

PA-REF-954  
ISA 68038

BURUNDI BIOLOGICAL DIVERSITY  
AND  
TROPICAL FOREST ASSESSMENT

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January 1989

Natural Resources Management Support Project  
(AID Project No. 698-0467)

Contract No. AFR-0467-C-00-8054-00

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# BURUNDI BIOLOGICAL DIVERSITY AND TROPICAL FOREST ASSESSMENT

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### Major Findings

Ecological Diversity. The geography, climate and ecology of Burundi are characterized by impressive heterogeneity. This heterogeneity is the product of Burundi's location in the East African Rift System, with its north/south mountain chains and the varying altitude, temperature and rainfall regimes created by that system.

Transformation of Native Flora. Under the impact of agricultural and pastoral land use, there has been a large-scale transformation of the flora of Burundi. In agricultural areas, native forest and savannah species have been replaced by domestic crops. In pastoral areas the herbaceous vegetation remains indigenous but the diversity of the original primary associations has been reduced. Overgrazing and over-burning have led to a more homogeneous, degraded landscape dominated by one secondary grass species (*Exothecca abyssinica*). Only in drier woody savanna areas with sparser populations and fewer human interventions can we find clusters of trees and grasses perhaps resembling the associations of earlier times. Less than one percent of the nation's landscape remains in virgin forest.

Fauna. The mammalian wildlife of Burundi is now restricted to a small percentage of the country's territory. Though no known cases of total species extinction have occurred in Burundi, several species such as elephants and gorillas have become, at least locally, extinct because of human expansion and depredation. A few of the larger reptiles, especially crocodiles, are also in danger of local extinction. Birdlife, especially species that dwell near water, has been less threatened by human expansion and several large waterbird species continue to flourish. Most fish species are found in Lake Tanganyika and two other smaller lakes. Human exploitation of fish may actually be leading to an (at least temporary) increase in the population of some species. Though the major fish predators--various species of perch--have themselves come under some pressure from net-fishers, the population of smaller species on which they prey appears to have increased.

Density of Human Population. The population density of Burundi, which averages about 180 people per square kilometer, is one of the densest in Africa. With 95% of the people living in rural areas, it is also one of the most rural nations on the entire continent. The diverse geography has led to an unequal distribution of this population, with drier regions having fewer than 70 people per square kilometer and certain moister, highland regions having up to 450 per square kilometer. This concentration of population in the steep-sloped highlands increases the vulnerability of the landscape to soil erosion. Ethnically, the population is divided between the Hutu majority (85 percent of the population), and the politically dominant Tutsi minority (14 percent). The pygmy Twa now constitute only 1 percent of the population. Linguistically, the population is homogeneous: all three ethnic groups speak Kirundi as their mother tongue. French is the official language of Burundi.

Land Tenure Issues. Pre-colonial patterns of kingly and princely control of land have yielded under colonial and post-colonial dynamics. A more privatized land tenure system now prevails in which each household group is the effective owner of its own land, even in the continuing absence of legal deeds to holdings. The few data available on holding size

indicate that virtually all families in Burundi own land and that in most regions, the average holding is 2 hectares or more. Most land is transmitted through patrilineal inheritance and women are largely excluded from land ownership. The transmission of land through purchase and sale, though more common than before, is still the statistical exception.

Intensive Agriculture. The bulk of the land in Burundi is dedicated to cropping activities. The major food crops are: beans, bananas, manioc, sweet potatoes and corn. The traditional sorghum now has lost its former importance. First under Belgian auspices and now under Burundi parastatal control, most farmers in the country grow at least one export crop on their holdings, coffee being by far the most important. Labor inputs into the land are all human. There are no draft animals in most regions and most labor is domestic; agrarian wage labor is still the exception. Erosion control techniques are ubiquitous but of low apparent effectiveness. Population pressure is too great and landholdings too small to permit systematic fallow in most regions. Soil fertility restoration is accomplished through organic techniques (particularly manure in regions with cattle) and through crop rotation.

Conservation interventions. Though Belgian colonial policy provided for the establishment of reserves and the planting of trees, the reserves were never effectively protected. Tree planting consisted primarily of border plantings along roads, park boundaries and plantations. The Burundi government, through the Institut National pour la Conservation de la Nature (INCN), has created new reserves and national parks, expelled residents from new and old reserve areas and has begun to take stricter measures to protect the few remaining stands of natural forest. There is evidence that these activities are having some positive effect on vegetation and wildlife populations in the protected areas. In the process, however, large numbers of rural families within or in the vicinity of the reserves have lost their homes, agricultural and grazing land and access to traditional wood supplies.

Government control of tree planting activities. During the past decades thousands of hectares of exotic trees (principally pine, cyprus, eucalyptus and grevillea) have been planted all over Burundi. Foreign donors have been the principal financiers of these activities with Burundian and expatriate involvement in the management of nurseries and outreach activities. Projects involving non-governmental organizations are expected to work with government agents who are responsible for managing nurseries and organizing extension. Tree planting is often associated in the eyes of Burundi farmers with the authority of the central government.

State ownership of planted tree stands. The government is the primary manager of nurseries as well as the owner of the trees that are planted in government plantations (even those planted on "communal land"). In addition, farmers require government permission to harvest their own trees. The result of all this government activity is that the population at large is excluded from access to many project benefits in the form of tree products. On the other hand, employment in site preparation, planting and maintenance are concrete benefits that accrue directly to local residents. Current wood scarcity and wood market conditions throughout Burundi are such as to render privatized tree planting programs both attractive and profitable to ordinary farm households. However, current government control of planted trees could be replaced, or at least supplemented, by programs which give local populations autonomous control over planted trees. Small-scale

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projects by USAID and Catholic Relief Services demonstrate the feasibility of this approach.

### Major Recommendations

Natural forests and the Kumoso lowlands. Continue with the current policy of public ownership and control of the few remaining stands of natural forest in Burundi. Consider the possibility of extending legal protection to certain areas in the Kumoso (the drier eastern lowlands near Tanzania). As will be discussed below, this region is still sparsely populated and contains pockets of indigenous vegetation and wildlife.

Buffer Zones. In protecting reserves, shift from a policy of simple protection to a mixed park/buffer zone strategy as has been done in the Rumonge and Bururi areas discussed below. In addition to the funding for park protection activities, provide equally adequate funding to enable the population in the buffer zones to undertake income generation activities. These economic inputs should be convincing enough to turn the creation of a reserve into positive economic news for neighboring populations. (Under current protection policies the announcement of a new reserve is catastrophic news for nearby populations.)

Tree planting programs. Undertake tree planting activities in which trees desired by farmers are made available as potential income generators and in which household ownership over planted trees is clear enough to leave no doubt as to eventual benefit flows. The traditional state control and state ownership approach should be, if not phased out, at least vastly reduced. There should be a mixture of trees for farmers to plant. This might include nitrogen fixing species which help to ameliorate poor soils and complement food crops. Other species such as grevillea and eucalyptus, could also be planted for construction and fuelwood needs as well as popular fruit tree species.

Non-governmental organizations (NGOs). Organize at least some tree planting programs under the auspices of NGOs, be they foreign or indigenous. Without dampening government interest in tree planting, encourage projects that are designed and managed by NGOs.

Education. Reorient conservation education in a way that links it up to specific programs providing funding for specific activities. Though educational messages must be part of any environmental program, donors should nonetheless be skeptical of funding public "conservation education" campaigns that exhort the population at large to engage in behaviors for whose implementation no specific program funds are provided.

Farming systems research. Ongoing USAID farming systems research should expand its scope to look at the role of both exotic and indigenous woody species in local agrarian systems, not only as ecological units, but also as possible income-generators on the holdings of ordinary Burundians.

## ACKNOWLEDGEMENTS

Many people provided their time and expertise to the writing of this report. The authors would like to thank Larry Dominessy and Samson Ntunguka at USAID/Burundi for their support in logistical arrangements. Andre Nyiokinde, Director of the Institut National pour la Conservation de la Nature was very helpful in all our dealings with INCN. Peter Trenchard, Coordinator of Peace Corps/Burundi's Biological Diversity Project, provided guidance and support throughout the assessment.

Finally, the team would like to thank LeRoy Duvall and Paula Williams for their comments and suggestions in the editing of the report.

Any errors in fact or interpretation are the fault of the team. This report presents the opinions of the authors, not necessarily the views or policy of USAID.

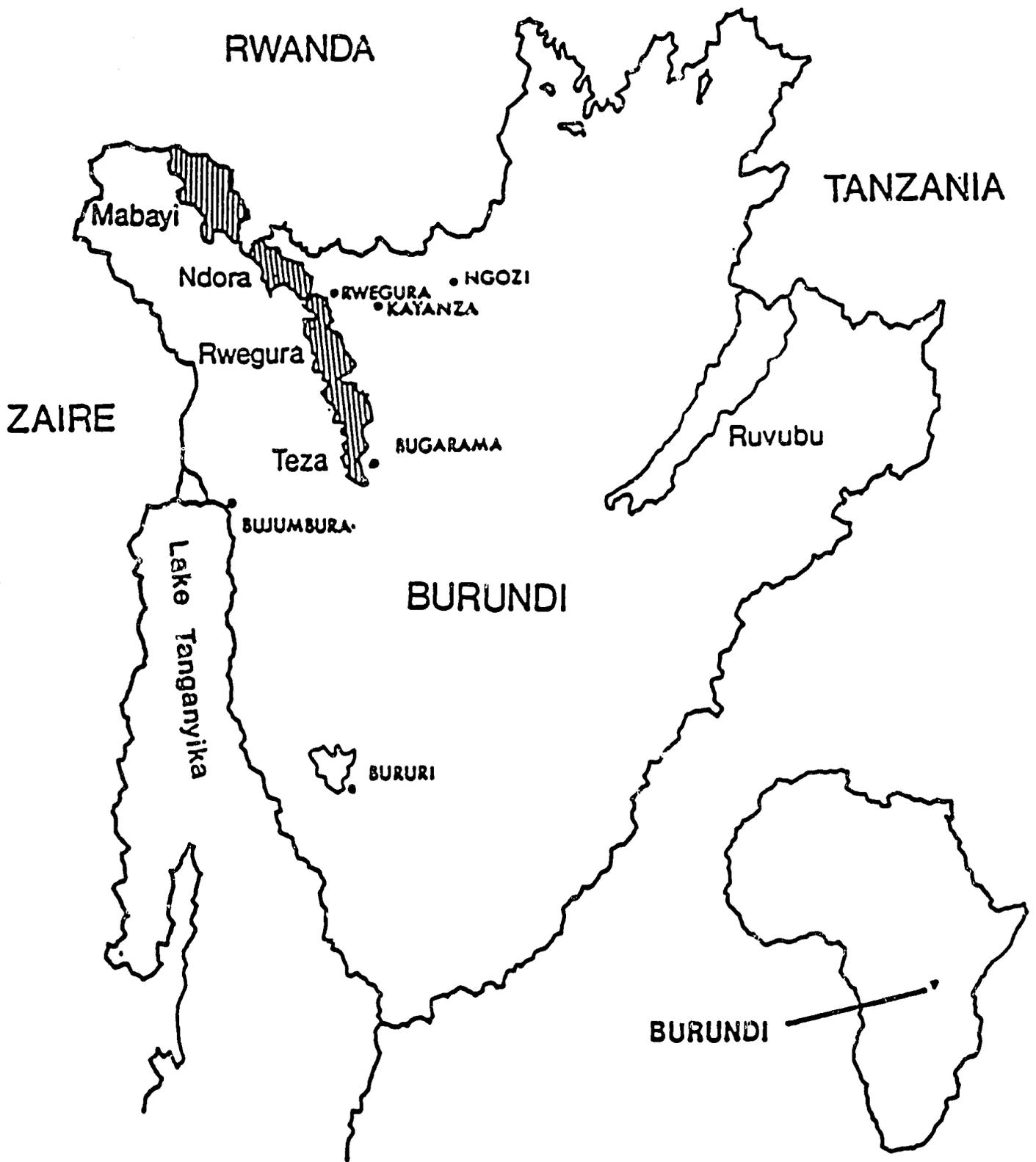
# BIOLOGICAL DIVERSITY AND TROPICAL FOREST ASSESSMENT SECTIONS 118/119 OF THE FOREIGN ASSISTANCE ACT

## PREFACE

Congressional mandate requires that all USAID Missions include in their CDSS or other country plans the following: 1) an analysis of the actions necessary in that country to conserve biological diversity and tropical forests; and 2) the extent to which current or proposed AID actions (if any exist in that country) meet those needs. The following assessment fulfills this requirement. At the same time it also promotes the Africa Bureau's natural resources management strategy as stated in the Plan for Supporting Natural Resources Management in Africa and as implemented by the Natural Resources Management Support Project for Africa (NRMS).

The basic goal of this assessment is to balance the interests of science and society. The interests of science dictate that a 118/119 assessment contain certain basic biological information. The interests of society dictate that the assessment also look at the human interaction with these biological and forest resources. This includes basic socioeconomic, agronomic and land use information and information on development projects.

The important point that the NRMS project wishes to stress is that science and society, particularly as defined in a 118/119 assessment, are intimately linked. Genetic, species and ecosystem diversity support human populations, just as human populations affect this biological diversity. An assessment of a country's biological resources is, by definition, an assessment of the basic foundation upon which sustainable development must build.



SOURCE: U.S. Peace Corps/Burundi, 1987

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## 1.0 INTRODUCTION

### 1.1 The Determinants of Biological Diversity

The fate of biological diversity can be viewed as the interaction of four distinct but chronologically overlapping processes: formation, reduction, conservation and restoration of biological diversity. A discussion of the biological resources of any country should ideally present at least some information on all four processes.

The first process, the formation of biological diversity, concerns natural landscape dynamics--the topographic, edaphic and climatic characteristics of the physical setting and the floral and faunal associations that have evolved there. The second often, though not always, concerns human activities and their effect, not only on the wildlife and the vegetation, but on the soil and water regimes themselves. The third and fourth processes, the implementation of conscious measures to conserve and restore biodiversity, are newly-emergent themes in many countries, including Burundi.

### 1.2 Background and General Context of the Assignment

The importance of biological diversity and tropical forests has led to the inclusion in the U.S. Foreign Assistance Act of Sections 118 and 119 which deal with tropical forests and biodiversity, respectively. In the development of its Country Development Strategy Statement (CDSS), USAID/Burundi called on A.I.D.'s Africa Bureau for technical assistance in addressing these issues. The resulting assessment was performed within the guidelines of the Africa Bureau's Plan for Supporting Natural Resources Management in Sub-Saharan Africa (1987), as well as guidelines prepared by the AID Bureau for Science and Technology (U.S. Department of State, 1988).

### 1.3 Objectives and the Scope of Work

The primary purpose of this report is to: (a) provide an analysis of the actions necessary in Burundi to conserve biological diversity and tropical forests; and (b) identify the extent to which current or proposed USAID actions meet those needs.

To comply with the 118/119 mandate, the assessment team's scope of work addressed four areas that would assist USAID/Burundi in preparing its CDSS. These were to:

identify and describe biological diversity and tropical forest projects and interventions, past and present, which have impacts on food production, income generation and conservation of important natural resources;

determine the effectiveness of current biological diversity and tropical forest programs and their impact on (1) long-term soil fertility, (2) long-term soil moisture conservation, (3) management of natural vegetation for sustained production of forage, wood and other products; and (4) germ plasm conservation and improvement.

#### 1.4 The Assessment Team

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#### 1.5 Information Sources

For background information the team relied on several published studies and agency reports on Burundi. A complete listing is given in the bibliography appended to this report. The team found the studies by Jones and Egli and Moussie et. al. to be particularly useful in providing background on the farming systems. Also, the draft Environmental Profile of Burundi by the Office of Arid Land Studies (University of Arizona) was one of our primary sources for an overview of the country's ecology and geography. Finally, the report by Vedder and Weber provided good documentation on how local populations perceive indigenous flora and fauna and how projects can give rise to conflicts.

Our discussions of past and current program interventions derives largely from interviews and field visits carried out in the course of the assignment. The assessment team, once assembled in Burundi, relied on USAID/Burundi to establish contacts. USAID/Burundi also provided the transportation and logistical support that made it possible for us to do a rapid country-wide survey of natural resources management programs. Key interviews and site visits, guided by our USAID guides, were made with persons and projects dealing with tropical forests and biodiversity in the country.

A week-long field trip allowed the assessment team to experience the impressive agroecological and sociological diversity of Burundi. During this time, the assessment team also had a few limited opportunities to discuss natural resources issues directly with farmers (in both project-related and unrelated contexts). The final week of our 18-day stay in Burundi, was spent confirming field observations and composing the initial draft report, which was left with the Mission prior to the team's departure. The final draft of the report was completed after returning to the United States.

#### 1.6 Limitations of the Report

It should be stressed that this assessment is by no means complete. Time and other logistical constraints limited the team's ability to conduct a more complete natural resources management assessment. Additional field time and more in-depth analyses would be required before an adequate evaluation of the socioeconomic impact of natural resources management practices and policies could be made. The list of contacts made by the team with individuals and organizations was quite limited. The number of groups and people that still need to be reached is quite large and a period of time equal to this visit would be required to tap those resources. Nevertheless, the information presented in this report does

provide a solid base for addressing key biological diversity and tropical forest management issues and for going on to develop the above-mentioned natural resources management assessment.

## 1.7 Structure of the Report

Consistent with A.I.D.'s focus, the team was as interested in solution formulation as in problem identification. Therefore, this report allocates as much space to assessing the incipient protection and restoration efforts that have been made as to describing the formation, and the reduction, of Burundi's original biodiversity. The report is organized into five chapters. This introductory chapter has described the general context of the evaluation, the scope of work and the information sources on which we relied. The second chapter--the "ecological formation" chapter--gives an overview of the ecology, flora and fauna of Burundi as they now exist. The third chapter is, in a sense, the "ecological reduction" chapter. It discusses the human population of Burundi, the various land use systems and economic forces which have led to degradation of the environment. Conservation and restoration themes appear in Chapter Four with an overview of the institutional interventions into natural resources management which have been attempted in Burundi and our assessment of the strengths and weaknesses of what has been tried. The final chapter discusses what we consider to be major policy issues which USAID and other donors should address as they identify the next steps that must be taken.

## 2.0 THE FLORA AND FAUNA OF BURUNDI

### 2.1 The Physical Setting

Located just south of the equator in East Central Africa, Burundi and its northern neighbor, Rwanda, are among the smallest republics in Africa. Though it has no outlets to the sea, many of Burundi's boundaries fall within lakes or along rivers--the Ruzizi and Lake Tanganyika on the west with Zaire; two smaller lakes (Rweru and Cohoha) and several rivers on the north with Rwanda; and the Maragariza and other smaller rivers on the east and south with Tanzania.

One of the smallest African republics in absolute size (28,000 square kilometers) Burundi, like its neighbor Rwanda, has an extremely high population density. Given population growth rates of 2.8 percent per year, the population density in Burundi will probably increase. The historical causes of this density are discussed below. What is of importance here are the ecological consequences. Virtually the entire landscape of Burundi has now been altered. There is little of the natural environment left to "protect" and the biological diversity issue must now be viewed largely in terms of the encouragement of new ecologically-appropriate floral and faunal associations. This totally-transformed landscape has greatly shaped the orientation of this report; the team found it most appropriate to discuss biological diversity solutions more in terms of production than protection.

