an expansion of development along the Lake, especially as the water level has receded.³⁰ Anecdotally, there has been concern expressed that these new developments will be inundated as the cyclical lake water levels return to previous levels.

Likewise, the small manufacturing and industrial sector occurs primarily in close proximity to Bujumbura and less so around other urban centers. Concerns have been expressed concerning the air and water pollution that occurs due to this sector as well as the insufficient and/or failing urban wastewater treatment infrastructure.

The drafting and promulgation of the Environment Code of 2000 as well as recent efforts towards the development of an Urbanization and Construction code are some early, yet concrete, steps towards better planning and management of these important issues.

7.2 THREATS

The threats of these other land uses on the environment are numerous. Many of the threats result in marginal land exploitation which in turn leads to additional conversion of remaining natural areas, degradation of watersheds, erosion, etc., all limiting the ability to provide the key ecosystem services Burundians depend on.

Widespread poverty (in its many dimensions), malnutrition, some drought-induced local “famines” create the context of desperation that leads to individual decisions based on immediate personal/family interest, thus limiting the space and ability for individuals, as well as the State, to make resource use decisions that could promote the longer term sustainability of land for agriculture and maintenance of many other key ecosystem services.

Likewise, another threat has resulted from the extended period of **civil conflict and the concomitant collapse of the state and other local level land management institutions**, which led to significant land grabbing and speculation in areas not previously allocated to subsistence farming (e.g., forests, parks/reserves, any unclaimed land).

Another threat of other land uses on the environment is the **traditional land inheritance system** in which children receive a subdivision of their father’s land **resulting in smaller and smaller agricultural plots** (< 0.5 ha on average) per household (RdB and UNDP 2008). This cultural system, when matched with continued and increasing demographic pressure limiting availability of arable land, leads to development of marginal and/or environmentally sensitive lands as well as land-based conflicts.



The continued use of the **extensive model for animal (livestock) husbandry** in a land-scarce and densely populated country leads to **overgrazing, poor production, and conflict** (RdB and UNDP 2008).

The fact that very few **off-the-farm alternative economic opportunities exist** will undoubtedly threaten the environment as pressure on the land will only increase.

Despite significant efforts to resolve it, the **continued, unclear land tenure** issue continues to cause conflict that

similar dynamic of farmers/settlers developing right up to water’s edge as it recedes. development occurs primarily for new land for cultivation due to the limited amount of not negligible.

As land is passed down to generations, individual plots become increasingly small and less desirable.

undermines social and economic stability and thus exacerbates threats on the environment. This challenge is compounded with Burundian refugees returning after what is for some an entire generation spent in neighboring countries. Moreover, as no effective formal land registry exists, confusion and land conflict continues to be the norm.

It appears that broadly speaking, **real incorporation of agroforestry, contour lines, and progressive/radical terracing** in the technical approaches of farmers **remains limited and tradition extensive practices continue to be the norm**. These various improved agricultural and land management approaches are popularly perceived as being done for “projects” and therefore such labor and/or financial investments are seen as something they do for immediate compensation (e.g., money from projects or from food for work initiatives), rather than for improving their own land. This continues to result in degraded lands with limited agroforestry for green manure and limited chance for fallow leads to poorer and unfertile soils.

Another threat from these other land uses on the environment is due to the **weak, outdated, and/or incoherent legislative/regulatory framework for the whole suite of previously described land issues**. This contributes to ongoing land conflict, which is a significant social, economic, and environmental issue, as it has been suggested that approximately 80% of court cases are regarding land conflicts (Athman et al. 2006).

Weak environmental regulations and enforcement institutions to mitigate environmental impacts of the agriculture, livestock, and mining sectors as well as urban/industrial air and water pollution, continues to threaten the environment and the ecosystem services it provides. Indeed, the Ministry of Environment itself was established just before the conflict and instability of the 1980s, which continued intermittently until 2005. Therefore, arguably, the Ministry is just now, for the first time since its creation, beginning to function and build its identity, mandate, and staff.

Continued **development of wetlands**, devoid of sufficient hydrological/ecological knowledge and examination to respond to water quantity/flow concerns, **may be accelerating decline of water resources rather than providing a solution**, perhaps due to a large-scale decline of wetland and floodplain function in the basin (Athman et al. 2006).

While not a unique problem in Burundi, many informants indicate concern over the issue of **lack of coordination among differing government, donor, and NGO actions**. The Planning Ministry is normally the official donor coordination structure for minimizing these issues. This often results in a duplication of effort – or worse, differing efforts working crosswise. Improvement in coordination is needed to shift from scattered and often uncoordinated actions to more effectively create critical new alternative economic opportunities needed to minimize pressure on the land and get Burundi out of the vicious cycle of poverty, land scarcity, land/environmental degradation, and conflict.

7.3 SECTOR GAP ANALYSIS

As Burundi is shifting from conflict, to post-conflict, to stabilization and recovery, broader development actions such as addressing the many land issues are increasingly garnering significant donor investment. A multitude for cross-cutting, sectoral, and subsectoral projects are underway across the spectrum from land policy reform to launching/relaunching agribusiness to promoting agricultural intensification on the existing lands.

As previously mentioned, many programs and projects are working on integrated watershed management (from the hilltops to slopes to valley bottom wetlands) for multiple objectives, including those other land use issues discussed in this section. Notably, USAID CRS (rehabilitation of *marais* rice cultivation), World Bank/GEF PRASAB (and most likely its follow-on PRODEMA), ADB PABV, UNDP/GEF - Lake Tanganyika Authority, UNDP/GEF PRODOC – sustainable land management project, Nile Basin Initiative, and French Cooperation projects have a significant integrated watershed management and development focus or component.



Wetland irrigation infrastructure rehabilitation is a popular intervention amongst international donors.

Some actors are promoting agribusiness for increased revenues throughout value chains for coffee, dairy, horticulture, and other commodities – notably the USAID Agribusiness program as well as the upcoming World Bank PRODEMA.

There is an important ongoing body of work to address some of the root causes of land conflicts through necessary capacity building and institutional (land management ministries, communal administrations, the legislature/parliament, and community organizations) and policy reform (land code, territorial management code, water code, etc.) – namely, USAID Policy Reform Program, GTZ, Swiss Cooperation,

UNHCR, Dutch Cooperation, CARE (and other NGO land conflict forum consortium members), and the EU.

Additionally, a land use planning (technical and political) processes is underway in a few targeted provinces, which will help provide the data-driven vision for meeting land and resource needs that is sorely needed. Notably, these activities have been supported by the World Bank/GEF through the PRASAB (10 provinces with four already completed) and now the EU (seven other provinces and apparently some national GIS capacity support in the Geographic Institute of Burundi (IGEBU)) in close collaboration with the MEEATU. It should be noted that the ADB PABV project is supporting the elaboration of forest management plans and simple participatory management plans for state forest (*boisement domanial*) in certain communes (RdB and BAD 2010). At the national level, a draft pre-project version of a land management law is under consideration and includes reference to the above and other “tools” for land use planning and management (RdB 2009d).³¹

Lastly, each province has a decentralized office from the Ministry of Agriculture and L (MINAGRI) – Provincial Directorate of Agriculture and Livestock – charged with providing technical assistance to the farmers as well as other monitoring and consultation roles.

³¹ Tools include: a) le Schéma National d'Aménagement, b) les schémas communaux d'aménagement, c) les schémas provinciaux d'aménagement du territoire, d) les plans régionaux d'aménagement du territoire, e) les plans d'aménagement du territoire, f) les plans locaux d'aménagement du territoire, et g) les plans particuliers d'aménagement.

7.4 OPPORTUNITIES

Due in part to the rather significant donor/NGO/government attention to the land issues, and despite the significant challenges, a certain number of opportunities to address the previously mentioned threats emerge.

First and foremost, there already is **widespread recognition of the land issues** and therefore new or continued **interventions in this domain, if well coordinated, will be welcome** to most stakeholders. That is to say, a well designed and coordinated effort to address land issues should likely not require significant convincing/education/awareness-raising, as it is seemingly front and center on the agenda of donors/government/NGOs/local communities.

Support MEEATU to carry out critical technical aspects of a national/provincial land use planning process. Certain steps have been made through the MEEATU (*Direction Général d'Aménagement du Territoire*) to carry out a land use planning exercise in several pilot provinces. Additional investment in these ongoing land use planning processes is vital at this time. More specifically, these efforts could benefit from: better grounding with local level aspirations, building internal capacity in the MEEATU and IGEBU in particular, to carry out technical work rather than outsourcing to consultants, scaling up, integration with the Poverty Reduction Strategy Paper (PRSP) process and the Planning Ministry's donor coordination function, support formal adoption processes to ensure outcomes are institutionalized and respected, and, as necessary, securing high level buy-in. This technical and political effort is fundamental to help Burundi systematically look at their needs (food, energy, minerals, water, ecosystem service provision, etc.); assess their land and resource constraints; incorporate in a participatory manner the multiple and perhaps at times diverging local, national, and international objectives; and ultimately, formulate an implementable plan of action that balances and works through the inevitably politically sensitive tradeoffs needed to put Burundi on an informed and supported trajectory for sustainable development. The long discussed inter-ministerial National Lands Commission (and the subsidiary communal commissions) will likewise have an important role to play in these important land use plans and decisions. Without such a multi-stakeholder-supported process it seems difficult to imagine how Burundi will move forward; the country would rather continue in status quo (e.g., uncoordinated, overlapping/competing, one-off development investments with less than optimum impact/staying power).³²

Build on and scale up the georeferencing of land holdings efforts. Related to the land use planning work, another opportunity exists to build on and scale up the georeferencing of land holdings efforts initiated by the European Commission (EC), Belgian Technical Cooperation, and Swiss Cooperation supported project in the Itaba region to issue land titles. Currently, GIS database building and managing capacity is very limited throughout the various technical services of the land management ministries.³³ Much work remains to support the relevant institutions to build capacity and then carry out the georeferencing of land holdings, classes, uses, etc. that currently exist and therefore in the process identify any unallocated lands. Likewise, analytical capacity should also be strengthened in these important technical services. Without knowledge of the resources and where they are, effective planning is stymied.

Support the expansion of agriculture and livestock production, minimizing negative environmental impacts and promoting a mix of locally consumed products and export commodities. Burundi is an agrarian society. While this might make shifting to non-agriculture-based

³² It seems that the Burundian NGO, ODEB, and the coalition of seven national NGOs it leads in the Burundi Green Movement would be worthy participants in these multi-stakeholder processes.

³³ IGEBU apparently lost many staff, skills, and GIS equipment during the conflicts.

livelihoods more difficult, the flip side is that agriculture is engrained in the culture and therefore, with the right tools, rules, and incentives, agriculture and livestock production is poised to expand.³⁴ Ensuring best practices for minimizing negative environmental impacts including identifying the right activity is matched to the right lands of the country will be crucial to long-term success.³⁵ Moreover, as Burundi remains food insecure, it seems that balancing programs to include a mix of locally consumed products and export commodities would be the right formula.

