

FROM THE GROUND UP
CASE STUDY NO. 5

Public Policy and Legislation in Environmental Management: Terracing in Nyarurembo, Uganda

*ELDAD M. TUKAHIRWA
Institute of Environment and Natural Resources
Makerere University
Kampala, Uganda*

*PETER G. VEIT
Center for International Development and Environment
World Resources Institute
Washington, D.C., USA*

April 1992

*Edited by
Center for International Development and Environment
World Resources Institute, USA*

Published in Kenya by
World Resources Institute (WRI)
Center for International Development and Environment
1709 New York Avenue, NW, Washington, DC 20006 USA
Tel.: (1-202) 638-6300; Fax: (1-202) 638-0036
Tlx.: 64414 WRI WASH

and

Acts Press
African Centre for Technology Studies (ACTS)
P.O. Box 45917, Nairobi, Kenya
Tel.: (254-2) 744047, 744095
Fax: (254-2) 743995

Printed by English Press Ltd.
P.O. Box 30127, Nairobi, Kenya

Cataloguing-in-Publication Data

Public policy and legislation in environmental management: terracing in Nyarurembo, Uganda/Eldad M. Tukahirwa and Peter G. Veit. – Washington, DC, USA : World Resources Institute and Nairobi, Kenya : Acts Press, African Centre for Technology Studies, 1992.

(World Resources Institute (WRI) and African Centre for Technology Studies (ACTS) From the Ground Up Case Study Series; 5)

Bibliography: p.

ISBN 9966-41-044-9

2

Series Introduction

In 1987, the Center for International Development and Environment of the World Resources Institute, in collaboration with African development institutions and Clark University's International Development and Social Change Program, initiated an ambitious program in Africa known as **FROM THE GROUND UP**. The program seeks to increase local, national, and international institutions' capacity to strengthen community management of natural resources. The guiding belief of **FROM THE GROUND UP** is that important insights can be gained by analyzing effective community-level efforts in natural resource management. In practical terms, taking this approach means identifying communities that are already pursuing ecologically sound self-development and analyzing the reasons behind their success -- local leadership, viable institutions, suitable technologies, etc. Collaborating institutions in Africa have studied and documented the cases in the series to date; manuscripts by other African organizations on successful local initiatives in sustainable development can be submitted to the Manager of the **FROM THE GROUND UP** program to be considered for publication.

FROM THE GROUND UP shares the results of its case studies and their policy implications with other communities, national policymakers, and the international development community. Publications, conferences, workshops, training programs, radio, and video are all used to reach these audiences. Over the long term, these findings will promote decentralized small-scale natural resource management policies, influence the allocation of development resources to the grassroots, and foster self-reliance and sustainability within the communities.

WRI's **FROM THE GROUND UP** case study series is designed for professionals in the development community -- governmental and nongovernmental development and environment planners and field workers, international and national development assistance officers, and concerned academics. The series is intended to inform policy-making, stimulate discussion on environment and development, and assist in training programs for development officers. The African Centre for Technology Studies, based in Nairobi, Kenya, and WRI are jointly publishing the **FROM THE GROUND UP** series for distribution in Africa and elsewhere.

Contents

<i>Acknowledgments</i>	vii
I. Introduction	3
II. Nyarurembo Subparish: Terracing for Improved Agricultural Production	5
<i>Location and Ecology</i>	5
<i>Land Use Changes</i>	8
<i>Effective Resource Management</i>	12
<i>Limitations and Adaptations</i>	19
III. Core Elements of Effective Resource Management	21
<i>Recognized Need and Proven Effectiveness</i>	21
<i>Legitimate Practices and Empowered Local Authorities</i>	22
<i>Appropriate Technical Advice and Effective Extension Services</i>	24
<i>Perceived Security in Land</i>	25
IV. Implications and Recommendations	27
<i>Environmental Policies and Initiatives: An Overview</i>	27
<i>Recommendations</i>	29
<i>Land Tenure Policies and Sound Environmental Management</i>	29
<i>Flexible District Guidelines and By-Laws</i>	31
<i>Extension Services in Policy Implementation</i>	33
V. Conclusions	35
References	36
Appendix A: Kigezi District Soil-Conservation By-Laws	38

4

Figures

Figure 1. Map of Uganda	6
Figure 2. Maps of Kisoro County and Mabungo Parish	7
Figure 3. Band Terracing in Kisoro County (Diagram and Photo)	14
Figure 4. Strip Terracing in Kisoro County (Diagram and Photo)	15
Figure 5. Socioeconomic and Ecological Characteristics Influencing Terracing Type	16

Acknowledgments

This report reflects the contributions of many concerned individuals and institutions. Foremost are Expedit Ndungo, a lecturer in the Department of Sociology, Makerere University, and Arson Mbonye, an agroforester with the Joint Energy and Environment Programme, a local nongovernmental organization. Mr. Ndungo and Mr. Mbonye participated in the field research. Mr. Mbonye comes from the area and helped introduce the research team to local authorities, sharing a personal perspective of the region and activities and translating from the local Kinyarwanda language.

No less important are colleagues at Makerere University, especially Eliezer Kateyo, and at the World Resources Institute, Tom Fox, David Gow, Kirk Talbott, Owen Lynch, and Kara Page. Editorial and production assistance was provided by Kathleen Courier, Hyacinth Billings, Sheila Mulvihill, Faye Kepner Lewandowski and Lauren Morris at WRI, Calestous Juma at the African Centre for Technology Studies (ACTS) in Nairobi, and Alison Field-Juma at ACTS' Initiatives, also in Nairobi. The authors take sole responsibility for any errors or omissions.

Most of the credit for this study goes to the citizens of Nyarurembo Subparish, the local authorities of Mabungo Parish, and

the agricultural extension staff of Kisoro County, who gave their time to explain to us the details of their agricultural practices and to show the research team some sites where their efforts are protecting the natural resource base. Thanks go out to the Mabungo Parish Chief, the retired Bufumbira (now Kisoro) County Chief, and the ex-agricultural extension officer for Nyarusiza Subcounty, who helped introduce the terracing activities in Kigezi (now Kabale) District. Special thanks go to Mr. Charles Ntibakwira, the current agricultural extension officer responsible for Nyarusiza Subcounty, including Nyarurembo Subparish. Mr. Ntibakwira took time off from his busy work schedule to introduce the research team to the communities in Nyarurembo and to share his most effective techniques for learning from and working with the farmers.

Makerere University's Institute for Environment and Natural Resources and WRI's Center for International Development and Environment would also like to thank the World Bank, the United States Agency for International Development, and the Pew Charitable Trusts for their financial support of the **FROM THE GROUND UP** program in Uganda, of which this project is only a small part.

E.M.T.
P.G.V.

In Nyarurembo Subparish, southwestern Uganda, several farming communities have continuously cultivated steep hillslopes for more than 50 years without significant losses in productivity. With the assistance of an enlightened agricultural extension officer, the farmers develop and implement site-specific soil-conservation plans, including the use of band, strip, and bench terraces. The terrace technology employed depends on social, economic, and physical conditions. Although these terracing activities do not conform with specific orders of the district soil-conservation by-laws, they stand out as some of the best soil-conservation practices in sub-Saharan Africa.

Four key issues frame the effective soil-management practices of the farmers in Nyarurembo Subparish:

- The recognized need for soil-conservation measures for continued agricultural productivity is evident in Nyarurembo Subparish and elsewhere in Kabale District, where the terrain is rugged and steep and the human population density is high.

- Since 1939, district soil-conservation by-laws, though not currently acted upon, have legitimized soil - conservation practices and empowered the local authorities to implement and enforce practices approved by them.
- Farmers have benefited from a good cooperative relationship with the local agricultural extension officer, who helps them design soil-conservation strategies that meet local concerns and both subnational and national interests.
- Farmers operate under a customary land-tenure system that provides them with a perceived security in their landholdings and the accompanying natural resources.

This study has implications for other farmers cultivating steep hillslopes, as well as for policymakers and program officers in the governments of Uganda and other African nations and in the international development assistance community. Recommendations regarding national- and district-level environmental policies and legislation are outlined in the Sections IV and V.

