

**BURUNDI ENVIRONMENTAL
THREATS AND OPPORTUNITIES
ASSESSMENT (ETOA)**

**WITH EMPHASIS ON
TROPICAL FORESTRY AND
BIODIVERSITY CONSERVATION**

**Supplement to the 2003-2005 USAID/Burundi
Integrated Strategic Plan**

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Authors

Mary Hobbs, USAID/REDSO
Walter Knausenberger, USAID/REDSO

Table of Contents

List of Acronyms	3
I. Executive Summary	4
Institutional and Socioeconomic Framework	4
Ecological Systems and Land Use Trends	5
II. Background	5
Tropical Forest Conservation Requirements	6
Biodiversity Conservation Requirements	7
II. Burundi's Environmental Context	7
III. Institutional and Legislative Structures	8
Institutions	8
Legislation and International Treaties	10
IV. Forest Resources	12
V. Wildlife Resources and Terrestrial Biodiversity	14
VI. Agricultural Resources and Land Use	15
VII. Freshwater and Wetland Resources	16
Freshwater Resources	17
Wetlands	17
VIII. Status and Management of Protected Areas	19
National Parks	19
National Forest Reserves	21
IX. Major Issues in Biological Diversity and Tropical Forest Conservation	22
Tropical Forests	23
Threats to Tropical Forests	24
Biodiversity	25
Threats to Biodiversity	27
X. Opportunities for Conserving Tropical Forests and Biodiversity	27

XI. Recommendations for Proposed Actions	28
Strategic Objective 1	29
Strategic Objective 2	30
Strategic Objective 3	31
Annex 1: Key Informants	33
Annex 2: Bibliography	34
Annex 3: IUCN Red List of Threatened Species in Burundi	35

List of Acronyms

APRA	Arusha Peace and Reconciliation Accord
CAUP	Community Assistance Umbrella Program
CITES	Convention on International Trade in Endangered Species
DRC	Democratic Republic of Congo
EIA	Environmental Impact Assessment
ETOA	Environmental Threats and Opportunities Assessment
GEF	Global Environmental Facility
GOB	Government of Burundi
IDP	Internally Displaced Person
INECN	Institute Nationale pour l'Environnement et la Conservation de la Nature
ISP	Integrated Strategic Plan
IUCN	International Union for the Conservation of Nature
MINAGRI	Ministère de l'Agriculture
MINATE	Ministère de l'Aménagement du Territoire et de l'Environnement
NGO	Non-Governmental Organization
NRM	Natural Resources Management
OFDA	Office of Foreign Disaster Assistance
PVO	Private Voluntary Organization
SO	Strategic Objective
UNDP	United Nations Development Program
USAID	U.S. Agency for International Development

Burundi Environmental Threats And Opportunities Assessment (ETOA)

With Emphasis on Tropical Forestry and Biodiversity Conservation

January 2003

I. Executive Summary

This report, *Burundi Environmental Threats and Opportunities Assessment*, (ETOA) provides an overview of key trends in Burundi's environment and natural resource sector and highlights the primary threats and opportunities that exist today. Section IX focuses in particular on tropical forests and biodiversity, and fulfills the requirements under Sections 118 and 119 of the U.S. Foreign Assistance Act. This assessment informs USAID's 2003-2005 Integrated Strategic Plan to support Burundi's transition from conflict to peace.

A. Political and Socioeconomic Context

Burundi is a country that has experienced several periods of political and economic instability over the last decades, culminating in the crisis of 1993 when a civilian, democratically-elected government was overthrown in a military coup d'Etat. This latest coup set off a period of civil war during which an estimated 300,000 Burundians died and over 800,000 sought refuge in surrounding countries. The Arusha Peace and Reconciliation Accord (APRA), signed in August 2000 by all but a few parties to the civil war, has ushered in a period of relative stability under a transitional government. The transitional government is scheduled for a change of leadership in May, 2003.

At the heart of Burundi's civil wars is conflict over access to political and economic resources, which is largely grounded in ethnicity (14% of the population are Tutsi, who inherited control over political and educational systems following Independence, while 82% are Hutu, and an estimated 3% are Twa).

Burundi's economy is overwhelmingly agricultural, with 90% of the population employed in this sector, primarily on a subsistence basis. The chief export commodity is coffee, which accounts for 80% of foreign exchange earnings in spite of precipitous declines in world market prices over the last decade. In 2001 GDP per capita in Burundi was \$600, and the real growth rate was 1.4%.¹ Burundi's economy has been debilitated by the ongoing civil war, and has also likely been negatively influenced by a high HIV/AIDS prevalence rate (over 11%) and low literacy levels (35.3% of the population).²

¹ CIA, *The World Factbook 2002: Burundi*

² CIA, *The World Factbook 2002: Burundi*

B. Ecological Systems and Land Use Trends

At the root of Burundi's environmental threats is one of the highest population densities in Africa: approximately 420 persons per sq km of arable land. Land pressure has led individuals to cultivate on hillsides, where soils are shallow, low in fertility, and easily affected by erosion. Cultivation is also spreading to low-lying wetlands, where constructed drainage systems accompanied by siltation from surrounding hillsides is destroying many of these ecologically valuable areas. Additionally, much of the original forest cover has been cleared due to extensification of agriculture as well as timber and fuelwood harvesting. Little of Burundi's native fauna or flora remain today; species such as elephants and gorillas have become locally extinct. What habitats and natural flora do remain can be found largely in the national parks of Kibira and Ruvubu, and possibly in some pockets of forest reserves scattered throughout the country which have not benefited from continuous or effective management over the last decade.

The dominant landform in Burundi is a north/south mountain chain known as the Congo-Nile Divide due to its role as a watershed for both the Congo and Nile rivers. To the west of the divide lies the Imbo plain, a relatively dry area with some swamps along Lake Tanganyika; this area is where the capital city of Bujumbura is located and it has become a region of cash cropping. Two protected areas are located in the Imbo plain: Rusizi National Park on the outskirts of Bujumbura, and the Rusizi Natural Palm Reserve. From the Imbo plain the Congo-Nile Divide rises to the east, reaching an elevation as high as 2500 meters. This region is where most of the remaining forests are located, in particular within the Kibira National Park. The Kibira forests are classified as tropical Afromontane, and a 1992 inventory estimated the Park to cover approximately 40,000 hectares although recent estimates now put this figure at less than 30,000 hectares.³ The most highly populated region of the country is the Central Highlands, which lies to the east of the Congo-Nile Divide. Due to long periods of human habitation and agricultural cultivation in this area, it is also relatively devoid of forest cover and native flora and fauna. Finally, the southeastern-most region of Burundi is known as the Kumoso and Bweru lowlands which are semi-arid and have relatively low population densities.

II. Background

To support the transitional government following the signing of the APRA Peace Accord, the USG pledged \$150 million in assistance over a three-year period. To plan for the programming of these funds, USAID/Burundi is developing a three-year Integrated Strategic Plan (ISP) to cover the 2003-2005 time period. One of three mandatory technical analyses required for the ISP is an Environmental Threats and Opportunities Assessment (ETOA), which incorporates the Tropical Forestry and Biodiversity analyses. Research for the drafting of the ETOA was conducted during the period November 2002 to January 2003 (for ETOA guidance, see USAID's

³ Mr. Astere Bararwandika, Director of Forestry, Republic of Burundi, personal communication (1/21/03)

Automated Directive System, ADS vetted version approved January 2003, ADS 201.3.8.2). The assessment was based on a review of existing literature, as well as field visits to Bujumbura, Kirundo, and Karuzi during the week of January 21st, 2003 (see Annexes for list of informants, field itinerary, and bibliography). Burundi is not considered by USAID to be a “key country” in the global context of biodiversity conservation, tropical forestry, or climate change. Nevertheless, this ETOA will include a description of the status, threats against, and actions recommended for conserving the biodiversity and tropical forests that continue to exist in Burundi while also addressing other critical threats and opportunities facing Burundi’s natural resource base.

Key documents consulted during the research process include government documents and legislation (including a 1997 National Environmental Strategy produced by the *Ministère de l’Aménagement du Territoire et de L’Environnement*, and the National Environmental Code—Loi No. 1/010 du 30 Juin, 2000), GOB, PVO and NGO research papers, NGO project reports, and historic documents produced for USAID/Burundi. However due to the high level of insecurity throughout Burundi over the last decade, USAID has not operated a mission in country since the early 1990s. Therefore few internal USAID documents relevant to the environment sector are available. Independent environmental research has also been limited in Burundi, once again due to the ongoing conflict.

As per USAID guidance (see ADS 201.3.4.11, or in vetted version, ADS 201.3.8.2) environmental analyses are required to accompany country strategic plans. Where relevant—as in Burundi—the environmental analysis should also be designed to address Sections 118 and 119 of the FAA. A brief description of these two requirements is provided below.