Support of local level, grassroots institutions for managing and adjudicating land conflicts.

Build on recent investments in support of local level, grassroots institutions for managing and adjudicating land conflicts to empower those closest to the problem and to redirect such cases from the overburdened court system.

Land-related policy and institutional reform processes should be seen through to their formal adoption and supported towards their effective implementation. There seems to be a tipping point opportunity to get the right policies and institutions in place to more effectively govern and manage the land. Civil society organizations are stronger than ever before. Therefore, the critical work already done on land-related policy (e.g. revisions of Land Code, Water Code, and early drafts on PA Code and Land Management Code) and associated institutional reform processes should be seen through to their formal adoption. This is critical as such efforts, if done right, can form the basic building blocks for the future sustainable development of Burundi. That said, once high-level policies are adopted and new organizational charts, etc. are approved, the even more challenging and long-term step of effective implementation support should follow. These policies and processes should also be buttressed with the strengthening of general coordination within the GoB of the monitoring, supervising, and regulating of environmental management matters between various ministries.³⁶

³⁴ The right tools, rules, and incentives could include respectively, capacity building and investment-friendly environment coupled with sound environmental regulatory structures and rules, and mix of incentives. This includes a reform of the tax regime, rectifying institutional corruption, rationalizing import/export duties, and working through and implementing other important subregional economic policies.

³⁵ Another suite of best practices in the agriculture sector to benefit from are the social and environmental certifications that are available for different important commodities in Burundi, most importantly coffee and perhaps tea. For example, the USAID agribusiness program is working with coffee producers to raise standards and link up with international certifiers in view of helping farmers and coops secure a price premium for specialty coffees as well as improving environmental outcomes.

³⁶ For example, clarification of the role, management, and authority of the *Police de l'Environnement* currently under responsibility of the Ministry of National Security is needed.

8. TRANSBOUNDARY ISSUES

8.1 OVERVIEW

A small landlocked country straddling East and Central Africa, Burundi is integrally linked to its neighbors across sectors and issues. Being landlocked, with over 90% of the population engaged in subsistence agriculture, and industry only starting to develop at a commercial level, import goods are an essential part of the economy flowing across Lake Tanganyika and from Tanzania and Rwanda. The few export industries (tea, coffee, minerals, fish, etc.) face transport cost barriers to world markets and thus have a more favorable comparative advantage at a regional level. In 2006, together with Rwanda, Burundi joined the East African Community (EAC), recognizing the importance of its eastern neighbors in Burundi's growth, development, and stability. Historically, marginalized populations from the entire region have moved amongst the countries, depending on the relative political stability.

In addition to the importance of regional economic and political connections, Burundi is situated within significant integrated environmental contexts. The country's watersheds flow towards the Congo and Nile rivers, including the southernmost source of the Nile. Lake Tanganyika's waters flow from Rwanda and its shores are shared with DRC, Tanzania, and Zambia. The entire Albertine Rift, from northwest Uganda through Rwanda, Burundi, Western Tanzania, and eastern DRC, is recognized as an "Endemic Bird Area" by Birdlife International, as an ecoregion by WWF, and as a biodiversity "Hotspot" by Conservation International. Kibira National Park not only abuts, but is intertwined with Nyungwe National Park in Rwanda, which represent the last large area of natural *Afro-montane* forest in either country. Burundi also shares the largest lakes in Bugesera (Cohoha and Rweru) and the Akanyaru marshland with its northern neighbor.

8.2 THREATS

Regional Political Instability/Population Migration. The last 20 years have clearly demonstrated the vulnerability of each country in the region to political instability and violence. Refugee migrations in all directions have significant economic and environmental ramifications. Furthermore, upon repatriation, affected populations have often lost their original lands, and are re-integrated by national and local authorities on open state lands, which in high population density countries often means in or around protected areas. In Burundi, the retreating waters around the *Lacs du Nord* have revealed new (and legally protected) land that has been settled by recent migrant and repatriated families. Similarly, in the Malagarasi wetlands, traditionally only seasonally habited, new settlers have moved in permanently, endangering the ecosystem with constant cultivation.

***Lacs du Nord* – Wetlands Development/Overfishing.** Multiple donor development projects are developing and rehabilitating wetlands in the Bugesera region as well across the border in Rwanda. Population growth and increased land use conversion/development to agriculture (rice) place increased pressure on the wetlands and surrounding watersheds, which maintain lake levels and water tables. Without proper coordination, research, education, and regulation, the increased and comprehensive wetland development could destroy the ecological system where wetlands regulate water flow and maintain lake levels.³⁷ The population migration to the area is also increasing fishing pressures on the lakes and local fishermen have noticed significant changes in catch composition and quantity. Not only

³⁷ Wetlands regulate flow, preventing floods and providing continuous flow during dry seasons. Wetlands also act as dams downstream from several of the *Lacs du Nord*.

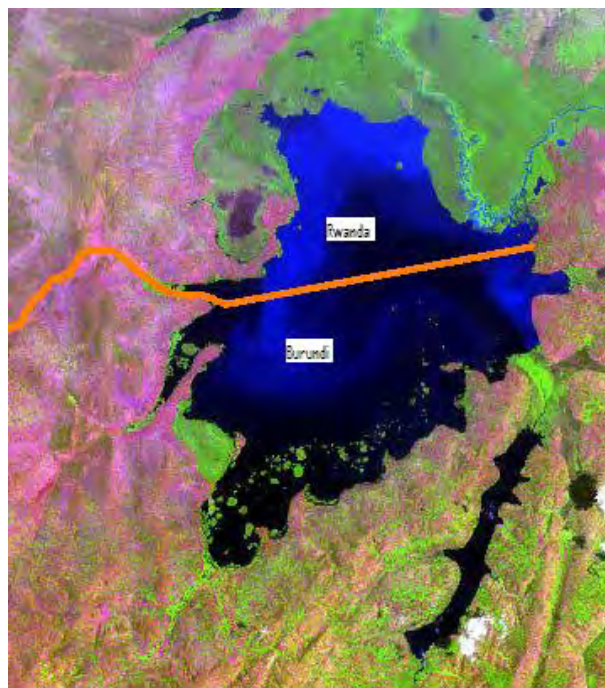
has individual average fish size decreased in the catches, but certain species have disappeared and the overall number of fish caught has greatly decreased.³⁸

Climate Change. The effects of Climate Change are worldwide and highlight the need for international and regional coordination to mitigate and adapt. The Northern Aquatic Landscape is highly sensitive to drought and rising temperatures. The lake waters have already receded by as much as 150 meters in some areas.³⁹ Integrated planning and monitoring is needed with Rwanda to ensure adequate adaptation strategies surrounding the lakes. Weather patterns have become more erratic,⁴⁰ producing increased floods in some areas and prolonged droughts in others. Early warning systems should be in place to notify authorities and shared across borders, so that governments can be prepared for famine or floods and properly prepare the affected populations.

Forest Monitoring and Regulation. Kibira National Park is highly threatened by population pressures, bordering on the most populous provinces in the country, Kayanza and Ngozi. Similarly, on the western slopes, mining (gold, tungsten, and castelite) and agricultural pressures are increasing. INECN lacks the organizational capacity and resources to properly manage and enforce Kibira's borders. Because Kibira National Park is intertwined with sections of Nyungwe National Park, the need for cross-border integrated planning, management, and enforcement is imperative. A common vision for development, law enforcement, conservation, tourism, outreach, and planning is essential to the success of transboundary protected area management. Without this, local communities can become confused, threats more acute, laws ineffective, and enforcement and management more expensive. Collaboration and coordination of resources, information, and work plans can strengthen regional political ties and be mutually beneficial, financially and organizationally.

Lake Tanganyika – Pollution/Overfishing. Although Burundi is only situated on a smaller fraction of the shores of Lake Tanganyika, its impacts are much larger. The industrial pollution and waste water from Bujumbura, Rumonge, and Nyanza Lac, despite the volume of the lake, is transient in nature. Similarly, while larger settlements exist on the Burundi shores, commercial fishing and improper watershed management in Tanzania, DRC, and Zambia can greatly affect Burundi. Burundi's majority of fishermen are artisanal, using traditional canoes and nets. However, increases in population have increased the number of fishermen, with no regulation of licenses or harvests. This has resulted in the decrease in catch and endangerment of several species. Most notably the popular yet endangered *Sangala* is rarely caught anymore and quite often what is listed as *Sangala* on restaurant menus is actually

Figure 13: Lake Rweru and surrounding wetlands



Benoit, 2005

³⁸ Interview with Gérard Ndikumana, President, Association des Pecheurs de Lac Rweru d'Est.

³⁹ Ibid.

⁴⁰ From interview with IGEBU director of meteorology.

Capitaine.⁴¹ Additionally, the unregulated overfishing of several species of cichlid fish for export for aquarium enthusiasts may have brought many of the endemic species to the brink of extinction. No sufficient research studies to date have been done on the migration of fish between the different basins of the lake, nor on general population trends, nor on breeding areas.



Fisherman with Mukeke at Rumonge. No studies to date have been done on fish breeding habits or migration in Lake Tanganyika.

Animal Migration. Chimpanzee populations in Kibira National Park in the north and Bururi, Rumonge, Kigwena, and Vyanda Protected Areas in the south traditionally migrate between valleys into Rwanda and Tanzania respectively. The southern corridor from Bururi Protected Area in Burundi to Gombe in Tanzania is highly threatened and effectively inoperable with population growth, development, and landscape denudation and degradation. This corridor is essential for the small chimpanzee populations isolated in Bururi, Kigwena, Vyanda, and Gombe to allow for greater genetic viability and habitats sufficient to their biology and ecology. Although smaller in area than Nyungwe Park in Rwanda, it is suspected that Kibira Park has a higher chimpanzee population, possibly due to higher concentrations of bamboo.⁴² Coordinated transboundary management is needed to ensure that populations are kept at healthy and viable levels and human conflict minimized.

The rift valley is a primary flyway for many migratory bird species from Turkey to South Africa. Burundi is on the River Jordan to Nile Valley corridor and the southern source of Nile is located in Bururi Province. This corridor is considered the most significant corridor for bird migration in the world, and is the main eastern corridor between Europe/Asia and Africa that is regularly used by over a million birds to pass through a series of bottleneck sites each season. The Congo Nile Divide and Lake Tanganyika are landmarks for migratory birds – some 135 migratory bird species have been observed (Yves Gaugris et al, 2008).