### 2.1.1 The East African Rift System

The incredible topographical and climatic diversity of Burundi, so striking to outside visitors, is a result of the position which Burundi occupies in the East African Rift Valley system. The dominant landform in Burundi is a north/south mountain chain, the Zaire-Nile Divide, which runs parallel to the Mitumba Mountains in Zaire to the west. Both mountain chains serve as the walls of the western branch of the Rift Valley. This valley is the gathering place of two types of water bodies: lakes, such as Lake Tanganyika, which occupy most of the space between the mountains, and rivers, such as the Ruzizi, which are flanked on either side by low-lying plains which slowly make their way to the slopes of the mountains. This north/south topography, with the varying soil and rainfall regimes created by the interaction of these parallel mountain systems, creates four distinct geographical regions in Burundi (cf. Environmental Profile). Each of these is described briefly below.

### 2.1.2 The Imbo

West of the Zaire-Nile Divide and east of the Ruzizi river which separates Burundi from Zaire, is a plain which is more than 20 kilometers wide at the junction of the Ruzizi and Lake Tanganyika, but narrows to less than 10 kilometers as the distance from the lake increases. Ranging in altitudes from 775 meters to 1,000 meters this entire region, which is Burundi's sector of the Rift Valley, falls within a rain shadow and receives less than 1,000 millimeters of rainfall, in some places as little as 750 millimeters. Epidemiological factors led human populations to avoid this plain in favor of the highlands, permitting a greater survival of the pristine Acacia savannas and mammalian wildlife inhabiting this niche. This ecological protection was removed in the 1950's, when colonial authorities established cash-cropping paysannats. The paysannats were to be the modern agricultural colony, staffed by a population relocated from the highlands and following carefully designed land clearing schemes devised by colonial technicians. Though many of these have proved unsuccessful and have since been abandoned, they survived long enough to significantly modify the vegetation and to eliminate the wildlife from this small region.

### 2.1.3 The Zaire-Nile Divide

Named after the two major rivers whose drainage systems separate here, these mountains rise abruptly to the east and northeast of the Imbo; some of the peaks attain 2,500 meters in height. Orographically-generated rainfall patterns reach highs of over 1,800 mm in some parts of this region. Cultivation extends up these mountain slopes to a ceiling of 2,300 m. The few remaining stands of virgin forest are located in this area in the Kibira National Park. In the recent past, thousands of hectares of these forests have been cut down between Teza and Rwegura, to make way for government tea plantations. In their place, eucalyptus and grevillea have been planted as future fuel for the tea processing mills. On the southern portion of the Divide, altitude decreases, soil fertility declines, soil acidity increases and the climate becomes drier and hotter, leading to a region of low agricultural utility. This area, the livestock-dominated Bututsi region, is best seen as a sub-unit within the next region to be discussed.

#### 2.1.4 The Central Highlands

Sloping gradually eastward and southward down from the Divide, the High Plateau was both the birthplace and the heartland of the pre-colonial kingdoms of the Highlands. The altitude of this extensive region varies between 1,500 and 1,800 meters with annual rainfall of about 1,000 to 1,200 mm. (The dry season begins in June and lasts at least 3 months). The majority of the population of Burundi lives in this region, and it is in the northern part of the Plateau that densities of over 450 people per square kilometer have been recorded. Most of the intensive agriculture in the country is practiced here and, as might be expected, this is the area where the elimination of indigenous flora and fauna have been most complete. Two forest reserves have been created in this area, the Ruvubu and the Bururi. The above-mentioned Bututsi, in the southern part of the Plateau, constitutes an ecologically-specialized sub-unit. The acidic quality of the soil has led to the dominance of pastoral, rather than agricultural, activities.

#### 2.1.5. The Kumoso and Bweru Lowlands

The least-densely populated region of Burundi is the Kumoso, a depression that runs from the southern tip of Burundi northeasterly along the Tanzanian border. With an average altitude of some 1,200 meters, the region is on the whole some 300 meters lower than the High Plateau to the west. (The Bweru lowlands, just south of Rwanda, are an extension of this same geographical region.) The rainfall of the Kumoso drops to levels similar to those of the semi-arid Imbo region in the far northwest and its historical population density has been correspondingly low. This situation has been changing in the past few decades. Unlike the Imbo, however, which was populated by governmental programs aimed at promoting cash cropping, the immigrants into the Kumoso have been refugees from other zones willing to settle into subsistence activities. Because their population densities are lower and their activities have been less intensive of land, labor and capital than those of the Imbo, their impact on local flora and fauna has been less. Though the bulk of the landscape even in the Kumoso has been altered, one can see more remnants of original flora and fauna associations than is possible in most other regions of Burundi.

To sum up, the presence of north/south mountain ranges in the East African Rift system has created in Burundi a situation of impressive ecological heterogeneity along the country's east/west axis. The preceding has discussed the four different ecological regions which have been created by topography, soil and rainfall regimes. The following sections briefly outline the different associations of flora and fauna which have emerged in these regions.

## 2.2 Flora

Five natural vegetation complexes have been identified in Burundi.

### 2.2.1 Undifferentiated Montane Communities

Fewer than 60,000 hectares of natural montane vegetation remains. Four different subclasses of montane forest associations have been identified at different altitudes, beginning at 1,600 meters and extending to over 2,500 meters. These associations contain a diversity of arborescent species, shrubs, ferns, epiphytes, liana and mosses--remnants of the heterogeneous landscapes of the past. Among the now-endangered tree species is Entandophragma excelsum. But this montane vegetation is, for the most part, secondary growth. In all of Burundi, there may be as few as 10,000 hectares of untouched primary montane forest and most of these are located in pockets in the Kibira National Park and Bururi Forest Reserve. Had these reserves not been created, the removal of these remaining pockets would be almost certain.

### 2.2.2 Montane grasslands

Though much of the grass-covered landscape found in parts of the Zaire-Nile crest and the Central Plateau has emerged after removal of the forest by the human population, at least some of these montane grasslands may have been part of the original landscape. These moist pastures found above 1,800 meters contained indigenous grass species now found only on forest borders. The original diversity of montane grasslands, which were abundant in Themeda diplandra and Pteridium aquilinum, has been converted through overgrazing and overburning to more uniform, degraded formations dominated by one species (Exothea abyssinica), which now covers 80 percent of the land surface in many of these areas.

### 2.2.3 Undifferentiated Moist Woodlands and Savannah

Four distinct lower-altitude (below 1,600 meters) woodland associations have been identified in Burundi. A study of two transects in the Ruzizi River Valley showed associations of the tree Hyphaene benguellensis with the smaller plants Euphorbia candelabrum, Phragmites mauritanus, Bulbine abyssinica, Cadaba spp., Lammiphora madagascarensis and others. Most of the associations currently existing are not primary, but the result of natural regeneration in the wake of human activities.

### 2.2.4 Wooded Savannas

In areas of lower altitude (ca. 1,000 meters) and less rainfall, part of the original landscape was dominated by associations of trees (principally species of Brachystegia, Julbernardia and nitrogen fixers from the Acacia genus) separated by stretches of grass cover. Found in areas less suited for dense human habitation (such as the eastern Kuzoso plain near Tanzania), more stretches of these wooded savannas have survived than of the other indigenous vegetative associations mentioned above. Even when interventions have occurred, the non-intensive character of human use has permitted the emergence of a

biologically diverse cluster of secondary associations. The secondary trees (including Pilostrigma thoningii, Grewia mollis, Aussonia spicata, Anona chrysophylla, Securidaca longipedunculata, Combretum binderanum, and various species of Acacia) tend to be shorter than the original tree species, as do the invading natural grasses (Brachiaria brizantha, Hyparrhenia dissoluta, Loudetia kagerensis, and Digitaria diagonalis).

### 2.2.5 Swamp and Lacustrine Associations

Two major types of swamp and bog associations have been documented in Burundi. The northern river valleys are dominated by papyrus (Cyperus papyrus) and several other members of this same genus. At higher altitudes (over 2,000 meters) a second type of bog association resembling the mosses, sedges, grasses and evergreen shrubs of European boreal bogs is found. This area's peat deposits have attracted interest in the past as a source of peat for fuel. However, past development projects that have attempted to exploit the resource have encountered a variety of difficulties, from cultural to economic and technical. Though the higher-altitude association has been less modified, large portions of the northern river swamps have been reclaimed for agriculture.

Natural associations of indigenous flora now cover only a small percentage of the Burundi landmass. Most of the nation's territory has been modified through human intervention. Less than one percent of the nation's territory remains covered by what could be considered undisturbed vegetation. The causes and consequences of this removal will be discussed below.

## 2.3 Fauna

The impact of human expansion on certain wildlife populations in Africa has been devastating--particularly to terrestrial fauna, less so to avifauna and ichthyofauna (with the exception of commercially valuable species of the latter). The team is unaware of any actual case of faunal species' extinction that can be attributed to Burundi, but several species (such as the gorilla) have become locally extinct. The population of most surviving species has dwindled drastically, having been squeezed by the human population into tiny pockets (perhaps as little as 10 percent of the landscape) still free of agriculture and livestock.

### 2.3.1 Mammalian Fauna

The Zaire-Nile Divide, the location of today's Kibira National Park, was once the habitat of buffalo, elephant, giant forest pig and other mammals. World attention has been primarily focused, however, on the fate of our own mammalian order--primates--of which seven species (besides Homo sapiens) are reported as present or formerly present in the Zaire-Nile crest: the Mountain Gorilla (Gorilla gorilla), Bosman's Potto (Periodicticus potto), Thick-tailed Bushbaby (Galago crassicaudatus), Yellow Baboon (Papio cynocephalus), Diadem Guenon (Cercopithecus mitis), Angoland Black and White Colobus Monkey (Colobus polychromos). Because of their forced proximity to human populations, several species of primates have become heartily-disliked predators of food crops and minor livestock. The determination of local cultivators to eliminate these pests stands in stark

contrast to the outside world's determination to preserve them. The Mountain Gorilla has disappeared from the Kibira and the other primate populations have dwindled. The small numbers of primates that remain in other regions of Burundi that we visited are even more threatened than those of Kibira, which is today accorded at least some systematic protection.

We were told by knowledgeable observers that the Ruvubu National Park has experienced an actual increase in mammalian population since the recent forced removal of the human population. We observed several hippopotami in the river, the species from which the river and the reserve drew their name, as well as large ungulates such as buffalo and waterbuck. Other animals common to the park are: jackals, hyenas, warthogs, wild dogs, anteaters, baboons and crocodiles.

The mammalian diversity of the other two former wildlife pockets--the Northwest Imbo and the Southeast Kumoso plains, both unprotected--continues to decline. The hundreds of elephants that were seen on the Imbo in the 1950's have now disappeared, as have the flora of their habitat, largely in the wake of the governmentally-organized paysannat scheme outlined earlier. The slow expansion of the agricultural and pastoral frontier into the semi-arid Kumoso has affected the terrestrial wildlife of this area, though not yet to the point of local extinction.

### 2.3.2 Reptilia

Burundi still has several representatives of the Class Reptilia. Neither edible (by local food norms) nor commercially valuable, the smaller extant reptiles--snakes, lizards, chameleons, geckos--appear to be surviving human expansion. The same is not true of their larger and commercially more valuable amphibian cousins, the crocodiles. Two species--the African Slender-Snouted Crocodile and the Nile Crocodile--have been placed on the endangered species list.

### 2.3.3 Avifauna

Nearly 600 species of birds have been spotted in Burundi, predictably clustered along the shores and inlets of rivers and lakes and in swamps and marshes. The non-random concentration of avian wildlife near bodies of water can be measured in terms of numbers of species, numbers of individuals and average size of individuals. A larger number of species live at or near bodies of water than would have appeared by random and the species containing the largest individuals are also water birds. Of particular visual interest for humans are the numerous species of stork, flamingo, ibis, egret and pelicans. Though they have been less studied, the birds of Burundi appear to have fared much better than the mammals. There has been no reported decline in the number of locally extant species, though the poaching of partridges and pigeons may be leading to declines in at least some localized populations.

### 2.3.4 Ichthyofauna

The bulk of the fish population of Burundi is located in the lacustrine habitats of Lake Tanganyika, shared with Zaire to the west, and in the two smaller lakes, Rweru and Cohoha, located on the northern border with Rwanda. The dominant species in these latter lakes are relatively small *Tilapia* species. In contrast, the dominant predators in the food chain of Lake Tanganyika, which has recorded 133 species, are relatively large members of the perch family of the genus *Lates*. After a developmental period in shallow littoral marshes, the perch move into open waters. Some species remain in the surface niches and others move down to prey on species inhabiting deeper habitats. One species, *Lates angustifrons*, is noted for its ability to prey in all lacustrine niches. The recent reduction in the *Lates* population, brought about by an intensification of the activities of purse-net fishermen, has probably produced a corresponding increase in the populations of the smaller clupeid species on whom they prey. That is, human impact on lacustrine ichthyofauna has apparently not yet reached the point of reducing overall biomass, but has simply shifted the species composition of that biomass.

## 3. HUMAN ADAPTATIONS

Those interested in measuring the scope of environmental destruction can justifiably focus on biological and ecological outcomes and simply allude, in passing, to the destructive character of human land use and resource extraction. Those interested in developing environmental solutions, however, must go beyond studying plant and animal behavior and undertake scientific analysis of the behavior of human populations. The following summary of local population land tenure and land use relies on Jones and Egli (1984), Borvin (1986), and Moussie et.al. (1986).

### 3.1 Population

#### 3.1.1 Historical Peculiarities

With an average of some 180 people per square kilometer, Burundi has one of the densest populations in Africa. This density can be attributed at least in part to the pre-colonial political and military organization which permitted its kingdoms to resist the incursions of the slave trade. This trade was responsible for depopulating large regions of Burundi's western neighbor, Zaire, and of thus opening up regions which were later to be occupied by European settlers. Burundi, in contrast, remained densely populated. Its best lands were already occupied when the colonists arrived, thereby preventing the establishment of European agrarian settlements.

#### 3.1.2 Linguistic and Ethnic Overview

The contemporary population of Burundi is primarily a fusion of three distinct African source populations, each representing a different phase of African economic history. These are: Mesolithic hunter gatherers, Neolithic and Iron Age Bantu cultivators and more recently-arrived Nilotic pastoralists. The first group presently occupies a statistically-minor and economically-marginal niche in the Burundi economy. These are the pygmy Twa who,

having lost their hunting and gathering habitats to agrarian cultures, have come to be a landless pariah class constituting only about 1 percent of the entire population. They survive either by pottery or basket making or by performing lower-status tasks for their higher status neighbors. In return for their services, they are paid either modest wages or given access to cropping land.

The contemporary Hutu are the descendants of the Bantu cultivators who first transformed the habitat of the former hunter-gatherers. But the Hutu, who today constitute about 85 percent of the population of Burundi, are practicing a form of cultivation quite different from the shifting cultivation of their ancestors. The lengthy fallow periods, on which such a system depends, are now impossible due to high population growth rates which have led to high person/land ratios. The contemporary Hutu now utilize a hillside farming system that is an evolutionary hybrid of several land use strategies. This system includes some cattle raising and, primarily, export cropping. As discussed below, the absence of adequate fallow periods or erosion control strategies and Burundi's continued rapid population increases raise questions about the long-term sustainability of Burundi's agricultural production systems.

The third element in the rural economy of Burundi is the pastoral element, introduced centuries ago by immigrant pastoralists from the North whose entire economy and sociopolitical organization revolved around cattle. For these people--in sharp contrast to the Bantu/Hutu--cropping was a secondary activity of minor economic and social importance in the placement of an individual in the local status hierarchy. Through processes about which historians still argue, the pastoralists with their cattle-focused social organization and value system came to occupy dominant positions in pre-colonial society. When The First Republic (Burundi's post-colonial monarchy) was overthrown, it was a military subgroup of the pastoral Tutsi who overthrew it. Now, though the Tutsi account for only 15 percent of Burundi's population, today's Third Republic continues to be dominated by these descendants of the Nilotic pastoralists.

The aboriginal linguistic differences which separated these three groups have been virtually erased. Today, everybody in Burundi speaks Kirundi, the Bantu-derived language which the Twa and the Tutsi adopted from the Hutu. And, though the international mass media still speak about warring "tribes" in Burundi, the Hutu and the Tutsi long ago abandoned the locally-autonomous social organization that is the anthropological touchstone of tribal society. They are no longer separate tribes, they are distinct ethnic groups within the same centrally-ruled society.

In addition to the above-mentioned groups, Burundi is host to people from other African countries, notably: Rwanda, Zaire, Tanzania and Uganda.

### 3.1.3 Differing Regional Densities

From the point of view of the landscape, it is not the ethnic affiliation but the density of the population which counts. Burundi's average of 180 persons per square kilometer is unusual in the African context. But in the ecologically more favorable (and economically more productive) regions of the Central Plateau, regional averages reach 350

persons per square kilometer and occasionally higher. Unlike settlement patterns in many other parts of the world, where denser populations cluster on lower plains and the hillsides are more sparsely inhabited, the population of Burundi has tended to cluster precisely in those hilly regions which are more vulnerable to erosion under agrarian land use. The most sparsely populated regions are the Imbo plain in the western Rift Valley and the Kumoso plain to the east near Tanzania. Whereas the mountainous, heavily cultivated Ngozi region in the north, with average elevations of around 1,800 meters, has population densities reaching as high as 450 per square kilometer, the Imbo plain to the east, with average elevations near 1,000 meters, has an average density under 100 person per square kilometer.

Many factors have helped create this demographic skewing. The abundant rainfall in the highlands renders that region more favorable to intensive cultivation. It was also in these highlands (not in the contemporary capital of Bujumbura) that the center of pre-colonial political power was located, adding historical causes to current demographic distribution. Perhaps most important, however, were the epidemiological factors. The lower plains have been the habitat of malaria-carrying mosquitos and insects bearing sleeping-sickness. The dangers to both humans and their livestock have led traditional populations to avoid these regions.

The current tendency for even the lower plains to become inhabited must be seen in political context. The Belgians established their own government in relatively low Bujumbura, located on Lake Tanganyika. Furthermore, Belgian authorities saw the nearby Imbo plains, which were still covered with virgin scrub forest and inhabited by numerous species of wildlife, as an agrarian frontier to be converted to productive cash-cropping. The experiment of the paysannat has had uneven results as many of the scheme's relocated beneficiaries have returned eventually to their homes in the highlands.

The population movements that are beginning to affect the drier eastern regions of the country are also politically generated but, in this instance, often by dynamics external to Burundi. The team learned that many of the settlers who have recently begun trying their hand at agriculture in the drier areas to the east of the Ruvubu Reserve are, in fact, Tutsi refugees from Rwanda who first arrived in Burundi in the early 1970's and who, along with their now adult children, have had to settle on lands less suitable for agriculture.

These recent movements into formerly uninhabited regions, small though they are, have been enough to create a negative impact on the indigenous flora and fauna of the lowland regions. But the bulk of Burundi's agrarian population still concentrates in the highlands, a distribution which heightens the vulnerability of the landscape to erosion.

#### 3.1.4 Dispersed Settlement

The rural population of Burundi has adopted, and continues to maintain, a highly dispersed settlement mode. The traditional unit of social organization was not the nucleated village that is found in many other settings but, rather, the colline (hillside). Rugos, family residential compounds, dot the hillsides in a random fashion. Many of the enclosures around the rugos have disappeared, as the growing scarcity of cattle in dense

agrarian regions reduces the need for nocturnal corrals (the prime function of the enclosure). Traditional round houses with thatched conical roofs appear to be yielding to more modern rectangular adobe houses with tin or tile roofs. But the basic unit of social organization continues to be the colline with its individual homesteads scattered over the landscape.

### 3.1.5 High Agrarian Dependence

Perhaps the most impressive feature of the population of Burundi is its almost total direct dependence on agropastoral pursuits. Ninety-five percent of the population lives in the rural areas and they are uniformly dependent for their survival on cultivating the land and/or raising livestock. In the densely populated agrarian regions of the north central highlands, the team observed neither cattle nor beasts of burden, indicating a total involvement in cropping. By contrast, we saw many herds of cattle during our visit to the Bututsi area in the south.