A. Tropical Forest Conservation: FAA Section 118 requirements:

In response to the accelerated worldwide loss of tropical forests, the U.S. Congress enacted Section 118 of the FAA, which acknowledges the important role tropical forests and tree cover play in the economies of developing countries and in the lives of their people. Section 118 recognizes the value of tropical forests for their potential financial contribution to the economy, but also cites the ecosystem benefits they offer: protection against erosion and resultant siltation of water bodies and loss of soil fertility, flood protection, wildlife habitat, and a diverse genetic resource pool. Section 118 states that USG support to developing countries shall, to the fullest extent feasible: help end destructive agricultural practices, help conserve forests that have not yet been degraded, support activities that will conserve and rehabilitate forested watersheds, support training, research, and other activities which will lead to sustainable practices for timber harvesting, and support research to develop alternatives to forest destruction.

B. Biodiversity –FAA Section 119 requirements:

The U.S. Congress enacted Section 119 of the FAA in response to the irreparable loss of plant and animal species occurring in many developing countries and the environmental and economic consequences of this loss. Section 119 addresses biodiversity conservation concerns by encouraging USAID to furnish assistance to protect and maintain wildlife habitats, develop sound wildlife management and plant conservation programs, establish and maintain wildlife sanctuaries, enforce anti-poaching measures, and identify and study animal and plant species.

Section 119 states that ongoing and proposed actions of USAID shall not inadvertently endanger wildlife or critical habitats, harm protected areas, or have other adverse impacts on biological diversity, and that USAID programs shall, to the fullest extent feasible, support policies, training and education, and long-term agreements and other types of cooperation efforts that will result in the conservation of biodiversity.

II. Burundi's Environmental Context:

Burundi is a small, densely populated country with a topography dominated by hills and mountains interspersed with seasonal and permanent wetlands in the low-lying areas. In some respects, the country's resource endowment is enviable. Burundi is blessed with a mild tropical equatorial climate, sitting on a high plateau with considerable altitude variation and an average annual temperature that varies with altitude from 23 to 17 degrees centigrade, but is generally moderate, as the average altitude is about 1,700 m. Average annual rainfall is approximately 150 cm distributed between two wet seasons. Burundi has significant mineral resources, though currently largely unexploited. In addition to various precious metals and minerals, phosphate and calcareous deposits exist in Burundi which could be extracted and put to use to improve the fertility of the acidic soils. A large rift valley lake, Lake Tanganyika, provides many options for sustainable economic development around trade and fisheries. Burundi's aquatic resources also lend themselves to aquaculture development. Ecotourism may have potential in Burundi as well.

Agricultural production is problematic. With 420 persons per sq. km of arable land, Burundi has one of the highest population densities in Africa.⁴ Available land per household averages approximately 0.5 hectares, much of which may be located on hillsides or in drained marshlands (*marais*). One frequently-cited statistic offered during interviews with key informants in Burundi was that 90% of Burundi's

⁴**Burundi Biophysical Statistics Summary.** *Area:* total: 27,830 sq km, land: 25,650 sq km, water: 2,180 sq km. *Land use* (1993 est.): arable land: 44%; permanent crops: 9%; permanent pastures: 36%; forests and woodland: 3%; other: 8%. *Irrigated land* (1993): 140 sq km. *Elevation:* Lowest point: Lake Tanganyika 772 m; highest point: Mount Heha 2,670 m. *Average annual rainfall:* ca.150 cm; wet seasons February to May and September to November. *Natural resources:* nickel, uranium, rare earth oxides, peat, cobalt, copper, platinum (not yet exploited), vanadium, calcium & phosphates, arable land, hydropower.

population derives their livelihood from agriculture (Kayengayenge, 1/21/03; Bikwemu, 1/21/03). Additionally, agriculture and other natural resources (including coffee, tea, forests, fisheries and livestock) account for 50% of the GDP, and 90% of the exports.⁵

Given the prevailing dependence on Burundi's natural resource base, many of the environmental problems facing the country stem from overuse of soils, forests, and water resources. Key environmental threats in Burundi include soil erosion and fertility loss, deforestation, extensification into vulnerable lands (hillsides and bottomlands, e.g.), inadequate water supplies, and overgrazing on hilly terrains. Particularly in some areas, many of these problems are exacerbated by the resettlement of returning refugees from Tanzania and the DRC. Wildlife is not abundant, and what numbers do remain can be found primarily in protected areas (*Stratégie Nationale de l'Environnement, 1997, p. 4*). The continued survival of existing fauna is uncertain, as evidenced by the fact that CITES (Convention on International Trade in Endangered Species) lists 5 wildlife species as endangered, and 14 as threatened in Burundi

III. Institutional and Legislative Structures

In principal, Burundi's natural resources are managed by legislative frameworks and institutional structures, however in practice the management regime suffers from poor coordination resulting in redundancy or lack of clear responsibility among institutions, and conflicting and outdated legal codes. These problems are exacerbated by political instability which has forced many displaced persons to exploit the environment to meet immediate needs, and has made it difficult to enforce laws governing protected areas.

A. Institutions

Governmental:

Overall responsibility for environmental management and protection in Burundi is housed in the *Ministère de l'Aménagement du Territoire et de l'Environnement* (MINATE), which was created in 1989. Three separate departments fall under the management of the Director-General of MINATE: Forestry, Territorial and Cadastral Management, and Rural Development (*Génie Rural*). Additionally, two autonomous institutions with environmental mandates exist under the general rubric of MINATE: the National Institute for the Environment and the Conservation of Nature (INECN), and the Geographic Institute of Burundi. INECN has direct management responsibility for the national parks and protected areas, including natural forests. The Department of Forestry, on the other hand, is concerned primarily with planted forests outside of protected areas, including agroforestry.

⁵ As much as 80% of Burundi's foreign exchange receipts come from coffee alone, according to one 2002 study. (Oketch and Polzer in *Scarcity and Surfeit*, p. 86)

Management priorities for other resources are less clear. For example, wetlands or marshes (*marais*) are a valuable resource to Burundi for their ecological services (such as water table recharge, flood control, and habitats for biodiversity), as well as a source of peat as a fuel alternative to firewood, and clay for housing construction and brick-making. Technically the wetlands fall under the management of the *Department du Génie Rural* (Rural Development), which is under the authority of MINATE. However according to some sources, the Ministry of Agriculture has targeted the wetlands as fertile agricultural land ready for exploitation since the 1980s.⁶ In a similar vein, the Ministry for Reinsertion and Reinstallation of Deplaced and Repatriated Persons had made plans to settle 7,600 families within the wetlands of Malagarazi District, according to one September 2000 report.⁷

This conflict highlights a frustration cited by many environmental professionals in Burundi: the overwhelming power and influence of the Ministry of Agriculture (MINAGRI) in comparison to the Ministry of Environment (MINATE). Efforts to strengthen Burundi's environmental management profile have included the creation of a *Conseil Nationale de l'Environnement* reporting to the Office of the President, but this has proved to be a weak organization, largely due to the fact that it operates with no budgetary support. In a highly populated, agriculturally-dependent country such as Burundi, it is not surprising that agricultural production is given greater attention than environmental management. However, what seems to be lacking—according to many environmental professionals interviewed—is the encouragement of environmentally-sound agricultural practices which could mitigate further destruction to Burundi's natural resource base. Some informants felt that environmental consciousness was lacking not only at the Ministry of Agriculture, but at several other ministries as well.

Non-Governmental and Private Voluntary Organizations

Following a trend in many African countries during the early 1990's, Burundi passed a "law of associations" (*Loi d'Association*) in 1992 which allowed for the creation and operation of non-governmental and civil society organizations for the first time in Burundi's history. This act provided opportunities for the creation of environmental NGOs as well, and a number were identified during the course of this assessment. Some of the more notable indigenous environmental NGOs operating in Burundi include the *Organisation de Defense de l'Environnement au Burundi* (ODEB), and the *Reseau d'Evaluation d'Impacts Environnementaux dans les Pays des Grands Lacs* (REIE-PGL). These groups are engaged in environmental impact assessment, environmental research, and environmental education activities, and are largely funded by external donors.

Several international PVOs were supporting sustainable agriculture and natural resource-based activities in the country at the time of this assessment. Many of these PVOs were operating under the UNDP Community Assistance Umbrella Program

⁶ Environmental Round Table discussion, Bujumbura, Burundi, January 21st, 2003.

⁷ FAO/UNDP, *Schema Directeur d'Aménagement et de Mise en Valeur des Marais*, September 2000

(CAUP), which is supported in part by USAID. Among the US-based PVOs that were supporting natural resource management activities were: Africare, CARE, Catholic Relief Services (CRS), and World Vision. CAUP and the PVOs and their implementing partners, communities and associations, will be developing multisectoral programs integrating rural enterprise, agriculture and NRM investments. With the involvement of local communities, their activities will focus on the rehabilitation of infrastructure such as health centers, roads, bridges, water catchments and wells. The activities of these organizations will be geographically linked to the areas where USAID's Office of Foreign Disaster Assistance (OFDA) has been working to address livelihood and food security issues. The PVOs will work to transition these populations from short term relief to longer-term investments in their future development.