8.3 SECTOR GAP ANALYSIS

The **Lake Tanganyika Authority** is a regional governing organization comprised of the four country governments surrounding Lake Tanganyika (Burundi, DRC, Zambia, and Tanzania). Its mandate is to promote regional cooperation required for socio-economic development and sustainable management of the natural resources in the Lake Tanganyika basin through coordination and oversight of the implementation of relevant projects and programs. Although conceptually more than 15 years old, the LTA has only been operational since 2008 with assistance from **UNDP**, the **EU**, and the **AfDB**. The **UNDP PRODAP** project is closely coordinated with the LTA, with interventions in all four countries along the lakeshore. In Burundi and Tanzania, PRODAP is focused on pollution reduction and wastewater management. In Tanzania, DRC, and Zambia, PRODAP is focused on water catchment management linked to livelihood development.

⁴¹ Interviews with restaurant waiters in Bujumbura and the President of the Rumonge Fishermen's Association. From interviews with USFS employee, Rob Sassor, in Kigoma, the same is true in Tanzania.

⁴² Interviews with WCS Nyungwe staff and INECN Kibira staff.

USAID, in collaboration with **WCS**, is heavily engaged in the development of Nyungwe National Park in Rwanda, including ecotourism infrastructure, marketing, and organizational planning. WCS currently is exploring expanding certain elements of this work, such as management and fire planning, into Kibira. Nyungwe National Park staff reported using the lessons learned from International Gorilla Conservation Programme's (IGCP) work in the Virungas to liaise and work with staff in Kibira National Park in Burundi. (Dennison n.d.)

USAID, **The Frankfurt Zoological Society**, **Jane Goodall Institute (JGI)**, **The Nature Conservancy**, and the NGO **Friedkin**,⁴³ are working in the Greater Gombe Ecosystem (GGE), including Gombe National Park, north to Burundi following the Afro-montane forest, and much of the Tanzanian Malagarasi wetland. Built around the famed chimpanzees of JGI's work in the 1960s, the GGE's vision is to conserve and develop the landscape in a sustainable manner for its residents, both human and chimpanzee, through land-use planning, education, and awareness-raising. **Burundi Nature Action** is working with **INECN** to advance the official recognition of the Burundian Malagarasi wetlands as a protected area and RAMSAR site. The **Millennium Challenge Corporation (MCC)** is supporting a hydroelectric project on the Malagarasi River in Tanzania.

Please see the above reference mentioned in **Section 6: Freshwater Resources** on the second **World Bank Lake Victoria Environmental Management Project (LVEMP II – 2010-2016)** and the 10 member **Nile Basin Initiative (1999-present)**.

Many projects in Burundi are involved in agricultural development in the *Lacs du Nord* and Bugesera area – the **World Bank PRASAB** project (2004-2010), the **USAID** Food for Peace Project, the **GEF** small grants program, and an upcoming **AfDB Kagera River Basin Project (TKTIWRDP)**. These interventions are very similar in their goal of infrastructure rehabilitation, especially in the wetlands to increase rice production. Many also intervene on the surrounding hills with varying strategies of micro-terracing, livestock promotion, and installation of anti-erosion grasses. The upcoming World Bank **PRADEMA** project (follow-on to PRASAB) will focus uniquely on wetland areas and shift towards complete value chain strengthening (rice, banana, coffee, dairy, and meat) rather than just production. The current **AfDB PABV (2006-2010)** is unique in that it is an integrated watershed management program with primary interventions focusing on watershed protection and reforestation from wetland to summit as a way to achieve increased agricultural and forest production. This project is active in the Kirundo, Cancuzo, Muyinga, Rutana, Bururi, and Gitega provinces.

8.4 OPPORTUNITIES

Kibira and Nyungwe National Parks present an important opportunity because of their condition and threats, including interlocking borders, large chimpanzee populations, tourist potential, high population pressures, and status as the last large natural forests in either country. While Nyungwe National Park is receiving significant attention from international donors and projects, Kibira remains the forgotten southern neighbor. Although organizations like JGI are expected to re-engage soon in Burundi, and several local NGOs are active in the conservation efforts in Kibira, a large gap exists in building and reinforcing the institutional and organizational capacity of the management of the park and surrounding land. INECN would greatly benefit from direct support and training as well as indirect implication and coordination through Rwandan counterparts. Recognizing the situation of these parks, Forest and National Park plans and visions should be transboundary in nature to better ensure the long-term sustainable management of the natural resources as well as transparent information sharing. The Memorandum of Understanding between INECN and the Rwanda Office for Tourism and National Parks should be used as a springboard to encourage and build further transboundary endeavors,

⁴³ NGO arm of Tanzania Game Tracker Safaris

including collaborative enforcement, synergetic work plans and visions, coordinated community outreach programs, information-sharing platforms, and harmonized policies and laws.

Similarly, the **Lacs du Nord and Akanyaru watersheds** need to be managed in a coordinated manner. The significant levels of agricultural and infrastructure development threatens to compound resource challenges and further dry up wetlands, lakes, and swamps. Donors within each country and across borders need to highly coordinate with the governments of Burundi and Rwanda to ensure the sustainable development of this climate and drought-sensitive area. Valley rice cultivation, hillside agriculture and reforestation, and summit protection are imperative interventions to be taken on simultaneously. Cross-border integrated land use planning should be accompanied by transparent legal procedures and clear lines of land and resource management authority. This effort not only includes Rwanda and Burundi, but also Tanzania, as dams downstream on the Kagera will greatly affect water management. Recently, the Rusumo Falls hydroelectric project, a cooperative effort by Burundi, Rwanda, and Tanzania, has been approved. The Rusumo falls are located on the Kagera River about 2 km downstream of the Kagera-Ruvubu Rivers' confluence. Both tributaries to the Kagera River, i.e. Nyabarongo and Ruvubu, are known for their high sediment load content. The high concentration in sediment may lead to the sedimentation of the reservoir and consequently to a loss of storage capacity, which would affect the reservoir benefits among which the power generation.⁴⁴

Although fairly young, the **Lake Tanganyika Authority** occupies an important position as a regional governmental entity. Lake Tanganyika is transboundary in its basic nature, and its circulating transitive properties will only be accentuated as its shores are further developed. The LTA should be supported before management of transboundary threats become compounded. While current direct support from the UN and AfDB are significant and will greatly develop the capacity of the LTA to carry out its mandate in the short to medium term, any project/program intervening at scale in Lake Tanganyika should make efforts to – at least – include the LTA as observers in its monitoring and planning to ensure effective technical coordination and dissemination of information. Additionally, the LTA's technical capacity should be developed so that it can participate at the necessary level in the wide variety of interventions in the lake, from pollution to fishing to recreation. The LTA should be active participants in the much-needed research on Lake Tanganyika (fish life cycles, biodiversity populations, pollution effects, climate change, watershed flows etc.). Outcomes of this applied research will help inform the design of development and conservation interventions.

The progress towards establishing a **Transboundary Malagarasi Wetland** merits support at its current nascent stage. If collaboration with Tanzania bears fruit, this wetland could be the largest Ramsar site in the world, and one of the largest Important Bird Areas in Africa, which would help protect a highly sensitive and ecologically important area and stimulate tourism. Because population pressures and agricultural development have only recently begun to take off, the opportunity is ripe for intervention at ground zero, before over-development degrades the land and compromises the wetland from providing its ecological services. Proper land use planning, monitoring, community sensitization, and local governance coordination is essential.

⁴⁴ <http://www.unesco-ihp.org/About/Academic-departments/Hydroinformatics-and-Knowledge-Management/Master-Programme/Msc-Abstracts/Msc-research-topics-2008/Modelling-of-Sediment-Yield-and-Deposition-in-the-Planned-Rusumo-Hydropower-Reservoir-Using-SWAT-Model>

9. OPPORTUNITY SYNTHESIS AND ORGANIZATION

The above sections present several laundry lists of threats, actors, and opportunities for intervention. While the thematic presentation allows targeted organization and information extraction, it is also beneficial to examine the environmental situation in Burundi as a whole. In the following section, the priority opportunities presented above are first summarized by the thematic sectors of Forests, Biodiversity, Climate Change, Water, Other Land Uses, and Transboundary Issues. These opportunities are then synthesized and prioritized by examining their cross-sectoral synergies. Those opportunities which address threats in multiple sectors are given higher priority. The same is true for opportunities where there are no significant interventions, as well as those prioritized by the GoB.

9.1 INTERVENTION OPPORTUNITY SUMMARY BY SECTOR

Identified opportunities for intervention by ETOA thematic sector, given the threats and existing actors (in no particular order):

FORESTS

- Promote community tree nursery development and financing
- Revise Forest Code and clarify use rights of forested lands
- Institutional strengthening of forest management authorities
- Forest sector investment through Climate Change issues of adaptation, clean energy and technology transfer, and mitigation
- Foster community involvement in forest resource conservation, management, and reforestation efforts

BIODIVERSITY

- Other eight PAs will still need to be legally defined by order of decree and adequate buffer zones established
- Promote reforestation and planting in PA buffer zones as a source of income to local communities
- Co-management schemes should be complemented with alternative livelihood activities, such as small animal husbandry and fish farming
- Institutional strengthening, resource support, and training in natural resource management, forest planning, inventories, develop resource monitoring plans, and schedules
- Promote ecotourism activities that complement PA management and provide alternative, non-extractive livelihoods for nearby communities

- Establish formal transboundary protected area management with Rwanda in Northern Burundi Aquatic Protected Landscape (*Lacs du Nord*)
- Revise the 1937 hunting and fishing code, IUCN Red List fish should be listed on CITES and prohibited from commercial and private take and trade until populations can rebound, baseline inventory of current fish populations and monitoring, better oversight is also needed to prevent the use of non-selective and destructive fishing gear, accompanied by economic alternatives for fisherman
- More aggressive, intensive agroforestry techniques would better stabilize soils while also improving soil fertility

CLIMATE CHANGE

- Diversifying food and cash crops could buffer losses with the unpredictability of changing seasons and climate
- Promoting mulching, rainwater catchment and drip irrigation systems would help extend water resources during the dry season or periods of drought
- Explore opportunities to participate in REDD
- Increase forest cover in industrial woodlots, fast growing trees could be planted in appropriate locations and harvests managed sustainably
- Build institutional human capacity and develop national curriculums to utilize analytic models and increase technical capacity of climate science and monitoring
- Increase climate-related public awareness on watershed management, promoting non-wood energy sources, and collection, analysis, and dissemination of agro-climate early warnings
- Replace current weather stations to support an early warning system
- Strengthen capacity of Ministry of Agriculture extension agents to demonstrate and transfer agroforestry techniques in rural areas
- Land use planning concerning human settlements to minimize risk to floods and other climate sensitive natural disasters