7
*

I. Introduction

Landlocked Uganda comprises 266,800 square kilometers and 18.4 million people (WRI 1990). The country sits atop the east-central African plateau, north of the Lake Victoria basin and between the Central and Eastern Rift systems; 84 percent of the land is 1,000-1,500 meters in altitude, sloping gradually toward the Sudan border (Muwonge 1977; University of Arizona 1982). As the plateau meets the two rift systems, the land rises to form mountain ranges and elevated peaks, including the Ruwensori and Bufumbiro ranges in the west and Mount Elgon in the east (University of Arizona 1982).

Uganda is in one of the African regions least prone to natural disasters. The country enjoys generally rich soils and a favorable climate for agriculture. Annual temperature variations are small, humidity levels are moderate, and rainfall over most of the country is adequate and well-distributed. In nine out of ten years, more than three-quarters of Uganda receives in excess of 800 millimeters of rainfall -- considered the limit for reliable rainfed agriculture (Muwonge 1977; University of Arizona 1982). The central plateau is marked by numerous rivers, lakes, and wetlands as well as by an

extensive network of underground reservoirs.

Uganda's economy relies on agriculture which in 1987 accounted for 76 percent of the Gross Domestic Product (GDP) and over 98 percent of total export earnings. Coffee contributed almost 97 percent of the export total, and employed more than 80 percent of the working population (WRI 1990; World Bank 1990; UNDP/World Bank 1989).

Following independence in 1965 and through 1970, Uganda's GDP expanded at an average annual rate of 4.2 percent in real terms. Between 1965-73, agricultural production grew by an average of 3.6 percent per year; the country was self-sufficient in food production and had surplus to export (World Bank 1989, 1990; UNDP/World Bank 1989).

From 1971 to 1986, and especially during the rule of Idi Amin (1971-79), however, Uganda experienced a period of severe political, economic, and social upheaval. In 1971, nominal GDP began to decline; between 1973 and 1980, Uganda's Gross National Product (GNP) fell, in real terms, at an average rate of 2.7 percent per year. (Agricultural and industrial production declined by an annual average rate of 2.3

percent and 11.9 percent respectively.) During this same period, the population grew at an annual average rate of 2.8 percent, translating into an average drop in real per capita GNP of 6.2 percent per year (World Bank 1989, 1990; UNDP/World Bank 1989).

In 1979, after Idi Amin was ousted, Uganda enjoyed a brief period of economic growth; between 1979-83 real GDP grew by an average of 9.9 percent per year. But with new outbreaks of social unrest leading to civil war in 1983, further declines were recorded; from 1984 to 1986 GDP fell by an average of 6.1 percent per year. Despite Uganda's early economic successes, its GDP performance from 1961-87 -- the independence period -- ranks as the poorest of all sub-Saharan African nations -- an average of minus 2.2 percent per year. In 1987, Uganda's GNP of US \$260 per person ranked it among the world's poorest countries (World Bank 1989, 1990; UNDP/World Bank 1989; WRI 1990).

In 1986, the National Resistance Movement came to power and began to address such priorities as rehabilitating the agricultural and industrial sectors and rebuilding the nation's infrastructure. These efforts contributed to an average growth in GDP between 1987-90 of more than 6 percent per year. (WRI 1990; UNDP/World Bank 1989). Although these improvements are beginning to reach the countryside, the decades of political

upheaval and economic chaos severely degraded the living standards of the rural people -- almost 90 percent of the total population (WRI 1990). By 1990, national GNP had only inched up to \$280 (WB 1990).

This report presents the findings and policy implications of a case study on the driving forces behind an effective community-based initiative in resource management and socioeconomic development. It is intended for government policymakers and members of the development assistance community concerned with sustainable grassroots development.

From June 3 to June 8, 1990, four scientists from Makerere University's Institute for Environment and Natural Resources and the Department of Sociology, the Joint Energy and Environment Programme (a local nongovernmental organization), and the World Resources Institute in Washington, D.C., conducted fieldwork in Nyarurembo Subparish, southwestern Uganda. The study examined the area's terracing activities of more than 50 years to protect soil, maintain soil fertility, and stabilize agricultural productivity (*see also* Tukahirwa, E. 1991). The research team collected demographic, socioeconomic, and environmental data through farm visits and direct observations, interviews with key informants, discussions with special interest groups, and secondary source reviews.

II. Nyarurembo Subparish: Terracing For Improved Agricultural Production

Farmers' terracing activities in Nyarurembo Subparish and their ecological, sociocultural, and economic contexts are detailed below.

Location and Ecology

The subparishes of Nyarurembo and Kabindi make up Mabungo Parish in Nyarusiza Subcounty, Kisoro County, Kabale District, in the mountainous southwest corner of Uganda.¹ (See *Figures 1 and 2.*)

Nyarurembo, about 2-1/3 square kilometers, is dominated by two hills -- Sagitwe and Karambi. A third -- Nyarurembo -- straddles the border between Nyarurembo and Kabindi Subparishes. The

hills range 30-152 meters above the area's general altitude with peaks between 2,010 and 2,130 meters above sea level. They are volcanic in origin: raw ash and lava rocks are visible in some places. The hill slopes are generally fertile, but the soils are shallow and highly erodible. In the valley bottoms and lowlands, the soils are mature, deep, fertile, and well-drained (Harrop 1960).

The average annual rainfall in Kabale town -- 34 kilometers from Kisoro town -- is approximately 1,000 millimeters. Nyarurembo Subparish, five kilometers from the Mgahinga Forest Reserve and Game Sanctuary watershed,² probably receives more rainfall. Rain falls throughout the year, but there are two

-
- 1 Kisoro County was formerly Bufumbira County and later Kisoro County, one of seven counties in Kigezi District and in 1986, Kabale District. In May 1991, Kisoro became Uganda's 35th district. This report uses the administrative units and nomenclature that existed during the time of the field work.
 - 2 In 1991, the Mgahinga Forest Reserve and Game Sanctuary were gazetted the Mgahinga National Park. The new National Park is contiguous with the Parc National des Volcans in Rwanda and the Parc National de Virunga in Zaire. This area has been part of the public protected estate since the 1930's