A. Legislation and International Treaties

A number of legislative texts and decrees provide a statutory basis for the management and use of Burundi's natural resources. However an oft-cited problem has been that many of these texts are in conflict with one another, or are outdated, and thus present obstacles to sound management. Most recently a new Environmental Code was drafted and signed into law (*Loi No. 1/010 du 30 Juin 2000 Portant Code de l'Environnement de la République du Burundi*). This new law is fairly comprehensive, but awaits the drafting and adoption of implementing texts to harmonize the law with previous legislation—notably the Forestry, Water and Land Tenure Codes.

A number of other legislative codes exist to regulate environmental management in Burundi, including the March 22, 1985 Forestry Code, the September 1st, 1986 Land Code, the July 17, 1976 Mining and Petroleum Code, the March 3rd, 1980 Decree regarding the Creation of National Parks and Natural Reserves in Burundi, and the November 26, 1992 Decree regarding the Institution and Organization of the Public Hydrological Domain. For the purposes of this assessment, only the Environment, Forestry and Land Codes were reviewed in detail.

Environment Code

The 2000 Environment Code addresses a wide variety of issues, ranging from environmental impact assessment, forest management, national park management, protection of soil and water, urban planning, and pollution. Several of the concepts laid out in the 2000 Law are progressive. For example, the Law envisions participatory management of local resources, mandatory environmental impact assessments for new public works and land management activities, simplified mechanisms for classifying forests and threatened habitats for protection, and reduction or waiving of customs fees on pollution prevention technologies. Most of these concepts are stated broadly, and refer to the need for complementary texts to delineate their implementation.

Many of the articles spelled out in the 2000 Environmental Code conflict with pre-existing legislation. Most notably, there are conflicts between the September 1st, 1986 *Code Foncier* which allows for the granting of land concessions by various public officials to private interests. This right is specifically reversed for forested land in the 2000 Environmental Law (Article 72)—an action which had support from many environmental professionals interviewed for this assessment. To correct these inconsistencies, the 2000 Environmental Code also calls for the harmonization of all legislation and regulations in conflict with the code to be undertaken within a period of five years.

Forestry Code

A number of directives were provided under the 1985 Forestry Code. In particular, natural forests were granted as the inalienable property of the State, with the objective of protecting them from further degradation and disappearance, thus no cutting rights are granted on these protected reserves. Another category for protected or reserved forests was specified and these can be classified for reasons of erosion control, ecological preservation, or conservation of flora and fauna recognized under international treaties. Both natural and reserve forests are currently placed under the management authority of the INECN.

On the other hand, forest plantations (*boisements*) were classified as either the domain of the State, communes, or public establishments, and are accorded the ability to be alienated under different property regimes. The prejudice for these plantations is one of exploitation, as evidenced by their ability to be returned to the State in the event of non-exploitation by other public entities. Harvesting is allowed on the State forest plantations, but these rights may only be granted through the acquisition of a permit from the Department of Forestry. The 1985 Code also calls for oversight of timber sales through marking and inspections, and for responsible management and obligatory reforestation on both state and communal forests. Private forests larger than 10 hectares are also obliged to present a management plan to be approved by the Department of Forestry, according to this code.

Land Code

The 1986 Land Code (*Code Foncier*) is biased towards favoring active use of land. Given the population pressures in Burundi and the scarcity of cultivable land, this bias is not surprising. However the concept of *mise en valeur* (literally, “putting land to value”) can easily conflict with sound environmental management such as conserving marginal or ecologically significant areas. The doctrine of *mise en valeur* is evident in many articles of the 1986 Land Code, notably in Article 330 which grants private customary rights to the (male) person who is exploiting land, Article 380 which necessitates “productive use...and continuous exploitation” of land to retain tenure rights, Article 231 which grants the State property rights over any vacant or unused land, and Article 294 which considers it a grave offense to not put land conceded by the State to productive use. Particularly troubling for the sound

management of marshlands is Article 331 which grants property rights over marshes to the man who “puts them to use” over the actual owner. However a positive element in the Land Code is the allowance for fallowing, which is considered an exploitable use of land as long as the practice alternates with periods of cultivation.

One of the primary functions of the 1986 Land Code is the establishment of various forms of property rights. Several rights are granted to the State, under the categories of “public domain” which is inalienable, and “private domain” which can be conceded to private entities by public officials. Navigable water bodies, flood plains, and areas designated specifically for protection (e.g. national parks and forest reserves) are considered the State’s private domain. However the State public domain is much broader, and includes “vacant” lands, land expropriated for reasons of public utility, confiscated lands, non-navigable waterbodies (including marshes and wetlands), and forests (Article 231). The fact that wetlands and non-protected forests remain the property of the State, and can be ceded to private individuals undercuts incentives for local inhabitants to manage these resources responsibly. In theory, however, the notion of community management over marshes and forests could be incorporated under this law, as Chapter III allows communes and public societies to gain title over land and resources for “public use or services” (Article 240).

An aspect of the 1986 Land Code which was frequently nominated for revision by those interviewed for this assessment, was the right of land concession granted to public officials. These highly discretionary rights are delineated under Articles 253 and 254 as follows: Provincial Governors have the right to cede or grant concessions to public domain land under 4 hectares, while the Minister of Agriculture may grant up to 50 hectares of rural land, and the Urban Affairs Minister may grant up to 10 hectares of urban land. Concessionary use rights to marshes were encountered during the field visit to Kirundo, where it was explained that small plots were being “rented” to individuals for rice cultivation for a nominal fee. This cultivation was occurring under the auspices of a USAID sub-grantee, and so was being subject to responsible management through irrigation canals and fertilization. However it was unclear how decisions of access were made to these fertile areas. On another note, one individual stated that this law was creating a conducive environment for land speculation.

International Treaties

Of particular relevance to this assessment, the Republic of Burundi is a party to both the Biodiversity and CITES conventions. The country is also a signatory to the Global Climate Change, Desertification, Hazardous Wastes, and Ozone Layer Protection treaties. The 2000 Environmental Law was an effort to address some of the requirements under these international treaties, but this process is not expected to be complete until the implementing texts and regulations are drafted.

IV. Forest Resources

Historically, between one-half and one-third of Burundi's territory was estimated to be under forest cover.⁸ The majority of these forests were located along the western slope of the Congo-Nile Divide. However little remains of the original forests; when the last USAID Biological Diversity and Tropical Forest Assessment was conducted for Burundi in 1989, it was estimated that less than 1% of the landscape remained in virgin forest.⁹ Clearing for agriculture, and harvesting for woodfuel and timber have been the primary culprits behind this deforestation. Several periods of tree planting have occurred, such as tree plantations under the colonial regime, and hillside planting under World Bank-financed reforestation activities in the 1980s. The last inventory of Burundi's forests was conducted in 1992, and at that time 8% of the country was considered "forested". By 2002 the Director-General of MINATE estimated this figure to be 5%.

Given the relatively high altitudes in Burundi most of the historic forest cover was classified as "Afromontane". This classification still describes much of the remaining natural forest cover found in Kibira National Park and Bururi National Forest Reserve in the central and western highlands. Only a small patch (estimated at 800 ha) of lower-altitude, transitional rainforest can be found along the western slopes of the Congo-Nile Divide, in Kigwena District.¹⁰ Forest cover in the drier regions of southeastern Burundi is predominately *Acacia* varieties sprinkled across savanna grasslands. Large numbers of *Hyphaene* palms can still be found within the Rusizi Palm Reserve in the Imbo plain along Lake Tanganyika.

Incentives for sustainable forest management in Burundi were lacking in previous periods. Under the colonial regime, forced labor was used to plant trees for erosion control and timber plantations, so following Independence these activities were often discontinued. Early forestry laws also required individual property owners to request permission and to pay for permits to harvest trees on their own land, thus leading to surreptitious and often uncontrolled harvesting. State ownership of forests continues under the 1986 Forest Code, with cutting rights allowed on a permit basis, and with inspections to ensure proper harvesting techniques. However it was widely stated during interviews that the ongoing civil war over the last decade has made it virtually impossible to regulate tree harvesting in the national parks and forest reserves.