FRESHWATER RESOURCES

- Support the implementation of the new Water code through institutional GoB strengthening
- Promote and support new MEEATU Water Directorate, to be used as a primary coordinating, regulation, and authoritative unit across ministries
- Strengthen capacity of INECN in organizational planning and management around *Lacs du Nord* Landscape
- MEEATU Land Directorate should be supported/consulted with their inter-ministerial Land Use plans for the wetlands development/protection
- Donor projects should adopt more common approaches to watershed infrastructure management

- Tourism should be developed on Lake Tanganyika
- The Lake Tanganyika Authority should be supported in its development as a regional coordinating governmental entity
- The official designation and recognition of the Malagarasi Wetland should be pursued and coordinated with the Government of Tanzania
- Creation of a Wetlands Code as recommended in the revised Land Code
- Cooperative enforcement (MOU) with Rwanda should be sought through collaborative patrols and international policy harmonization in the *Lacs du Nord* Landscape
- Research on the impacts and tolerance of the wetlands surrounding the *Lacs du Nord* vis à vis the agricultural development
- Research on effects of the industrial pollution upon Lake Tanganyika and fish populations
- Government authorities at high level should be engaged in water management issues
- Agencies and NGOs intervening in water management should coordinate their actions to avoid duplication

OTHER LAND USES

- Support MEEATU to carry out critical technical aspects of a national/provincial land use planning process
- Build on and scale up the georeferencing of land holdings efforts
- Support the expansion of agriculture and livestock production, minimizing negative environmental impacts and promoting a mix of locally consumed products and export commodities
- Support of local level, grassroots institutions for managing and adjudicating land conflicts
- Land related policy and institutional reform processes should be seen through to their formal adoption and supported towards their effective implementation

TRANSBOUNDARY ISSUES

- Support transboundary collaboration and integrated planning and management with Nyungwe Park in Rwanda, and strengthening the institutional and organizational capacity of the management of the Kibira Park (INECN).
- Lacs du Nord and Akanyaru watersheds need to be managed in a coordinated manner (MOU needed)
- Lake Tanganyika Authority's technical capacity should be developed to ensure effective technical coordination.
- Support the establishment and coordinated management of a Transboundary Malagarasi Wetland (MOU needed)



Overlooking Ruvubu National Park at dusk.

9.2 SYNTHESIZED AND PRIORITIZED OPPORTUNITIES FOR INTERVENTION

In order to orient readers and help organize the opportunities identified above, Table 6 consolidates and prioritizes the opportunities, taking into account a number of factors. This is one way to identify which opportunities are the most needed or would address the most issues across the sectors examined by this ETOA.

In the prioritization and synthesis of identified opportunities, the following process was undertaken:

1. Similar opportunities were combined
2. Each opportunity was marked with an “X” if it addressed a threat within the thematic sectors (Forests, Biodiversity, Climate Change, Water, Other Land Uses, and Transboundary Issues)
3. Opportunities were “marked” if they were perceived Government of Burundi priority
4. Opportunities were “marked” if there were no major known interventions currently in the area
5. Opportunities were prioritized by those having most “X’s,” with perceived GoB priorities listed first.

Table 6: Synthesized and Prioritized Opportunities for Intervention

	Forests	Biodiversity	Climate Change	Freshwater Resources	Other Land Uses	Transboundary Issues	Perceived GoB Priority	No Known Interventions
Priority Opportunities with Five or More Marks								
Strengthen capacity of INECN in organizational planning and management around <i>Lacs du Nord</i> Landscape; Cooperative enforcement (MOU) with Rwanda should be sought through collaborative patrols and international policy harmonization	X	X	X	X	X	X	X	X
More aggressive, intensive agroforestry techniques would better stabilize soils while also improving soil fertility	X	X	X	X	X		X	
Research on the impacts and tolerance of the wetlands surrounding the <i>Lacs du Nord</i> vis-à-vis the agricultural development and Climate Change		X	X	X	X	X		X
Land-related policy and institutional reform processes should be seen through to their formal adoption and supported towards their effective implementation; Creation of Wetlands Code		X	X	X	X		X	
Institutional strengthening (Forest Management Authorities), resource support, and training in natural resource management, forest planning, inventories, develop resource monitoring plans and schedules	X	X			X		X	X
Promotion of community tree nursery development and financing; Promotion of tree planting for erosion control and wood supply	X		X	X	X		X	
Support MEEATU to carry out critical technical aspects of a national/provincial land use planning process	X			X	X		X	X
Climate public awareness on watershed management, promoting non-wood energy sources, and collection, analysis, and dissemination of agro-climate early warnings	X		X	X	X		X	
Support transboundary collaboration and integrated planning and management with Nyungwe Park in Rwanda, and strengthening the institutional and organizational capacity of the management of Kibira Park (INECN).	X	X				X	X	X
The official designation and recognition of the Malagarasi Wetland should be pursued and coordinated with the Government of Tanzania		X		X		X	X	X

	Forests	Biodiversity	Climate Change	Freshwater Resources	Other Land Uses	Transboundary Issues	Perceived GoB Priority	No Known Interventions
Opportunities with Four Marks								
Revise Forest Code; Clarify use rights of forested lands	X				X		X	X
Promote ecotourism activities that complement PA management and provide alternative, non-extractive livelihoods for nearby communities	X	X					X	X
Foster community involvement in forest resource conservation, management, and reforestation efforts; Reforestation and planting in PA buffer zones promoted as a source of income to local communities	X	X		X			X	
Current weather stations replaced to support an early warning system			X		X		X	X
Tourism developed on Lake Tanganyika		X		X		X	X	
Land use planning concerning human settlements to minimize risk to floods and other climate sensitive natural disasters			X	X	X			X
Revise hunting and fishing code; threatened fish should be listed on CITES; better enforcement accompanied by economic alternatives for fisherman; baseline inventory of current fish populations and monitoring		X		X		X		X
Research on effects of the industrial pollution upon Lake Tanganyika and fish populations		X		X		X		X

	Forests	Biodiversity	Climate Change	Freshwater Resources	Other Land Uses	Transboundary Issues	Perceived GoB Priority	No Known Interventions
Opportunities with Three Marks								
Forest sector investment through Climate Change issues of adaptation, clean energy and technology transfer, and mitigation; Opportunities to participate in REDD should be explored	X		X				X	
Legally define other eight PAs by order of decree and establish adequate buffer zones		X			X		X	
The Lake Tanganyika Authority supported in its development as a regional coordinating governmental entity; technical capacity should be developed				X		X	X	
Increase forest cover in industrial woodlots, fast growing trees could be planted in appropriate locations and harvests managed sustainably	X		X				X	
Build institutional human capacity and develop national curriculums to utilize analytic models and increase technical capacity of climate science and monitoring			X				X	X
Build on and scale up the georeferencing of land holdings efforts with MEEATU and IGEBU					X		X	X
Donor Projects should adopt more common approaches to watershed infrastructure management				X	X			X
Promoting mulching, rainwater catchment and drip irrigation systems would help extend water resources during the dry season or periods of drought			X	X	X			
Co-management schemes should be complemented with alternative livelihood activities such as small animal husbandry and fish farming	X	X			X			

	Forests	Biodiversity	Climate Change	Freshwater Resources	Other Land Uses	Transboundary Issues	Perceived GoB Priority	No Known Interventions
Opportunities with Two Marks								
Strengthen capacity of Ministry of Agriculture extension agents to demonstrate and transfer agroforestry techniques in rural areas			X				X	
Support the expansion of agriculture and livestock production, minimizing negative environmental impacts and promoting a mix of locally consumed products and export commodities					X		X	
Support the implementation of the new Water Code through institutional GoB strengthening				X			X	
New MEEATU Water Directorate should be promoted, supported, and used as a primary coordinating, regulation, and authoritative unit across ministries				X			X	
Support of local level, grassroots institutions for managing and adjudicating land conflicts					X		X	
Diversifying food and cash crops could buffer losses with the unpredictability of changing seasons and climate			X		X			

ANNEX I: PROTECTED AREAS

Table 7: Established and proposed protected areas for Burundi

Category ⁴⁵	Name	Area (ha)	Year Created	Legal Status	Features/Ecosystem Type	Other Designations
National Park	Kibira	47,794 ⁴⁶	1980 ⁴⁷	2000	Afromontane forest; bamboo; Transboundary with Nyungwe Forest	Important Bird Area (IBA); MOU with Rwanda for managing Kibira-Nyungwe
National Park	Ruvubu	50,900	1980		Woodlands, gallery forests, grassland savannahs, marshes	IBA
Nature Reserve	Rusizi	5,280 ⁴⁸	1980	2000	River delta, natural palm savannah	Ramsar Site (1,000 ha); IBA
Nature Reserve	Bururi Forest	3,300	1980 ⁴⁹	2000	Afromontane forest	IBA
Nature Reserve	Kigwena Forest	500	1980 ⁴⁹	2000	Guinean-type forest	Potential IBA
Nature Reserve	Rumonge Forest	600	1980	2000	Gallery forest	
Nature Reserve	Vyanda Forest	4,500	1980	2000	Gallery forest	
Nature Reserve	Monge Forest	5,000	1980		Afromontane forest	
Natural Monument	Karera Falls and Nyakazu Gorge	450	1980		Waterfalls, unique geology	
Protected Landscape	Gisagara	6,126	1994		Miombo woodlands, gallery forests, grassland savannahs	
Protected Landscape	Kinoso	1,971	1994		Gallery forest, savannah	
Protected Landscape	Mabanda/Nyanza-Lac	3,500	1994		Miombo woodlands, gallery forests, savannah, grasslands	
Protected Landscape	Mukungu-Rukambasi	5,000	1994		Miombo woodlands, gallery forests, savannah, grasslands	
Protected Aquatic Landscape	Northern Burundi ⁵⁰	30,000	2006		Includes Murehe Forest and 8 lakes, 2 are transboundary with Rwanda; floating islands	IBA (Lake Rwihinda only)
	Malagarasi ⁵¹	9,000	Proposed	N/A	Transboundary river and wetlands with Tanzania	Potential IBA and expansion of existing Ramsar in Tanzania

⁴⁵ (IUCN 1994) http://www.unep-wcmc.org/protected_areas/categories/

⁴⁶ Hakizimana et al. 2008

⁴⁷ Colonial reserve established in 1932.

⁴⁸ 10,000 ha were established as a National Park in 1980. In 2000, the area of protection was reduced and status changed to a Nature Reserve.

⁴⁹ Forest reserves of Bururi and Kigwena were originally created June 15, 1954 by O.R.U. n° 52/115.

⁵⁰ *Lacs du Nord*: Includes Lake Rwihinda (Lac aux Oiseaux) Managed Nature Reserve originally designated in 1980.

⁵¹ Will be presented to parliament in 2010.