Figure 1. Map of Uganda

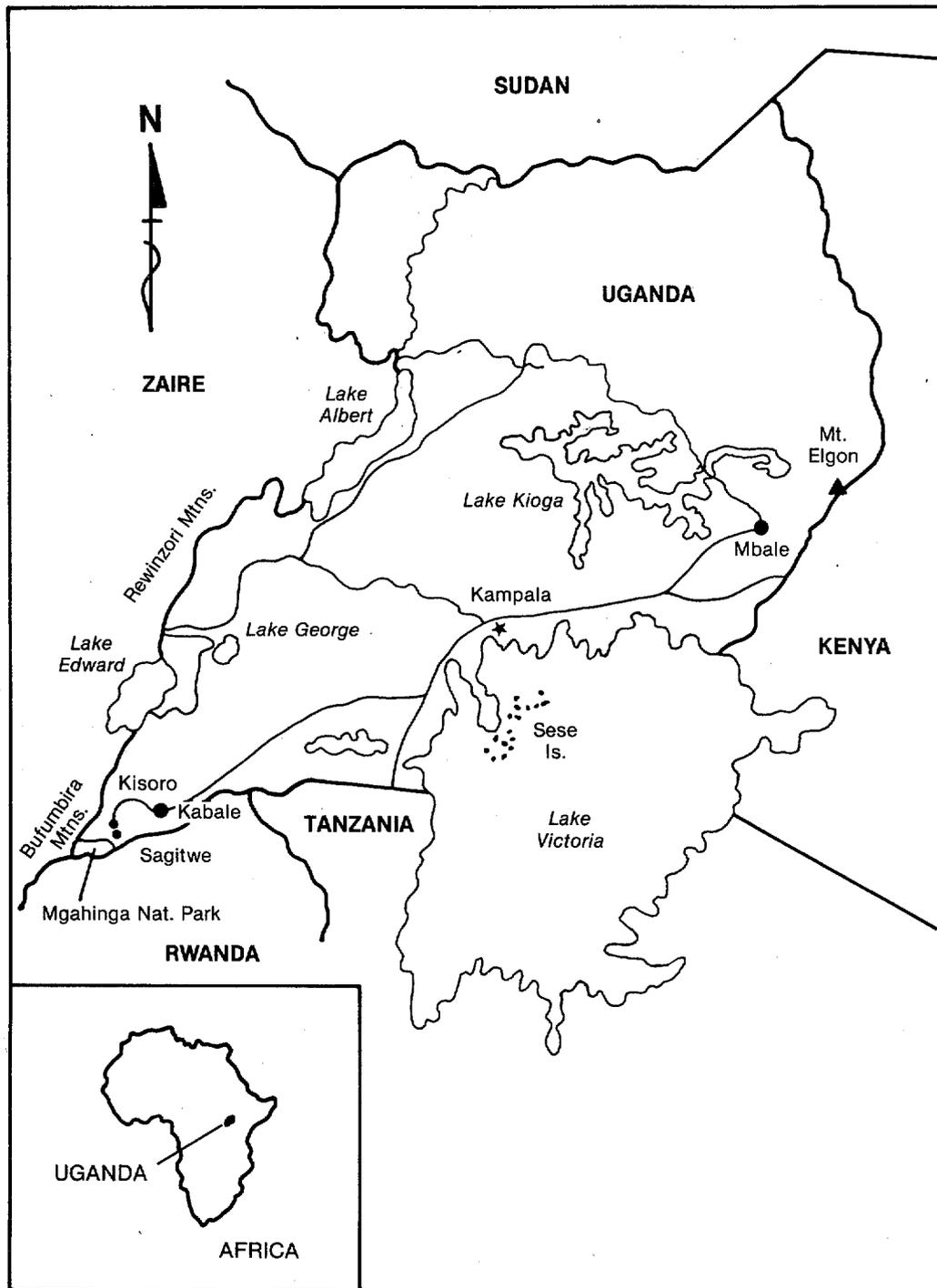
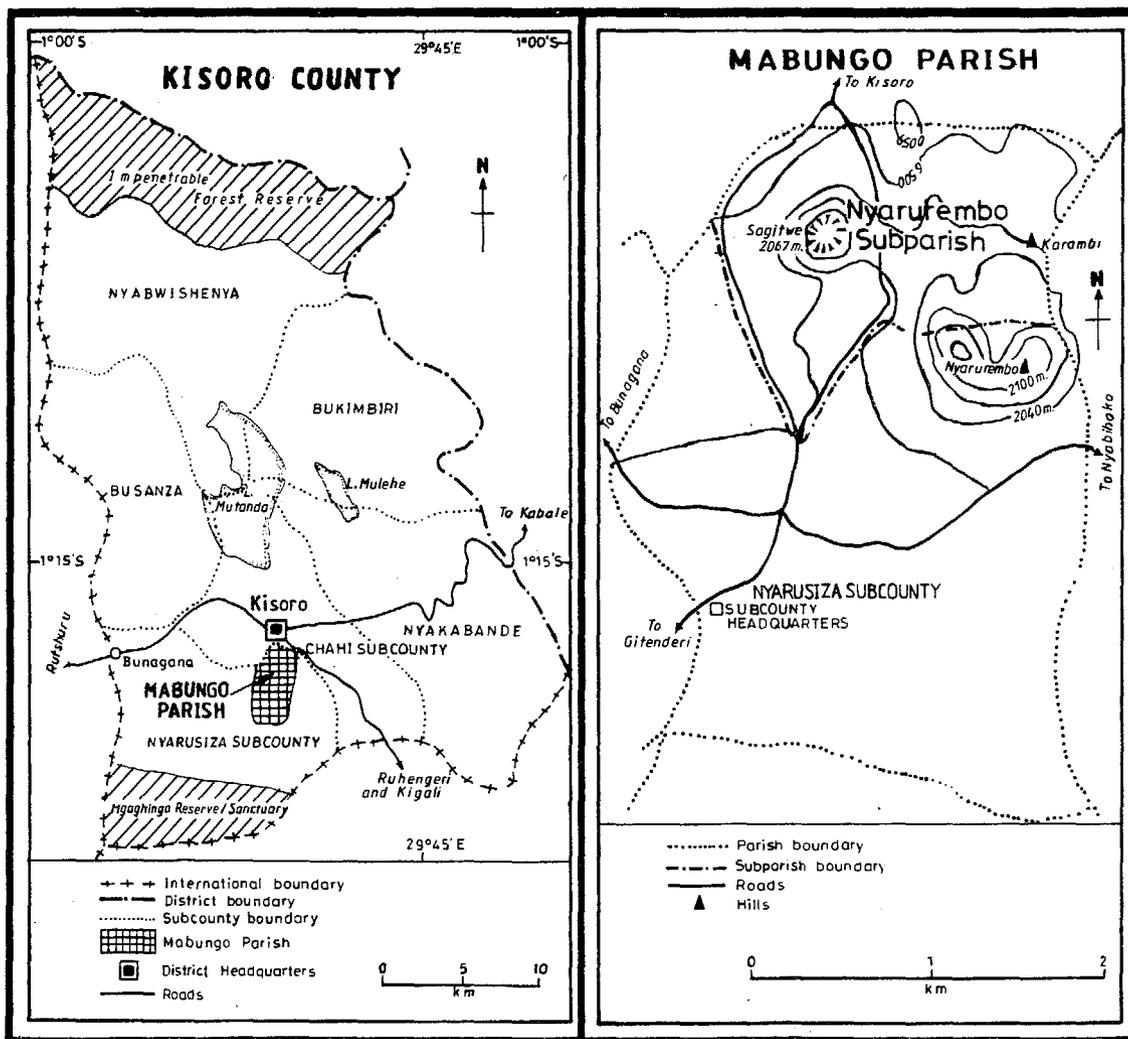


Figure 2. Maps of Kisoro County and Mabungo Parish



7
 12

distinct periods of increased precipitation:
March to May and September to October.

No permanent streams or springs flow through Nyarurembo, and digging wells or drilling boreholes in the volcanic rock is not practical. Runoff from the Mgahinga Reserve/Sanctuary, which residents collect and store in tanks and pipe to Nyarurembo through a gravity-fed faucet, is an important source of domestic water. However, the system often breaks down and the tanks run dry. As a result, most water is collected from seasonal wetlands in the low-lying areas, but during the long dry season -- especially in June and July -- people must sometimes travel 10 kilometers or more to Lake Mutanda or other permanent sources for water.

Nyarurembo's three hills were originally covered with open-canopy montane rain forest (as found in the Mgahinga Reserve/Sanctuary) and the lowlands with bamboo and small shrubs and grasses (Langdale-Brown et. al. 1964). Today, most land in Nyarurembo is cultivated or in fallow; no natural forests remain. Depressions and wetlands are not cultivated, and they are covered with papyrus reeds and palm trees. Most households have planted *eucalyptus* woodlots, sometimes including Blackwattle (an acacia) and temperate pines. For this reason and despite local fuelwood shortages and high prices, Nyarurembo probably has more trees today than 50 years ago.

Land Use Changes

An Historical Perspective

As recently as 200 years ago, the predominant economic activity in southwest Uganda was pastoralism. The original pastoralists were organized within a small kingdom that had several levels of semiautonomous chiefdoms; their leaders had loose, sometimes hostile relationships with each other and with the larger, more organized Tutsi kingdom in Rwanda and Burundi.

In the mid-1800s, emigrants from more densely populated Rwanda began flowing into southwest Uganda.³ The Tutsi pastoralists, in search of grazing lands for their cattle, settled in the valleys and plains, while the Hutu agriculturalists, in search of farmland and political freedom,⁴ farmed the hillsides. By the late 19th century, the Watutsi and Hutus had displaced or absorbed virtually all the area's original inhabitants. When the Germans took over the area in 1899, this region was considered part of Ruanda-Urundi, though after World War I, it became part of British East Africa. (Rwanda and neighboring Burundi and Zaire were administered by Belgium.)

In the early 1900s, Kisoro was a thriving market town. The economic disparity between Rwanda and southwest Uganda

3 Rwanda has the highest human population of any nation in Africa -- 280.1 per square kilometer in 1989 -- compared to 89.2 in Uganda and 14.4 in Zaire (WRI 1990).

4 In Ruanda-Urundi -- now Rwanda and Burundi -- the social and political system by which the Tutsi ruled over the majority Hutu has been likened to feudalism (Maquet 1961). In Uganda, the Hutus had greater autonomy and control of their land.

encouraged additional waves of Rwandans to relocate to the Kisoro region. Chiefs, appointed by the British as administrative heads, encouraged immigration since their income was based on the number of taxpayers in their jurisdictions (Denoon 1972).

As the population increased, the need for arable land forced the farmers to cultivate the steeper hillsides. Animal husbandry gave way to farming. By the mid-1920s, population pressure was damaging land resources. Overcultivation and inappropriate farming methods were denuding the hillsides, causing soil erosion and contributing to declining agricultural performance. Land prices rose and land inheritances declined, increasing land fragmentation and making land acquisition more difficult (Denoon 1972; Tindituza and Kateete 1971). Fuelwood shortages forced people to burn cow dung or to purchase or barter for wood from neighboring areas.