With the exception of Bujumbura and Gitega, the towns which the team visited were primarily small administrative centers rather than centers of non-agricultural industrial employment. Virtually the entire population of Burundi is dependent on the land and the structural changes in the economy associated with urbanization in other countries have yet to make their appearance in Burundi.

## 3.2 Land Tenure

Because the entire population is dependent on the land, the questions of land tenure and land use take on particular importance. Their relevance resides, not only in terms of the present, but in terms of their impact on the willingness of people to undertake new land use behaviors in the future.

### 3.2.1 Patrilineal Descent and Inheritance

Access to land and the inter-generational transmission of land continue to be governed by strong rules of patrilineal descent. In Burundi, one's basic social identity and one's basic claims as a member of a landowning social group are transmitted to children only by their fathers. This means that, though wives perform many agricultural tasks and make many land use decisions, particularly in respect to subsistence crops, it is the husbands who are the owners of the land. Daughters leave their fathers' compounds and communities upon marriage. Sons stay and inherit the land. Out-marrying daughters continue to be members of their fathers' clans. But they receive no access to the land of that kin group and it is not they, but their husbands, who will transmit land to children.

### 3.2.2 The Question of Holding Size

Though the size of the average holdings throughout Burundi is small, population pressure has not yet led either to a mass exodus from the land or to the emergence of a landless class. (Recent mass emigrations are due more to political factors than to land tenure issues.) The impression from published studies is that this generation of cultivators,

on the whole, continues to produce enough from holdings to feed themselves and to produce at least some crops (particularly coffee or tea) for cash export. Our conversations with farmers indicated that they are not sure that the same level will be able to be maintained by the next generation of inheritors.

Though from an outsider's perspective the farmers of Burundi appear uniformly land-poor, there seems to be highly significant differences in average holding size within communities. The only credible statistics which the team could find on holding size come from a very careful and precise comparative survey done by Bonvin (1986) of agriculture in three communes--Ngozi in the northern part of the central highlands, Ruyigi in the drier and lower east and Bubanza in the Imbo plain. The largest holdings were in the Imbo plain: 3.4 hectares. This larger average holding size may derive from the fact that the holdings there were given by the government rather than inherited and by the fact that many of the relocated settlers have abandoned the region, selling their land to those that remain. (Land sales are discussed below).

Farmers interviewed in the areas of traditional land tenure--Ngozi and Ruyigi--reported average holdings of 2.4 hectares. (The total sample in these two areas was about 1,000 farmers.) These averages, however, mask a high standard deviation, indicative of important wealth differences within local communities. In the two communes cited above, about a third of the farmers had more than 2 hectares and about 40 percent of them had less than one hectare.

### 3.2.3 Privatization and Commercialization of Land

During the pre-colonial period, the king was theoretically the owner of all land in the country. Individuals had access to land by virtue of his permission or that of his local deputies. The exercise of these royal or princely prerogatives seems to have been restricted, for all practical purposes, to land for grazing livestock. Agricultural land has been under the effective control of locally-resident kin groups rather than locally-appointed authorities.

Recent decades have seen the erosion of power of the broader kin-group as a decision-maker with respect to land allocation. For all practical purposes, even in the absence of legal titles to most plots of ground, it is now the individual household which owns its landholdings and transmits plots of ground to its younger members.

The privatization of land has reached the stage where the purchase, sale and rental of land are becoming increasingly common. In former times, a cultivator who emigrated from a region would lose access to the land which he had inherited. It would be assigned to some other member of his kin group. Now, individuals may sell their land and many, in fact, do. Members of one's kin group have rights of first refusal to any such land put up on the market. But the landowning entity is not the kin-group itself; it is, rather, the individual head of household.

Some suggestive data on the commercialization of land were gathered by Bonvin (1986) in the study cited above. The land in the Imbo plain had originally been allocated by the government as part of a settlement project. However, 25 percent of the farmers

there have also augmented their holdings by purchase. In Ngozi and Ruyigi, the percentages of land purchasers is less, but it is still between 10 percent and 20 percent in both communities.

In regions dominated by pastoral activities, communal control of grazing land has held out longer though, even here, there are reported tendencies toward privatization of local pastures, probably under the impact of externally-funded projects.

The overall ecological implications of the privatization of land--either through purchase or through individualized inheritance--is probably positive. Though the privatization has occurred too late to permit interested owners to protect indigenous vegetation in Burundi, secure private owners may be more likely to engage in conservation and restoration activities on their holdings.

### 3.3 Land Use Systems

The same information gaps that surround the domain of Burundi land tenure data exist in the realm of land use as well. We have very little reliable farming systems information, either case-study or statistical, concerning land allocation, labor mobilization, crop/livestock interactions or other traditional farm management variables. The USAID-financed study by Moussie et.al. (1987) in Bugenyuzi, the earlier cited study by Bonvin (1986) and the farming systems descriptions by Jones and Egli of the World Bank (1984) each make some contributions. The following is a distillation of our observations, enriched with the insights provided in those documents.

#### 3.3.1 Distinction Between Agrarian and Pastoral Land Use Systems

The astounding ecological heterogeneity of Burundi has created a situation in which, within the borders of one relatively small country, there are several quite different land use systems in operation. The first land use distinction that must be made is that between systems in which cattle are either absent or of minor importance and systems in which cattle are the major economic good, cultivation being relegated to a secondary role. Both types of systems were traditionally found in Burundi.

Because of information constraints, only the former will be discussed. But it is useful to point out that even in Bututsi, a traditional center of livestock activity, there is a trend toward increasing dependence on agricultural pursuits. This can be, at least in part, attributed to the growth of both human and bovine populations and to the consequent overgrazing that has occurred.

### 3.3.2 Crop Associations

With some regional exceptions, it appears that the land use strategy of the Burundian cultivator is to strive to have at least one member of all five of the following categories on his land:

A legume. Many varieties of beans were observed in Burundi, as well as peas. These constitute perhaps the major staple crop in most regions.

A grain. Maize, millet, sorghum and wheat were seen in different parts of the country. Rice is a more specialized crop that is also grown in certain regions.

A tuber. Most families will strive to have at least one tuber. Sweet potatoes appeared to be the most common. Manioc will be used at lower altitudes and potatoes at higher altitudes.

Bananas. Different varieties of bananas are found, some for cooking but others principally for the making of beer. (The banana, which was introduced to Africa centuries ago, has taken the place of traditional sorghum as the principal source of home-brewed beer.)

A cash crop. The major cash crop found throughout the country is coffee. First introduced and made obligatory by the Belgians, most coffee has been grown, and continues to be grown, on small holdings. In other areas, tea and cotton are grown. But, with the possible exception of certain agriculturally-marginal regions, it appears that cash cropping is now a central component in the farming system of most Burundian farmers.

The Burundi farmer endeavors to have a mixture of these items in the crop inventory. As far as the team could determine, the typical holding is acquired through inheritance in one block. (In other systems, heirs will insist on getting smaller plots of different types of land in different places, producing greater fragmentation than appears to be the case in Burundi.) Having acquired the holding in a block, the owner will subsequently subdivide it into different plots for purposes of planting different crops. Cash crops are generally monocropped on a plot, but subsistence crops will be intercropped in various traditional associations. In terms of their physical deployment, bananas are a special category of crop whose planting is often not localized on a single, specific plot but will be planted close to and around the house itself.

### 3.3.3 Labor Mobilization

As is true of many African farming systems, Burundi agriculture depends almost entirely on human energy for labor inputs into the soil. Tractor-mediated fossil fuel inputs are neither technically appropriate nor expected among impoverished hillside farmers. Animal traction, even on terrain that would permit such a technology, is lacking. The hoe is the principal ground preparation tool. (It might be added that for post-harvest transportation, the human head is the primary vehicle. The team did not observe any

beasts of burden; however, bicycles, trucks, cars and buses are often used to transport agricultural products destined for market.)

We can distinguish among three general labor-mobilization strategies used by cultivators: domestic labor, exchange labor with neighbors and the purchase of labor. Bonvin's study (1986) indicates that Burundi relies most heavily on domestic labor. The team did observe groups of men and women working in fields, probably under one or another exchange labor arrangement. But most labor was being done by individuals or small domestic groups. The purchase of labor from neighbors is not unknown but, in most regions, quite rare. Bonvin's data suggest that no more than 20 percent of cultivators in traditional regions purchase labor in a given cropping cycle and the amount of labor which they purchase is modest and for specific tasks.

### 3.3.4 Erosion Control Strategies

Declining soil fertility in Burundi is a problem that has been recognized both by professionals and by the farmers with whom the team conversed. But wholesale soil erosion does not yet appear to be a problem. Soil conservation techniques, such as bench terraces with grass (*Setaria* spp.) risers, were observed in the Central Plateau region and help to limit the deleterious effects of high rainfall in that area. Such terrace building, as well as the drainage canal digging also observed in the Central Plateau, can be more reliably attributed to Belgian colonial land use policy than to the survival of traditional techniques. These practices are now promulgated by the Institute of Agricultural Science of Burundi (ISABU).

The team's impression on the whole was that, though the vast majority of farmers engage in one or another practice which could be labelled "erosion control", the erosion control efficiency of these practices is at best modest. The planting of legumes and grains --major food staples which account for a high percentage of cropped land--is done on slopes that have been completely cleared of vegetation and are devoid of any structural or vegetative protective measures, except perhaps a vegetative band at the bottom of the field or, in some cases, marking the boundary of a landholding. Only in the case of tubers did the team observe the building of mounds which, extrapolating from research done in other settings, is done more for moisture control than for erosion control.

The fact that each farm is also subdivided into a number of smaller food production plots also mitigates potential erosion problems. Although one or two plots may be bare or in preparation in any one season, adjacent plots covered with vegetation provide substantial cover and reduce erosion problems.

### 3.3.5 Fertility Restoration

Though the use of chemical fertilizers is common only in governmentally-founded settlements, Bonvin's data show that at least some farmers in the Ngozi area have begun supplementing their traditional land fertilization techniques with chemical fertilizer. But the use of one or another traditional fertilization techniques has been found to be almost universal.

The major, traditional technique for restoring fertility--shifting cultivation based on lengthy periods of brush and tree regrowth--has now disappeared from Burundi. Even shorter periods of fallow appear to have been eliminated from the more densely populated regions, creating a landscape in which virtually every plot is under one or another form of cultivation. In regions where there are livestock, manure will be collected from the enclosures where the animals are kept and carried directly to the field. A somewhat less effective variant of this in the more densely populated areas where there are no cattle is the burning of small bits of vegetal debris in fields to release nutrients in the form of ash. The team was told that, in these areas, farmers rely most heavily on crop rotation as a vehicle of fertility restoration.

### 3.3.6 Gender Division of Labor

The team found virtually no information on Burundi rural domestic organization and our comments on gender-specific divisions of domestic power and labor are impressionistic. As indicated earlier, local patterns of patrilineal descent and patrilocal post-marital residence operate in the aggregate to exclude women from land ownership, though there are "special case" arrangements to channel land to daughters in the absence of male heirs. But, though female land ownership is alien to the local agrarian system, female labor inputs are not. The important distinction in this matter is the distinction between governmentally-controlled export crops (coffee, tea, cotton) and traditional local crops. Male decision-making and labor predominates in the former. Female agrarian inputs are strongest in the latter. Even in this matter, however, our observations indicated that distinctions between male and female tasks are not rigid. Men and women work together in subsistence crop fields. Observations of market scenes further suggest the status of females as the principal local marketers of much agricultural produce.

In addition to their agrarian roles, women are in charge of household organization and maintenance--cooking, cleaning, child care. The gathering of fuelwood is assigned to women and children for the most part.

The absence of precise information on the role of women in the local agrarian system, particularly as regards decisions concerning domestic land use and labor allocation, opens the way to possible false assumptions or program mistakes in the design of, not only conservation information packages, but also of tree planting activities. It is the men who are approached for programs of coffee or tea planting. It is not yet clear which gender should be approached for domestic tree planting activities. Detailed descriptive case studies are needed of representative rural households.

### 3.3.7 Cash Crops in the Local Economy

The basic orientation of most rural families is to produce most of what they consume and to consume most of what they produce. However, in most regions of the country, farmers are now also growing one or another export crop. The major export crop is coffee, followed by cotton, tea and other crops. Coffee was first introduced on an obligatory basis by Belgian authorities. It is now an integral part of the local economy.

Parastatal organizations have been created for the production and marketing of each major export crop. That is, both production and marketing are, for all practical purposes, controlled and managed by the Burundi government which depends on the sale of these crops for foreign exchange. The colonial policy of obliging cultivators to allocate part of their holding to export crops and to prevent them from removing these crops once present, has apparently been continued by contemporary Burundi administrations. In return, the parastatal organization in charge of the specific plot provides subsidized inputs and technical assistance to the farmers.

Coffee. Coffee is grown in higher altitudes and in areas of higher moisture. It is a nutrient-demanding crop. The Belgians obliged farmers not only to plant, but also to mulch their coffee. Coffee mulching, for reasons unknown to the assessment team, is no longer practiced in neighboring Zaire or Rwanda. Burundian farmers, however, continue to practice mulching. Mulching is generally done with banana leaves. (In the southeast of the country the use of hay as a mulch is more common since bananas are relatively scarce there.) Mulching is begun from the time the young plants have first been established.

Tea. Tea is grown in the highest and wettest areas of the country, with production occurring about eight months of the year. The soils of this region are quite fertile, some of volcanic origin, and are on steep slopes. Full establishment of a tea garden takes about three years during which time the soil is vulnerable to erosion. Once tea is established, it provides an excellent vegetative cover against hydric erosion.

Cotton. Cotton is cropped primarily in the drier and lower parts of the country--the western Ruzizi valley bordering on Zaire and the eastern Kumoso plain bordering on Tanzania. It is also grown on the gently sloping lakeshore lands south of Bujumbura. Its culture, although relatively demanding in terms of soil nutrients, has not contributed significantly to soil erosion in these areas due to the land forms on which it is cultivated.

In short, the growing of a particular cash crop is guided more by geographic and moisture regimes and by parastatals than by farmer choice.

But, the Burundi farmer also plants, at his own initiative, other crops for local sale. Because these locally sold crops--bananas, beans, corn and others--do not bring in foreign exchange, there is no governmental control over their production or marketing. In the cooler altitudes, minor quantities of temperate zone vegetables are also produced, destined primarily for the urban markets.

To point out the prominence of the government in the export market sector and the operation of free market forces in the internal market, is not to say that the latter is necessarily better than the former. The team lacks information to make any judgments about differential returns to land and labor or about the equity of prices paid by the parastatals to the farmers. It is clear, for instance, that the Burundi cultivators are paid substantially more by their government for coffee than their counterparts across the border in Zaire. Additionally, the Burundi parastatals provide substantial material and technical

support for farmers' cash crop activities. What bears investigation is, if the farmers are receiving adequate returns to land and labor from the parastatals, why does the government require them to plant the export crops and why are they prevented from allocating their land to other crops if they so choose?

### 3.4 Farming Systems vs. Indigenous Flora and Fauna

#### 3.4.1 Trajectories to the Reduction of Biological Diversity

The discussion in Chapter 2 of native flora and fauna was interspersed with a simultaneous account of the human activities which have led to widespread transformation and/or destruction of the environment. In a country where less than 1 percent of the land is still under virgin forest and where mammalian wildlife has been restricted by surrounding human populations to small areas of land, any discussion of flora and fauna in isolation from an account of human interventions runs a risk of being artificial.

In reconstructing the downward trajectory of biological diversity in Burundi it is useful to separate, at least analytically, three quite different pathways.

- A) Direct damage through economic over-exploitation. The hunting of elephants for their tusks would be an example of this. The economic utility of the species is the prime cause of its exploitation.
- B) Direct damage through intentional removal and disposal to facilitate or protect other economic activities. The killing of primates because of their crop depredations would be an example of this. The economic utility of the species is secondary; elimination is done in the service of a different economic agenda only indirectly related to the species.
- C) Indirect damage through habitat destruction. The disappearance of the gorilla because of the conversion of its habitat to some other use would be an example of this.

All three forms of pressure on natural flora and fauna have existed in Burundi, but it seems clear that the dominant trajectory is route C. The most serious threats to natural flora and fauna have come as secondary spin offs of other economic activities. The direct hunting of animals, either for commercial use or for consumption, has been a minor activity in Burundi for generations. Deforestation has occurred, not as part of a commercial exploitation strategy, but simply through the clearing away of the natural forest to permit putting the land to other uses.

#### 3.4.2 Continued Stresses on Natural Flora and Fauna

Though this emphasis is the dominant one, all three trajectories continue to operate in Burundi to one degree or another. A simple inventory of the potentially destructive impact which local resource procurement processes can have on the little remaining natural flora and fauna follows.

**Wood extraction.** Though wood scarcity has produced a shift to the use of locally-made bricks in home construction, there continues to be a need for wood, principally firewood but also poles, planks and various sorts of boxes. The roadsides are lined with piles of wood at various stages of processing, awaiting transportation to market. Recent governmental decisions to create reserves has made much of this wood extraction illegal, creating antagonisms between the local population and local authorities.

**Charcoal making.** Though technically a sub-category of wood extraction, this activity deserves special mention because of its potentially destructive character. Theoretically, there is nothing of inherent environmental destructiveness in the making of charcoal. If trees are planted and managed with that purpose in mind, their harvesting and conversion to charcoal is no more maladaptive than the picking of coffee or the pulling of beans. In historical fact, however, charcoal is generally made, not from planted and managed trees, but from trees from natural forests.

A somewhat new (and potentially dangerous) twist in the charcoal economy was observed in the team's visits to the interior of Burundi. In times past, Belgian colonial authorities and others had planted large stands of eucalyptus, grevillia and cypress. Until mid-1988 these trees were under the jurisdiction of Eaux et Forêts, a national ministry. At that time they were turned over to the proprietorship of local Communes, most of whose authorities are officials brought in from the outside to rule over the local farming population. At about the same time, cuts were made in the annual budget allocated to communes and they were apparently instructed to find other ways of financing their activities. The solution of several communes has been to enter into contracts with Bujumbura charcoal merchants for the cutting, conversion and sale of the roadside tree stands planted in the past several decades.

**Bamboo.** In the Kibira Reserve, several individuals were observed in the process of illegally extracting bamboo and carrying it openly on the roadside. The illegal extraction of bamboo is the most common violation cited in the monthly reports by the Kibira guards. Its importance in the local economy (it is used to make the ubiquitous baskets used in tea collection) probably explains the high frequency of violations. Until a reasonable substitute is found, or the Burundi Tea Office (OTB) bans the use of bamboo baskets, the problem is likely to persist.

Although bamboo is fairly common in the Park's edges and open areas (it is not a shade-tolerant species), Park officials have banned its harvest because some evidence suggests that bamboo stands provide excellent conditions for seeding and establishment of some of the endangered species found in the Kibira.

**Food.** Some minor hunting and fishing continue to occur. But no evidence was found that there are any social sectors who depend on this foraged food as a major element in their diet. The Twa, descendants of former hunter/gatherers, have now adopted a sedentary lifestyle.

These data do not mean that there is no danger to fish populations or that numbers of game animals go unthreatened. Both bear investigation. No one knows what the minor hunting activity does to already-reduced small animal stocks. Fish inventories, particularly in rivers and streams, are incomplete. "Overfishing" in these waters has yet to be defined. (Even in the larger water bodies such as Lake Tanganyika, fisheries experts do not fully comprehend the dynamic between the rise in demand for fish in the Bujumbura market and increasing levels of pollution.)

Pasture. Communities on the fringes of the forest have traditionally pastured their animals near or in the forest. Some herders continue to knowingly violate the rules and graze their herds in forest openings. Others unwittingly trespass official limits because the INCN has recently altered a longstanding boundary.