ANNEX 2: THREATENED SPECIES

Table 8: Critically Endangered, Endangered and Vulnerable Species of Burundi

Status ⁵²	Scientific Name	Common Name ⁵³ English or (Kirundi)	Habitat	Threats	CITES 54 Listed
Mammals					
EN	Lycaon pictus	African wild dog, hunting dog	Habitat generalist	Conflict with human activities, infectious disease	No
EN	Pan troglodytes	Chimpanzee	Moist and dry forests, forest galleries,	Habitat destruction/ degradation, disease, poaching	Yes
VU	Acinonyx jubatus	Cheetah	Extinct in Burundi	Habitat fragmentation, persecution	Yes
VU	Delanymys brooksi	Delany's swamp mouse	Forest marsh areas between 1,700-2,400m	Habitat destruction, high population density	No
VU	Hippopotamus amphibius	Hippopotamus	Freshwater lakes, deep rivers	Hunting, habitat loss/ water diversion	Yes
VU	Loxodonta africana	African elephant	Extinct in Burundi	Habitat loss, fragmentation, hunting	Yes
VU	Praomys degraaffi	De Graaff's praomys	Undisturbed montane forests >1,900m	Loss of habitat from agriculture, grazing, wood extraction	No
VU	Ruwenzorisorex suncoides	Ruwenzori shrew	Semi-aquatic, damp mossy vegetation in primary moist forest	Habitat loss, conversion of land to agriculture	No
VU	Sylvisorex lunaris	Moon forest shrew	Primary montane tropical moist forest	Deforestation, conversion to agriculture	No
VU	Thamnomys kempfi	Kemp's thicket rat	Thickets in open areas of montane secondary forests >1,800m	Conversion of land to agriculture / other uses	No
Birds					
EN	Apalis argentea	Kungwe apalis	Montane forest (Bururi, Kibira)	Pressure on protected area habitat	No
EN	Ardeola idae	Madagascar pond-heron (Agasozo)	Freshwater wetlands	Exploitation of eggs/ young at breeding sites	No
EN	Bradypterus graueri	Grauer's swamp-warbler	Montane marshes (Kibira)	Conversion to agriculture	No

⁵² **CR: Critically Endangered** (extremely high risk of extinction in the wild in the immediate future); **EN: Endangered** (very high risk of extinction in the wild in the immediate future); **VU: Vulnerable** (high risk of extinction in the wild in the medium-term future)

⁵³ BayScience Foundation, Inc. 2009 or Benoit et al. 2005

⁵⁴ UNEP-WCMC 2010.

VU	Balaeniceps rex	Shoebill	Seasonally flooded marshlands, floating islands, papyrus	Habitat destruction/ degradation, hunting, trade	Yes
VU	Balearica regulorum	Grey crowned-crane (Umusambi)	Wetlands and adjacent grasslands	Loss of wetland breeding habitat, live-trapping, egg collecting, hunting	Yes
VU	Chloropeta gracilirostris	Papyrus yellow warbler	Papyrus swamps, other marshy areas, reeds (Rwihinda, Rvubu)	Cutting and burning of papyrus in dry season	No
VU	Cryptospiza shelleyi	Shelley's crimson-wing	Closed-canopy moist forest near water	Deforestation, forest degradation	No
VU	Falco naumanni	Lesser kestrel	Winters in West and South Africa, steppe and grasslands	Loss of breeding areas in Europe, key grasslands converted to agriculture, pesticides (loss of prey)	Yes
VU	Trigonoceps occipitalis	White-headed vulture	Mixed dry woodlands, nests in Acacia spp.	Reduced wild ungulate populations, indirect poisoning, trade	Yes
Fish					
CR	Chiloglanis lufirae		Rusizi (rocky fast-flowing stretches)	Water turbidity from erosion, farm expansion	No
CR	Chiloglanis ruziziensis	Rusizi suckermouth	Rusizi (rocky fast-flowing stretches)	Water turbidity from erosion, farm expansion	No
EN	Barbus acuticeps	Matthes' barb	upper Kagera watershed (Rweru)	Water turbidity from erosion; overfishing	No
EN	Barbus claudinae	Claudine's barb	upper Kagera watershed	Water turbidity, erosion	No
EN	Barbus quadralineatus		Malagarasi River	Sedimentation from land clearing	No
EN	Brycinus jacksonii	Victoria robber	Lake Victoria system incl. mid-Kagera	Water turbidity, erosion	No
EN	Chiloglanis asymetricaudalis	Longtail suckermouth	Ruisizi River	Water turbidity, erosion	No
EN	Lates angustifrons	Tanganyika lates (Sangala)	Lake Tanganyika and Rusizi, Malagarasi deltas	Fishing pressure	No
EN	Lates microlepis	Forktail lates (Nonzi)	Lake Tanganyika and Rusizi, Malagarasi deltas	Fishing pressure	No
EN	Orthochromis mazimeroensis		Mazimero and Nanganga Rivers (Upper Malagarasi)	Water turbidity, erosion	No
EN	Orthochromis mosoensis		Upper Malagarasi	Water turbidity, erosion	No
VU	Lates mariae	Bigeye lates (Sangala)	Lake Tanganyika and Rusizi, Malagarasi deltas	Heavy fishing in pelagic/littoral zones	No
VU	Neolamprologus christyi		Lake Tanganyika, limited to central-east shoreline	Sedimentation	No
VU	Neolamprologus schreyeni		Lake Tanganyika, deep rock crevices limited to Burundi shore	Sedimentation	No

VU	Orthochromis malagaraziensis		Upper, mid-Malagarasi, reeds, fringe vegetation with moderate current	Habitat loss	No
VU	Synodontis ruandae	Rwanda Ruandae	Upper, mid-Kagera, (Rweru, Cohoha) ⁵⁵	Fishing, loss of marginal reeds along rivers, lakes from agriculture	No
VU	Tropheus duboisi	Dwarf Tanganyikan Cichlid	Lake Tanganyika, solid rock areas	Aquarium trade, sedimentation	No
VU	Varicorhinus leleupanus	Leleup's Carp	Northern Lake Tanganyika and Rusizi	Water turbidity, erosion	No
Amphibians					
VU	Afrixalus orophilus		Grasslands, bamboo forests, reeds, papyrus above 1,500m	Loss of habitat from agriculture/human settlements	No
VU	Hyperolius castaneus		Grassland and forest swamps 1,600-2,850m	Loss of habitat from agriculture/settlements	No
VU	Hyperolius discodactylus		Montane forest streams, rivers, moving water	Loss of habitat from agriculture/settlements	No
VU	Phrynobatrachus acutirostris		Forest streams	Firewood and building material collection	No
VU	Phrynobatrachus bequaerti		Grassland and forest swamps	Human settlement, wood collection	No
VU	Phrynobatrachus versicolor		Mountain forest swamps/rivulets between 1,500-2,300m	Loss of habitat from agriculture/settlements/ wood extraction	No
Insects, Crustaceans, Mollusks					
EN	Chlorocypha molindica		Rainforest streams	Opening forest areas along rivers, streams	No
VU	Papilio leucotaenia	Cream-banded swallowtail	Terrestrial	No information	No
VU	Tropodiptomus burundensis		Rusizi River	No information	No
VU	Tropodiptomus simplex		Lake Tanganyika, prey for cichlid fish	No information	No
VU	Reymondia tanganyicensis		Lake Tanganyika, littoral zone	Sedimentation	No
Plants					
VU	Prunus africana	Red stinkwood (Umuremera)	Montane forest at 1,800-2,200m	Harvesting bark for medicinal trade	Yes
VU	Secamone racemosa		Montane forest at 1,200–2,400m	Forest clearance for agriculture	No

⁵⁵ Benoît et al. 2005

ANNEX 3: RELEVANT ENVIRONMENTAL LAWS AND STRATEGY DOCUMENTS

RELEVANT LAWS

Forestry Code (Law No. 1 / 02 of March 25, 1985 on Forest Code)

The Forest Code sets out special rules governing administration, installation, exploitation, monitoring, and forest law enforcement. While predated, it meets several objectives of the Rio de Janeiro Convention on Biological Diversity:

- It moves several provisions in the sense of conservation and sustainable use of forest resources and other provisions intended to the integrity of forest systems
- It imposes a general obligation on any owner of land to be afforested, to carry out forestation, its maintenance and exploitation to ensure its profitability in accordance with the rules of fair economic management, and take necessary measures for the reconstruction of forest stands
- It regulates farming fires and defines prevention measures
- It establishes protective forests or forest reserves to fight against land degradation and the conservation of endangered plant or animal species.

Environmental Code (Law No. 1 / 010 of June 30, 2000 on the Environmental Code in Burundi)

This code sets the fundamental rules intended to enable the environmental management and protection against all forms of degradation so as to safeguard and promote the rational exploitation of natural resources, fight against pollution, and improve the population's living conditions in respect of the balance of ecosystems (Art. 1).

In its section on biodiversity, the code sets provisions aiming at the protection of fauna and flora and biodiversity in general, so as to ensure the sound management of the genetic property and preserve the balance of the latter by preventing damage to the natural environment and to animal and plant resources.

Thus, it established the principle of biodiversity conservation, the restoration of degraded ecosystems and the rehabilitation of plant and animal species threatened or endangered, which is an obligation incumbent to the state, local communities, private individuals and persons or entities.

Similarly, it provides the possibility to establish, where necessary, special measures involving the creation of wilderness reserves for further reinforcement of conservation in situ of species, particularly threatened or endangered.

Fishery Law

The law governing fishing dates from 1937, but was amended in 1957 and 1960. In 1961, a ministerial order on fishing regulations on Lake Tanganyika was signed, but it only addressed fishing permits. In 1982, a ministerial order set new fees for fisheries that are into force so far.

Land Law (Law No. 1 / 008 of 1 September 1986 on the Land Law of Burundi)

The purpose of the Law No. 1 / 008 of 1 September 1986 on the Land Law of Burundi is to provide the rules pertaining to land rights within the national territory, and all that is united and incorporated, either naturally or artificially. The State has an important right of the management of national land property for the public interest so as to ensure the economic and social development according to the law.

This code provides specific laws relating to land management, and property investment for some categories of land or for specific areas.

Land Use Code (draft)

The basic rules contained in this law aim at the best optimal organization and exploitation of space, the creation and development of urban areas, namely so as to:

- Improve quality of life
- Ensure the rational exploitation of natural resources in compliance with the Environment Code
- Protect ecologically sensitive areas
- Protect natural and cultural sites provided by the laws and regulations
- Ensure security and public health
- Ensure an appropriate distribution between urban and rural areas
- Ensure ecological balance, so as to ensure sustainable development and the citizen's right to a healthy environment

This code has not yet been adopted by the government but it passed through a stakeholder consultation process. The draft adopted by stakeholders was taken by the Ministry of Environment to the Government cabinet, but this document has not yet been analyzed for signature.