Several reforestation projects were undertaken during the 1980s, the most notable being the widespread planting of exotic species such as pine, eucalyptus and cypress on hillsides as an anti-erosion measure. The majority of these reforestation activities were financed by the World Bank, and planted on state-owned land. Some of the informants interviewed mentioned that the pine forest in particular had been highly susceptible to fire: one cited a recent fire that had destroyed 1,000 ha of pine forests

⁸ Kanyamibwa, Samuel and Jean-Pierre Vane Weghe, *Important Bird Areas in Africa and Associated Islands-Burundi*, p. 128

⁹ Dennison et al, "Burundi Biological Diversity and Tropical Forest Assessment", January 1989

¹⁰ Kanyamibwa, op cit, p. 128

in eastern Burundi, while a UNDP report estimated that 3,000 out of 5,000 ha in the Muyinga Reforestation Project had burned following the 1993 civil war.

A number of recent reports highlight dramatic deforestation levels following the 1993 crisis. This deforestation is attributed to two causes: the existence of large numbers of refugees, and destruction of property as retribution. References in the literature and during the interviews were made to the high levels of deforestation that had occurred in northern Burundi following the Rwandan genocide in 1994. As refugees poured into Burundi, large camp populations required massive amounts of wood for cooking, heating, and housing construction. During the field trip to Kirundo, one person explained that because the Red Cross was paying good prices for fuelwood, the local population began harvesting whatever they could, including fruit trees.

Deforestation as a targeted activity during the civil war was described in a 2001 UNDP report on the environmental consequences of Burundi's conflict. This report estimated that 32,641 hectares of forest were burned or cut down since the 1993 crisis. The high incidence of burning in state-owned forests and coffee plantations was viewed as evidence that this destruction was aimed at specific targets. As the report described, "The population was as if taken by collective madness in the burning of many forests....Since the crisis of 1993, people destroyed all that was held valuable by their supposed enemies".¹¹

The few remaining large forest stands in Burundi are under nominal protection—either in Kibira and Ruvumbu National Parks, or in one of the State forest reserves. The primary threat to these forests is the lack of capacity to regulate cutting due to insecurity. Kibira National Park—which is contiguous to the Nyungwe forest in Rwanda—is known to harbor large numbers of rebels and refugees, and is feared to be subjected to extensive harvesting of timber, fuelwood, bamboo, forest products, and bush meat.

The future sustainability of Burundi's forests is further hampered by an outdated "command and control" policy environment. Positive changes were made to the forest policy framework under the 2000 Environmental Law which allowed for greater community involvement in forest management. However the implementing text on forestry which would replace the 1985 Forestry Code is yet to be drafted.

There have been some successful experiments in increasing community involvement in forest management—such as the IUCN-funded "*Parcs pour le Paix*" project, and the Bururi Forest Project which was assisted by USAID, Peace Corps and the INECN from 1981-1987. The Bururi Forest Project grew out of the activities of a Peace Corps volunteer and focused on community agroforestry, extension education, and increased surveillance in the forest with the aim of reducing negative impacts from settlement. Although enforcement was a key element of this project, the focus on community development activities also contributed to a dramatic decline in timber harvesting violations. The model was replicated under INECN and CRS support in

¹¹ UNDP, *Les Effets de la Crise Socio-Politique sur l'Environnement au Burundi*, January 1996, p. 2

the Rumonge region in 1985. The *Parcs pour le Paix* activity is a more recent effort to mitigate negative impacts on the Kibira National Park through community engagement.

V. **Wildlife Resources and Terrestrial Biodiversity**

Burundi's high population density and extensive agricultural production have resulted in the fragmentation of habitats that foster biodiversity. A number of species were once present in the country, but now are believed to be locally extinct. These fauna include the African Slender-Snouted Crocodile, elephant, giant forest pig, and the Mountain Gorilla (*Gorilla gorilla*). Other primates have managed to survive in small pockets of Burundi's remaining forested landscape, but inventories have not been conducted over the last ten years due to civil unrest. These primates include: Bosman's Potto (*Periodicticus potto*), Thick-tailed Bushbaby (*Galago crassicaudatus*), Yellow Baboon (*Papio cynocephalus*), and Angoland Black and White Colobus Monkey (*Colobus polychromos*). It is known that some of these primates are seen as pests by local populations for their propensity to steal food and other items, so they are often targeted if found in areas of human habitation. While consumption of primates for bushmeat is not common in Burundi, it is in the neighboring DRC, so some harvesting may be occurring in areas such as Kibira for trade purposes. Examples of megafauna which continue to exist in parts of Burundi are the hippopotamus and Nile crocodile which inhabit Lake Tanganyika and the river systems that feed it, and various species of antelope, gazelles, and Cape Buffalo.

Avifauna in Burundi remain relatively abundant, particularly those that inhabit wetlands and waterways such as stork, ibis, egret and pelicans. One study recorded the existence of 596 bird species in Burundi, with 439 resident populations and 109 migratory species. Thirteen of these species are considered to be of global conservation concern.¹²

Lake Tanganyika on Burundi's western border is an important reservoir for fish biodiversity, possessing 300 species of fish, of which 90% are endemic.¹³ However certain predators such as the Nile perch are coming under pressure from over-fishing, so disruptions to this aquatic ecosystem could result. Other threats arise from soil siltation and effluent run-offs into the Lake. Siltation from hillside erosion is also said to be negatively impacting aquatic species in Burundi's inland lakes and rivers.

VI. **Agricultural Resources and Land Use**

Agricultural cultivation in Burundi is expansive, affecting hillsides, valleys and wetlands. While emphasis should continue to be placed on preserving protected areas, a critical focus for environmental interventions in Burundi should be placed on mitigating further deterioration to the natural resource base through inappropriate cultivation practices. This section will specifically address the consequences of

¹² Kanyamibwa et al, p. 128

¹³ *ibid*, p. 127

Burundi's agricultural and land use patterns on the environment. A separate agricultural analysis was conducted for the *2003-2005 Burundi Integrated Strategic Plan*, and details on agricultural production can be found in that document.

Burundi's high population density translates into a very small average farm size of 0.5 ha per household. Historically, land has been inherited through subdivision of family holdings among sons, yet the viability of this system is beginning to reach its limits as smallholdings do not meet subsistence needs and soils become exhausted from continuous use.

More than 85% of the population is involved in agricultural production, with subsistence crops accounting for 87% of total production.¹⁴ Important commercial crops—particularly coffee—provide the bulk of the country's foreign exchange earnings, yet account for a surprisingly small land area, as seen in the table below. Of a total land area of 2,783,400 hectares, land use in Burundi is divided as follows:

Table 1: Land use¹⁵

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

Burundi's land and resources are fairly evenly distributed, with the important distinction that patrilineal inheritance prevents women from gaining tenure rights to land. With a high number of female-headed households due to the ongoing war and poor economy, lack of tenure rights for women could jeopardize their future access to resources, particularly if large numbers of IDP's return in search of land.

Several environmental factors inhibit the productivity of and sustainability of the agricultural system. In particular, soil erosion from cleared hillsides is one of the major threats to Burundi's environment; many of the hillsides are covered by poor soils which have little water retention capacity that is further hampered by a paucity of natural and planted vegetation. The Ruyigi region in particular suffers from dramatic erosion, with estimated soil losses of 1000 tons per ha/per year.¹⁶ Soils also tend to be low in both nitrogen and phosphate throughout many parts of the country, and fallow periods are uncommon due to population pressures. One natural source of nitrogen—livestock—has suffered severe depletion rates since the 1993 civil war, thus reducing the amount of organic fertilizer available.

¹⁴ Lind et al, *Scarcity and Surfeit: The Ecology of Africa's Conflicts*, 2002, p. 120

¹⁵ *ibid*, p. 120

¹⁶ UNDP, *op cit*, p. 64

Efforts to redress problems of soil erosion, deforestation, and declining soil fertility are being introduced by USAID implementing partners, GOB Ministries, and other NGOs. Use of agroforestry and agro-sylvo-pastoral techniques have had success in reducing erosion and increasing nitrogen levels, while providing fodder and fruit crops at the same time.

VII. Freshwater and Wetland Resources

Freshwater resources in Burundi include three large lakes (Tanganyika, Cohoha and Rweru), several significant rivers and streams which feed into the Nile and Congo River Basins, and numerous marshes and wetlands. This section will divide these resources into separate categories: freshwater resources (lakes, rivers and streams), and wetlands.

Freshwater Resources

All three of Burundi's major lakes share borders with neighboring countries: Lake Tanganyika with DRC, Tanzania and Zambia, and Lakes Cohoha and Rweru with Rwanda. The transboundary nature of these water bodies means that they are subject to joint management regimes. Lake Tanganyika in particular is a significant source of aquatic biodiversity, possessing over 200 species of endemic fish, including several members of the perch family, genus *Lates*. Perch have been the major predators, but concerns were raised during the interviews for this study that overfishing of predators is leading to imbalances in Lake Tanganyika's fish populations.