Primates. The international community views monkeys and apes as high priority endangered groups. Farmers' views of the primates are completely different. As agriculture moves closer to the forest, some primates become predators on crops and small livestock. Chimpanzees in particular are endowed in local tradition with quasi-human predatory characteristics. They are reported to have hunted farmers' goats and to have "raped women". The adamant intent of farmers to eliminate these predators as rapidly and as thoroughly as possible is quite at odds with the international community's intent to protect them. The case of the primates is a good example of category B above--the local elimination of species, not because of their direct economic utility, but because of their direct threat to ongoing economic systems.

Little evidence was seen of high or intensive local exploitation of the forest in the categories mentioned above. These behaviors are "problematic" because they are now technically illegal and must be done clandestinely and because the small amounts of forest that are left cannot sustain even a modest level of exploitation. It would be misleading to attribute contemporary ecological crises to direct over-exploitation of natural flora and fauna by human beings. The transformation of the landscape has occurred rather as the side effect of the expansion of the human population and competing economic systems.

### 3.4.3 Transformation of the Burundi Landscape

The results of these expanding land use systems have been catastrophic for indigenous biota. What is most striking about the flora and fauna that cover the landscape of contemporary Burundi is its almost total exotic character. All of the export crops--coffee, tea and cotton--originated elsewhere. None of the major food crops--sweet potato, manioc, potatoes, beans, corn, wheat, bananas and rice--are indigenous to Burundi. Most of these, however, have been present for a long time. Native sorghum, which once had not only nutritional, but also social and ritual, importance in Bantu culture has been relegated to a minor role.

This import of exotic species has affected, not only food crops, but trees as well. The next chapter discusses the large amount of institutionally-financed tree planting in Burundi. This tree planting has focused largely on monocropped stands of exotics: pine,

cyprus, eucalyptus and grevillea. The area of these plantations, which is much larger than the stands of remaining natural forest, is generally counted as part of the "forest cover" of Burundi. If that is the case, then even the forest cover of Burundi must now be classified as dominated by exotics.

#### 3.4.4 Protection vs. Production: Competing Perspectives

Not everyone views this as a problem. It is true that those professionals who focus on the conservation of indigenous species lament the large number of exotic species in the Burundi countryside. In contrast, however, professionals whose agenda is on income and production will look neutrally, or even approvingly, at the substitution of indigenous species by exotics. The World Bank's comments on this matter are dramatically illustrative of this latter philosophy:

"Forests of exotic species--especially pines and cypresses--are as good for soil conservation as local tree species and vastly more productive... If forests make sense at all as a land use, then converting indigenous forests to improved forests is desirable, subject only to the constraints dictated by tourist development (and) preservation of examples of primitive ecosystems..." (Jones and Egli, 1984: 68)

In its funding of numerous hilltop plantations of pine and cypress, the World Bank has been faithful in putting this philosophy into practice. Those who object to this philosophy should be aware that it represents, not only the position of some international development professionals, but also the position of some local governments and, to some degree, of the rural populations which they govern. Some farmers are more concerned about access to tree benefits than about tree species. Most people focus their concerns on the improvement of the economic present, whether or not the floral and faunal associations of the new system are in any way related to those of the old.

## 4. AN ASSESSMENT OF INSTITUTIONAL INTERVENTIONS

The analysis up till now has emphasized indigenous floral and faunal associations and the impact of traditional land use systems. In this chapter a discussion of the various ecological interventions which different agencies and groups have financed in Burundi will be discussed.

### 4.1 Colonial Policies

The team was unable to verify historical reports of pre-colonial kingly forest reserves or traditional religious sanctions against cutting certain trees. The forests of the highly-populated Central Highlands had already been removed by the time of European arrival. The Germans first, and later the Belgians, found forest cover remaining either on the very high altitudes, such as the forests of the Kibira and Bururi reserves, or on sparsely-populated lower altitudes, such as the Imbo Plain of the northwest. The Belgians undertook at least four types of activities that had an impact on natural resources. Some have been mentioned already, but will be listed again.

#### 4.1.1 Delimitation of Reserves

The Belgians created two reserves in the afro-montane zone: the Zaire-Nile Divide (the Kibira) in the north and the Bururi Reserve in the south. There was some boundary tree planting done to mark the perimeters of these lands--the black wattle plantations on the edges of the Bururi reserve are evidence of this. Unfortunately, there was often inadequate or, in most instances, no follow-up or monitoring of these activities. As a result, protection floundered.

#### 4.1.2 Formation of Paysannats

The fate of the forests and wildlife of the Imbo plain have already been discussed. Rather than resources to be protected, they were viewed by the Belgians as untapped frontiers to conquer and the conquering vehicle was to be the paysannat described earlier. The disappearance of both the flora and fauna of that region as a direct result of the paysannats was discussed in Section 2.1.2. The World Bank (Jones and Egli, 1984) further comments on the deleterious effect of improperly-used fertilizer by the paysannats.

#### 4.1.3 Obligatory Cash-cropping

A less radical form of colonial agrarian intervention was the obliging of already-settled farmers to plant coffee (discussed earlier). Because this policy was applied to already-existing communities where local flora and fauna had already been transformed, the environmental impact of government policy was less than in areas where new settlements were set up.

#### 4.1.4 Planting of Roadside Trees

One of the most visually-impressive legacies of the Belgian administration is the presence of hundreds of kilometers of eucalyptus, cypress and grevillea stands along roads throughout Burundi. As indicated above, these public stands have recently been entrusted to local authorities and, in some cases, are now being exploited for commercial charcoal production.

### 4.2 Direct Government Policy

In discussing the role of the Burundi government in natural resources management, it is useful to introduce at least two distinctions:

- 1) The national government vs. local provincial and communal governments. The policies of the two groups are not always consistent.
- 2) Protection measures vs. production measures. The managerial demands and immediate economic logic of each is quite distinct.

#### 4.2.1 Institut National pour la Conservation de la Nature (INCN)

More serious institutional attention to matters of forest protection arose during the Second Republic and took the form of the creation, in 1980, of a special governmental agency: l'Institut National pour la Conservation de la Nature. Hand in hand with the creation of INCN came a series of measures to relocate populations from areas that had been declared reserves under the Belgians (such as Kibira) or that were now declared reserves and parks by the Burundi government, such as the Ruvubu National Park. In the case of Ruvubu, several thousand people were expelled by the Burundi armed forces.

Operating out of its current headquarters in Gitega, the INCN has administrative divisions in the Kibira National Park, the Ruvubu National Park and at the Bururi and Rumonge Forest Reserves. All the major activities which INCN has carried out up till present have been done with foreign funding. The French government, for example, has financed a long-term protection project in the Kibira Park. USAID financed a now-terminated plantation, protection and agroforestry project in the Bururi Reserve in the south. Today USAID finances, through the United States Peace Corps, a biodiversity project affecting all areas under INCN jurisdiction.

The mandate of INCN park and reserve employees is to protect the parks and reserves, keep track of violations and, where possible, discover and punish the perpetrators of the violations. Local guards are recruited from local villages. The consensus of everyone consulted, Burundi as well as expatriate, is that the guards are under-trained and under-supervised. That is, the basic institutional structure is in place for possible protection. But the actual performance of the institution is still lacking.

#### 4.2.2 Natural Resource Protection and Government Income Generation

The economic policies of the Burundi government have, on the whole (and quite understandably), been more focused on the generation of revenue than the protection of nature. Policies are determined by the pressing needs for foreign currency. Coffee, tea and cotton are the principal sources of these revenues and government interest has thus focused more on these export crops than on the protection of forests. In fact, substantial forested areas in the area of the Kibira were recently cleared to establish tea plantations.

One result of this public need for revenues is that conservationist measures are being reconceptualized by the government in terms of their income-generating potential. A case in point is the recent ministerial readjustment that occurred during the field team's visit. The new ministry "de l'Amenagement, du Tourisme, et de l'Environnement" makes an institutional linkage between environment and tourism. This ministerial linkage is an accurate reflection of what is probably the major functional interest of the government in the environment: its potential for attracting tourists. Many African governments are already structured in this way. Though the protection of the parks could produce at least some ecological payoffs for the surrounding regions, such potential benefits are viewed as secondary spin offs of policies embraced by the government first and foremost for their income-generating potential.

From interviews, the team surmised that there was little interest in establishing facilities for individual "backpacking" tourists in INCN's parks and reserves. The French-financed "Protection of the Kibira" project prides itself, however, on the small shelters (gites) that it has constructed throughout the Park. These are intended primarily as way stations for patrolling guards, but project staff emphasize that they are also shelters for individuals (and small groups) who are hiking or conducting research. There is also a newly-completed shelter (with three large rooms) on the summit of the Bururi Reserve. This was constructed specifically as a base for hikers exploring the surrounding forest.

These observations are descriptive, not critical. Nor is the presence of genuine conservationist sentiments among the educated sectors of Burundi being denied. It is important, however, for the donor community to have a realistic assessment of the economic considerations that determine the behavior of local institutions.

The creation of parks and reserves and of administrative structures to protect them has, of course, been undertaken at the national level. The team is aware of no strictly-protective measures undertaken at their own initiative by local provincial or communal governments.

#### 4.2.3 The Nationalization of Wood Production

The government has not only moved in the direction of protection; it has also undertaken various types of wood production as well. To the casual observer, the visual impact throughout the country of the wood production measures is much more impressive than the evidence of protective measures. In the course of the team's literature review and field visits, several different types of tree planting activities were encountered. Some have already been alluded to, but are listed again below to make the inventory complete.

- 1) Roadside trees and block plantations planted under Belgian auspices;
- 2) Rows of trees planted by the INCN to demarcate park and reserve boundaries;
- 3) Plantations of eucalyptus, pine and cypress within park boundaries by the INCN;
- 4) Plantations of eucalyptus, grevillea and cypress within park boundaries or on public land near park boundaries by the OTB;
- 5) Numerous hillcrest plantations of pine and cyprus throughout the country, on communal and public land, financed by World Bank and other international donors;
- 6) Thousands of rows of eucalyptus, cypress and grevillea trees for marking privatized pasture boundaries in the Bututsi region in the south-central part of the country. This activity was first started by the Belgians as part of the Mugamba Sud Project and has since been transferred to ISABU, the National

### Agronomic Institute of Burundi.

- 7) A number of trees have been planted by cultivators on their own land. These have been INCN projects financed by USAID in and around Bururi and by Catholic Relief Services in the Rumonge area. The World Bank is also reported (Anonymous, 1985) to have an on-farm tree planting component in one of its projects.

What emerges from the above is the large number of trees that have been planted by and for the government. Numbers Six and Seven above are the exception to this general rule. Category Three and Four trees were planted for economic reasons. The trees planted by the Tea Office will serve as fuel for the tea processing factory. The large block plantations within deforested sections of the park are intended to provide a supply of marketable wood by which INCN can, in the future, become economically self-sufficient. Categories One, Two and Five are somewhat more ambiguous. The park-demarcation trees planted by INCN serve a protective function by providing a visual boundary to the park. The team was unable to discover the original intent of the roadside trees or the hillcrest plantations. However, both plantings could serve protective functions (protecting watersheds) and economic functions.

In their present format, the majority of these tree planting activities exclude the surrounding farmers from many concrete benefits of tree planting activities. The creation of parks and reserves denies them access to traditional fuelwood-gathering terrain, other secondary forest products and land for agriculture and grazing. The new tree stands, which could help alleviate fuelwood and construction wood shortages, are also off-limits.

The same policy of exclusion is found on plantations occurring on communal land in other parts of the country. The donors who finance these projects may have been under the mistaken impression that, if the trees were planted on "commune land", local villagers would have access to this wood for their own fuel and construction needs. As mentioned earlier, communal authorities in Burundi are generally outside officials sent in to rule over the hillside farmers. This situation prevailed at the time that the trees were planted. From the outset there was very little likelihood that the villagers would get access to this wood. Though these hilltop plantations have had clear ecological payoffs, the economic benefits to be eventually derived from these trees appear to have been less carefully thought out. At the moment, nobody has access to the trees except the Communal authorities and those to whom they grant access.

#### 4.3 Stresses Created on Local Villages

Despite the long-term beneficial intentions of natural resources protection, the design of many of these activities is having negative impacts on local populations. These impacts are discussed below.

### 4.3.1 Expropriations

Probably the most serious impact came to those families that were physically ejected from the regions declared to be parks or reserves. This occurred to several thousand families who had formerly inhabited what is now the Ruvubu National Park. Similar, though less extensive, expulsions have occurred elsewhere. In the Ruvubu case, the military arrived and within days people had been removed from their homes. Vacated houses were destroyed, though we could still observe the numerous stands of bananas that once surrounded these homes. People still make their way clandestinely back into the Park and harvest bananas which continue to produce. The monetary recompense promised to people was delayed for years; questions still remain about the equity of this compensation.

### 4.3.2 Loss of Pastureland

Virtually all established parks and reserves include within their boundaries areas that had already been deforested or were covered with savanna vegetation. Such areas were often used by local populations as communal pasture ground. When the INCN began strict enforcement of its boundary policy, this pasture was suddenly forfeited, without even the promise of compensation that had accompanied the loss of homesteads.

### 4.3.3 Loss of Access to Fuelwood, Bamboo, Game and Other Forest Resources

When parks and reserves were created, communities found themselves barred from fuelwood gathering, bamboo cutting, hunting, fishing and other activities traditionally carried out in the forest. As mentioned earlier, guard training and manpower deficiencies decreases INCN's effectiveness in regulating these activities. The team encountered, at several sites, people engaged in activities which are technically illegal. In Kibira National Park, a man and his son were seen grazing two cows within the reserve (the Park Director and his assistant apprehended them). We also saw several men carrying illegally-cut bamboo. In Ruvubu, people were observed fishing in a river that had been declared out of bounds. In a small lakeshore reserve near Rumonge, we observed the remains of a pit-saw operation.

### 4.3.4 Fear of the Tree as an Instrument of Expropriation

Perhaps the most serious impact of current and past government control of wood is the creation of enmity between local populations and trees. Despite fuelwood scarcities, some Burundi farmers have been heard to express a reluctance to plant trees on their land because they fear it may lead to the eventual expropriation of their land. This fear has been heard by foresters in other African countries and in Latin America. Cautious farmer logic assumes that, since nature's tree stands have been declared the property of the government, planted tree stands may also eventually be declared government property. When a project is implemented, farmer (or land user) access to land or traditional resources is often changed. In the Burundi instance, the loss of access to public land has become associated with tree planting projects. This is the bridge that needs to be spanned to ensure the farmer that a tree planted on his land will not cause him/her to lose ownership--or access.

#### 4.4 The Fallacy of Communal Tree Planting Schemes

A large part of the solution to the above problem will involve the pursuit of economically-productive modes of tree exploitation--strategies which optimally would involve income generation for participating farmers. But the potential of the earlier-mentioned tree planting projects has failed to directly benefit local landowners due to inadequate project design. Greater sensitivity to farmer access and use of project outputs during the planning stages and proper monitoring during the implementation phase might have allowed more farmer benefits.

In many instances, this error may be derived from a broader land tenure misunderstanding that we have seen intrude into the design of tree planting projects in other countries as well. This is the belief among planners that there are traditional "communal ownership arrangements" which make it appropriate for communities as a whole to plant trees as a collectively-owned good.

It is critical that designers of development interventions be aware that even in most traditional land tenure systems, it is the individual domestic group which produces, "owns" and consumes the crops. Although there is "communal land tenure" in many traditional settings, there is little or no "communal crop growing". Though traditional cultivators pool labor and perform other services for each other, it is often alien to their traditions to grow food or other vegetation collectively and to split the harvest among the group.

This observation must be emphasized in view of the misguided tendency of many development projects to promote collectivized, communal models of production, be it food or trees. The fallacy is particularly easy to commit with trees. Since natural wood stands are often treated by traditional communities as collectively-owned resources, projects may assume that trees should be planted under the same arrangements. This assumption is often unjustified. Although nature's goods may be communally-owned, vegetation intentionally planted is most often the property of the domestic group planting it. This should be applied to trees as well as food crops and projects should seek to endow individual domestic groups with tenure rights over specific tree stands from the outset. From the team's limited perspective, it appears that virtually no project in Burundi has done so.

The effect of these policies is the current situation: tens of thousands of hectares of trees planted all over Burundi to which local villagers have little, if any, access. These projects may be a good first start; trees are in the ground and some ecological benefits are present. But future project planning needs to go beyond attention to biomass production into the more judicious structuring of benefit flows as well.

## 4.5 Alternative Models

Some promising alternative starts have already been made in Burundi. In addition to small, localized tree planting efforts made by different Catholic missions (on which no specific information was obtained), three efforts, described below, were observed which depart from general patterns of government management and control of trees.

### 4.5.1 ISABU Sylvo-pastoral Plantations in Bututsi

A large area in Muramvya and Bururi provinces and the central part of the country supports substantial herds of cattle. Often in checkerboard with agricultural crops, most of this area is devoid of tree and shrub vegetation. By tradition, most of the grazing lands are held in common.

In Eastern Bururi province, however, a large area (thousands of hectares) was observed in which grazing lands were demarcated by rows of planted trees. This project, originally started under Belgian auspices, is now managed by ISABU, the Burundi Agronomic Sciences Institute. The tree planting was part of a larger effort aimed at improving the rangeland through private ownership incentives. Grazing areas were divided and marked with row plantings (double and triple) of exotic tree species (Grevillea robusta, Ecucalyptus spp. and Cupressus lusitanica). Improved varieties of grasses were then made available to willing land owners.

The project has reportedly led to a transition from communal to individualized pasture ownership in some sectors, though no precise information on either the extent or impact of this privatization was available. The trees themselves, however, are privately owned and there was evidence of some tree harvesting. The ownership, usufruct and benefit flows of these trees are fundamentally different in character from those of the reforestation projects described earlier.

### 4.5.2 INCN/USAID Bururi Forestry Project

The former USAID project in Bururi is another example of a shift into a more privatized mode of tree planting on individually-owned plots of land. Information provided by LeRoy Duvall of the Forestry Support Program indicates that between 1983 and 1987, approximately 500 households planted a total of 101,251 seedlings on their own land. The trees came from the genera Eucalyptus, Grevillea, Pinus, Casuarina, Callitris, Cyprus, Calliandra, and Acacia. This activity, which was an addition to a project which had focused on more traditional plantations, constitutes what appears to be, for Burundi, a new type of project intervention in tree planting. Conversations with participating villagers in the Bururi area indicated genuine enthusiasm for these privately-planted trees.

Two additional, important offshoots of the Bururi Forestry Project have occurred since USAID funding was terminated. First is the management plan that has been developed for the Bururi Reserve. Although it focuses primarily on tree planting elements, the plan clearly states that other components (wildlife, tourism and perimeter populations are specifically named) need detailed amendments in the plan. Second is the proposal

currently being written by the Bururi Forest Reserve manager. Encouraged by the farmer response to private plantings under the USAID-funded project, the manager is designing a similar endeavor to develop farm forestry activities with the local population on the western side of the Reserve.

#### 4.5.3 INCN/CRS Rumonge Agroforestry Project

This recently-launched project is beginning to establish on-farm plantings of exotic and indigenous trees. Annual nursery production is still relatively low and emanates from eight central nursery sites. As with the Bururi project, the nurseries are governmentally-run (INCN). The trees are planted on private land and the planters are given ownership rights over the trees. At the two nurseries visited, space was also allocated to species trials and provenance testing in areas that served as demonstrations of species potential for interested farmers. About 40 percent of the seedlings produced by the project are given to the local Regional Development Office (SRD) for an in-kind arrangement whereby the SRD provides office space and some logistical support.

The project is operating, at this stage, primarily through a pilot farmer program. There is also a project-sponsored extension program that works with these farmers to help them establish their trees and provide technical assistance with tree growing. Project staff, in addition to working with the local government structure, also work with the local parish of the Catholic church and the Commune administration.