This code has some innovations compared to the 1986 code. For example, only the Ministry of Environment, or the Ministry of the Urban Planning, or the President has the authority to allocate land, and even the President needs the approval of the Land Commission. It also clearly defines the size of buffer zone for rivers and lakes.

Water Code (draft)

This code sets the fundamental rules intended to ensure the rational and sustainable management of water resources, to allow the conservation and protection of this resource against all forms of degradation and pollution, and its rational use and exploitation according to different needs and priorities of the State, local communities, and the persons or entities operating on the territory of Burundi. This code has also gone through a consultation process and thematic studies were carried out, in water and agriculture as well as water and health, and adopted at regional workshops. A stakeholders' workshop was organized to adopt the code; it was then taken to the Ministry of Environment who took it to the Government, where it is awaiting adoption.

The Law on Creation and Management of Protected Areas in Burundi (draft)

This law was submitted to the Government early in 2010 to be analyzed. It is intended to correct the prior law of 1980 and presents a modern text adapted to requirements emerging from the management of protected areas in Burundi in harmony with the Environment Code and the Convention on Biodiversity. This draft law provides a series of definitions commonly used in the management of protected areas to facilitate their understanding. At the same time it gives the basic principles that must be taken into account when creating protected areas; this was not the case in the 1980 Law.

The draft law describes different measures to protect species of fauna and flora found in protected areas. It gives different types of protected area governance, namely, areas managed by the State, areas co-managed by the state and the local communities (Articles 12-18), areas managed by private individuals, and areas managed by communities. At the legal level of protected areas, the draft law addresses management and development plans, it gives the guidelines for prosecuting crimes committed in protected areas, and the related competence. In the end, the draft law provides the prohibition of transfer and concession of protected areas. It also details how protected areas are decommissioned and provides for their delimitation.

RELEVANT ENVIRONMENTAL STRATEGY DOCUMENTS

As laws and codes are legislative tools set up to achieve missions and objectives of the State, strategies allow the Government to implement laws and codes by giving general guidance.

National Environmental Strategy (2000)

The National Environment Strategy is a response to resolve conflict between the objectives of development and those of protection of natural and environmental resources, proposing measures suitable to restore or safeguard a balance between interests of development and those of environment.

It aims at organizing a coherent and cooperative set of complementary structures for better management of national and global environment. The specific objectives are: capacity building of the Ministry in charge of Environment (MINATET, now MEEATU), the improvement of intersectional coordination for better management of environment for sustainable development, the adoption of a participative approach and principles of good environmental management in the planning and implementation of actions, the emergence and operation of associations, NGOs and groups defending environment.

National Biodiversity Strategy and Plan (NBSAP) (2000)

“All populations are properly informed on values of biological diversity and the risks of its loss, involved and committed in its conservation and its sustainable use for the benefit of present and future generations.”

NBSAP gives orientations on conservation of biodiversity, sustainable use of biological resources, equitable sharing of responsibilities, and benefits in the management of biodiversity, biotechnology, education and public awareness, training and research, studies of impacts and reducing harmful effects, cooperation, and information exchange.

The strategy gives actions to be implemented in order to achieve the vision and states that the success will be related to involvement of all strata of population through adequate coordinated programs.

National Water Policy (2009)

The National Water Policy gives the Government's vision for the water sector: "A State where water is available in quantity and quality sufficient to meet the needs of present and future generations and used as efficient and fair for sustainable socio-economic development without compromising environment." Water is now considered a motive of socio-economic development for the people of Burundi. The

overall objective in this policy is to "Ensure sustainable water for all users by a harmonious development of the national water resources needs."

This policy also gives strategic directions for the proper management regarding good governance in water, water-related disaster management, and integrated water management, drinking water and basic sanitation, water for socio-economic development, and the environmental resources management sector. It also provides the cross-border dimension of Burundi resources management and capacity-building in the field of water.

It discusses some preparatory policy, organizational and institutional measures which must be taken in order for the policy to be implemented.

Fourth Report to the CBD (2009)

The Fourth Report to the CBD gives an overview of the state, threats, and trends of the biodiversity and progress made in implementation of strategies and national action plans on biodiversity. It gives also the progress towards the 2010 target.

This report gives the state of deforestation, which has increased considerably the last nine years. Global deforestation in 2003 had a rate of 9%. Deforestation, bush fires, water pollution, poaching, and the introduction of invasive alien species are known biodiversity threats.

The report found that the measures taken to implement the strategies and national biodiversity action plans have been insufficient to affect the status and trends of biodiversity in Burundi. It also stated that current national biodiversity action plans and strategies are not appropriate to address threats to biological diversity.

National Report on State of the Environment (2005)

This report shows the state of the environment, whose indicators are indicating a decline; for example: mismanagement of forests and forest plantations with consequent degradation of lands, modification of the micro-climate and hydrological regimes, unregulated exploitation of quarries, poor waste management, and poor urban planning and infrastructures. It denounces the mismanagement of natural resources and carelessness in protecting the environment at the local administration level. Similar failures occur at the level of public authorities who have not invested sufficiently in environmental protection. It suggests the revision of the institutional framework for greater efficiency.

National Action Plan for Adaptation (2007)

The NAPA produces a list of urgent and immediate priority actions that contribute to adaptation efforts of the country to address the adverse effects of climate change. They are integrated into the country's development strategies, which can be supported by concerned donors, given that Burundi has very limited adaptation capacity. These actions also include human and institutional capacity building.

The plan identifies important adaptation needs and provides relevant solutions for adaptation (proposals to adapt periods of low rainfall with drought). It shows past and current practices for adaptation to climate change (e.g., movement of populations to areas less affected by extreme events, a judicious rotation of crops according to the intensity of rainfall, an adaptation of the agricultural calendar to the changing cycle of seasons, the introduction and adoption of new crops, conservation of genetic resources in the form of seeds and by repetitive planting and propagation by cuttings, seasonal migration for livestock, among others).

National Strategy of Sustainable Land Use (2007)

The National Strategy of Sustainable Land Use includes the general principles of land use in Burundi. It provides strategic orientations for land use to serve as a coherent framework for future instruments of planning and sector actions based on the territory. It also gives suggestions of a legal framework of the

strategy for restructuring the institutional context. It includes temporary guidance intended to guide the next immediate actions while waiting for the development of all instruments. A summary assessment of necessary resources to implement the strategy contained in the document is also included. It also contains an action plan detailing the tasks to be undertaken in the first three years of implementation of the strategy.

INECN National Strategy and Action Plan (2009-2010)

The objective of the Action Plan is the “Sustainable development based on conservation, protection and participative management of environment.” It consists of five strategic lines:

- Institutional capacity building
- Increasing the awareness on the need of conservation and environmental protection
- Improvement of conservation and protection mechanisms and effective and participatory management of environment
- Relaunching of ecotourism
- Improvement of communication

Poverty Reduction Strategy Paper (2006)

The PRSP casts Burundi towards a better future through reforms and programs whose objective is to build a new society of hope for Burundians early in the third millennium. The vision of the strategy is medium- and long-term development of Burundi for the reduction of poverty.

“The promotion of sustainable and equitable economic growth” is one of four strategic lines affecting the environment. The PRSP’s most pertinent points are the relaunching of agriculture, livestock, fisheries, and fish farming and the improvement of environment protection. For the relaunching of agriculture, livestock, fisheries, and fish farming, the PRSP provides several useful guidelines for agro-biodiversity conservation. However, it says nothing about the role of biotechnology, especially the importance and danger of genetically modified organisms. For the improvement and protection of the environment, the PRSP also calls for the involvement of the private sector and other non-State organisms in the management and exploitation of natural resources.

National Biosafety Framework (2006)

This framework concerns the use of Genetically Modified Organisms, which requires taking precautions that impose compliance with a code of conduct to mitigate the risks on human health and environment. Thus, Burundi’s policy on biosafety should comply with the requirements of the precautionary principle contained in the Rio Declaration. The overall objective is stated as follows: “Promoting the development of modern biotechnology around a biosafety participative system.”

ANNEX 4: INTERNATIONAL TREATIES, LAWS, AND CONVENTIONS

Table 9: Burundi's International Treaties, Laws, and Conventions

International Conventions	Date of ratification	Objective of the Convention	Status of enforcement
CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) on March 3, 1973	1988	To ensure that international trade in specimens of wild animals and plants does not threaten their survival	A law on species trade is in development Seize of ivory trophies (1 T in 2009)
The International Plant Protection Convention (IPPC)	1990	To secure common and effective action to prevent the spread and introduction of pests of plants and plant products and to promote measures for their control.	
Plant Protection Convention in the Great Lake Economic Community members (CEPGL) on February 25, 1990	1990	To promote cooperation in plant protection through the agronomic and Zootechnic Research Institution (IRAZ) and national organizations in charge of plant protection	The countries have gone a long time without giving their contributions. Now, the three countries (Burundi, Rwanda, and DR Congo) are negotiating to relaunch the activities of IRAZ
The animal health Convention between the Member States of the CEPGL on February 25, 1990	1990	To protect livestock by fighting against the introduction and spread of animal diseases.	Implementation of a project on avian flu prevention and capacity building of national veterinaries in Great lakes countries (FAO project)
The Phytosanitary Convention for Africa on September 13, 1967	1992	To strengthen cooperation between the African States to fight the enemies of plants and plant products, and to prevent their introduction and spread on national territories.	
Convention on Biological Diversity on June 5, 1992	1996	The conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources	Production of the fourth national report to the CBD Development of a national strategy on capacity building Proposal to the Government of a law on protected areas
The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) on February 2, 1971	1996	Conservation and sustainable utilization of wetlands.	A list of sites submitted to the convention secretariat to be designated as Ramsar sites Malagarasi wetlands is proposed to be a protected area and a Ramsar site

United Nations Convention to Combat the Desertification (UNCCD)	1996	To combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, with a view to contributing to the achievement of sustainable development in affected areas.	Project implementation on reforestation and protection of watershed (PABV) Programs to fight against the land degradation Programs to fight against erosion is ongoing (PNLAE)
Vienna Convention for the Protection of the Ozone Layer and Montreal Protocol on Substances that Deplete the Ozone Layer	1996	To protect human health and environment against harmful effects resulting from or arising from human activities that affect or may amend the ozone layer	Training of stakeholders using product that deplete the ozone layer Replacement of the gas used in fridges
BASEL Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal as adopted at BASEL on 22 March 1989	1996	Control of the “transboundary” movements of hazardous wastes across international frontiers. It also developed the criteria for “environmentally sound management”	
United Nations Framework Convention on Climate Change (UNFCCC)	1997	To set an overall framework for intergovernmental efforts to tackle the challenge posed by climate change	The National Action Plan for Adaptation (NAPA) developed The 2nd communication of the country on the Climate Change produced
Stockholm Convention on Persistent Organic Pollutants (POPs)	2004	To protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife.	Inventory of POPs done Training of staff
The Convention On The Sustainable Management Of Lake Tanganyika	2004	To ensure the protection and conservation of the biological diversity and the sustainable use of the natural resources of Lake Tanganyika and its environment by the Contracting States on the basis of integrated and co-operative management.	The Lake Tanganyika Authority in place and based in Bujumbura Projects to support the Tanganyika action plan are implemented (UNDP GEF project, PRODAP)
The Rotterdam International Convention on the establishment of international procedures agreed by states on commercial transactions of agricultural pesticides and other poisonous products	2004	To promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm; To contribute to the environmentally sound use of those hazardous chemicals.	
The Bonn Convention On Conservation of Migratory Species of Wild Animals	2008	To conserve terrestrial, marine, and avian migratory species throughout their range	
The Cartagena protocol on Biosafety to the Convention of Biodiversity	2008	To contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity.	Development of a biosafety framework A clearinghouse mechanism in place Training of staff