The British established several district farm institutes and, in 1935, organized training courses for extension officers (and some chiefs) on improved agricultural techniques. The courses emphasized improved practices for subsistence (i.e., beans, wheat, sweet potatoes) and cash crop production (i.e., castor oil, coffee, bananas), tree planting, and livestock grazing. An agricultural officer from Kisoro was among the first to receive the training. In turn, he trained a cadre of local agricultural officers who then taught the local farmers.

In 1939, after widespread famine in Rwanda, another large wave of emigrants arrived in Kisoro. The same year, the then-Kigezi District authorities passed a series of soil-conservation by-laws detailing how farmers should protect their lands. (See *Appendix A.*) The by-laws stipulated that farmers construct bunds -- soil mounds no less than three feet wide (1 meter) -- across cultivated hillslopes at intervals not exceeding 16 feet (5 meters).⁵ The by-laws were well-implemented and were enforced by the well-supported agricultural officers and local chiefs. By 1945, virtually all the communities in the district were complying with the by-laws, and, by 1949, the area had reached a standard of soil conservation perhaps unsurpassed anywhere in Africa (Uganda Protectorate 1949).

In 1953, the British initiated a resettlement program, encouraging the residents of Kisoro to move to other parts of Uganda. Those who migrated received up to 10 acres of land (4 hectares), free transport, subsidized food, and a six-month tax exemption. To discourage newcomers and land fragmentation, those who left had to leave their land with immediate relatives. This action reduced the region's population growth rate.

More recently, population growth in the Kisoro region has been most influenced by periods of civil unrest in both Uganda and Rwanda. In 1959, when the Hutus in Rwanda overthrew their Tutsi overlords in a bloody revolt, many Watutsi fled to

⁵ Uganda adopted the metric system in 1969.

Uganda, some to the Kisoro area. During Uganda's period of political instability (1971-86), including the war with Tanzania (1979-80), the tide of migrants reversed; Ugandans and Rwandan refugees fled into Rwanda. With the return of political stability and improved socioeconomic conditions in Uganda, Rwandans and ex-Ugandans began moving again to Uganda.⁶

Local Authority and Institutions

During the German colonial period of "indirect rule" (1899-1919), the indigenous authority structure was formally recognized, supported, and, as a result, strengthened. The Hutus were organized around extended families, and sometimes the patriarchs of extended families came together in loose councils of elders. The dominant position which the Watutsi had enjoyed in Rwanda did not persist in Uganda.

This traditional political structure and responsibility in Uganda was significantly modified by the British colonial powers. The British established new levels of public administration and appointed chiefs for each subparish, parish, subcounty, and county (the latter answered to the District Commissioner). Chiefs were responsible for local administration, tax collection, development, law enforcement, and adjudication.

The British strategically selected chiefs to ensure their control and influence over the

people. Many chiefs appointed to the Kisoro region were Baganda leaders from central Uganda -- the nation's largest ethnic group. The British worked closely with the Baganda and gave them significant internal responsibility during the precolonial period, Buganda was the region's dominant kingdom. Although traditional community-level authority was retained, the local leaders were undermined and their capacity to supervise and mobilize people was hindered, including for such efforts as *bulungi bwansi* labor efforts (self-help). Because traditional local leadership was not hereditary, it eventually died out.

The policy of appointing chiefs to meet political objectives continued after independence. During Idi Amin's regime (1971-1979), chiefs were recruited from the ranks of soldiers. Later, they were selected from among party functionaries and sycophants and became nominees of the party in power. Many chiefs abused their positions by functioning more as security and recruiting agents than as administrative officers. The local people grew increasingly suspicious of the chiefs and less supportive of their leadership.

In response to the decline of public authority, when the National Resistance Movement came to power in 1986, it established a five-tiered system of Resistance Councils (RCs) and Executive Committees -- community, parish, subcounty, county, district (Government of Uganda 1987, 1988, 1990b, 1991a). The chiefs and the RCs are responsible for

⁶ In late 1990, civil war broke out in Rwanda. The fighting spilled over into Kisoro, leading to some outmigration.

security and development in their administrative zones and are a principal channel of communication between the government and the grass roots. Community RC members (RC1) include all residents 18 years and older; higher-level RCs include all Executive Committee members of the RCs immediately below them and in their area of influence. Only RC4 and RC5 members are paid.

Conflicts over authority, roles and responsibilities soon arose as a result of the dual administration of RCs and chiefs. Strong government support of the RCs has fostered their growth in power, often at the chiefs' expense. Local administration, arbitration, and the mobilization of people for community development have increasingly become the responsibility of RCs. Some RCs have even made rules that have not gone through the formal procedures for enacting by-laws but that, because of RC influence, are enforced and implemented. Today, the chiefs' principal responsibilities, inspecting programs and initiatives, are mainly ceremonial.

In addition to these local-government institutions, other organizations are active in Nyarurembo. For example, several groups of 20 or more women sew, knit, and market their handicrafts. They also do farm work for pay -- tilling, sowing, weeding, and harvesting, traditionally considered women's work. Men and women organize into short-term working groups and rotate to the members' farms during peak labor periods. Institutions of another kind in Mabungo Parish include three primary schools, one secondary school, and two churches.

Current Land-Use Practices

At the time of this study, Nyarurembo Subparish included five communities with a total population of 867 (284 taxpayers, adult men) and a density of about 375 people per square kilometer. Most residents are Hutus and speak Kinyarwanda; under 10 percent are Tutsi.

Mabungo Parish -- 10 square kilometers -- comprises 10 communities and 1,955 people (562 households, 640 taxpayers). The average family size in Mabungo is about 3.5 per household, compared to the national average of six to seven. The high population density and limits on land have led to relatively high rates of outmigration, high levels of monogamy, and small families. An estimated 25 percent of Mabungo's households are headed by women.

Farming is the basis for most economic activity in the region; most Nyarurembo land is continuously double cultivated. The average land holding per family in Nyarurembo is 1-1.5 hectares, above the average of less than 1 hectare for Kabale District as a whole. Family landholdings are usually fragmented into five to ten parcels, often five to six kilometers apart; over 80 percent of Mabungo's farmers own land outside the parish lines.

Sorghum, beans, and Irish potatoes are the most common crops cultivated in the fertile valleys and lower hillslopes along with cowpeas, maize, bananas, and plantains. Sweet potatoes and cowpeas are the principal crops grown on the hills. Maize, beans, and both sweet and Irish potatoes are grown on raised beds; peas are broadcast with minimum tillage. Most

families also cultivate vegetable gardens and several fruit trees near their home.

Few Nyarurembo families grow wheat, even fewer barley and millet. Most of the wheat is produced on Nyarurembo Hill and illegally in the Mgahinga Reserve / Sanctuary and sold in neighboring Rwanda. During this study, 10 families from Mabungo Parish farmed in the protected area. Typically, farmers invest little labor and few resources in their wheat farms, especially the illegal ones. The illegal farms are rarely weeded, protected from soil erosion, or safeguarded from marauding birds and other wildlife; onfarm losses are usually high and yields low.

Most households in Nyarurembo own a few goats, sheep, and chickens; under 5 percent own cattle. Animals graze on fallowed cropland, around homesteads, along access paths and the roadside, or on the few remaining communal grazing areas. Four such areas remain in Nyarusiza Subcounty, none in Mabungo Parish.

Because of the region's ecological variability, agricultural seasons and cropping priorities also vary. For example, in Nyarusiza Subcounty, the principal planting season begins in August or September and the secondary season starts in February or March; in neighboring Chahi Subcounty, the major planting season is in January and February and the minor one in August and September. Farm laborers move from area to area during the peak

agricultural periods to take advantage of these seasonal differences. In another example, in Mabungo Parish, Nyarurembo Subparish produces more plantain, sweet potatoes, and peas than does Kabindi Subparish, where more sorghum, beans, and Irish potatoes are grown.