These three efforts are a first start. Though the trees are privately owned, nursery production and access to the seedlings produced continue to be controlled by the government. (The Bururi Forestry Project is reported to have a small private nursery component. There are about ten private nurseries producing about 200 seedlings each.)

## 5. MAJOR POLICY ISSUES

### 5.1 Protection and Production

#### 5.1.1 The Buffer Zone Concept: Combining Two Agendas

The information presented in this chapter clearly reveals a conviction on the part of the authors of the need for a production-oriented forestry policy that ensures benefit flows to local villagers. An integrated program involving this and the conservation of biological diversity and tropical forests would be one in which the unit of action is a park/buffer zone complex. Whereas the focus of park activities would be conservation, with only marginal economic activities permitted, the focus of the activities in the area surrounding the park would be privatized, income-generating production.

A major income-generating activity could be the planting of trees for market purposes. That is, the above recommendations concerning the need for the privatization of tree planting activities, while applicable to most of Burundi, could be programmatically focused (at least in the beginning) in areas surrounding park reserves. Special inputs and nursery facilities could be made available to farmers living in designated "Buffer Zone"

areas.

In the less-populated areas around the Ruvubu National Park, the system might work differently. The current boundary of the park has a natural buffer zone of grass and shrub savannah between the excluded population and the area inhabited by most of the wildlife. Limited use/access (using a permit system) of this buffer zone would not only help to maintain its ecological diversity but would also be a progressive step towards ensuring local participation and acceptance of park policies by the local population living around the park boundaries.

In the final analysis, the success of a buffer zone strategy will depend largely on the degree to which programs find economic mechanisms to make it worthwhile for people to produce wood and protect existing resources. The key element of the program must be increasing farmer income. Sanctions and educational messages should be embedded as ancillary elements in this program. Its prime focus, however, is the search for activities which contribute to the conservation of biological diversity as they simultaneously contribute to the item which is foremost on the agenda of many contemporary rural populations: income generation.

### 5.1.2 Tree Ownership

It is recognized that the few remaining stands of natural forest and the endangered species which international groups and the Burundi government wish to protect serve important ecological functions. It is, thus, appropriate that the reserves have been declared public property and off-limits to private exploitation. On the other hand, the major barrier to local involvement in tree planting has been, in the team's opinion, the totally-public and government-controlled character of most tree planting activities. Therefore, the team cannot agree with logic that declares most donor-financed tree plantations to be public property as well.

The most direct way to resolve this issue would be consideration by both donors and the Government of Burundi to move to the privatization of tree planting and a concomitant privatization of the ownership of the resulting wood stands. Aggressive, energetic programs should be undertaken to assist farmers themselves to become tree planters on their own holdings.

This is not as impractical as it might first appear. Restricting discussion for the moment to small woodlots (as distinct from permanent tree/crop associations), it would require only a fifth of a hectare to plant 500 trees at 2m X 2m spacing which would, at least for certain species, permit limited cropping for a short period among the trees themselves before shade competition set in. As the discussion on land tenure indicated, most regions of the country appear to have mean holdings of 2 hectares or more. Therefore, the use of a fifth of a hectare for privately-owned trees would not be out of the question for holdings of this size and should be explored with farmers who express interest. Other alternatives could be investigated for motivated farmers with less land.

In any case, the planting should be totally voluntary, done only by those who wish to do so. The presence of depleted land that no longer serves for adequate food production might make the planting of such "domestic" trees attractive even to households with smaller holdings; provided these depleted sites will support productive trees. Farmers should at least be given this option. For the most part they have not (with a few exceptions), as most projects have placed all nursery production and tree ownership under the control of various government agencies.

Where farmers have had some variant of this option, as in the final phase of the Bururi project, they have responded enthusiastically. The team has the strong impression that, if given access to seedlings, many families may have access to more land than official statistics indicate.

The term privatization needs to be emphasized. In a fully privatized mode, the harvesting of trees will be completely at the farmer's discretion. This means that two issues must be addressed by local project managers. First, Burundian law requires that people "request" permission to harvest and use or sell their wood.

The second danger, specific to Burundi, is that farmers will fear that wood will fall into the same category as coffee or tea--i.e., crops that, once planted, the farmer is not allowed to remove on his own accord. Policy makers should be aware of both of these obstacles which could diminish the truly private nature of tree growing and reduce the willingness of farmers to take the step of planting trees on their land.

### 5.1.3 Income Incentives

Closely related to the privatization theme is the idea that the most interesting aspect of tree planting is its potential for generating cash income. Some project planners place emphasis on the fertility-enhancing potential of nitrogen fixers or the erosion control effect of trees planted on the contour; i.e., emphasis is placed on the advantages of the tree from an agriculture production point of view. Others place emphasis on the ability of the tree to supply domestic fuel and construction needs--the subsistence advantages of the tree. Both of these are genuine and important. But the prime selling point in many settings has been found to be the potential for wood in local pole, plank or charcoal markets. (Grevillea poles in the Bururi area, for example, are currently being sold in Rumonge for a USD equivalent of \$1.25 each. Poles of the same species, if allowed to grow an additional 5-6 years beyond pole size, are currently worth about US\$65.00 on the stump.)

The potential for trees in this regard in Burundi will differ by region. But there appear to be regions where farmers, if given access to seedlings, would be both willing and able to become small-scale "income-generating tree farmers" without ceasing to be subsistence food cultivators as well. The wood scarcity and market conditions are ripe for an attempt at this approach.

## 5.2 Outreach Issues

### 5.2.1 Current NGO Involvement

An important component of the "privatization" policy could be a more serious attempt to use non-governmental channels of forestry extension. All projects that have been described here as "NGO" are, in reality, functioning as government projects. The major implementers were INCN personnel. The Catholic Relief Services project cited earlier is a case in point. CRS is functioning basically as a funder of activities directed and implemented by public employees. (The managerial input that CRS had has been phased out.) For the next phase, CRS will simply supply funds with a small technical assistance component. INCN employees will manage the activities.

The Government of Burundi should be encouraged to open the way for more complete NGO and farmer involvement in tree planting activities. Projects will, of course, be approved by public authorities. But resources and managerial authority should be allocated less and less to public employees. (The NGO mode that we observed in the natural resources domain is primarily another variant of governmental management of trees.

### 5.2.2 United States Peace Corps

The Peace Corps has been actively involved in natural resources projects. During the early years, Volunteers were engaged mostly in wildlife inventories, trail maintenance and general park management planning. A new arrangement has recently been instituted by which AID/Washington funds Peace Corps directly to provide various types of support to INCN. These activities include conservation education and flora and fauna inventories in the parks and reserves. In view of the policy issues mentioned above, PCVs could play an important role in farmer tree planting activities as well.

### 5.2.3 Conservation and Education/Training

Closely related to the Peace Corps issue is the current policy emphasis on education and training in the domain of natural resources management. If the analysis presented in this document is correct, the real barriers to tree planting have not been educational in character. It is only when the conditions have been created to allow direct access of seedlings and tree ownership to farmers that educational materials for the landowners and training skills for the technicians begin to make sense. Education embedded in real life activities serves a vital purpose. In contrast, the preparation of educational materials in the absence of these activities constitutes a substitute for genuine action. Donors should be wary of funding public conservation education programs that exhort farmers to carry out activities where no material provisions are made.

### 5.3 Other Issues

#### 5.3.1 Commune Linkages with Charcoal Merchants

Another issue that must be raised concerns the earlier-mentioned evidence for what may be a new involvement of local commune authorities in the sale of woodlots to charcoal merchants. One group of people questioned on a roadside about a charcoal operation taking place a few meters away stated that the land was communal but that the authorities were selling off the wood to Bujumbura charcoal merchants. These merchants often hire workers in the immediate vicinity to cut and process the wood into charcoal. Transport from roadside is then handled by the charcoal merchant. This use and sale of products from communal woodlots by local government authorities could be a dangerous trend ecologically, economically and socially. It needs to be explored further.

#### 5.3.2 The Kumoso Depression and Adjacent Areas

The extreme eastern and southeastern regions of Burundi (about 1/4 of the country) receive less rainfall, have lower population densities and currently have less land use pressure. As indicated in the chapter on flora and fauna, there are still pockets of floral and faunal associations that are relatively untouched. Even in areas which have experienced some human impact, there are still substantial amounts of indigenous tree and shrub species that service the local population.

Immigration from other areas of the country is beginning to threaten these areas. The poorer soils which exist here are more susceptible to degradation than other parts of the country. In order to maintain the natural fertility that still exists and to guard against soil erosion, farming systems which employ tree and shrub species need to be encouraged. This needs to be done as soon as possible before the damaging forces which accompany intensive land use come into play.

#### 5.3.3 Research Needs

The analyses presented in this document have certain implications for the type of research that can assist in formulating policy in the natural resources sphere. The Small Farming Systems Research Project, now being funded by USAID in Gitega and Karuzi, has already yielded descriptively-rich information on local farming practices in the Central Plateau. Currently, research in Karuzi is focusing on species trials aimed at increasing food production on the small farmer holdings in the area. Although fuelwood issues are recognized as important and have been inventoried in the past, most of the Project's orientation is agronomic. But, though the questions explore fuelwood issues, the focus is purely agronomic.

Project personnel are hoping to cooperate with ICRAF (International Council for Research in Agroforestry) scientists who will be arriving soon. It appears that most of the ICRAF effort will focus on species trials of exotic, nitrogen-fixing species. Additional investigation of farmer-identified (and used) nitrogen fixers could be a beneficial complement to this effort.

This report has identified the absolute importance of encouraging wood production as a potential income-generating crop. But current farming systems research in Burundi is not yet in tune with this potential. If trees are mentioned at all, they tend to be viewed in terms of their ecological impact, rather than their potential economic return. Those interested in natural resources management would benefit if additional research could focus on the costs of current wood gathering and the potential economic benefits, both in terms of subsistence needs and market outlets. This could be compared with the costs and benefits of allocating part of a family holding to the growing of wood-producing trees.

Finally on our list is the need for a series of in-depth case studies of farms in different regions. These could focus specifically on current wood procurement and use patterns and on the various ways in which wood could be dynamically integrated into the holding of the Burundi cultivator.

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ANNEX A  
TEAM CONTACTS DURING BURUNDI VISIT

U.S. Embassy

James D. Phillips                      Ambassador

USAID/Burundi

Donald Miller	Mission Representative
Campbell Wicken	Program Officer
Larry Dominessy	Agriculture Development Officer
Samson Ntunguka	Assistant ADO
M. Moussie	Project Manager, USAID-ISABU Small Farming Systems Research Project
Amal Chaterjie	Agronomist, SFSR, Karuzi
Lorraine Denakpo	Participant Training Coordinator

U.S. Peace Corps/Burundi

Erica Jessen-Eng	Director
Peter Trenchard	Coordinator, Biological Diversity Project
Dan Griffin	Coordinator, Fisheries Program
Donald Gay	PCV, Wildlife Biologist/INCN Ruvubu National Park
Colleen Flynn	PCV, Conservation Education Specialist/INCN

Catholic Relief Services

Audace Kabayanda	Program Coordinator
Theo Manirabarutu	Agroforestry Project Manager
Paul Cowles	Agroforestry Project Technical Advisor
Dieudonne Butunaga	Agroforestry Project Forester
Melchior Munama	Agroforestry Project Extension Coordinator

Caisse Central de la France

Pierre Dubus                      Director, Protection of the Kibira Project

Institut National pour la Conservation de la Nature

Andre Nyiokinde	Director
Dumas Ndwumwani	Counterpart Director, Protection of the Kibira Project
A. Nestor	Assistant Director, Protection of the Kibira Project
Andre Ndikuriyo	Manager, Bururi Natural Forest Reserve
Venant Buroyi	Assistant Forester, Bururi Natural Forest Reserve

Other

Pere Dario Drabeni	Volontaires Italiens pour Solidarite avec les Pays Emergents, Bugenyuzi Commune
Wendy Bromley	Ethno-botanist Consultant, Rumonge
Steve Loegerina	CRS/Tanzania (in Burundi on TDY)
LeRoy Duvall	U.S. Forestry Support Program, US Forest Service, Washington, D.C.
Hal Fischer	A.I.D. Science and Technology Bureau, Washington, D.C.
Amy Vedder	World Conservation International, New York Zoological Society, New York, NY
Bill Weber	World Conservation International, New York Zoological Society, New York, NY
Rob Clausen	Wildlife Conservation International, New York Zoological Society, New York, NY
Mike McGahuey	A.I.D. Africa Bureau, Washington, D.C.
Paula Williams	Forest and Natural Resources Sociologist Washington, D.C.

## ANNEX B GOVERNMENT ORGANIZATIONS IN BURUNDI

The Government of Burundi is currently restructuring its national parks, forestry and tourism offices. The information provided below is, therefore, tentative and should be updated accordingly.

### Ministry of Agriculture

The Ministry of Agriculture is the key national institution. The Ministry has three Departments: agriculture, livestock and planning. The Department of Agriculture is subdivided into agronomy, rural works, forestry and fishing and land improvement. The Department of Livestock is subdivided into livestock production, animal health and veterinary laboratory. The Department of Planning is subdivided into studies and planning, monitoring and evaluation, training and information.

### The National Institute of Nature Conservation

Burundi's National Institute of Nature Conservation (INCN) was established in 1980 by presidential decree to create and preserve nine natural areas, comprising more than 80,000 hectares of tropical highland forest and savanna woodland. The INCN is administered by the Director-General, Mr. Andre Niyokindi.

The INCN has received technical assistance in park management from USAID, Catholic Relief Services (CRS), the French Caisse Centrale de Cooperation Economique and the U.S. Peace Corps.

### Water and Forestry Department

The Water and Forestry Department is one of four Departments of the Directorate General of Agriculture in the Ministry of Agriculture. In addition to forestry, the Department's director is also responsible for fisheries and wildlife. The responsibilities of the sub-directorate of forests include: implementation of the Government's forest policies, management of natural forests and government-owned tree plantations, control of the exploitation of communal plantations and management of government-controlled sawmilling operations. Forest reserves are under the control of the INCN.

### National Office of Tourism

The National Office of Tourism (ONT) is responsible for the promotion of tourism and distribution of tourism information in Burundi. The Director of the ONT is Mr. Andre Ndayiragije. In September 1988, a roundtable conference on tourism was held in Bujumbura. According to the Burundian publication, Actualites Nationales (October 28, 1988), the ONT is interested in cooperating with other countries in East Africa for tourism development.

## Institute of Science and Agronomy in Burundi

The Institute of Science and Agronomy (ISABU) is the national agricultural research institute in Burundi. It is closely tied to the Ministry of Agriculture. ISABU's exclusive orientation towards cash crops (coffee, tea and cotton) is being modified to include more research on food crops and forestry. A number of stations are experimenting with bench terracing. Field research stations are located in many parts of the country.

## ANNEX C STATUS AND MANAGEMENT OF PROTECTED AREAS

### Kibira National Park

Designated a National Park in 1934 by Belgium, the Kibira National Park is located in the northwestern region of Burundi along the Zaire-Nile Massif. The Park stretches from the town of Muramvya in the south and extends north to Rwanda where it is contiguous with the Nyungwe Forest Reserve.

The Kibira National Park is given the highest priority in terms of protection, development and park management in the Action Plan for African Primate Conservation (INCN/WWF/UNDP, 1985). This designation is based on the following criteria: 1) Number of high priority species in the area; 2) imminence of threat to the area; 3) primate species diversity in the area; and 4) number of endemic primates in the area.

At least six species of primates have been identified in the forest. These include the Chimpanzee, Gray-Cheeked Mangabey, L'hoesti's Monkey, the Black and White Colobus Monkey, Blue Monkey and Baboon. The Chimpanzee population has been estimated at two hundred individuals (U.S. Peace Corps proposal, 1987). The U.S. Peace Corps and the French are currently working in the Kibira National Park in cooperation with the INCN.

### Ruvubu National Park

The Ruvubu National Park was designated a National Park in 1984. The largest of Burundi's parks, the Ruvubu stretches from the town of Buteze in the west to the Tanzanian border in the east. At the time of the park's creation, the three thousand people living within the park's borders were relocated outside the Park. Compensation for their land was arranged.

The Ruvubu National Park is a forest/grassland mosaic or wooded savanna similar to that found in Tanzania. A U.S. Peace Corps Volunteer, working with the INCN, has been conducting wildlife and park management studies in the park since January, 1988. The Park maintains populations of Cape Buffalo, numerous ungulates, crocodiles and hippos. The assessment team observed a wide variety of birdlife in the Park including the Fish Eagle, Woolly-Necked Stork, Yellow-Billed Stork and Pink-Backed Pelican.

Some of the issues currently being investigated by the Peace Corps and INCN include: 1) fire management within the reserve; 2) designation of access routes through the park for the surrounding population; 3) improvement of the park guard system and guard shelters; 4) poaching of fish and wildlife within the park; and 5) unauthorized woodcutting and grazing of livestock within the park.

### Bururi Forest Reserve

The Bururi Forest Reserve was created in 1951 and is considered a remarkable relic of the tropical montane forest system. The Bururi Forest Reserve represents an interesting and unique example of a montane semi-evergreen or mixed deciduous forest. It harbors species of plants and animals that are typically found in such different areas as the Zaire-Nile Divide montane forest to the north, the Zambebian forests to the south, the drier forests to the east in Tanzania and Kenya, and the lowland rainforest of Zaire to the west. The forest is of great biological value and provides a unique natural laboratory for scientific research (A. Vedder and B. Webber, 1983).

Between September 1982 and December 1987, the USAID/Burundi Mission managed the Bururi Forestry Project (695-0105). The initial project objective was to circumscribe and protect the Bururi forest through the establishment of block plantations of several exotic tree species on 750 hectares of cleared land located inside the forest boundaries. The project later broadened its focus to include a farmer extension and fuelwood component. The U.S. Peace Corps is now working in the forest Reserve in cooperation with the INCN.

### Rumonge Forest Reserve

This forest constitutes one of the northernmost extensions of the threatened Miombo woodland forest. It is more commonly found in eastern and southern Africa. In Burundi, the Miombo forest is only found along the Lake Tanganyika corridor. The Rumonge Forest reserve, located just west of Lake Tanganyika and in the mountains above the town of Rumonge, represents the last remaining Miombo forest block in Burundi (U.S. Peace Corps, 1987). Catholic Relief Services is working in this forest in cooperation with the INCN.

### Kigwena Forest Reserve

The Kigwena Forest Reserve was established in 1954 to protect it for scientific study. It is located just south of the town of Karonda on the west coast of Lake Tanganyika. Perhaps the most unusual of Burundi's forest types, the Kigwena Forest Reserve is the only remaining patch of lowland tropical rain forest in Burundi. Many species found here are commonly associated with the great rain forests of Central Zaire, Gabon and the Congo (U.S. Peace Corps proposal, 1987). Catholic Relief Services is now working in this forest in cooperation with the INCN.

### Gere National Reserve at Lake Rwihinda

No information was available.

### Karera National Monument

No information was available.

### Couffre des Allemands de Nyakazu Natural Monument

No information was available.

## Areas of Concern Not Fully Addressed by the Assessment Team

### Lake Tanganyika Resources

According to the Burundi Environmental Profile (1981), Lake Tanganyika, Lake Rweru and Lake Cohoha contain important populations of fish. Four species of fish occur only in Lake Tanganyika: Lates mariae, L. microlepis, L. angustrifrons and Luciolates stappersii. There are a total of 133 fish species in Lake Tanganyika. Environmental problems related to Burundi's fishing industry include overfishing, unsanitary drying and packing facilities, lack of fuel to permit smoking and high concentrations of pesticides in the tissues of fish.