ANNEX 5: ETOA ITINERARY AND KEY CONTACTS

Tuesday, April 20, 2010 – Arrival

Wednesday, April 21, 2010 – Bujumbura

- **USAID** –
 - Donatien Ntakarutimana, Health Program Development Specialist / Environmental Officer – NtakarutimanaDM@state.gov
- **Departement des Forets** –
 - Sylvestre Ndonse, Director - ndosyl@yahoo.fr
- **UNDP** –
 - Philibert Mundanda, GEF Small Grants Coordinator – philibert.mundanda@undp.org
- **French Cooperation (Region Pays de la Loire)** –
 - Jerome Gaugris, Environment coordinator – contact@florafaunaman.com
- **Association Burundaise pour la protection des Oiseaux (ABO)** –
 - Dieudonné Bizimana, CEO – bizdieu@yahoo.fr
- **Association Burundaise pour les Etudes d'Impacts Environnementaux (ABEIE)** –
 - Jacqueline Ntukamazina, Coordinator – ntukajacky@yahoo.fr
 - Etienne Kayengeyenge, IUCN Livelihoods and Landscapes Strategy (LLS) Country Focal Point – kayengeyenge@yahoo.fr
- **Organisation pour la Défense de l'Environnement au Burundi (ODEB)** –
 - Antoine Kinyomvyi, President – odeb2002@yahoo.fr
- **Action Ceinture Verte pour l'Environnement (ACVE)** –
 - Ange Kigeme, Chef de projet- angekigeme@yahoo.fr
 - Richard Harimenshi, Chef de projet- richardharimenshi@hotmail.fr

Thursday, April 22, 2010 – Bujumbura – Rumonge – Bururi – Kigwena – Lac Nyanza

- **French Cooperation (Pays de la Loire)**-
 - Estelle Deniel, Coordinatrice Volet Agroalimentaire – esdeniel@yahoo.fr
- **Association des vendeurs de poissons (AVEPOMABU)** –
 - Ibrahim Nzeyimana- Président- tel +257 78 832 977
- **Association pour le Développement et l'encadrement des Pêcheurs de Rumonge (ADEP)**-
 - Madjid Nduwimana- Représentant de l'association- tel +257 77 744 234
- **Association des Palmiculteurs de Rumonge (APROPABU)** –
 - Festus Ciza-tél 79 760 538

- **INECN –**
 - Leonidas Nzigiympa, Head Warden Bururi Protected Areas (5) / LLS Bururi Representative- 79 452078; nzigiympal@yahoo.fr

Friday, April 23, 2010 – Lac Nyanza – Makamba – Rutana – Gitega

- **Departement des Forets, Makamba –**
 - Joachim Ndayishimiye, Inspecteur des forêts Makamba; +257 79 996 844
- **INECN, Makamba –**
 - Onésime Nyandwi, Head Warden Makamba Protected Areas- Tél 78 22 12 98
- **Sugar Refinery – SOSUMO- Malagarasi Wetlands**
- **Dept Provincial Agriculture Elevage (DPAE), Rutana –**
 - Zakana Nestrata, Supervisor Agricultural Production

Saturday, April 24, 2010 – Gitega – Ruyigi – Cankuzo – Ruvubu – Mayinga

- **IGEBU –**
 - Aloys Rurantije, Director of Hydrology and Meteorology- arurantije@yahoo.fr
- **INECN, Ruvubu –**
 - Evariste Buyiruke, Deputy Head Warden- +257 77748919

Sunday, April 25, 2010 – Muyinge – Kirundo – Reserve Ruhinda – Lake Rwera - Ngozi

- **INECN, Kirundo –**
 - Evariste Mbonimpa, Head Warden- Paysage Aquatique Protogé du Nord-Tel 79 375 634
- **PABV (Projet d'Aménagement des Bassin versants, AfDB Project) –**
 - Dieudonné Nizigiymana, Kirundo Coordinator- Tel 79 736 814
- **Association des Pecheurs de Lac Rweru d'Est –**
 - Gérard Ndikumana, President
- **Reserve de Murehe - visit**
- **Association des Cultivateurs de Riz du marais de Nyamugerera – President & Vice President**

Monday, April 26, 2010 – Ngozi – Bugarama – Bujumbura

- **UCODE –**
 - Charles Nahimana, Director- Tel 79 946 777
 - Dieudonne Ndizeye, Animateur Communal, Ngozi - Marais Kagoma 2 et marais de Nyakijima

Tuesday, April 27, 2010 – Bujumbura

- **Ministry Environment and Forests –**
 - Antoinette Macumi , DG - macsasa72@yahoo.fr
 - Bernadette Hakizimana, Directrice de l'Environnement - hakiberna@yahoo.fr

- **USAID –**
 - Alice Nibitanga, Program Development Specialist, Economic Growth- nibitangaa@state.gov
- **USAID Burundi Policy Reform Program**
 - Michelle Momy, COP- -momym@chemonics.bi
 - Karen Ottoni, Program Manager- kottoni@chemonics.com
 - Albert Mbonerane, Political Advisor- albert@chemonics.bi
 - Gaudence Kabuyenge, Governance Advisor- kabuyenge@chemonics.bi
- **INECN –**
 - Adelin Ntungumburanye, DG INECN- dGINECN@yahoo.fr
- **USAID –**
 - Seconde Nizigiyimana, Program development Specialist - Democracy and Governance- NizigiyimanaS@state.gov

Wednesday, April 28, 2010 - Bujumbura

- **Ministry of Land-**
 - Damien Macumi, DG Aménagement du Territoire – tel +257 79952900
- **CARPE Focal Point –**
 - Savin Sabumukiza- sabumukiza@yahoo.fr
- **Departement des Pêches et Pisciculture –**
 - Fidel Bashingwa, Director-Tel 78 893 858 ; bashirwa44@yahoo.fr
- **CRS – USAID Food For Peace Program**
 - Katherine Overcamp, Multiyear Assistance Program Manager - kovercamp@bi.caro.crs.org

Thursday, April 29, 2010 – Bujumbura

- **Lake Tanganyika Authority**
 - Henry Mwima, Executive Director- henry.mwima@lta-alt.org
 - Laurent Ntahuga, regional Project Coordinator- LaurentN@unops.org
- **USAID Agribusiness Project: DAI –**
 - Ben Lentz, COP- Ben_Lentz@dai.com
 - Allison Williams, Directrice Adjointe- allison_williams@dai.com
 - Pierre Ndikumagenge, M&E- tel 79 928 137
- **PRASAB –**
 - Gérard Niyungeke, Responsable des Sous projets- Tel 79 931 793 ; gerardniyungeko@yahoo.fr

Friday, April 30, 2010 – Bujumbura – Bugarama – Kibira – Kayanza

- **Association DukingiriKibira –**
 - Marie Nahimana, President -
- **Bwayi Coffee Washing Station –**
 - Protais Habonimana, Manager- tel 79 865 575

- Constatin Ndayizeye, Deputy manager
- **INECN, Kibira National Park**
 - Jonathan Hatungimana , Head Warden Kibira- johadelb@yahoo.fr

Saturday, May 1, 2010 – Kayanza – Bubanza – Rusizi – Bujumbura

- **Western Kibira Landscape**
- **Rusizi Palm Reserve**
- **Rusizi Delta Reserve**

Sunday, May 2, 2010 – Off

Monday, May 3, 2010 – Bujumbura

- **GTZ / ProSecEau –**
 - Placide Amoussou Appalo, Responsable eau potable et assainissement en milieu rural- placide.appalo@gtz.de
- **UNDP –**
 - Therese Ndayisenga, Chargée de Programme-Point Focal Environnement - therese.ndayisenga@undp.org

Tuesday, May 4, 2010 – Bujumbura

- **Burundi Nature Action (BNA) :**
 - Elias Bizuru, President- ebisou@yahoo.fr
 - Jean-Bosco Kwizera, Comptable- boscokwi@yahoo.fr
- **PRODAP** (Projet d'Appui au programme regional d'aménagement integer du Lac Tanganyika)
 - Félix Nicayenzi, Environnemental Expert – f_nicayenzi@yahoo.fr
- **Office National du Tourisme(ONT)-**
 - Déo Ngendahayo, Director- deongenda@yahoo.fr

Tuesday, May 4, 2010 – Bujumbura

- **USAID**
 - Jim Anderson, Country Representative - AndersonJM1@state.gov
 - Donatien Ntakarutimana, Health Program Development Specialist / Environmental Officer – NtakarutimanaDM@state.gov
 - Audace Mpoziriniga-Food Security Specialist- MpozirinigaA@state.gov
- **Department of Mines –**
 - Damien Mbonicura - Director- tel +257 77 778 333