In Nyarurembo, farmers derive most of their cash income from crops. Many families produce five to six bags of both Irish potatoes and sorghum in each of the two annual cropping periods and sell two to three bags of each crop after every harvest. In 1990, a bag of sorghum sold for Shs 20,000 (US \$67; \$1 = Shs 300 at the time of the study); one bag of Irish potatoes sold for Shs 6,000 (\$20). Excluding other income, the average family earns Shs 100,000 - 140,000 (\$333-467) per year from the sale of produce, well above the GNP per capita (\$280 in 1990).⁷

Effective Resource Management

For 50 years, Nyarurembo Subparish farmers have practiced soil and water management. The most visible practices are the terraces on Nyarurembo's hills. The consistency of the terracing in Nyarurembo has gained the farmers recognition. Nyarurembo won the Nyarusiza Subcounty soil conservation award in 1962 (the last time the competition was held). In recent years, more than 100 visitors come each year from government and development - assistance agencies interested in their

⁷ Despite the active market in surplus subsistence crops, the level of commerce in Kisoro today is low compared to the early 1900's. During this study, nearly 80 percent of the town's shops were closed. Most were owned by Asians, and they were closed in 1972, when Ida Amin expelled all foreigners.

terracing activities. At least three forms of terracing are practiced in Nyarurembo -- band, strip, and bench terraces.

Band terraces are contoured bands of land, in this case, 26 feet wide (8 meters), that encircle the hill and are alternately cropped and fallowed. A three-foot (1 meter) path is cut between each two bands (every 52 feet; 16 meters). (See Figure 3.) Nyarurembo farmers rotate the fallowed and cropped areas every six or 12 months. The natural growth on the fallowed band captures soil that erodes from the more exposed cultivated band above it.

Strip terraces are also contoured bands of farmland 26 feet wide (8 meters) that encircle the hill. Between the bands, the farmers plant a three-foot (1 meter) strip of napier grass. (See Figure 4.) The grass strips trap soil eroding down the slope; over time, a natural terrace builds up in and above the strip. Farmers continuously plant two crops per year on the bands.

In Nyarurembo, the terraces are knocked down every eight to nine years, when the accumulated soil threatens to collapse the terrace and the area immediately below the grass strip becomes bare. The soil is redistributed and the grass strips are redemarcated 13 feet (4 meters) above and below their previous locations. The farmers, with assistance from the agricultural extension officer, use a rope knotted at 26-foot (8 meter) intervals to mark the new strip locations and farm boundaries.

Bench terracing, the most labor intensive form of terracing, is the least common in Nyarurembo. Bench terraces consist of permanent level steps cut into the

hillside along contours. The width and depth of the steps vary with the available labor, the hillslope, and soil depth; in Nyarurembo, they are usually less than five feet wide and deep (1.5 meters). The level land is continuously double cultivated. In Nyarurembo, the terrace steps are not systematically reinforced with stones, grass, or trees.

The type of terracing depends on interacting ecological and socioeconomic factors. Below, these are discussed separately for Nyarurembo's three hills. (See Figure 5.)

Sagitwe Hill. Sagitwe Hill was probably first cultivated in the 1920s. Each of the six farmers who originally owned it farmed a strip of land extending from the base to the top of the hill. The hill was demarcated in 1939 and first terraced in 1941. Today about 200 farmers from three communities practice band terracing on the hillslopes, still using the 1939 delineations. The farmers -- many descendants of the original six -- now own sections of bands; many own several, though not necessarily adjacent plots. All hill farmers also own and cultivate land in the low-lying areas; a few farm on other hills in the subparish.

Band terracing is not an effective soil management practice unless one-half of the hill is fallowed at all times. Sagitwe Hill farmers use a six-month rotation cycle and grow two crops per year, one on each band. Over the year, the entire hill is cultivated. In contrast, the original farmers cropped only one time per year, intercropping fields of traditional long-duration crops on the entire hill. The current crop/fallow rotation system has several advantages. In addition

Figure 3. Band Terracing in Kisoro County

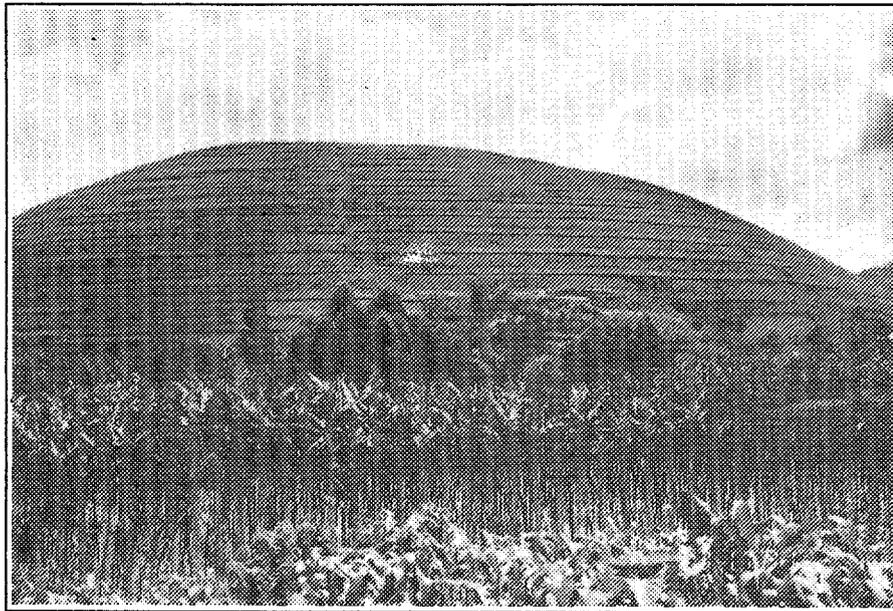
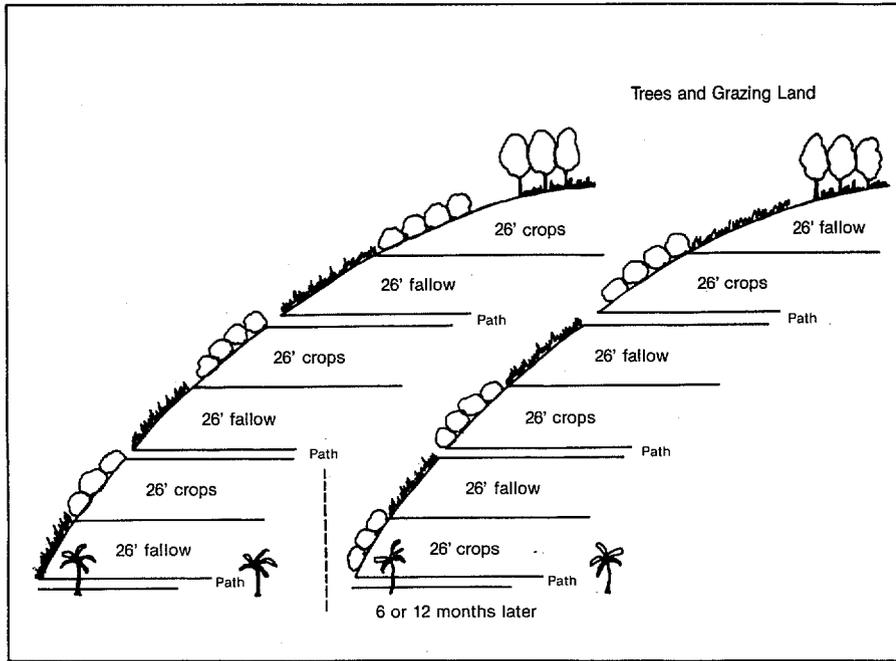


photo of Sagitwe Hill - Eldad Tukahirwa

19
14

167

Figure 5. Socioeconomic and Ecological Characteristics Influencing Terracing Type

Name of Hill	Type of Terracing	Farmers/ Villagers	Average Land Holding In Hectares	Slope	Soil	Coordination Necessary	Crop	Cycle	Principal Problems
Sagitwe	<i>Band (on hill slope)</i>	200/3	1.5	~35%	sandy	type of crops grown	peas/beans complex	6 month crop; 6 month fallow	fallow period necessary
Sagitwe	<i>Bench (in crater)</i>	<25/?	1.5	~25%	deep loam	bench maintenance	sweet potatoes, peas/beans complex	continuous	labor intensive
Nyarurembo	<i>Band</i>	250/5	1.5	~35%	loam	type of crops grown	sweet potato, Irish potato, wheat	12 month crop; 12 month fallow	fallow period necessary
Karambi	<i>Strip</i>	32/1	0.5	~25%	sandy, loam	demarcation	sweet potato/bean complex	continuous	no grazing; rats, birds

to the soil-conservation and water-retention effects of the fallow bands, double cropping usually means more food, less severe hungry seasons, and dispersed labor patterns with lower labor peaks.