Additional information on Lake Tanganyika is needed regarding fisheries development and management, shoreline management (public vs. private ownership and related development impacts), extent of pollution and the management of the Ruzizi River Delta. Additional information is also needed on the other lakes in Burundi.

### Imbo Region

The Imbo region is located in the western corner of Burundi above Lake Tanganyika and extends along the Ruzizi River. Until 1950, the Imbo was open acacia savannah often described as a wildlife paradise, but since that time it has been converted to a vast agricultural settlement zone on which cotton, irrigated rice, groundnuts and vegetables are grown (Burundi Environmental Profile, 1981). Current vegetation in the region includes Hyphaene benguellensis, Euphorbia candelabrum, Commiphora madagascariensis, Acacia albida, and Strychnos potatorum (AFRENA Report, 1988).

The Ruzizi Delta Reserve is the only Forest Reserve in the Imbo region. It is recommended that future natural resources assessment teams visit the Imbo region to assess cattle grazing improvement projects in the region.

ANNEX D  
SELECTED PLANT AND ANIMAL SPECIES

Trees (Weber and Vedder, 1989)

Alangiaceae

*Alangium chinense* (umugote)

Apocynaceae

*Labernaemontana johnstonii* (umutwetwe)

Araliaceae

*Polyscias fulva* (umwungo)

*Schefflera goetzenii* (igisorya)

Asteraceae

*Vernonia*

Celastraceae

*Maytenus*

Clusiaceae

*Symphonia globulifera* (umushishi)

Euphorbiaceae

*Bridelia brideliifolia* (umugimbo)

*Bridelia micrantha*

*Croton macrostachyus* (umukungere)

*Macaranga neomildbraediana* (umutwenzi)

*Macaranga spinosa* (umutwenzi)

*Neoboutonia macrocalyx* (igihondogori)

*Sapium ellipticum* (umusasa)

Hippocratteaceae

*Salacia* spp.

Loganiaceae

*Anthocleista grandiflora*

*Nuxia congesta* (umungongongongo)

Meliaceae

*Carapa grandiflora* (umuhunahuna)

*Ekebergia capensis* (umunusu)

*Entandrophragma excelsum* (umuyove)

Melanthaceae

*Bersama abyssinica* (umuhinguri, umurerabana)

Mimosaceae

*Albizia gummifera* (umusebeyi)

*Newtonia buchananii* (umusebeyi)

**Monimiaceae**

*Xymalos monospora* (umuhotora)

**Moraceae**

*Ficus* spp. (igisorya, ikivumuvumu, igitabora, urusugi)

*Myrianthus holstii* (umwufe)

**Myrsinaceae**

*Maesa lanceolata* (umuhangahanga)

**Myrtaceae**

*Syzygium guinense* (umugoti)

**Ochnaceae**

*Campylospermum densiflorum*

*Ochna* spp.

**Olacaceae**

*Strombosia scheffleri* (umushiga)

**Oleaceae**

*Schrerebera alata* (umubanga)

**Pittosporaceae**

*Pittosporum spathicalyx* (umunyereza)

**Proteaceae**

*Faurea saligna*

**Rosaceae**

*Parinari excelsa* (umunazi)

*Prunus africana* (umuremera)

**Rubiaceae**

*Chassalia subochreatea* (umunyamabuye)

*Galiniera coffeoides*

*Oxyanthus speciosus*

*Pavetta virungensis* (umunyamabuye)

*Psychotria bugoyensis*

*Psychotria chalconeura*

*Psychotria* spp.

*Sericanthe burundensis*

**Rutaceae**

*Oricia renieri* (rutuminkungugu)

**Sapindaceae**

*Dodonea viciosa* (umusasa)

**Sapotaceae**

*Chrysophyllum gorungosanum* (umuyazi)

**Sterculiaceae**

*Dombeya goetzenii* (umukore)

**Ulmaceae**

*Celtis* spp.

*Trema guinensis*

**Verbenaceae**

*Clerodendrum* spp.

**Agavaceae**

*Dracaena afromontana*

*Dracaena steudneri*

Mammals (U.S. Peace Corps/Burundi, 1987)

<u>KIRUNDI</u>	<u>ENGLISH</u>	<u>LATIN</u>	<u>FRENCH</u>
INKENZI/INKIMA/INKENDE	Blue Monkey	<i>Cercopithecus mitis</i>	Singe argente
INKINDI/IKYONDI	Hoesti Monkey	<i>Cercopithecus lhoesti</i>	Cercopithèques de lhoesti
IKISHABAGA/IKISMABAGA	Grey Cheeked Mangebey	<i>Cercocebus albigena</i>	Cercocèbes à joues grises
IKYOMO/INKOMA	Black and White Colobus	<i>Colobus angolensis</i> <i>adolphi-friederici</i>	Colobes blancs et noirs d'Angola
UMUKUNGA	Red-Tailed Monkey	<i>Cercopithecus ascanus</i>	Cercopithèque ascagne
INKOTO	Baboon	<i>Papio anubis</i>	Babouin obguera
INKUFU/IMPUNDU	Chimpanzee	<i>Pan troglodytes schweinfurthi</i>	Chimpanzé
	Bosman's Potto	<i>Perodicticus potto</i>	Potto de Bosman
IKIKANGONDO	Owl-faced Monkey	<i>Cercopithecus haanlyni</i>	Cercopithèque à tête de hibou
INKYOGOTO	Crested Porcupine	<i>Hystrix sp.</i>	Porc-épic
IKIEGESHI	Brush Tailed Porcupine	<i>Atherurus africanus</i>	Athérure
INKEZI	Cane Rat	<i>Thryonomys sp.</i>	Aulacode
IKIHA	Rat de Gambie/Giant Rat	<i>Cricetomys emini</i>	Rat de Gambie
IKUBAKUBA/IKIHALE	Sun-Squirrel	<i>Helioscaurus sp.</i>	Ecureuil
IKIHALE	Giant Forest Squirrel	<i>Protoxerus stangeri</i>	Ecureuil géant
IKIRUHEKE	Flying Squirrel	<i>Anomalurus sp.</i>	Ecureuil-volant
IKIERI/IMBWEWE	Striped Jackal	<i>Canis adustus</i>	Chacal à flanks rayés
IKIHIMBI	African Civet	<i>Viverra civetta</i>	Civet
IKURUTONI	Two spotted palm civet	<i>Nandinia binotata</i>	Mandinie
IKITONI	Large Spotted Genet	<i>Genetta tigrina</i>	Genette tigrine
IKIKENKE	Mongoose	<i>Herpestes sp.</i>	Mangouste
IKIHURA	Congo Clawless Otter	<i>Aonyx congica</i>	Loutre à joues blanches du Congo
IKISAKANYIKA	White-Naped Weasel	<i>Poecilogale albinucha</i>	Poecilogale
IKIYA	Serval	<i>Felis serval</i>	Serval
IKIRARA	"Tigre" Probably Golden Cat	<i>Felis aurata</i>	Chat doré
IKINGWE	Leopard	<i>Panthera pardus</i>	Léopard
IKISURUBE/IMBAKA	Bush-Pig	<i>Potamochoerus porcus</i>	Potamochère
IKISENGE	Giant Forest Hog	<i>Hylochoerus meinertzhageni</i>	Hylochère
IKIMPONGO	Bushbuck	<i>Tragelaphus scriptus</i>	Guib harnaché
IKIBOGO	Buffalo	<i>Syncerus caffer caffer</i>	Buffle d'Afrique
IKIZOVU	Elephant	<i>Loxodonta africana</i>	Eléphant
IKISAKO	Yellow-Backed Duiker	<i>Cephalophus sylvicultor</i>	Céphalophe à dos jaune
IKIMBERI	Black-Fronted Duiker	<i>Cephalophus nigrifrons</i>	Céphalophe à front noir
IKICOROBWA/INKARWABWA	Hyena	<i>Crocuta crocuta</i>	Hyène tachetée

Birds (U.S. Peace Corps/Burundi, 1987)

<u>FAMILY</u>	<u>LATIN</u>	<u>FRENCH</u>
<b>PELECANIDAE</b>		
White pelican	<i>Pelecanus onocrotalus</i>	Pélican blanc
<b>PHALACROCORACIDAE</b>		
White-Necked Cormorant	<i>Phalacrocorax africanus</i>	Cormoran pygée africain
<b>PODICIPIDAE</b>		
Little Grebe	<i>Podiceps ruficollis</i>	Grebe Castagneux
<b>SCOPIDAE</b>		
Hammerkop	<i>Scopus umbretta</i>	l'Oubrette
<b>ARDEIDAE</b>		
Grey Heron	<i>Ardea cineria</i>	Héron cendré
Black-Headed Heron	<i>Ardea melanocephala</i>	Héron à tête noir
Great White Egret	<i>Egretta alba</i>	Grand Aigrette
Cattle Egret	<i>Ardeola ibis</i>	Héron garde-boeuf
<b>CICONIIDAE</b>		
Yellow-Billed Stork	<i>Ibis ibis</i>	Tantale africain
<b>THRESKIORNITHIDAE</b>		
Sacred Ibis	<i>Threskiornis aethiopicus</i>	Ibis sacré
Hadada Ibis	<i>Hagedashia hagedash</i>	Ibis Hagedash
<b>ANATIDAE</b>		
White-Backed Duck	<i>Thalassornis leuconotus</i>	Canard à dos blanc
<b>ACCIPITRIDAE</b>		
Bateleur	<i>Terathopus ecaudatus</i>	L'Aigle Bateleur
Long-Crested Eagle	<i>Lophoetus occipitalis</i>	L'Aigle Huppé
Black Kite	<i>Nalvus eigrans</i>	Milan commun
Black-Shouldered Kite	<i>Elanus caeruleus</i>	Faucon blanc
Augur Buzzard	<i>Buteo rufofuscus</i>	Buse augur
Mountain Buzzard	<i>Buteo tachardus oreophilus</i>	Buse des montagnes
Pallid Harrier	<i>Circus macrourus</i>	Busard pâle
African Fish Eagle	<i>Haliaeetus vocifer</i>	Aigle vocifer

02 ORIGIN AID-00

03

04 ORIGIN OFFICE AFTR-05

05 INFO AFMG-03

AFEA-03

AFDP-06

AFPD-04

AFCO-02

AAAF-03

BIFA-01

06 SAST-01

PPCE-01

PPPR-02

IG-01

GC-01

GCAF-01

FVA-01

07 PVC-02

ES-01

OFDA-02

STAG-02

STFN-02

STEN-01

AAPF-01

08 IGII-04

FPA-02

RELO-01

AMAD-01

/054

A0

10 INFO LOG-00

AF-00

/000 R

11

12 DRAFTED BY: AID/AFR/TR/ANR::GBOOTH, 8900Q:

13 APPROVED BY: AID/AFR/TR/ANR:AWAHAB

14 AID/AFR/TR/ANR:DWALKER (DRAFT)

15 AID/AFR/EA:WRUSH

16 AID/AFR/PD:JSCHLESINGER (INFO)

17 AID/AFR/TR/PRO:GBRICKER (INFO)

AID/AFR/TR/ANR:LJEPSON

AID/AFR/DP:ESIMMONS (INFO)

AID/S&T/FENR:CGALLEGOS (INFO)

19 O R 150003Z OCT 88

20 FM SECSTATE WASHDC

21 TO AMEMBASSY BUJUMBURA IMMEDIATE

22 INFO AMEMBASSY NAIROBI

23

24 UNCLAS STATE 336688

25

26 AIDAC, NAIROBI REDSO/ESA - DAVE GIBSON

27

28 E.O. 12356: N/A

29

30 FY 89 BIOLOGICAL DIVERSITY AND TROPICAL  
31 FORESTS ASSESSMENT IN BURUNDI

32

33 REF: (A) NAIROBI 27183

34 (B) STATE 032584

35 (C) STATE 222608

36

37 1. PER REF A, AID/W APPRECIATES USAID/BUJUMBURA'S  
38 INTEREST IN CONDUCTING A BIOLOGICAL DIVERSITY AND  
39 TROPICAL FORESTS ASSESSMENT TO COINCIDE WITH DRAFTING OF  
40 MISSION'S CDSS. THE SUBJECT ASSESSMENT SCHEDULED FOR  
41 OCTOBER 18 - NOVEMBER 4, 1988 WILL BE IMPLEMENTED  
42 THROUGH THE AFRICA BUREAU'S NATURAL RESOURCES MANAGEMENT  
43 SUPPORT PROJECT (698-0467).

44  
45 2. PURPOSE: AMENDMENTS TO SECTIONS 118 (TROPICAL  
46 FORESTS) AND 119 (BIOLOGICAL DIVERSITY) OF THE FOREIGN

White-Browed Crombec  
Chubb's Cisticola

APODIDAE

Scarce Swift

CAMPEPHAGIDAE

Grey Cuckoo Shrike

LANIIDAE

Luhder's Bush Shrike  
Mountain Sooty Boubou  
Fiscal Shrike

Mackinnon's Grey Shrike  
Black-Backed Puffback  
Pink-Footed Puffback  
Puffback Shrike

Lagden's Bush Shrike  
Doherty's Bush Shrike  
Sulphur-Breasted Bush Shrike

ZOSTERUPIDAE

Yellow White-Eye

NECTARINIIDAE

Green-Headed Sunbird  
Scarlet-Chested Sunbird  
Blue-Headed Sunbird  
Regal Sunbird  
Variable Sunbird  
Malachite Sunbird  
Northern Double-Collared Sunbird  
Bronze Sunbird  
Purple-Breasted Sunbird  
Greater Double Collared Sunbird  
Copper Sunbird  
Olive Sunbird  
Collared Sunbird  
Violet-Backed Sunbird

FRINGILLIDAE

African Chiffchaff  
Streaky Seed-Eater  
Thick-Billed Seed-Eater  
Yellow-Crowned Canary

*Sylvietta leucophrys chloronata*  
*Cisticola chubbii chubbii*

*Schoutedenapus myoptilus*

*Coracina caesia pura*

*Laniarius luhderi luhderi*  
*Laniarius poensis holomelas*  
*Lanius collaris*

*Lanius mackinnoni*  
*Dryoscopus cuba*  
*Dryoscopus angolensis nandensis*  
*Dryoscopus gabensis erwini*

*Malacotus lagdeni centralis*  
*Malacotus doherityi*  
*Malacotus sulphurepectus suahelicus*

*Zosterops senegalensis scotti*

*Nectarinia verticalis viridisplendens*  
*N. senegalensis*  
*N. alinae alinae*  
*N. regia kivuensis*  
*N. venusta igniventris*  
*N. fassa cupreonitens*  
*N. preussi kikuyuensis*  
*N. kilimensis kilimensis*  
*N. purpureiventris*  
*N. afer*  
*N. cuprea cuprea*  
*N. olivacea cephaelis*  
*Antheptes collaris garguensis*  
*Antheptes longuemarei angolensis*

*Serinus citrinelloides frontalis*  
*Serinus striolatus kivuensis*  
*Serinus burtoni tanganyicae*  
*Serinus flavivertex sassii*

Fauvette croabec à sourcils blancs  
Cisticole de Chubb

Martinet de Shoa

Echenilleur gris

Gonolek de Luher  
Gonolek de montagne  
Pie-grièche fiscale  
à dos noir  
Pie-grièche de Mackinnon  
Pie-grièche cuba

Pie-grièche cuba  
de Gambie  
Pie-grièche de Lagden  
Pie-grièche de Doherty  
Pie-grièche à

L'Oiseau-lunette

Nectarin olive à tête verte  
Nectarin à poitrine écarlate  
Nectarin à tête bleue  
Nectarin royal  
Nectarin à ventre feu  
Nectarin malachite  
Nectarin d'Angola  
Nectarin bronze  
Nectarin à poitrine pourpre  
Grand Nectarin à double collar  
Nectarin cuivre  
Nectarin olivâtre  
Sousonge à collier  
Sousonge à dos violet

Canari à bec fin  
Canari strié du Kivu  
Serin de Burton  
Serin à couronne jaune

## TURROIDIDAE

Hill Babbler  
Arrow-Marked Babbler  
Brown Illadopsis  
Mountain Illadopsis  
Grey-Chested Illadopsis

*Alcippe abyssinica atriceps*  
*Turdoides jardines*  
*Trichastoma fulvescens*  
*Trichastoma pyrrhopterus*  
*Malacocinda poliothera*

Alcippe à tête sombre  
Craterope de jardin  
Grive akalat brune  
Grive akalat de montagne

## TURDIDAE

Stonechat  
Olive Thrush  
White Starred Bush Robin  
Brown-Chested Alethe  
Red-Throated Alethe  
Archer's Robin Chat  
Grey-Winged Robin Chat  
Equatorial Akalat

*Saxicola torquata*  
*Turdus olivaceus*  
*Pogonochia stellata*  
*Alethe poliocephala*  
*Alethe poliopteryx*  
*Dessonornis archeri archeri*  
*Cossypha polioptera polioptera*  
*Sheppardia aequatoriaalis aequatoriaalis*

Traquet patre  
Grive olivâtre  
Grive à tête bleue du Ruwenzori  
Alethe à poitrine brune  
Alethe à gorge rousse  
Cossyphne à sourcils blancs  
Merle rouge-gorge équatorial

## MUSCICAPIDAE

Dusky Flycatcher  
Chin-Spot Flycatcher  
Black-Headed Puffback Flycatcher  
Ruwenzori Puffback Flycatcher  
Wattle-Eye Flycatcher  
Yellow-bellied Wattle Eye

*Alseonax adustus*  
*Batis molitor puella*  
*Batis minor nyanzab*  
*Batis diops*  
*Platysteira cyanea nyanzae*  
*Platysteira concreta graueri*

Gobe-mouches sombre  
Gobe-mouches soyeux molitor  
Gobe-mouches soyeux à joues noires  
Gobe-mouches soyeux du Ruwenzori  
Gobe-mouches caronculé à collier  
Gobe-mouches caronculé

Black-Throated Wattle Eye

*Platysteira peltata aentalis*

à ventre doré  
Gobe-mouches caronculé  
à gorge noire  
Gobe-mouches nuppe à queue blanche  
Gobe-mouches huppe du cap

White-Tailed Crested Flycatcher  
Crested Flycatcher  
Dusky Crested Flycatcher  
Paradise Flycatcher  
European Spotted Flycatcher  
Yellow-Eyed Black Flycatcher  
White-Eyed Slaty Flycatcher  
Red Collared Flycatcher

*Trochocercus albonotatus albonotatus*  
*Trochocercus cyanomelas vivax*  
*Trochocercus nigromitratus toroensis*  
*Terpsiphone viridis kivuensis*  
*Muscicapa striata*  
*Melaenornis ardesiaca*  
*Dioptrornis fischeri*  
*Lioptilornis rufocinctus*

Moucheronie commune  
Gobe-mouches gris d'Europe

## SYLVIIDAE

Black-Throated Apalis  
Black-Breasted Apalis  
Kungwe Apalis  
Masked Apalis  
Grey Apalis  
Chestnut-Throated Apalis  
Collared Apalis  
Cinnamon Bracken Warbler  
Lopez's Warbler  
White-Chinned Prinia  
Banded Prinia  
Mountain Yellow Flycatcher Warbler  
Red Faced Woodland Warbler

*Apalis jacksoni jacksoni*  
*Apalis flavida*  
*Apalis argentea eidos*  
*Apalis binotata personata*  
*Apalis cinerea cinerea*  
*Apalis porphyrolaema affinis*  
*Apalis ruwenzori catiodes*  
*Bradypterus cinnamomeus cinnamomeus*  
*Bradypterus barretti barroee*  
*Prinia leucopogon reichowii*  
*Prinia beirdii obscura*  
*Chloropeta virescens*  
*Phylloscopus laetus laetus*

Fauvette forestière à moustaches blanches  
Fauvette forestière à gorge jaune

Fauvette masquée  
Fauvette à tête brune  
Fauvette forestière à poitrine barrée  
Fauvette forestière du Ruwenzori  
Fauvette cannelle