Lake Tanganyika is also significant as it is the second deepest lake in the world. A multi-country management body with the aim of conserving the biodiversity of Lake Tanganyika has been organized and funded by the UN's Global Environment Facility (GEF). According to the Burundi representative of this committee, Mr. Gabriel Hakizimana, the first priority for Burundi's activities will be to mitigate pollution levels flowing into the Lake from Bujumbura and surrounding areas. The major pollutants include solid waste, pesticides, run-off from cattle pens, hydro-carbons, silt, and even heavy metals such as chrome and mercury which are believed to emanate from a textile factory located on the Lake's border. Bujumbura's drinking water is considered potable, however, as it is drawn from deep in the Lake's interior and subject to water treatment.

Overcultivation of hillsides and deforestation are also contributing to the siltation of many wetlands, streams, rivers and lakes. A National Water Policy has been elaborated to stipulate management procedures for Burundi's water bodies, but the policy has not been fully implemented. Sources interviewed for this assessment explained that a major focus of the Water Policy concerns the construction of catchments to facilitate cultivation of rice and other crops. If construction of small dams is planned, efforts to reduce erosion will be critical to prevent siltation from occurring and disrupting their efficiency. A large hydropower dam on the Ruvubu River has been planned as part of the Nile Basin Initiative. Should this project move

into implementation, it is estimated that thousands of hectares of agricultural land will be inundated, and several resident populations forced to move.

Wetlands

An important freshwater resource in Burundi are the many wetlands and marshlands found in low-lying areas throughout the country. A distinction can be made between the more permanent swamps, or wetlands, and the seasonal, grassy areas or marshes (*marais*, in French). These wetlands cover over 118,000 ha, or about 5% of the nation's territory. The wetlands and marshes serve several important ecological functions, including flood mitigation, erosion control, aquifer recharge, water quality enhancement through filtering, and habitat for various flora and fauna.

Historically the seasonal marshes have been used as pasture for livestock, which helped to increase the marshes' fertility. As livestock numbers have decreased and as the demand for cultivable land has grown, marshes and wetlands are increasingly being drained or used seasonally for agricultural production, particularly of rice. Their high levels of organic matter and ability to retain moisture in the dry season have increased incentives for their cultivation. Peat and clay extraction are other economic processes which are threatening the integrity and ecological viability of the *marais*. Table 2 below demonstrates the various uses of Burundi's wetlands:

Table 2: Use of Burundi's Wetlands¹⁷

Wetland Use	% of Wetlands
Peat exploitation	1.2%
Agriculture	69%
Protected wetlands	3.2%
Identified for protection	2.8%
Clay and sand harvesting	1.8%
Not yet exploited	22%

The effective management of wetlands and marshes has been difficult in Burundi due to confusion over management authority and tenure rights. The 1986 *Code Foncier* established the wetlands under the public domain of the State, hence eligible for exploitation through concessions. Apparently some of the wetlands have also been conceded to the authority of the communes, as was found during a field visit to Kirundo. There it was explained that private citizens were allowed cultivation rights to a small plot at a cost of 200 francs burundais per season, or approximately 20 U.S. cents. Even within the local economy this price is quite low, as it was estimated that 80 kilos of rice could be harvested from the plot per year.

Management authority over wetlands and marshes is divided among various departments and ministries. The Rural Development Department (*Génie Rural*) under MINATE is to supervise the technical management of wetlands, while the

¹⁷ République du Burundi/UNDP/FAO, *Schema Directeur d'Aménagement et de Mise en Valeur des Marais*, September 2000

National Office for Peat Extraction (ONATOUR) has the authority to manage and extract from the peat bogs. Additionally, since the early 1980s it was reported that the Ministry of Agriculture has targeted these resources for production, despite not having direct management authority over the wetlands.

An effort has been made to better regulate wetland use and conserve remaining unexploited marshes through the drafting of a September 2000 Wetland Management Plan (*Schema Directeur d'Aménagement et de Mise en Valeur des Marais*). The *Schema Directeur* is a progressive document, and calls for a number of actions, including:

- the creation of a subcommission for the conservation of wetlands;
- mandatory environmental impact assessments (EIA's) prior to wetland exploitation;
- increased use of organic fertilization (green manure);
- community participation in wetland management;
- trans-boundary management agreements for cross-border wetlands;
- guidelines for peat extraction; and
- the conservation of an additional 2.8% of wetlands under the authority of the INECN.

If some of the above actions were to be implemented in a timely manner, it is likely that these resources could be conserved and/or managed sustainably. However other activities are taking precedence, as indicated by a planned program to resettle 7,600 families in the wetlands of Malagarazi District, as proposed by the Ministry for Reinsertion and Reinstallation of Displaced and Repatriated Persons.¹⁸ Some agricultural exploitation can be supported within the marshes without irreversibly altering their ecological functions or causing further environmental degradation. Recommended techniques which are being used by USAID partner organizations such as CRS, include the construction of irrigation ditches rather than complete drainage, use of green manure and other organic fertilizers, and periods of fallow, particularly during the dry season.

VIII. Status and Management of Protected Areas

Approximately 5.6% of Burundi's territory is classified under some form of protected area, including two national parks, five forest reserves, and 2 national monuments. All protected areas are under the management authority of the *Institut National pour l'Environnement et la Conservation de la Nature* (INECN), which is housed under MINATE. In spite of the best intentions, nearly ten years of civil unrest in the country has made it difficult if not impossible to conduct inventories or assess the condition of protected areas—let alone to ensure their continued protection.

¹⁸ *ibid*, p. 36

National Parks

Three national parks—Kibira, Ruvubu and Rusizi—exist in Burundi, and were placed under the management authority of the newly-created *Institut National pour la Conservation de la Nature* in 1980, which later became INECN. Since its inception, the INECN has relied on donor funding to meet its basic operating expenses. Park management is focused on hiring guards to protect timber and wildlife from poaching activities. The majority of guards are drawn from neighboring villages and are poorly trained and poorly paid. Since the onset of civil war in the early 1990s, both the Kibira and Ruvubu Parks have played host to rebel groups and IDPs, and it is doubtful that the park guards have been successful in limiting their hunting and tree clearing activities.

Additionally, apart from a few experiments funded by donors, such as the Bururi Forest Project in the 1980s and the IUCN *Parcs pour le Paix* activities in Kibira National Park, there have been few efforts to involve local communities in protected area management or planning. The 1997 Burundi National Environment Strategy attributes acts of deforestation and forest burning following the 1993 crisis to the GOB tradition of directive, non-participatory management with respect to protected areas.¹⁹

The first park created in Burundi was Kibira, which was designated in 1934 under the Belgian colonial government. Kibira is of critical importance due to its location at the summit of the Congo-Nile Divide and its impact on these watersheds. It stretches across northwestern Burundi, joining with the Nyungwe Forest Reserve across the border in Rwanda. The Park covers a terrain of 40,000 hectares and is dominated by afro-montane forests, including species such as *Parinari excelsa*, *Entandophragma excelsum*, *Albizia gummifera*, and *Prunus africana*. The Mountain Gorilla once inhabited the area, but is now believed to be locally extinct. However other six other species of primate have been documented in the forest, including Chimpanzee, Gray-Cheeked Mangabey, L'hoesti's Monkey, Black and White Colobus Monkey, the Blue Monkey and the Baboon. In 1989 Chimpanzee numbers were estimated at 200 individuals, but no inventories have been conducted since that time to determine their current population size.

Threats to Kibira National Park have included clearing for tea plantations and gold mining in the recent past. Post-1993 destruction within the park is estimated at 2800 ha, due to both intentional fires and tree felling. An additional fall out from the crisis has been the loss of park guards—due either to attrition or combat. The number of surveillance personnel has dropped from 64 to 9 over the last decade, according to one source.²⁰

¹⁹ MINATE, *Stratégie Nationale de l'Environnement au Burundi*, November 1997, p. 29

²⁰ MINATE, 1997, p. 83

When it was created in 1984, Ruvubu National Park was Burundi's largest, encompassing 50,000 hectares. Nearly 3,000 people were inhabiting the land on which the Park was formed, and they were forcibly resettled by the Burundian army and granted compensation by the GOB. The Park is located in the eastern part of the country, and borders Tanzania at its eastern-most point. The ecology of the Park is a forest/grassland mosaic which is similar to the wooded savanna found in the contiguous portions of Tanzania. When the last inventories were conducted in the late 1980s, animal populations included Cape Buffalo, antelope, crocodiles, hippos and a variety of bird life. Similar to Kibira Park, no inventories have been conducted over the last decade, and the Park has faced incursions from returning refugees and neighboring populations.