To ensure synchronized crop/fallow rotations, all crops must be harvested by the end of each six month cropping period. Meetings of the hill farmers or their representatives (village elders, RC chairmen) and the agricultural extension officer prior to the beginning of each planting cycle are important to reach consensus on the crops to be cultivated and to coordinate planting and harvesting schedules. Twice a year for the past 20 years, virtually all farmers have grown a pea/bean complex. Peas and beans are productive, they mature in three months, and they fix nitrogen in the soil. Farmers with insufficient seed or labor have been assisted by the village leaders and agricultural officer in acquiring the inputs. Sometimes, farmers have had to plant an alternative short-duration crop; rarely have they had to leave their fields fallow during the cropping cycle.

Band terracing was selected by the farmers because they recognize it as an effective soil-conservation measure. In addition, the average landholding of each Sagitwe Hill farmer is relatively large (1.5 hectares), and farmers can afford to leave some of their land in fallow. (See Figure 5.) (Band terracing in fact restricts farming by requiring fallowing.) Strip terraces would build up too quickly owing to the loose soils and steepness of the slope. The terraces would need to be broken down every few years and the hill redemarcated, a laborious task made more difficult by the need to coordinate 200 farmers. Bench terracing is

labor intensive and would strain the small households; the terraces would be difficult to maintain, considering the hill's sandy soils, and reinforcement with stones, grass, or trees would be needed.

The few owners of land in Sagitwe Hill's small crater have cut permanent bench terraces into the deep loamy soils on the crater slopes. The terraces are continuously double cropped, usually rotating between a monoculture of sweet potatoes and a pea/bean complex. The legumes help ensure soil fertility. Crops are grown on the crater bottom; the rim is reserved for pasture. *Eucalyptus* is grown on the crater rim, slopes, and bottom.

Nyarurembo Hill. Nyarurembo Hill is the largest and highest of the three hills. Cultivated by about 250 farmers from five communities in Mabungo Parish and a few from adjacent Chahi Subcounty, it was first demarcated in the late 1930s and terraced in the early 1940s. For reasons similar to those for Sagitwe Hill, farmers prefer band terracing. (See Figure 5.) The average landholding is also about 1.5 hectares; the hill soils are loamy but thin, and the slopes are steep.

Unlike Sagitwe Hill, Nyarurembo farmers operate on a 12-month crop/fallow cycle; the bands are cultivated twice before they are left to fallow for one year. The longer cropping period and more fertile soils allows for longer-duration and nonleguminous crops. Green manuring and the 12-month fallow periods help ensure soil fertility.

Nyarurembo's farmers plant sweet potatoes in February, harvest them in September/October, and immediately

22

broadcast wheat, which is cut in January. They then switch to the fallow bands and duplicate this crop rotation, leaving the formerly cropped bands in fallow. Sweet potato is the preferred first crop because it commands a high price in the Kisoro market. Nyarurembo sweet potatoes mature later (six months, as opposed to four) but are "sweeter" and firmer than those from other regions. Because most buyers prefer Nyarurembo sweet potatoes, they command a higher market price.

Wheat is the preferred second crop. It thrives on Nyarurembo's loamy soils and cooler climate (characteristic of the higher elevation and the second agricultural cycle), requires minimum labor, and matures in three months. If the farmers do not have enough wheat seed, they plant Irish potatoes, sometimes intercropping them with a second crop of sweet potatoes. (Irish potatoes mature one to two months earlier than sweet potatoes.)

During this study, only a small portion of the hill was cultivated. In the midst of Uganda's political and economic hardships, the soil conservation practices of some Nyarurembo farmers began to degenerate. Some began shortening or abandoning the fallow cycle and allowing livestock to graze on the hill and cause crop damage. By the early 1980s, soil fertility on certain plots had appreciably declined. In 1984, a drought hit the region, disrupting the agricultural cycle and increasing the prevalence of pests, particularly in the valleys. Crops were stunted, damage was significant, and harvests were poor. The value of hillfarms appreciated, and, threatened by famine, more farmers felt the need to double crop all land continuously.

The agricultural extension officer called meetings to discuss the increasing neglect of soil conservation, but few farmers attended or complied with his requests for better practices. The ensuing food aid gave farmers even less reason to heed the agricultural officer's advice.

Late in 1984, uncommonly heavy rains caused severe soil erosion on the exposed hillsides. At the suggestion of the agricultural officer, the local chief closed Nyarurembo Hill to all agricultural and livestock activities. The farmers responded by intensifying agricultural activities on their valley plots, but because most sweet potatoes -- an important cash crop -- were grown on the hill, household cash income earnings declined appreciably. Conflicts also arose because the farmers who had continued their terracing practices argued that the hill was closed because of those who had not.

Five years later, in November 1989, the agricultural officer judged the hill to have recovered from overuse, and the chief agreed to reopen it. But during the closure, the terrace intervals and farm boundaries were lost. Redemarcation began immediately, and, by February 1990, several plots had been marked and some farmers were able to plant crops again. Redemarcation will require several seasons to complete; most of it is done during the short periods after harvest and before the next planting.

Karambi Hill. Karambi is the smallest of the subparish's three hills; its slopes are less steep and its soils are sandy, shallow, and less fertile. The hill was first cultivated in 1924; strip terracing has been practiced there since 1936. Today 32 farmers, all

from Karambi village, own and continuously double crop their small hillplots scattered on the hillside.

Karambi farmers prefer strip terracing because it allows continuous double cropping on all hill land (except the grass strips). (See *Figure 5*.) The average landholding per household in Karambi is only about one-half hectare; the farmers can ill afford to leave any land out of production. To maximize production, farmers even crop the area immediately below the grass strip and the terrace side. Most farmers cultivate pole beans from February to April, and sweet potatoes from September to November, principally because of their market value.

Although seasonal farming activities on strip-terraced hillsides are not coordinated, redemarcating the hill requires significant collaboration. Strip-terrace redemarcation shifts household farm plots up or down the hill 13 feet (4 meters). Coordination is needed to remark the hillslopes and reallocate farmplots. The customary tenure of strip-terraced land offers rights to use a certain amount of land instead of rights to certain plots.

Effective strip terracing is possible on Karambi Hill because it is comparatively small and requires coordination among only 32 farmers from a single community. Hill redemarcation is necessary only every eight to nine years because natural terrace build-up is relatively slow on the moderately sloped hillsides. Karambi Hill was last redemarcated in 1985.

Despite the small landholdings, most Karambi farmers produce surplus crops for sale. According to many farmers,

productivity has not declined in the more than 50 years the hill has been continuously double cropped. For example, sweet potato productivity remains stable at 2.5 - 3.1 metric tons per hectare.

In Karambi, soil fertility is maintained by controlling erosion through strip terracing, incorporating a legume into the crop rotation, fallowing the land for one to three months after each harvest, mulching/green-manuring crop residues and grass cuttings, long-term resting and redistribution of soil trapped in the strips, redistribution of the fallowed soil on the plots, and shifting farms onto the former strips through redemarcation.

Strip terracing has some shortcomings. Farmers complained of pests (i.e., rats, birds) that shelter in the grass strips and cause crop damage, especially to the pole beans. (The grass stalks are needed to provide the poles for the beans.) Cattle and other livestock must be carefully watched, or they will eat the grass and trample the terraces. Unlike band terracing, which can tolerate some controlled grazing on the fallow bands and hilltops, no grazing is allowed on Karambi. For this reason, strip terracing is usually practiced on farmland near human settlements or where the livestock can be closely monitored.

Limitations and Adaptations

Although Nyarurembo's farmers have effectively addressed the threat of soil erosion through terracing, two pressing problems remain: land shortage and land fragmentation. Kabale has the fourth highest human population density (197 per

29

square kilometer) of Uganda's 34 districts. As land became scarce, household landholdings shrunk in size and became fragmented. When holdings became so small that families had difficulties meeting subsistence needs, several changes occurred. The population growth rate declined, and the inheritance pattern began to favor leaving all land to the eldest son, thereby increasing outmigration and decreasing household size. The average landholding continued to decline and fragmentation increased, but their rates slowed (Kateete and Tindituza 1971). Today, Kabale's population growth rate is one of the nation's lowest -- 1.9 percent in 1988, compared to 3 percent for the nation.