Fauvette à gorge blanche  
Fauvette rayée  
Gobe-mouche jaune de montagne  
Pouillot à face rouge

PARIDAE

Stripe-Breasted Tit

*Parus fasciiventer fasciiventer*

Mesange à ventre strié

FUCIIDAE

Black-Esteeo Weaver

*Ploceus melanogaster stephanopterus*

Fisserin noir à tête jaune

Strange Weaver

*Ploceus alienus*

Fisserin alien de montagne

Stuhlman's Weaver

*Ploceus baglafaecnt stuhlmanni*

Fisserin de Bagiatecht

Vieillot's Black Weaver

*Ploceus nigerrimus*

Fisserin noir de Vieillot

Yellow Bishop

*Euplectes capensis*

Euplecte noir et jaune

Grey-Headed Sparrow

*Passer griseus*

Moineau à tête grise

Pintailed Whydah

*Vidua macroura*

veuve dominicaine

ESTRILDIDAE

Yellow-Bellied Waxbill

*Estrilda melanotis*

Astrild noir à ventre jaune

Black-Crowned Waxbill

*Estrilda nonnula nonnula*

Astrild nonnette

Common Waxbill

*Estrilda astrild*

Bec-de-Corail

Black-Headed Waxbill

*Estrilda atricapilla*

Astrild à tête noire

Dusky Firefinch

*Lagonosticta cinerovinacea*

Senegals aaranthe

Red-Billed Firefinch

*Lagonosticta senegala*

Bengali de Reichenow

Red-Faced Crimsonwing

*Cryptospiza reichenowii ocularis*

Bengali de Jackson

Dusky Crimsonwing

*Cryptospiza jacksoni*

Bengali de Salvador

Abyssinian Crimsonwing

*Cryptospiza salvadorii ruwenzori*

Bengali de Shelley

Shelley's Crimsonwing

*Cryptospiza shelleyi*

Black and White Mannikin

*Lonchura bicolor poensis*

Bronze Mannikin

*Lonchura cucullata scutata*

Sperpète à capuchon

Grey-Headed Negro Finch

*Nigrita canicapilla schistacea*

Bengali negre

White-Collared Oliveback

*Mesocharis ansorgei ansorgei*

Bengali vert à collier blanc

Red-Headed Bluebill

*Spermophaga ruficapilla*

Gros-bec à tête rouge

ORIOLIDAE

Black Winged Oriole

*Oriolus percivali*

Crivot à ailes noires

STURNIDAE

Waller's Chestnut-Wing Starling

*Onychognathus walleri elgonensis*

Merle métallique de Waller

Slender-Billed Chestnut-Wing

Starling

*O. tenuirostris theresae*

Etourneau de montagne à bec fin

Stuhlmann's Starling

*Poeyptera stuhlmanni*

Etourneau de Stuhlmann

Sharpe's Starling

*Cinnyricinclus sharpi*

Etourneau de Sharpe

CORVIDAE

Pied Crow

*Corvus albus*

Corneille à scapulaire

White-Necked Raven

*Corvus albicollis*

Corbeau à nuque blanc

PHASIANIDAE

Scaly Francolin

*Francolinus squamatus*

Francolin ecaille

Mombasa Francolin

*Francolinus nobilis*

Cape Quail

*Coturnix coturnix orlangetti*

**MEROPIIDAE**

Cinnamon-Chested Bee-Eater

*Merops oreobates*

Guepier de montagne

**BUCERCYIDAE**

Black and White Casqued Hornbill  
Crowned Hornbill

*Bucanistes subcylindricus subquadratus*  
*lockus alboterminatus geloensis*

Calao à joues grises  
Calao aureole

**STRIGIDAE**

African Wood Owl

*Ciccaba woodfordi nigricantior*

Chouette hulotte africaine

**CAPITONIDAE**

Spotted-Flanked Barbet  
Golden-Rumped Tinkerbird  
Western Green Tinkerbird  
Yellow-Billed Barbet

*Tricholaema lacrymosus*  
*Pogoniulus bilineatus nufumbiri*  
*Pogoniulus coryphaeus*  
*Trachyphonus purpuratus elgonensis*

Barbu à flancs tachetés  
Barbu à gorge blanche  
Trachyphon pourpre

**PICIDAE**

Olive Woodpecker  
Cardinal Woodpecker  
Tullbergs Woodpecker

*Mesopicos griseocephalus*  
*Dendropicos fuscescens*  
*Campethera tullbergi*

Pic Olive  
Pic cardinal  
Pic de Tullberg

**MOTACILLIDAE**

African Pied Wagtail  
Mountain Wagtail  
Well's Wagtail  
Richard's Pipit  
Plain-Backed Pipit  
Long-Billed Pipit  
European Tree Pipit

*Motacilla aguimp*  
*Motacilla clara torrentium*  
*Motacilla capensis wellsi*  
*Anthus novaeseelandiae*  
*Anthus leucophrys*  
*Anthus similis hallae*  
*Anthus trivialis trivialis*

Bergeronnette veuve africaine  
Bergeronnette de montagne  
Bergeronnette du cap  
Pipit de Richard  
Pipit à dos non-strié  
Pipit à long bec  
Pipit des arbres

**HIRUNDINIDAE**

Striped Swallow  
Mosque Swallow  
Angola Swallow  
White-Headed Roughwing Swallow  
Black Roughwing Swallow  
African Band Martin

*Hirundo abyssinica*  
*Hirundo senegalensis montezzi*  
*Hirundo angolensis*  
*Psalidoprocne albiceps*  
*Psalidoprocne holobaena*  
*Riparia paludicola*

L'Hirondelle à dessous strié commune  
Hirondelle des mosquées  
L'Hirondelle d'Angola  
Hirondelle hérissée à tête blanche  
Hirondelle de montagne bleue-noire  
Hirondelle de rive paludicole

**PSYCHOTIDAE**

Olive-Breasted Mountain Greenbul  
Yellow-Whiskered Greenbul  
Slender-Billed Greenbul  
Little Greenbul  
Yellow-Vented Bulbul  
Yellow Streaked Greenbul  
Placid Greenbul

*Andropadus tephrolaeus kibuyensis*  
*Andropadus latirostris eugenius*  
*Andropadus gracillirostris congensis*  
*Andropadus virens virens*  
*Pycoptotus barabatus*  
*Phyllastrephus flavostriatus olivaceogriseus*  
*Phyllastrephus placidus sucosus*

Bulbul des montagnes  
Bulbul à moustache jaunes  
Bulbul à bec grêle  
Bulbul verdâtre  
Bulbul à cul jaune  
Bulbul à stries jaunes  
Bulbul placide

Rufous Breasted Sparrow-Hawk  
Cassin's Hawk-Eagle  
Crowned Hawk-Eagle

*Accipiter rufiventris*  
*Spizaetus africanus*  
*Stephanoaetus coronatus*

Aigle de Cassin  
Aigle couronne

#### RALLIDAE

Moorhen  
Red-Knobbed Coot

*Gallinula chloropus*  
*Fulica cristata*

Poule d'eau  
Foule huppe

#### BALEARICIDAE

Crowned Crane  
Buff Spotted Crane  
White-Spotted Crane

*Balearica regulorum*  
*Sarothrura elegans*  
*Sarothrura pulchra centralis*

Grue couronne  
Râle nain élégant  
Râle pygme

#### ALCEDINIDAE

Blue-Breasted Kingfisher

*Halcyon malimbicus*

Halcyon à poitrine bleue

#### COLUMBIDAE

Olive Pigeon  
Dusky Turtle Dove  
Lemon Dove  
Tambourine Dove

*Columba arquatrix*  
*Streptopelia lugens*  
*Aptopelia larvatā jacksoni*  
*Turtur typanistris typanistris*

Pigeon arquatrix  
Tourterelle à poitrine rose  
Colombe à cou bronze  
Tourterelle tambourinette

#### CUCULIDAE

Black Cuckoo  
Barred Long-tailed Cuckoo  
Emerald Cuckoo  
Yellow Bill  
White-Browed Coucal  
Blue Headed Coucal

*Cuculus clamosus gabonensis*  
*Cercococcyx montanus montanus*  
*Chrysococcyx cupreus cupreus*  
*Ceuthocharis aereus aereus*  
*Centropus superciliosus*  
*Centropus monachus occidentalis*

Coucou noir  
Coucou montagnard  
Coucou foliotocol  
Coucou à bec jaune  
Coucal à sourcils blancs  
Coucal à tête bleue

#### PHOENICULIDAE

White-Headed Wood Hoopoe

*Phoeniculus bollei jacksoni*

Moqueur à tête claire

#### COLIIDAE

Speckled Mousebird  
Blue-Naped Mousebird

*Colius striatus*  
*Colius cafer*

Coliou commun  
Coliou huppé

#### MUSOPHAGIDAE

Great Blue Touraco  
Ruwenzori Touraco  
Black-Billed Touraco  
Renn's Touraco

*Corythaëla cristata*  
*Touraco johnstoni*  
*Touraco schultzei*  
*Muscophaga rosae*

Tulizoko  
Touraco du Ruwenzori  
Touraco à crête blanche  
Touraco du Ross

#### TROGONIDAE

Marina's Trogon  
Bar-Tailed Trogon

*Apaloderma marina marina*  
*Apaloderma vittatus camerunensis*

Couroucou commun  
Couroucou à queue barrée

56

1 ASSISTANCE ACT REQUIRE THAT CDSS OR OTHER COUNTRY PLANS  
2 INCLUDE AN ANALYSIS OF QUOTE (A) THE ACTIONS NECESSARY  
03 IN THAT COUNTRY TO CONSERVE BIOLOGICAL DIVERSITY AND  
04 TROPICAL FORESTS AND (B) THE EXTENT TO WHICH CURRENT OR  
5  
6 PROPOSED A.I.D. ACTIONS (IF ANY EXIST IN THAT COUNTRY)  
07 MEET THOSE NEEDS UNQUOTE.

8  
9 3. PROPOSED PERSONNEL FOR THE ASSESSMENT ARE AS FOLLOWS:  
10

11 GREG BOOTH, AFR/TR REPRESENTATIVE/BIOLOGICAL DIVERSITY  
12 GERALD F. MURRAY, SOCIOLOGIST  
13 STEVEN DENNISON, ECONOMIST/FORESTRY MANAGEMENT  
14

15 4. LOGISTICAL SUPPORT  
16

17 AID/W WOULD APPRECIATE MISSION'S SUPPORT TO ARRANGE:  
18 (1) FIELD TRANSPORTATION IN BURUNDI; AND (2) MEETINGS  
19 WITH APPROPRIATE PVO/NGOS, DONOR COMMUNITY AND HOST  
20 GOVERNMENT PERSONNEL WHERE APPROPRIATE.  
21

22 5. DETAILED SCOPE OF WORK  
23

24 INTRODUCTION  
25

26 THE MISSION HAS REQUESTED THAT THIS ASSESSMENT BE  
27 CONDUCTED DURING THE PERIOD OF OCTOBER 18 - NOVEMBER 4,  
28 1988. THE ASSESSMENT TEAM WILL COMPLETE AN ANALYSIS OF  
29 BIOLOGICAL DIVERSITY AND TROPICAL FORESTS SUFFICIENT FOR  
30 THE MISSION'S CDSS AS REQUESTED (ITEMS A1-A4 BELOW).  
31

32 DUE TO THE SHORT TIME FRAME ALLOWED FOR THIS ACTIVITY,  
33 HOWEVER, AID/W WOULD SUGGEST A FOLLOW-UP ASSESSMENT IN  
34 BURUNDI BY NRMS STAFF LATER IN FY 89. THE AMOUNT OF  
35 TIME PRESENTLY SCHEDULED IN BURUNDI WILL NOT BE  
36 SUFFICIENT TO DEVELOP AN ACTION PROGRAM INDICATING  
37 SPECIFIC LONG-TERM RECOMMENDATIONS (ITEMS C1 AND C2  
38 BELOW). TO DATE, MOST NRM COUNTRY ASSESSMENTS HAVE  
39 REQUIRED TWO TRIPS.  
40

41 (A) BIOLOGICAL DIVERSITY AND TROPICAL FORESTS ASSESSMENT  
42

43 (1) IDENTIFY AND DESCRIBE BIOLOGICAL DIVERSITY AND  
44 TROPICAL FOREST PROJECTS AND INTERVENTIONS IN THE PAST  
45 AND PRESENT WHICH HAVE HAD IMPACTS ON FOOD PRODUCTION,  
46 INCOME GENERATION AND CONSERVATION OF IMPORTANT NATURAL  
47 RESOURCES;  
48

49 (2) DETERMINE THE EFFECTIVENESS OF CURRENT  
50 BIOLOGICAL DIVERSITY AND TROPICAL FOREST PROGRAMS AND  
51 THEIR IMPACT ON: (1) LONG-TERM SOIL FERTILITY; (2)  
52 LONG-TERM SOIL MOISTURE CONSERVATION; (3) MANAGEMENT OF  
53 NATURAL VEGETATION FOR SUSTAINED PRODUCTION OF FORAGE,  
54 WOOD, AND OTHER PRODUCTS; (4) GERMPLASM CONSERVATION AND  
55 IMPROVEMENT.  
56

57 (3) IDENTIFY TECHNOLOGIES AND CONDITIONS NECESSARY  
58 TO FACILITATE ACHIEVING THE ABOVE IMPACTS THROUGH: (1)  
59 INTERVENTIONS (1-2 ABOVE); (2) INCENTIVE PRODUCING  
60

1 (6) "IMPORTANT" KEY INDIVIDUALS; AND (7) "NRM" "TRAINING".

02

03 (4) DETERMINE PRIORITY BIOLOGICAL DIVERSITY AND  
04 TROPICAL FOREST NEEDS AND OPPORTUNITIES;

05

06 (B) ASSESSMENT PRODUCT

07

08 - COMPLETION OF BACKGROUND ANALYSIS REQUIRED IN  
09 SECTIONS 118 AND 119 (TROPICAL FORESTS AND TROPICAL  
10 FORESTS) OF THE FOREIGN ASSISTANCE ACT FOR MISSION'S  
11 CDSS AS DESCRIBED IN REF B.

12

13 (C) ACTION PROGRAM

14

15 INTRODUCTION

16

17 PER REF C, AN ACTION PROGRAM IS DEVELOPED BASED ON  
18 TECHNICAL CONSIDERATION. THE PROGRAM SHOULD BE VIEWED  
19 AS TENTATIVE, THAT IS, DEVELOPED WITHOUT REGARD TO  
20 PROJECTED MISSION APPROVED ASSISTANCE PLANNING OR  
21 STAFFING LEVELS. BUDGET AND STAFFING CONCERNS WILL BE  
22 CONSIDERED AS SEPARATE ISSUES.

23

24 (1) DEVELOP A LIST OF SPECIFIC RECOMMENDATIONS (AND  
25 ASSOCIATED COSTS) AS TO WHERE A.I.D., AND OTHER DONORS  
26 COULD PROVIDE LONG RANGE FINANCIAL AND OTHER SUPPORT (OR  
27 SUPPLEMENT EFFORTS OF OTHER ORGANIZATIONS) TO IMPROVE  
28 BIOLOGICAL DIVERSITY AND TROPICAL FOREST MANAGEMENT IN  
29 BURUNDI. THESE RECOMMENDATIONS WOULD COMPLEMENT OTHER  
30 PLANNED OR ONGOING NRM COUNTRY PROGRAMS IN THE REGION  
31 (E.G. USAID/KIGALI PLANNED FY 99 NRM PROJECT AND THE  
32 A.I.D. FUNDED TROPICAL FOREST PROJECTS IN UGANDA).

33

34 (2) MATRIX OF SUCCESSFUL BIOLOGICAL DIVERSITY AND  
35 TROPICAL FOREST INTERVENTIONS AND THE NECESSARY  
36 CONDITIONS FOR SUCCESS.

37

38 6. ACTION REQUESTED: (1) APPROVAL OF SOW; AND (2)  
39 MISSION CONCURRENCE FOR AFR/TR/ANR TO PLAN A FUTURE  
40 LIMITED FOLLOW-UP ASSESSMENT.

41

42 7. BOOTH'S ETA IS OCT. 17 1310 HR ON SN 497. ETA FOR  
43 MURRAY AND DENNISON OCT. 19 O/A 1200 HR.

44

45 REQUEST SWB FOR DENNISON AND MURRAY.

46

47 DENNISON AND MURRAY WILL BE CARRYING A PERSONAL  
48 COMPUTER. REQUEST MISSION ASSISTANCE IN CLEARING CUSTOMS. SHULTZ

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02 ACTION AID-00

03

04 ACTION OFFICE AFDP-06

05 INFO AFEA-03 AFPD-04 AFCD-02 AFTR-05 ARAF-03 AFEO-02 BIFA-01

06 SAST-01 PPCE-01 GC-01 GCAF-01 GCCM-02 ES-01 STAG-02

07 RELO-01 AMAD-01 ATPC-04 /041 A0

08

09 INFO LOG-00 AF-00 EB-00 /000 W

10

11 -----220362 250952Z /10

12 R 250932Z OCT 88

13 FM AMEMBASSY BUJUMBURA

14 TO SECSTATE WASHDC 1543

15 INFO AMEMPASSY NAIROBI

16

17 UNCLAS BUJUMBURA 04439

18

19 AID ADMIN

20

21 WASHDC FOR AFR/DP, AFR/EA, AND AFR/TR/ANE

22

23 NAIROBI FOR REDSO/ESA

24

25 E.O. 12356: N/A

26 SUBJECT: FY 89 BIOLOGICAL DIVERSITY AND TROPICAL

27 FOREST ASSESSMENT IN BURUNDI - ASSESSMENT TEAM

28

29 REF: (A) STATE 336688, (B) STATE 32584, (C) STATE

30 157498, (D) STATE 297522, (E) BUJUMBURA 3803

1 1. USAID/BURUNDI APPRECIATES AID/W'S QUICK RESPONSE IN  
 2 FIELDING THE ASSESSMENT TEAM. THE TEAM ARRIVED  
 3 BEGINNING OCTOBER 17, THE SAME DAY AS THE MISSION  
 4 RECEIVED REFTEL (A) PROVIDING THE SOW FOR THE  
 5 ASSESSMENT TEAM AND REQUESTING OUR APPROVAL.

36

37 2. WHILE THE MISSION GENERALLY CONCURS WITH THE  
 38 CONTENT OF THE SOW, IT HAS ASKED THE TEAM TO  
 39 CONCENTRATE ITS EFFORTS ON PARA 4.A. OF REFTEL (A)  
 40 WHICH CONCERNS THE TECHNICAL ASPECTS OF THE ASSESSMENT  
 1 THAT WILL BE USED BY THE MISSION IN THE PREPARATION OF  
 2 ITS LCDSS.

43 THE MISSION BELIEVES THAT THE CONTENT OF PARA 4.B.  
 4 (ANALYSIS FOR THE LCDSS) AND 4.C. (ACTION PLAN) OF  
 5 REFTEL A ARE THE RESPONSIBILITY OF THE MISSION IN THE  
 46 PREPARATION OF ITS LCDSS. IN ITS DISCUSSIONS WITH THE

17 ASSESSMENT TEAM, THE MISSION EXPRESSED CONCERN THAT  
02 THE SOW LACKED SUFFICIENT DEPTH IN PROBLEM  
03 IDENTIFICATION NECESSARY FOR PREPARATION OF THE  
04 LCDSS. THE MISSION ALSO BELIEVES THAT THE SOW IS  
05 OVERLY PROJECT AND ACTION ORIENTED. AT OUR REQUEST,  
06 THE TEAM HAS AGREED TO STRENGTHEN ITS RELIANCE UPON  
07 THE GUIDANCE PROVIDED IN REFTEL (B) FOR THE  
08 PREPARATION OF BACKGROUND ASSESSMENTS ON BIOLOGICAL  
09 DIVERSITY AND TROPICAL FORESTS IN CARRYING AND ITS  
10 ANALYSIS.