Rusizi National Park is a small reserve located on the delta where the Rusizi River empties into Lake Tanganyika. The Park is very close to both Bujumbura and the DRC border, and thus has been encroached upon by refugees returning from across the border, and by city residents in search of land. The predominant vegetative cover within the park is papyrus (*Cyperus papyrus*) bordering the river and in the marshes, and varieties of acacia on higher ground. There is a rich diversity of birdlife, including herons (*Egretta intermedia*, *Ardea melanocephala*), ibis (*Threskiornis aethiopicus*), and paleo-arctic migrants such as *Ciconia ciconia*, *Capella media*, and *Philomachus pugnax*. Numerous hippopotamus and crocodiles can also be viewed within the park. Park guards are stationed at the reserve, but it is unclear whether they are paid officially, or subsist on guide fees from the occasional tourist. In addition to land encroachment, the Park is also negatively impacted by pollutants flowing into the river and wetlands from nearby industries, and from siltation caused by erosion higher in the watershed.

National Forest Reserves

Five National Forest Reserves exist in Burundi, and all are currently under the management of the INECN. These forests include: Bururi, Kigwena, Rumonge and Vyanda Forest Reserves, and the Rusizi Palm Reserve. The forest reserves have been impacted by agricultural expansion, timber harvesting, and forest fires. These actions appear to have increased since the beginning of the recent civil war. According to the 1997 *Stratégie Nationale de l'Environnement au Burundi*, a 30% reduction in state domain forests/plantations (*boisements domaniaux*), and a 5% destruction of natural, protected forest land has occurred since 1993.²¹ Some of the destruction is due to harvesting of valuable timber species for illegal export, including *Podocarpus milanjanus*, *Entandophragma excelsum*, *Prunus africana*, and *Hagenia abyssinica*.

The Bururi Forest Reserve, located in southern Burundi, was established under the Belgian colonial government in 1951. It is a remnant of tropical montane forest similar to that found in the Kibira National Park along the Congo-Nile Divide. Historically considerable animal life has been recorded in the forest, including chimpanzees (*Pan troglodytes*), colobus monkeys (*Colobus badius*), panthers

²¹ MINATE/UNDP/FAO, *Stratégie Nationale de l'Environnement au Burundi*, 1997, p. 53

(*Panthera pardus*), and 117 species of birds. However a lack of recent inventories makes it impossible to determine current populations levels.

During the mid-1980s, the Bururi Forestry Project was implemented with assistance from USAID and the U.S. Peace Corps to carry out reforestation and alternative income activities with neighboring village populations, and to train forest guards in forest management and protection. The project was viewed as a success and was replicated in the Rumonge Forest Reserve.²² The Bururi Forest Reserve is reported to have suffered considerably from recent deforestation activities, estimated at 1020 ha of forest destroyed out of a total of 3300 ha.²³

The Kigwena Forest Reserve contains some of the last remaining stands of lowland tropical rainforest of the humid guinean variety in Burundi. Common tree species in the reserve include *Newtonia*, *Albizia*, and *Pycanthus*. The reserve was created in 1954 for the purposes of scientific study. Since that time, Kigwena has been continuously encroached upon, and the original 2000 hectare reserve had been reduced to 500 hectares by 1980.²⁴ Palm oil plantations have been established within the reserve since that time, so it is unlikely that much of the original forest remains.

Rumonge Forest Reserve is a small remnant of Miombo woodland forest, which is typically found in regions of eastern and southern Africa. The Rumonge is located on the mountains above the town of Rumonge in southern Burundi, and overlooks Lake Tanganyika. Common tree species include *Annona senegalensis*, *Combretum binderanum*, and *Strychnos spinosa*.

Vyanda Forest Reserve is located less than a mile from Rumonge Reserve and shares a similar vegetative cover. Efforts by the GOB were made to establish tree plantations in and around the Vyanda Reserve in the early 1990s. However both Rumonge and Vyanda Reserves are within Bururi province, which suffered some of the greatest destruction following the 1993 conflict. The commune of Vyanda reported the greatest deforestation levels: 2,000 ha of coffee plantations and 2,320 ha of tree plantations were destroyed, but figures for the forest reserve itself are not available.²⁵

The Rusizi Palm Reserve is located in the Imbo plain bordering Lake Tanganyika to the north of Bujumbura. The palm reserve is a low-lying area covered by permanent wetlands and seasonal marshes, and dominated by palms of the *Hyphaene ventrivose* variety. The reserve and the park are considered sites of international importance for the conservation of migratory birds. While there has been some encroachment of agriculture and livestock into the reserve, the viability of these activities is limited by

²² The 1989 USAID *Burundi Biological Diversity and Tropical Forest Assessment* states that 750 hectares of exotic tree species were planted in block plantations within the Bururi Forest boundaries. This figure is unsubstantiated, but if true, does not signify responsible forest management practice (Annex C).

²³ MINATE, op cit, p. 84

²⁴ *ibid*, p. 79.

²⁵ Kabeya et al, *Les Effets de la Crise Socio-politique sur l'Environnement au Burundi*, 1996, p. 45

the marshy quality of the land and vegetative cover, and the permanence of low-lying wetlands.

IX. Major Issues in Biological Diversity and Tropical Forest Conservation

Burundi is not generally considered to be a critical country for biodiversity or tropical forest conservation because very little of the original habitat remains. Small patches of lowland tropical forest can be found in Kigwena reserve, but the majority of Burundi's original forests are tropical montane (afromontane), and located in Kibira National Park and Bururi Forest Reserve. As part of the greater Albertine Rift ecosystem, these forests along the Congo-Nile Divide are considered "potential hotspots" for biodiversity. Much of the remaining forests and tree stands are second growth, or are the result of reforestation activities, and include exotics such as pine, eucalyptus and cypress. Less than 1% of the territory is believed to remain in virgin forest cover.

No terrestrial fauna are endemic to Burundi. This is not surprising considering the country's small size and the fact that it comprises part of the broader ecosystems which cross national borders in the region. Burundi is relatively rich in biodiversity, yet actual numbers, particularly for large mammals, have declined significantly over the last few decades. Human population encroachment has left only small pockets free from agriculture where species may live, and many original species are no longer present in the country. Burundi is rich in avifauna and ichthyfauna, most of the latter being found in Lake Tanganyika. More than 200 endemic fish species are estimated to inhabit Lake Tanganyika alone. Plant biodiversity is also rich, but declining with the spread of agriculture. Estimated plant diversity numbers 2500 species for higher order plants, which include flowering plants, conifers, cycads, ferns, and fern allies.

A. Tropical Forests

Based on colonial Belgian accounts, as much as 40% of Burundi was once forested. Population pressures and clearing of native stands for tea and coffee cultivation under the colonial regime had already dramatically reduced the forests by the 1930's, leading to the establishment of the Kibira and Bururi forest reserves. The most recent forest inventory was conducted in 1992, and at that time 8% of the country was considered "forested". This figure includes tree plantations; natural forest cover was estimated at 3.5% of land area.²⁶ These numbers are certainly much lower today following the destruction that has occurred during the civil war.

The remaining natural forests in Burundi are located in the national parks and forest reserves. The predominant types include:

Afromontane: These are higher altitude, moist forests. Predominant tree species include *Parinari excelsa*, *Entandophragma excelsum*, and *Prunus Africana*.

²⁶ Etienne Kayengeyenge, Director-General of MINATE, interview, January 27, 2003

Afromontane forests are located along the Congo-Nile Divide, with the majority remaining in the Kibira National Park under nominal protection.

Humid Guinean: A small remnant of this tropical lowland rainforest type can be found in Kigwena Forest Reserve in southern Burundi. Tree species commonly found include *Newtonia*, *Albizia*, and *Pycanthus*. Very little of this forest type remains in Burundi; in 1980 only 500 ha remained in Kigwena Reserve, and while data are not available for 2002 it is safe to assume that this figure is now much lower.

Miombo Woodland Forest: This dry forest type of semi-closed canopy and underlying savanna which is common to eastern and southern Africa can be found in the Rumonge Forest Reserve near Lake Tanganyika in southern Burundi. Tree species include: *Annona senegalensis*, *Brachystegia*, and *Strychnos spinosa*.

Palm: On the Imbo plain along the shores of Lake Tanganyika lies an extensive palm “forest”. The predominant species is *Hyphaene ventrivoise*, which tolerates the marsh-like conditions found in this region. These forests are classified as a national reserve, and are therefore under some form of nominal protection.

Wooded Savanna: In the relatively dry Kumoso lowlands of southeastern Burundi, the predominant forest type is wooded savanna which is dominated by associations of *Brachystegia*, *Julbernardia*, and various members of the *Acacia* genus. Underlying the dispersed woodlands are grasses such as the *Brachiaria brizantha*, *Hyparrhenia dissolute*, and *Digitaria diagonalis*.

Threats to Tropical Forests:

The major threats to Burundi’s few remaining tropical forests stem from the following activities:

Land Clearing for Cultivation: This has been the greatest cause of deforestation in Burundi. Some of the clearing has been the result of subsistence farmers encroaching on the borders of forest reserves. Efforts such as the Bururi Forestry Project in the 1980s met with some degree of success by promoting agroforestry initiatives on surrounding farms, involving local populations in forest reserve management, and increasing patrol efforts within the reserve.