Nyarurembo's population density -- 375 per square kilometer -- is high compared to the district and national averages (85.6 for Uganda). Mabungo Parish's is 200 people per square kilometer; Nyarusiza, at more than 400, is among the most densely populated subcounties in Kisoro; and Kisoro is the most densely populated county in Kabale District.

The fragmentation problem was first formally addressed in 1959, when the Kisoro County chief was sent to Kenya to

observe land-consolidation programs in Kikuyuland. In his report, he recommended consolidation for Kisoro. Farmers rejected the idea, concerned that their consolidated farms might not be as large or of the same quality and their personal use and disposal of the land might be restricted (Tindituza and Kateete 1971).

Fragmentation has both shortcomings and benefits. Much time is spent traveling to and from plots, making it more difficult to intensify production either through increased labor or certain improved techniques with an economy of scale. With multiple plots, it is more difficult to survey landholdings for acquiring government-granted leases. On the other hand, working several locations spreads the risk of crop failure and makes it possible to cultivate a greater variety of crops. In Kabale District, however, fragmentation levels are so high that the disadvantages probably outweigh the advantages. Consolidation of some household plots would save time and resources without a loss of multiple farm benefits. At any rate, land shortage and fragmentation are issues that need further attention.

III. Core Elements of Effective Resource Management

Several factors contribute to Nyarurembo Subparish's success with terracing.

Recognized Need and Proven Effectiveness

The farmers' recognition of the need for soil conservation on hillside farms, coupled with the proven effectiveness of terracing in controlling erosion and maintaining soil fertility, has helped ensure continuation of terracing for more than 50 years.

In Nyarurembo, the high rural population density has forced farmers to cultivate steep hillsides. The soils there, though fertile in some places, are fragile and highly susceptible to wind and water erosion. Significant amounts of soil can quickly be lost from hillsides that are bare of vegetation and unprotected by terraces. Indiscriminate farming could make productivity plummet. Hillside farming is risky and has increased the threat of environmental degradation.

Nyarurembo's farmers understand the relationships among soil erosion, soil

fertility, and agricultural production, and they recognize the potential for soil loss through erosion on their hillplots. Many have witnessed landslides and gully erosion on poorly managed hillfarms. Before Nyarurembo Hill was closed, some experienced soil loss and yield declines as a result of waning conservation practices. Most Nyarurembo Hill farmers feel the five-year closure was too harsh a punishment for their infractions. But they also believe that they would have suffered more in the long term from consistently poor harvests had the hill soil not been fallowed and had they not recommitted themselves to soil conservation.

Band, strip, and bench terracing are recognized locally as effective soil-conservation techniques; most Nyarurembo farmers credit terracing with ensuring soil fertility and maintaining agricultural productivity on hill farms. As in other sub-Saharan African nations where colonial governments forced soil - conservation practices -- often terracing -- on the people, Kisoro farmers initially considered the measures unnecessary interferences by the British authorities (Thomas-Slayter et. al. 1991). But early on,

farmers in Kabale and the surrounding areas (where the threat of soil erosion is particularly high) acknowledged the effectiveness of terracing, and incorporated the practices with minimum resistance (Bagoora 1989; Byres 1986; Ford 1990; Harrop 1960; Nyamulinda 1988; Tukahirwa, J. 1991).

In essence, people in Nyarurembo transformed officially imposed soil-conservation requirements into community practices that they clearly value and implement. With the exception of the Nyarurembo Hill closure, in the last 15 years, only two people in Mabungo Parish have been warned or otherwise reprimanded for not practicing soil conservation, and no one has been fined or imprisoned.

In the more than 50 years of terracing in Nyarurembo, the practices have been institutionalized within the agricultural strategy of every hill farmer and enculturated within the prevailing socioeconomic value system. This internalization, coupled with the appropriateness and effectiveness of terracing, suggests that these soil - conservation practices are sustainable and that they will continue.

Legitimate Practices and Empowered Local Authorities

The Kabale District soil-conservation by-laws have been a driving force behind effective terracing in Nyarurembo Subparish.⁸ Their principal impacts have been to legitimize soil conservation and to empower local authorities -- the agricultural extension officer, chiefs, RCs -- to implement and enforce conservation practices *that they have approved* (i.e., not necessarily those specifically ordered in the by-laws).

During the colonial period, the British distinguished between African and "non-African" land and created different legislative approaches to implement its soil-conservation policies. On "non-African" lands, the central government imposed a legal duty on the land owner/occupier to prevent soil erosion, and created soil-conservation committees to facilitate sound management.⁹ In areas occupied by Africans, soil-conservation was left largely to local authorities. In the late 1930s, district administrators began adopting more-or-less standard by-laws for soil conservation; by independence, all had approved such by-laws.

8 At the time of this writing, the newly established Kisoro District continues to operate under the Kabale District policies, including the soil-conservation by-laws.

9 The underlying assumption was that the occupier of "non-African" land appreciated soil erosion as a problem and only needed advice from the soil-conservation committees as to how to prevent or control it. On the other hand, African occupiers had to be subjected to specific orders and threatened with penal sanctions for them to practice sound soil conservation (MUIENR 1992).

In 1939, the Kigezi (now Kabale) District Council, together with the District Team and Planning Committee, drafted and approved such soil-conservation by-laws. Kigezi numbered among the first districts in Uganda to have such by-laws in place. These Kabale district by-laws have been amended several times. Although specific conservation provisions are virtually unchanged (*Appendix A*), the punishment for failure to comply with the by-laws has periodically increased. Through independence, first offenders could be fined up to Shs 5 (US \$0.02; \$1 = Shs 300) and multiple offenders up to Shs 10 (\$0.04) and/or imprisonment of up to 15 days. In 1969, the first offense fine was increased to Shs 1,000 (\$3); in April 1989, it was increased to Shs 3,000 (\$10) and/or 30 days in prison.¹⁰

Several institutions are responsible for executing the soil-conservation by-laws. Agricultural extension officers (Ministry of Agriculture) supervise the farm practices ordered in the by-laws, and local RCs, chiefs, and administrative police (Ministry of Local Government) enforce the by-laws.

During the colonial period, the strength of the extension services and policing efforts ensured strict compliance with the by-laws, but after independence extension services received less support and local authority declined (Uganda Protectorate 1949;

Bagoora 1989; Tukahirwa, J. 1991). In the late 1980s, the central government launched several initiatives to strengthen local administration and facilitate community development. (*See below.*) Concurrently, many districts toughened their soil-conservation by-laws, including Kabale. With RC assistance, the extension officers and local chiefs have been able to implement and enforce the by-laws more effectively.

In Nyarurembo, however, the district soil-conservation by-laws governing terracing have not been implemented or enforced.¹¹ The farmers have never established contoured three-foot soil bunds at 16-yard (14.5 meters) intervals on their hillfarms. Bund terracing is not practiced, in part because the agricultural officer does not recommend it, and the sanctions are not enforced because he has not advised the local chiefs, RCs, and police to do so. Alternative terracing forms are endorsed by the local authorities who recognize their effectiveness and appropriateness. Villagers follow the guidance and orders of the agricultural officer, chiefs, RCs, and police because they perceive their power and actions to be legitimate and because few farmers know the specific mandates and implications of the by-laws. From a legal perspective, however, these civil servants should be reprimanded for not performing their duties.

10 District by-laws must be approved by the Minister for Local Government. The backlog of district by-laws at the ministry has meant long delays in the approval process. During the study, the 1989 revision of the Kabale soil conservation by-laws had not been gazetted by the central government but was being implemented.

11 Other aspects of the by-laws are not practiced or enforced. For example, few paths and access roads are protected by water runoff channels, and annual crops are often planted within 9 feet (3 meters) of water courses and roads.

The legitimacy of the local authorities in the eyes of the farmers has also enabled them to impose sanctions not prescribed in the by-laws, such as the five-year closure of Nyarurembo Hill, even on activities not prescribed in the by-laws. Because the closure jeopardized the livelihood of the people and adversely affecting their well-being, it probably will deter future lapses in soil-conservation practices. The farmers said they will adhere to the crop/fallow cycle even if famine again threatens. Since the hill closure, community vigilance of terracing practices has increased, further ensuring that farmers' conservation efforts will not wane.