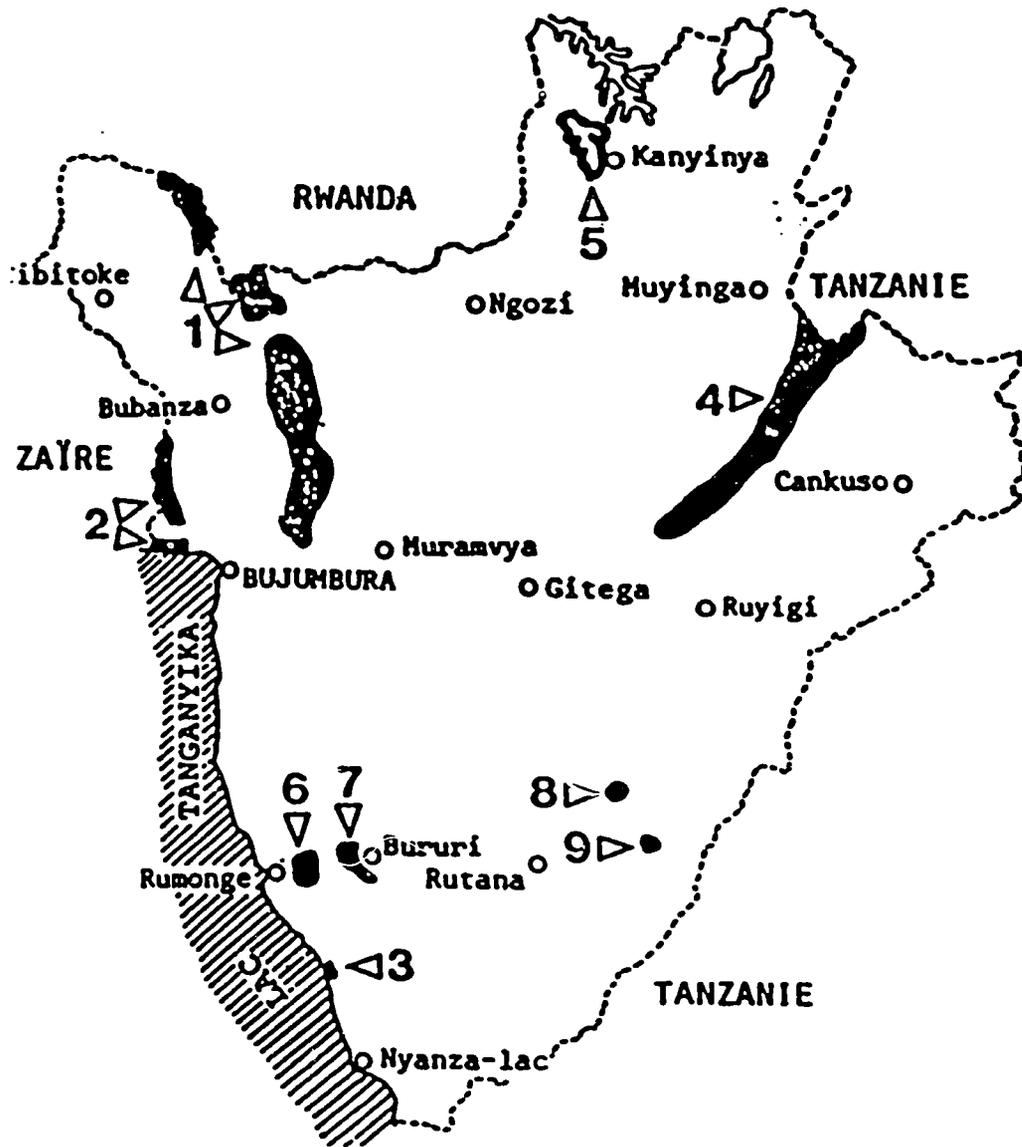
11  
12 3. THE MISSION WILL BE PREPARING ITS CDSS IN  
13 ACCORDANCE WITH THE PROGRAM DIRECTIONS AND DECISIONS  
14 PROVIDED BY AID/W IN REFTEL C (PRELIMINARY STRATEGY  
15 STATEMENT GUIDE) AND REFTEL D (PROGRAM DEVELOPMENT IN  
16 BURUNDI).

17 WHILE NATURAL RESOURCES CONCERNS ARE INHERENT IN THE  
18 ACTIVITIES AGREED TO IN THESE TELEGRAMS, THE MISSION  
19 WILL NOT UNDERTAKE TO DEVELOP NEW ACTIVITIES WHICH  
20 DIRECTLY ADDRESS BIOLOGICAL DIVERSITY OR TROPICAL  
21 FOREST ISSUES FOR AID FINANCING IN THE SHORT TERM.  
22 NOTWITHSTANDING, THE MISSION WILL CONTINUE ITS  
23 MONITORING OF ITS NATIONAL PARKS DEVELOPMENT PROJECT  
24 FOR WHICH IMPLEMENTATION JUST BEGAN THROUGH A PASA  
25 WITH PEACE CORPS. IN ADDITION, WE HAVE REQUESTED THE  
26 TEAM TO DISCUSS WITH THE GRB POSSIBILITIES FOR USE OF  
27 FUNDS THE GRB WILL SOON ACCUMULATE THROUGH THE SALE OF  
28 SEIZED IVORYS BASICALLY, THE GRB HAS BECOME A MEMBER  
29 STATE OF COUNCIL ON INTERNATIONAL TRADE OF ENDANGERED  
30 SPECIES (CITES) AND RECENTLY HAS PUT A STOP TO ILLEGAL  
31 IVORY TRADE WHICH WAS BEING DONE THROUGH BURUNDI. THE  
32 GRB IS NOW NEGOTIATING THE SALE OF RESULTING SEIZED  
33 IVORY WITH CITES, THE PROCEEDS OF WHICH WILL BE USED  
34 FOR NATURAL RESOURCE ACTIVITIES IN BURUNDI. ESTIMATES  
35 ARE THAT THE PROCEEDS OF THIS SALE WILL BE IN THE  
36 NEIGHBORHOOD 20 MILLION DOLLARS.

37  
38 4. RE REFTEL A, PARA 6, FOR THE NEXT SEVERAL MONTHS  
39 THE MISSION'S LIMITED RESOURCES WILL BE CONCENTRATING  
40 ON THE PROGRAM DEVELOPMENT OUTLINED IN REFTELS (C) AND  
41 (D). ANY DECISION RELATED TO TIMING AND NATURE OF A  
42 POSSIBLE FOLLOW-ON NATURAL RESOURCES ASSESSMENT WILL  
43 ONLY BE MADE AFTER THOSE ACTIVITIES HAVE BEEN  
44 COMPLETED.

45  
46 5. GREG BOOTH HAVE CLEARED THIS MESSAGE. PHILLIPS.  
47

# NATIONAL PARKS, RESERVES AND NATURAL MONUMENTS OF BURUNDI

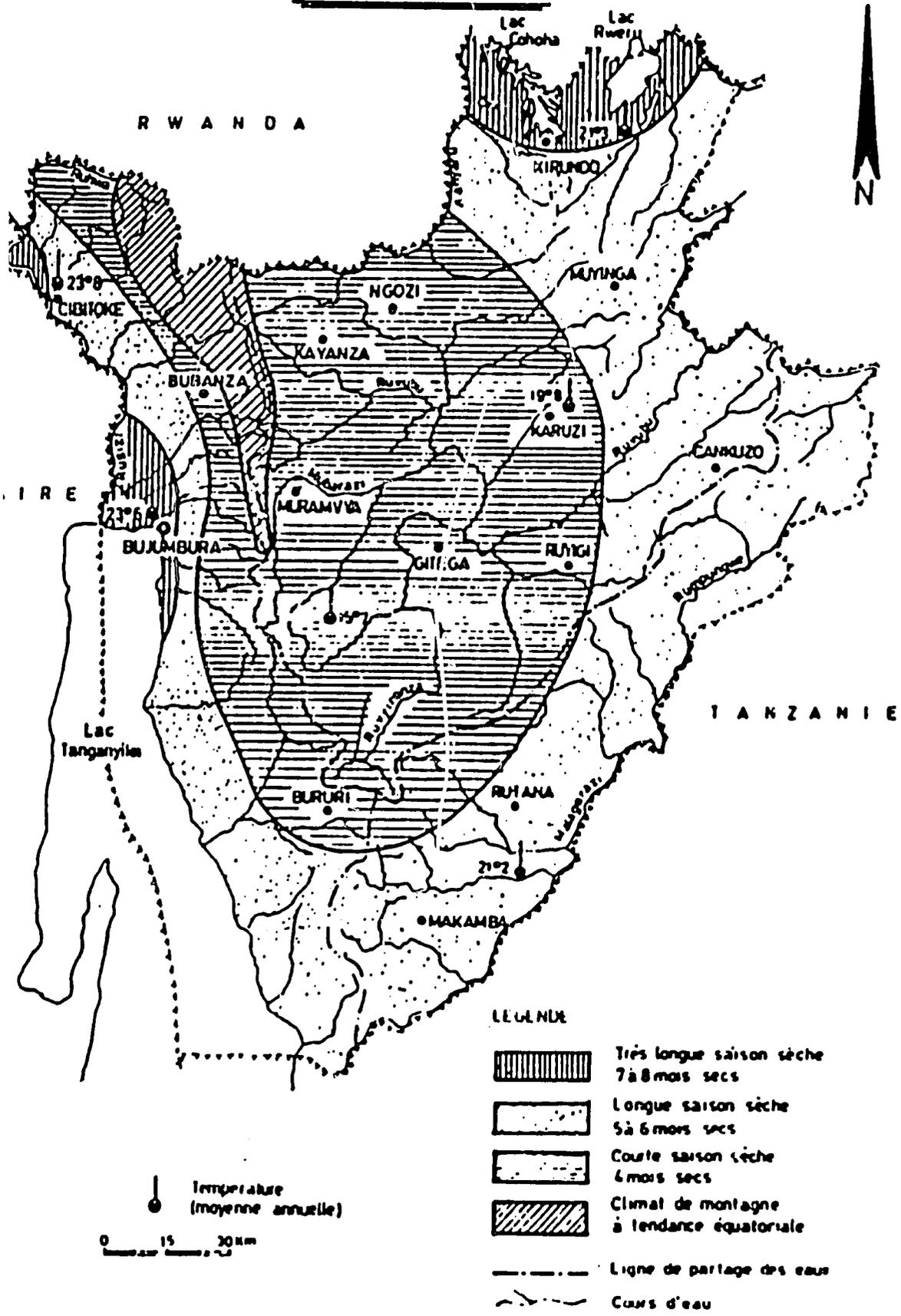


1. Kibira National Park
2. Rusizi Natural Reserve
3. Kigwena Forest Natural Reserve
4. Ruvubu National Park
5. Lake Rwhinda Natural Reserve
6. Rumonge Forest Natural Reserve
7. Bururi Forest Natural Reserve
8. Karera Falls Natural Monument
9. Nyakazu Gorge Natural Monument

SOURCE: U.S. Peace Corps/Burundi, 1987

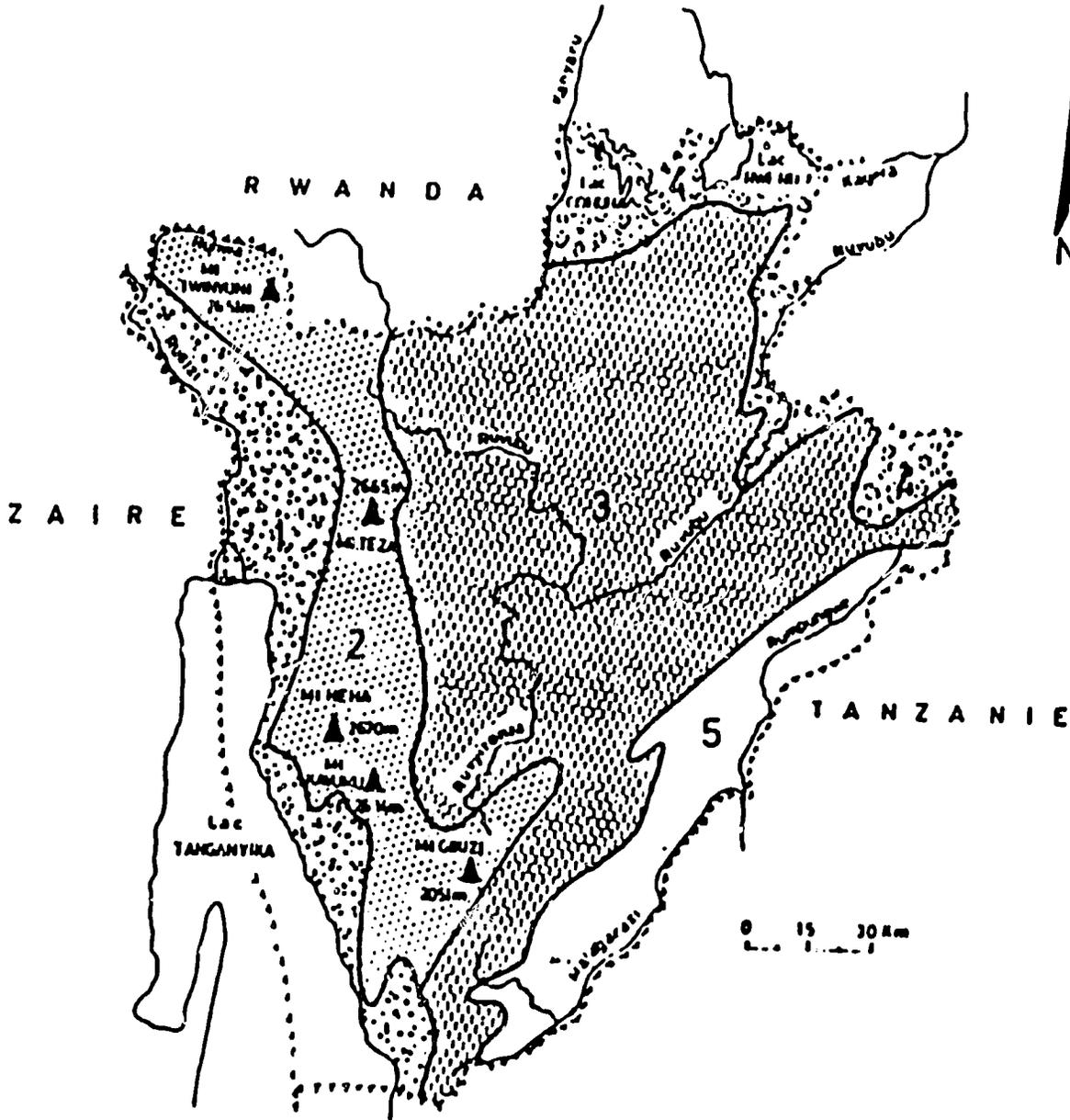


# CARTE DES REGIONS CLIMATIQUES DU BURUNDI



SOURCE: Ministry of Plan/Burundi, 1988

# CARTE PHYSIQUE (Relief) DU BURUNDI



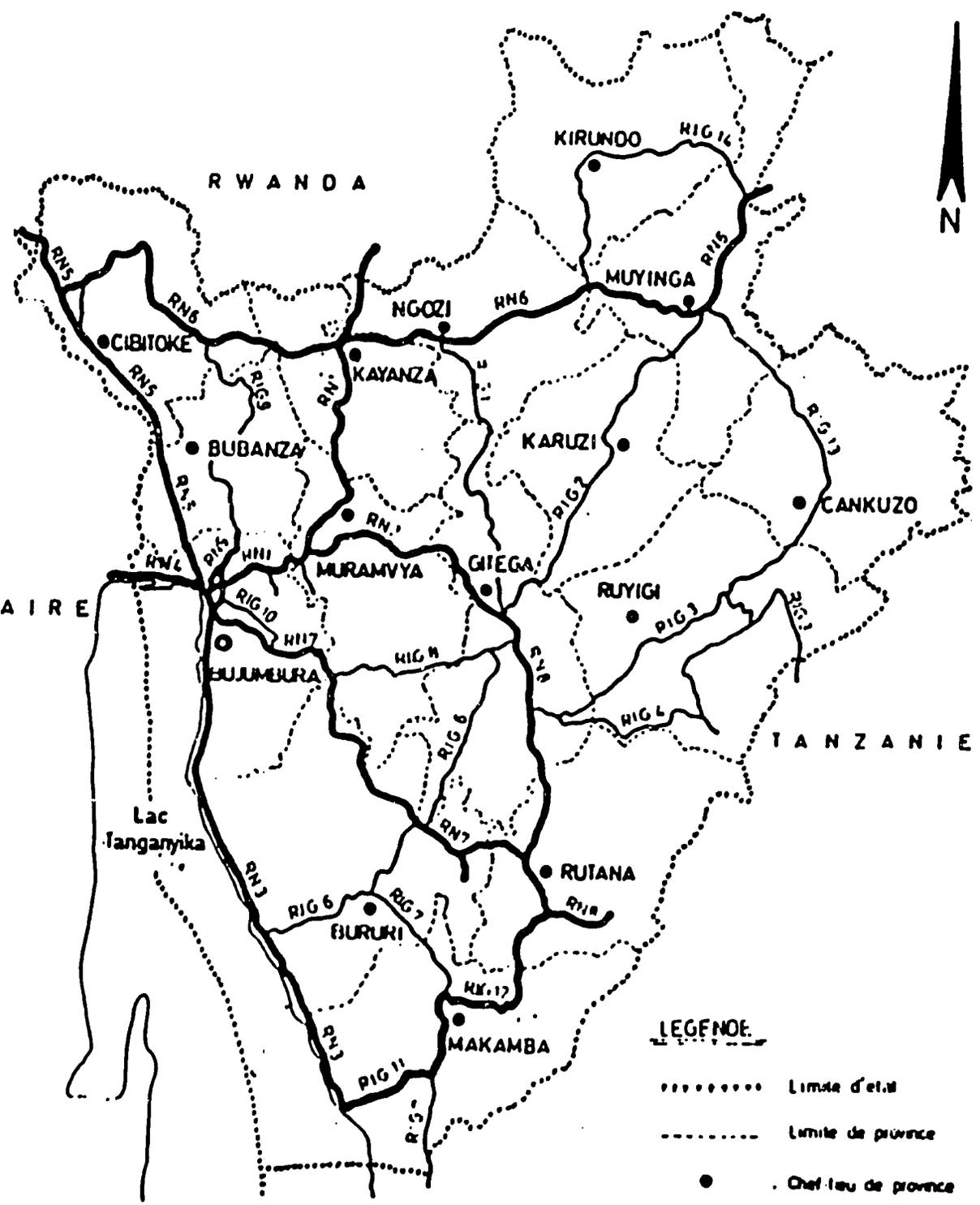
N°	CLASSIFICATION	ALTITUDE	PLUIE
1.	La plaine de l'imbo	774 à 1000m	< 900 mm
2.	La crête Zaire Nil	2000 à 2670m	1600-2000mm
3.	Le plateau central	1500 à 2000m	± 1200mm
4.	Les dépressions du Nord-Est	± 1300 m	800-1200mm
5.	La dépression du Mosso	1200 à 1400m	900-1200mm

▲ MI NEMA  
2670m

: Les points culminants

- 66

# CARTE ROUTIERE DU BURUNDI



### LEGENDE

- ..... Limite d'Etat
- Limite de province
- Chef-lieu de province
- RN 6** Route nationale N° 6
- RIG 7** Route d'intérêt général N° 7

SOURCE: Ministry of Plan/Burundi, 1988

échelle 1:100,000

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