Large-scale clearing for the planting of tea and coffee plantations has also contributed to the disappearance of Burundi’s natural forests, particularly in the Kibira National Park. Bamboo has been particularly targeted in Kibira, as it is used as to weave baskets for tea harvesting.

Small-scale land clearing has re-emerged as a major issue during the 1990s as a result of the return of displaced persons who require land for cultivation.

Fuelwood harvesting:

As throughout much of Africa, the principal energy source for cooking and heating is fuelwood collected or felled from neighboring forests. In response to growing wood scarcity, the GOB instituted large-scale reforestation activities during the 1983-87 National Plan. However these forests remained within the State Domain, so fuelwood harvesting was forbidden or tightly controlled, depending on the forest classification.

Civil Unrest:

Since Burundi's most recent period of civil war beginning in 1993, there has been widespread destruction of both natural and planted forests. Forests have been utilized to provide fuelwood for refugee populations, rebel groups, and the military. Targeted destruction of private and state domain forests has also occurred, according to the 1996 UNDP study, *Les Effets de la Crise Socio-Politique sur l'Environnement au Burundi*. The UNDP study estimated that 30,641 ha of *boisements* (wooded areas) and 2,000 ha of coffee plantations were destroyed as a result of targeted cutting and burning (p. 89). No distinction is made in the report between protected forests, and forest plantations. However the report claims that very little of Kibira National Park was impacted, citing only 320 ha of destroyed *boisements* within the entire province of Kayanza, and stating that Kibira National Park was not impacted. However during the key informant interviews, there was much speculation that Kibira Forest was being negatively impacted by the presence of rebel groups hiding in the Park. The National Forest Reserves of Kigwena and Rumonge are estimated to have been seriously impacted during the crisis, with 2,320 ha of *boisements* destroyed. Again, no distinction was made in the report between forest reserves and plantations.

Timber extraction: Burundi's relative lack of forest cover and poor infrastructure limit the profitability of timber extraction. However certain valuable tropical wood species (*Podocarpus milanjianus*, *Prunus africana*, and *Hagenia abyssinica*) have been targeted and exported illegally from the Kibira National Park. *Prunus Africana*, or Red Stinkwood, is listed as a vulnerable species on the IUCN Red List.

B. Biodiversity

Flora

In spite of the nearly complete dominance of human-altered landscapes in Burundi, a surprising level of plant biodiversity remains. This diversity is due in part to the number of different ecosystems within the country, ranging from afro-montane forests, to savannas, to extensive marshlands. There are estimated to exist over 2,500 species of higher plants in Burundi, of which none are endemic, according to the World Conservation Monitoring Center. Seven species of plants are listed under Appendix II of CITES, that is flora which are not necessarily threatened with extinction, but for which controlled trade is advised. These species belong to three families: *Cyatheaceae*, *Euphorbiaceae*, and *Liliaceae*.

Fauna

As part of contiguous ecosystems such as the Albertine Rift which reaches into Rwanda and the Democratic Republic of Congo, and the low altitude woodland savannas of southeastern Burundi which cross into Tanzania, Burundi was once an important habitat for a richly diverse number of faunal species. The country remains surprisingly rich in bird and fish biodiversity, but few large mammals remain.

Fish

The majority of fish biodiversity can be found in Lake Tanganyika, of which 8% is within Burundi's borders. This large freshwater lake, the second deepest in the world, contains over 300 species of fish, of which more than 90% are endemic.²⁷ The numerous rivers and smaller lakes of Burundi also provide an extensive habitat for fish. While overfishing of perch is believed to be occurring from Lake Tanganyika, no fish species found in Burundi are currently listed as threatened by CITES.

Amphibians and Reptiles

Actual species numbers for the classes *Reptilia* and *Amphibia* were not available from a number of sources, however it is known that two species of *Amphibia* are endemic to Burundi.²⁸ Two species of reptile are included under Annex I of CITES, species threatened with extinction. Both are species of Crocodile (Family *Crocodylidae*), *Crocodylus cataphractus*, and *Crocodylus niloticus*.

Birds

Burundi is rich in avifauna diversity, with 596 species having been recorded within its territory. No bird species are considered endemic to Burundi, however over 400 are resident populations, and slightly more than 100 are seasonal migrants.²⁹ The variety of bird life is due in part to the variation in topography and biomes, including Afrotropical highlands, Guinea-Congo forests, and the Lake Victoria Basin biome. The existence of extensive wetlands also provide a preferred habitat for many bird species.

One avian species is listed in Annex I of the CITES list of threatened species: the peregrine falcon, or *Falco peregrinus*. Raptors are among the most threatened avian species in Burundi, comprising the majority of the 76 avian species appearing in Annex II of the CITES list. One species which is believed to be locally extinct is the *Balearica regulorum*, or crested crane.

²⁷ Kanyamibwa et al, p. 128

²⁸ Sources consulted included websites for the World conservation Monitoring Center, IUCN-the World Conservation Union, and the American Museum of Natural History.

²⁹ Kanyamibwa, op cit., p. 129

Mammals

The few large mammals which remain in Burundi are found predominantly in the nation's parks and protected areas. According to a census conducted in 1987 under the U.S. Peace Corps, only 34 species of mammal were recorded in Burundi. These included various species of primate, gorillas, porcupines, cane rats, squirrels, jackals, civet cats, mongoose, leopards, pigs, buffalo, elephant, hyenas, and duikers. It is now known that elephants and gorillas have become locally extinct, and six mammal species have been listed under Annex I of CITES. These species are: *Loxodonta africana*, *Acinonyx jubatus*, *Panthera pardus*, *Gorilla gorilla*, *Pan troglodytes*, and *Diceros bicornis*. This list is no longer correct, as was identified through a U.S. State Department unclassified cable dated December 2001, which verified that three of these species no longer exist in Burundi (*Gorilla gorilla*, *Diceros bicornis*, and *Loxodonta Africana*).

Threats to Biodiversity:

The majority of threats to biodiversity have already been addressed, but are summarized below:

Human Influence

The single greatest threat to Burundi's biodiversity stems from loss of habitat as human occupation, agricultural production, and deforestation continue to expand. More than 80% of the country's territory is under some form of agricultural exploitation. Deforestation for land clearing, fuelwood collection and timber extraction have also taken a toll, leaving only 3.5% of the land area under natural forest cover.

The ongoing civil conflict negatively impacted biodiversity. Recent reliable data on these impacts do not exist, but the belief was widely expressed by environmental professionals during the interviews that unrest had increased hunting of wild animals for consumption and the bush meat trade, and lead to destruction of habitats through forest fires and timber harvesting. Likewise, the conflict has made it extremely difficult, if not impossible, to patrol the remaining protected areas. It has been estimated that only 9 of 64 guards remain to protect Kibira National Park.

Overfishing has also been a problem in the permanent wetlands, streams, rivers and lakes of Burundi. Lake Tanganyika is believed to be suffering from over-harvesting of perch, which are some of the major predators in the food chain of the Lake. This could be disrupting the balance of fish populations.

X. Opportunities for Conserving Tropical Forests and Biodiversity

Future efforts to preserve and protect remaining tropical forests and biodiversity in Burundi will be highly dependent upon the peaceful resolution of ongoing conflicts.

The resettlement of displaced persons away from critical habitats, and encouragement and support for non-agriculturally based livelihoods will also be critical elements to ensuring the survival of the country's remaining biodiversity. Finally, support for enforcement and implementation of the June 2000 Environmental Code would also help to ensure that an appropriate legislative and institutional framework exists for tropical forest and biodiversity conservation. A brief overview of recommendations specific to tropical forest and biodiversity conservation is provided below, with more detailed descriptions of recommended actions following under Section X.

Reduction of Conflict

Burundi's recent period of civil war has exacerbated the already declining state of tropical forests and biodiversity in the country. Instability has made it difficult to protect conservation areas, and large numbers of displaced peoples have been forced to rely on the surrounding environment to meet their daily needs. There have also been reports of targeted destruction of forests and tree plantations as retribution against the Burundian government and private individuals.

Under SO 1 of the *2003-2005 Burundi Integrated Strategic Plan*, USAID intends to work towards the peaceful resolution of conflict and support for good governance. Success under this Strategic Objective could have a significant impact on the future survival of remaining biodiversity. Recommended actions specific to tropical forest and biodiversity conservation include: drafting of implementation texts and enforcement of the June 2000 Environmental Code with respect to protected area management; revision of the 1986 *Code Foncier* to include participatory resource management approaches; and promotion of GIS-based mapping techniques to aid land use planning and resource conflict resolution. These recommendations are described in greater detail in the following section.