ANNEX 6: BIBLIOGRAPHY

- Athman Constance et al. 2006. Technical Assistance to the US Government Mission Burundi on Natural Resource Management and Land Use Policy. US Forest Service International Programs, Department of Agriculture and Republic of Burundi, Mission dates: September 9-22, 2006. 50 pp.
- Baer, Anton. 2001. Aquatic Biodiversity in the National Biodiversity Strategy and Action Plans of Signatories to the Convention on Biological Diversity, Part 2: Country Thematic Reviews: Argentina to Colombia. August 2001. 141 pp.
- Banderembako, Deo. 2006. The Link between Land, Environment, Employment, and Conflict in Burundi. Produced by Nathan Associates, Inc. for the USAID, May 2006. 39 pp.
- Benoît, N. et al. 2005. Paysage Aquatique Protégé du Nord du Burundi, Etude d'Identification. Institut National pour l'Environnement et la Conservation de la Nature (INECN). August 2005. 95 pp.
- Bigawa, S., G. Ntakimazi and F. Ntirushwa. 2000. Stratégie Nationale et Plan d'Actions en Matière de la Diversité Biologique (INECN), Juillet 2000. 126 pp.
- Bigendako, Dr. Marie José et al. 2009. Connaissances actuelles, expériences et potentialités des espèces ligneuses autochtones du Burundi. Action Ceinture Verte pour l'Environnement and IUCN Netherlands Ecosystems Grants Programme (Project N° 600409), Décembre 2009. 157 pp.
- Colls, A., N. Ash, and N. Ikkala. 2009. Ecosystem-based Adaptation: a natural response to climate change, IUCN. 16pp.
- Dennison, Steve et al. 1989. Burundi Biological Diversity and Tropical Forest Assessment. Produced by Development Alternatives, Inc. for the USAID, January 1989. 74 pp.
- Hay, Simon I. et al. 2002. "Climate change and the resurgence of malaria in the East African highlands," Nature, Vol. 415, February 21, 2002, pp. 905-909.
- Kolmannskog, Vikram. 2009. "Climate change, disaster, displacement and migration: Initial evidence from Africa," New Issues in Refugee Research Paper No. 180 United Nations High Commissioner for Refugees, December 2009. 18 pp.
- Lake Tanganyika Biodiversity Project (LTBP). 2000a. The Strategic Action Programme for the Sustainable Management of Lake Tanganyika, LTBP Regional Steering Committee, July 13, 2000. 69 pp.
- LTBP. 2000b. Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika: The Transboundary Diagnostic Analysis (a component of the Strategic Action Programme for the Sustainable Management of Lake Tanganyika). 93 pp.
- Naeem, Shahid et al. (Eds.) 2009. Biodiversity, Ecosystem Functioning, and Human Wellbeing: An Ecological and Economic Perspective. Oxford Scholarship Online: September 2009. Available at: <http://www.oxfordscholarship.com/oso/public/content/biology/9780199547951/toc.html>
- Ndikumana, Dr.-Ing. Gabriel. 2007. Baseline Assessment. Nile Basin Initiative, Water Resources Planning and Management Project, Decision Support System, June 2007. 179 pp.

- Nduwumwami, D. and I.Ndayizeye. 2010. Formulation d'Une Vision Commune 2020, Rapport Définitif. Forum Burundais de la Société Civile du Bassin du Nil (FCBN). DRAFT. 48 pp.
- Nkezabahizi, L. and D. Bizimana. 2009. Burundi's Important Bird Areas: Status and Trends in 2008. Association Burundaise pour la protection des Oiseaux (ABO), May 2009. 58 pp.
- Ntakimazi, G. 2006. *Barbus acuticeps; Lates angustifrons; Lates microlepis; Lates mariae*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.1: www.iucnredlist.org. Accessed May 13, 2010.
- Ntungumburanye Adelin et al. 2008. PROPOSITION DE NEGOCIATION: Concilier l'Exploitation Minière du Sulfure de Nickel sur le Site de Muremera et la Conservation du Parc National de la Ruvubu au Burundi, 16 Décembre 2008. 19 pp.
- O'Reilly, Catherine M. et al. 2003. "Climate change decreases aquatic ecosystem productivity of Lake Tanganyika, Africa," *Nature*, Vol. 424, August 14, 2003, pp. 766-768.
- Olhoff A. and C. Schaer. 2010. Screening Tools and Guidelines to Support the Mainstreaming of Climate Change Adaptation into Development Assistance - A Stocktaking Report, UNDP, February 2010. 48 pp.
- Red Cross/Red Crescent. 2007. "Burundi: the lakes are disappearing," Case Study on Climate Change-Eastern Africa Zone, International Federation of Red Cross and Red Crescent Societies. 5 pp.
- Republique du Burundi (RdB). 2000. La Stratégie Nationale de l'Environnement du Burundi. Ministère de l'Aménagement du Territoire, du Tourisme et de l'Environnement (MINATTE). 108 pp.
- RdB. 1991. Burundi Mineral Resources: An Investment Brochure. Ministry of Energy and Mines (MEM). 35pp.
- RdB. 2003. Interim Strategic Framework for Accelerating Economic Growth and Reducing Poverty (INTERIM PRSP), November 2003. 98 pp.
- RdB and UNDP. 2006. Habilitation du Burundi à Formuler sa Seconde Communication Nationale au Titre de la Convention Cadre des Nations Unies sur les Changements Climatiques. 76 pp.
- RdB. 2007. National Adaptation Plan of Action, Ministère de l'Aménagement du Territoire, du Tourisme et de l'Environnement (MINATTE), January 2007. 85 pp.
- RdB. 2008. Document de Stratégie Nationale Agricole 2008-2015. Ministère de l'Agriculture et de l'Élevage (MINAGRIE), Avril 2008. 97 pp.
- RdB. 2009a. Stratégie et Plan d'Action Biennal 2009-2010, Institut National pour l'Environnement et la Conservation de la Nature (INECN), Janvier 2009. 85 pp.
- RdB. 2009b. Quatrième Rapport du Burundi à la Convention sur la Diversité Biologique, Mise en œuvre de l'objectif 2010 de la CDB, Institut National pour l'Environnement et la Conservation de la Nature (INECN), Mars 2009. 101 pp.
- RdB. 2009c. Projet de Loi N°1/...du...2009 Portant Révision du Code Foncier du Burundi. DRAFT. 150 pp.
- RdB. 2009d. Avant Projet de Loi N°..... du2009 Portant Organisation de l'Aménagement du Territoire du Burundi. DRAFT. 55 pp.
- RdB. 2009e. Avant Projet de Loi N°.... du 2009 Portant Code de l'Urbanisme et de la Construction au Burundi. DRAFT. 39 pp.

- RdB. 2009f. Deuxième Communication Nationale sur les Changements Climatiques, MINATTE, 95 pp.
- RdB. 2009g. Termes de Référence pour l'Etude de l'Impact des Activités Artisanales sur l'Environnement. Ministère du Commerce, de l'Industrie et du Tourisme (MCIT). Direction Générale de l'Artisanat. 4 pp.
- RdB. 2009h. Plan d'Actions Stratégiques pour la Gestion Intégrée des Ressources en Eau du Burundi-PAGIRE. Volume II, Tome 1 – Actions Stratégiques. Ministère de l'Aménagement du Territoire, du Tourisme et de l'Environnement (MINATTE).
- RdB. 2010a. Avant-Projet De Loi Portant Code de l'Eau au Burundi. DRAFT. 67 pp.
- RdB. 2010b. Projet de Loi N°1/....du..... Portant Création et Gestion des Aires Protégées au Burundi. DRAFT. 17 pp.
- RdB and BAD. 2010. Réalisations du Projet au 30 Avril 2010. Project d'Aménagement des Bassins Versants du Burundi (PABV).
- RdB and UNDP. 2008. Capacity Building for Sustainable Land Management in Burundi, Medium GEF Project Proposal, January 2008. 78 pp.
- RdB and UNDP. 2009. Burundi 2025 Vision Statement, Ministry of Planning. 96 pp.
- Reynolds, J.E., G. Hanek, & H. Mölsä. 1999. Lake Tanganyika FFMP Implementation Programme and Component Project Profiles. FAO/FINNIDA Research for the Management of the Fisheries of Lake Tanganyika, June 1999. 34 pp.
- Sattherthwaite, David et al. 2008. Adapting to Climate Change in Urban Areas: the possibilities and constraints in low- and middle-income nations, International Institute for Environment and Development (IIED). 45 pp.
- Schlaifer M. and P. Ntahompagaze. 2007. Profil Environnemental de Pays (PEP) du Burundi Rapport Final, Commission Européenne, Burundi and République du Burundi, 11Mai 2007. DOCUMENT DE TRAVAIL-PROVISOIRE A NE PAS DIFFUSER. 63 pp.
- Stockholm Environment Institute (SEI). 2010. The Economics of Climate Change in Burundi. DRAFT Summary for Policy Makers. 10 pp.
- UNDP/GEF. 2008. Supporting Country Action on the CBD Programme of Work on Protected Areas Application for funding, endorsed May 28, 2008. 15 pp.
- Wildlife Conservation Society (WCS). 2009. Plan Stratégique Decennal de Collaboration Transfrontaliere (2009-2018) Paysage Ecologique Nyungwe – Kibira. October 2009. 81 pp.

Websites

- BayScience Foundation, Inc. 2009. <http://zipcodezoo.com>. Accessed May 13, 2010.
- Convention on Biological Diversity (CBD). 2010. Country Profiles: <http://www.cbd.int/countries/>. Accessed April 28, 2010.
- International Union for the Conservation of Nature and Natural Resources (IUCN). 2010. IUCN Red List of Threatened Species. Version 2010.1: www.iucnredlist.org. Accessed May 13, 2010.

- IUCN. 2010. Paysages et Moyens d'Existence (LLS) – Composante des Grands Lacs : http://www.iucn.org/fr/propos/union/secretariat/bureaux/paco/programmes/paco_forest/initiatives_pf_aco/lls_pf_aco/lls_pf_aco/. Accessed May 3, 2010.
- UNEP-WCMC. 2010. UNEP-WCMC Species Database: CITES-Listed Species: <http://www.cites.org/eng/resources/species.html>. Accessed April 28, 2010.
- UNEP/GRID-Arendal. 2009. Vital Climate Graphics Africa: <http://www.grida.no/publications/vg/africa/>. Accessed April 28, 2010.
- USAID. 2005. Annex 2: Summary Environmental Analysis Burundi Strategy Statement (FAA 118/119 Assessment). 8 pp.
- USAID. 2007. Adapting to Climate Variability and Change: A Guidance Manual for Development Planning, August 2007. 31 pp.
- USAID. 2008. Initial Environmental Examination and Categorical Exclusion, Burundi/East Africa/Limited Presence Countries, Program/Activity Number 695-009 and 695-010, July 31, 2008. 39 pp.
- USAID. 2009. Initial Environmental Examination for Multi-Year Assistance Program *Tubaramure*, July 9, 2009. 6 pp.
- USAID/Burundi. 2009. USAID/Burundi Programs. July 9, 2009. 15 pp.
- USAID/Burundi. 2010. Burundi Policy Reform Project Quarterly Report, January-March 2010. Produced by Chemonics International, Inc. for the USAID, April 15, 2010. 10 pp.
- USAID/Burundi. 2009. Burundi Policy Reform FY 2009 Annual Report, October 1, 2008-September 30, 2009. Produced by Chemonics International, Inc. for the USAID, October 2009. 53 pp.
- USAID/REDSO (M. Hobbs and W. Knausenberger). 2003. Burundi Environmental Threats and Opportunities Assessment with Emphasis on Tropical Forestry and Biodiversity Conservation (Supplement to the 2003-2005 USAID/Burundi Integrated Strategic Plan), March 2003. 36 pp.
- World Bank. 2010. Burundi Profile and Data: <http://data.worldbank.org/country/burundi>. Accessed April 28, 2010.

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