Promotion of sustainable livelihoods

Conservation of tropical forests and biodiversity depends in large part on reducing encroachment into critical habitats. Several options for reducing future detrimental impacts could be accommodated under Strategic Objective 2: "Food Security Enhanced".

Encouraging non-resource dependent livelihoods through provision of training and capital for establishing micro-enterprises in food processing and services would be one method for alleviating pressures on the resource base. Micro-enterprises which focus on sustainable harvesting and processing of natural resources such as honey, fiber, and non-threatened medicinal plants would be another approach.

Intensification and improved management for agricultural production

Burundi's population and economy are dependent upon agriculture for their survival. As population pressures continue to rise, it will be necessary to increase the

productivity and viability of existing farms in order to prevent the occurrence of land clearing in protected areas and critical habitats.

Recommended methods to reduce soil erosion and increase soil fertility while increasing productivity would include: promotion of agroforestry, terracing, agro-sylvo-pastoral techniques, and introduction of high-yielding seed varieties. These and other techniques could be incorporated under SO 2, and are described in greater detail in the following section.

XI. Recommendations for Proposed Actions

The disequilibrium between population and available resources has led to broad-based environmental destruction in Burundi. The direct consequences of this disequilibrium are food insecurity, insufficient fuel energy, pollution, and heightened civil strife. These negative consequences could be mitigated through a well-ordered public welfare society with an appropriate policy and regulatory environment allowing for decentralized management of resources and the encouragement of private initiative to achieve an equitable distribution and use of natural, social and political resources. Poverty itself can cause competitive and inappropriate behavior, rather than management of natural resources for the collective good. Much empirical evidence points to the resourcefulness of poor people and their ability to manage under the right conditions. Also, it is often the rich and powerful who contribute significantly to mismanagement and degradation. Thus sound environmental management should be promoted out of a sense of the common good and both as a consequence of, and contributor to peace.

The option of expanding into previously uncultivated areas is no longer a viable alternative for Burundi. Rather improving the quality of existing farmland should be a focus, using techniques such as agroforestry, erosion control, and introduction of improved and high-yielding seeds. However efforts to improve crop yields through sustainable intensification will at best barely stem the degradation of the soil resource and vegetative cover. A part of the solution must include providing economic options off the land. Finally, to address these problems it will be important to create a climate of peace and expand the consciousness of the people of Burundi by mobilizing all social actors.

Under the current ISP, USAID will work towards addressing these issues through three strategic objectives: Peace Process and Good Governance Enhanced, Food Security Enhanced, and Access to Basic Social Services Improved. The management structure for assistance to Burundi will partner two USAID bureaus: the Africa Bureau (EA, REDSO, SD), and DCHA Bureau.

Opportunities for enhancing environmental management in Burundi through the proposed strategic objectives are described below:

Strategic Objective 1: Peace Process and Good Governance Enhanced

IR 1.1: Causes and consequences of conflict mitigated

- Revision of the 1986 Land Tenure Code (*Code Foncier*): Key aspects of the Land Tenure Code should be revised to include: removal of the concessionary rights to State domain lands granted to government officials; promotion of tenure security for individuals and communities; individualized and communal tree tenure rights secured; incorporation of community-based land use planning; mechanisms for resolving conflicting tenure claims instituted, and stipulations for discouraging unsustainable farming practices such as tree removal for hillside planting.
- Harmonize natural resource legislation: The Land Tenure and Forest Codes need to be revised to support initiatives promoted under the 2000 Environmental Code. In particular they should incorporate participatory management of local resources, mandatory environmental impact assessments for public works and land management activities, and simplified mechanisms for classifying forest and threatened habitats for protection.
- Draft and enact implementing texts to accompany the June 2000 Environmental Code specifically for: protection of threatened and endangered species, creation and management of buffer zones around protected area perimeters, and Environmental Impact Assessment procedures.
- Develop an environmental and Geographic Information Systems-based decision support system to aid better visualization and understanding of resource allocation factors, and make transparent the land allocation process to support dispute avoidance and resolution. This is possible with minimal investment by capitalizing upon the considerable expertise already present in the region via FEWS Net.

IR 1.3: Civil society participation increased

- Introduce participatory resource management practices through creation of enterprise-based, social self-help, and other types of associations;
- Promote the application of environmental assessment processes at the prefecture and commune levels for application to decision-making for collective investments and enterprises as a means of advancing local governance systems and sound environmental management;
- Promote environmental awareness and education through training of journalists and parliamentarians, and of the general populace through radio programs;

Strategic Objective 2: Food Security Enhanced

IR 2.1: Vulnerable groups receive effectively targeted assistance

- Provide access to land, improved seeds, and proper seed propagation and sustainable agricultural technologies to vulnerable populations to enhance income and food security;

- Discourage use of fired bricks and mud and wattle for home construction to reduce wood use. Encourage use of non-fired mud bricks;
- Avoid provision of pesticides in agricultural support packets given to returnees

IR 2.2: Increased opportunities provided for productive livelihoods

- Provide training and capital for micro-enterprise activities to increase non-farm incomes;
- Distribution of small ruminants accompanied by training in zero-grazing and agro-sylvo-pastoral production systems to enhance soil fertility and reduce erosion;
- Promote linkages with the regional natural resources-based economy through trading ties with the members of the East African Community;
- Incorporate environmental guidelines into road construction and rehabilitation, and improved drainage systems;
- Promote natural-resource-based enterprises with economic potential such as bee-keeping, plant-based natural products, and fiber crafts;

IR 2.3: Sustainable Natural Resources Management Practices Adopted

- Promote sustainable intensification of basic food production integrated with soil fertility enhancing measures. Provide training and materials to promote introduction of nitrogen-fixing trees and grasses onto hillside farms. Introduce agro-sylvo-pastoral and composting activities to promote soil fertility;
- Improved hillside farming through training in bund construction, rock lines, and agroforestry;
- Introduce sustainable cultivation methods for wetlands and waterlogged areas. Examples of these techniques include construction of irrigation channels over drainage, and introduction of organic fertilizers such as livestock and green manure. Discourage cultivation of permanent wetlands that provide habitat for birds and aquatic species;
- Promote a watershed management approach through organization of trainings and coordinated planning among GOB, prefecture, and community-level resource planners. Integrate watershed management awareness into the planning and construction of new structures, drainage systems, and dams;
- Use of appropriate tree species for reforestation activities. Promote tree species that provide multiple benefits, such as neem (*Azadirachta indica*) and shea (*Vitellaria paradoxa*) for fruit harvesting, and grevillea (*Grevillea robusta*) and calliandra (*Calliandra calothyrsus*) for nitrogen and forage production.
- Encourage application of the September 2000 Wetlands Master Plan (*Schema Directeur d'Aménagement et de Mise en Valeur des Marais*). If implemented, the Plan will enhance the sustainable management and conservation of wetlands through implementing guidelines for cultivation and peat extraction, instituting environmental impact assessments for use of wetlands and marshes, providing a

- mechanism for community participation in wetland management, and increasing the number of wetlands protected for conservation purposes.
- Assist with the financing of forest, wildlife and natural resource inventories, particularly in protected areas. No inventory has been conducted since 1992, so existing information is out of date and probably inaccurate. Improved information will enhance natural resource planning efforts.

Strategic Objective 3: Access to Basic Social Services Improved

IR 3.3: Safe water and sanitation more widely available

- Encourage use of environmental impact assessments to avoid further damage to the surrounding environment and diminish detrimental health impacts as a result of poor infrastructure planning

Appendix I: Key Informants

Mr. Astère Bararwandika	Directeur General, Department of Forestry
Dr. Gaspard Bikwemu	President, Réseau d’Evaluation d’Impacts Environnementaux dans les Pays des Grand Lacs (REIE-PGL)
Mr. Nzojibwami Cyriaque	INECN, Projet Parc pour la Paix
Mr. Gabriel Hakizimana	Biodiversity of Lake Tanganika
Mr. Jerome Karimumuryango	Directeur-General, Institut National pour l’Environnement et la Conservation de la Nature (INECN)
Mr. Etienne Kayengeyenge	Directeur-General, Ministère de l’Aménagement du Territoire et de l’Environnement
Mr. Antoine Kinyomvyi	President, Organisation de Defense de l’Environnement au Burundi
Ms. Jean Moorhead	Program Officer, World Vision-Burundi
Mr. Chris Necker	Interim Director, CARE-Burundi
Mr. Tilaye Nigussie	Team Leader, CARE-Burundi
Mr. Joseph Nindorera	Environment Project Manager, CARE-Burundi
Ir. Emmanuel Nshimirimana	Chargé de Programme au Burundi, REIE-PGL
Dr. Laurent Ntahuga	Professor of Biology, Faculty of Science, University of Burundi
Mr. Stephen Walsh	Acting Country Representative, CRS-Burundi

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