Appropriate Technical Advice and Effective Extension Services

Another principal force behind Nyarurembo's terracing success is the efforts of the Nyarusiza Subcounty agricultural extension staff. Although responsible for all agricultural activities in the subcounty's seven parishes, the current officer -- in his position since 1975 -- focuses on terracing Nyarurembo's three hills. He hopes to develop them as model soil - conservation sites where farmers from other areas can come to learn about terracing. His first priority is Sagitwe Hill, then Nyarurembo and Karambi.

The current agricultural officer, now an elderly man, was born, raised, and still lives in a subparish neighboring Nyarurembo. Although not formally educated in the agricultural sciences, he comes from a farming background and his family continues to farm. Years ago, he attended

two five-day training courses in Kabale on improved farming techniques. Since he became an agricultural officer, he learned extension skills and other improved farming practices from his colleagues and predecessors. (In fact, he was taught by the first agricultural officer from Kisoro to receive training from the colonial government in 1936.)

The agricultural officer's effectiveness can be attributed to his genuine interest in the people's welfare and his good relations with Nyarurembo's farmers. The close proximity of his home allows him to visit frequently and to develop long-term professional relationships and personal friendships. The officer's skills include listening, negotiating, mediating, and strategic planning. His confidence in his knowledge of agriculture and local socioeconomic and ecological matters enables him to work outside by-law orders.

The agricultural officer performs at least two functions critical to effective terracing activities -- facilitating the planning and implementation of hill-specific terracing practices and linking farmers with local authorities and development agencies.

The extension officer recognizes that farmer participation in decision making is critical to effective soil conservation. He helps organize and facilitate meetings of hill farmers to develop hill-specific terracing strategies that best meet local needs and constraints and district/national interests in soil-conservation, to reach consensus on critical terracing actions, and to coordinate terracing and related activities. (See *Figure 5.*)

The local farmers actively seek the agricultural officer's advice and assistance. They even refuse to undertake some activities without them. For example, Karambi Hill farmers will not redemarcate their hill without the agricultural extension officer, who not only helps mark the hill but acts as an arbitrator to ensure that each farmer's plot is as large and good as his previous farm.

The agricultural officer is also an important link between the farmers and local authorities. He is effective in this role because of his good working relations with the local chiefs, RCs, and other civil servants.¹² He has often facilitated visits to Nyarurembo and participation in farmer meetings by representatives of development assistance agencies and by local leaders. The backing of local authorities has further legitimized the officer's recommendations and proposed actions (e.g., closure of Nyarurembo Hill) and helped mobilize people for soil conservation. His close relationships with local leaders have also led to direct support for Nyarurembo. Through his contacts, the agricultural officer has mobilized resources and other external assistance to provide inputs critical to local agricultural activities. In so doing, he has become a local leader.

Perceived Security in Land

The largest portion of land under human occupation and use in Nyarurembo and throughout Uganda is held in customary tenure (MISR 1988, 1989; Slade and Weitz 1991). But unlike much land in Uganda, which is held communally, most land in Nyarurembo is held by individuals or households. This is the case for the fixed land tenure on Sagitwe and Nyarurembo Hills and the rotating land use system practiced on Karambi.

The current customary land tenure system in Nyarurembo provides owners with access to and control of land, as well as the right to inherit, rent, or sell the land and its resources. Decisions by traditional leaders and local government authorities regarding land and resource conflicts have been based on the rights of customary land ownership. Farmers have little experience with the possible loss of rights to their land. They feel secure in their land and other holdings and in their customary tenure.

The farmers' perceived security in their land has encouraged ecologically sound land-use management with long-term goals and discouraged unsustainable farming practices and the mining of natural resources for short-term objectives. Farmers practice band terracing which requires that they forgo cultivation on their

¹² Prior to joining the Ministry of Agriculture, the current officer was the Kisoro Town Clerk. As such, he worked closely with a wide range of traditional and public local authorities.

30

hillplots during the fallow cycle to ensure soil fertility for future production. They also invest significant time and effort in coordinating crop production and hill redemarcation for effective terracing, often at high opportunity costs to individuals and households. These efforts stand in stark contrast to the neglect and mismanagement of the land illegally farmed in the Mgahinga Reserve/Sanctuary.¹³

The customary land tenure systems in Nyarurembo have evolved considerably since the precolonial period as local circumstances and needs changed. The high population density and traditional settlement pattern of extended families living on dispersed compound farms led to customary tenure systems that emphasized landholdings for extended families, instead of ethnic communities. As a result of the waves of emigration, a family's neighboring compounds often house unrelated families. With further increases in population pressure and commercialization of land, decreasing landholdings and increasing land value, the extended family system evolved into systems based on household and individual tenure. And, as local government authorities recognized customary tenure, household heads strengthened their position as landowners. After independence, alternative state - designed tenure systems were introduced.

But they have had limited impact on local customary tenure patterns. (*See below.*)

Today, land in Nyarurembo is one of the most important productive resources. It has become a valuable commodity for sale and is the cause of most common law suits and other legal concerns, whether regarding inheritance or sale. During this study, 0.5 hectares was selling for more than Shs 200,000 (US \$667), more than twice the average per capita GNP in Uganda.

Customary tenure systems continue to evolve. For example, a father would traditionally divide his land equally among his sons, but, with the growing shortage of land, many now give their entire holding to the eldest son to ensure minimum landholdings and limit fragmentation. Further, women in traditional society rarely held land rights and were not much involved in decision-making regarding land and land use. Today more women are obtaining land rights, often through purchases, and are exercising newly acquired rights to protest against, for example, the sale of land by husbands. (A woman's veto is increasingly often being recognized by elders, chiefs, RCs, and judicial courts.)

13 The government approved gazetting of the Mgahinga National Park in early 1990. Farmers expected that this change would lead to immediate further restrictions on local use and to stricter enforcement. This policy, however, was not implemented until late 1991. During this study, the number of farms in the protected areas was higher, they were larger, and farmers' investments in them lower than in previous years. The rate of ecological degradation was accelerated.

IV. Implications and Recommendations

The factors behind effective soil conservation in Nyarurembo have implications for other farmers, government policymakers, and development assistance officers supporting sustainable agricultural production and resource management.

Environmental Policies and Initiatives: An Overview

Since assuming power in 1986, the National Resistance Movement has made strides to address natural resource management and local development issues (Government of Uganda 1990a, 1991a). Particular attention has been given to national natural resource and environmental policies, legislation, and institutions and to strengthening decentralized administrative and political authority for local development and environment purposes.

In 1986, the government established the Ministry of Environment Protection (MEP) to formulate environmental policies and to

develop and implement programs to meet Uganda's most pressing resource management needs.¹⁴ In 1987, Makerere University's Institute of Environment and Natural Resources was formed to conduct environmental research. The government also encouraged the establishment and work of environment and development nongovernmental organizations (Slade and Weitz 1991).

The MEP has initiated several environmental policy and programming exercises. In 1987, in collaboration with the United Nations Environment Programme, it prepared nine issue papers on the state of the environment (UNEP 1989a). These reports backed a 1990 government request for World Bank assistance in preparing a National Environmental Action Plan (NEAP). The NEAP's goal is to define policy/legislative actions, institutional strengthening guidelines, and activities/investments for a more environmentally sustainable national development strategy (Kramer et. al. 1989; USAID 1991; Slade and Weitz 1991; Government of Uganda 1991b).

¹⁴ In 1991, the MEP was merged with other ministries to form the Ministry of Energy, Minerals, and Environment Protection.

32

The government is updating existing policies and legislation and is developing new policy, as needed. Between 1989 and 1991, the national wildlife and forestry policies were revised and a new wetlands policy drafted (MUIENR 1992). In 1991, the government upgraded the status of several protected areas, including the gazetting of four new national parks, to expand the nation's fully protected area. As part of the NEAP effort, a draft national environmental policy was prepared and is now in review (UNEP 1991). Many district authorities are also reviewing and updating their guidelines, policies, and by-laws.

At the international level, Uganda is a member of many United Nations and Organization of African Unity-related regional and subregional environmental and development organizations and is a signatory to several international environmental conventions. In June 1989, the government hosted the first African Inter-Ministerial Conference on Environment and Sustainable Development.

After independence, the 1962 constitution provided for decentralized government. A system of planning was established at the district level based on District Team/Planning Committees consisting of representatives of the central ministries and departments at the local level. But for various reasons, the Committees were not effective planning and implementation organs. In 1967, a new constitution put into place a highly centralized system of government which remained until the National Resistance Movement came to power in 1986.

The new government recognizes the role of its rural people as principal resource

users in environmental management and has worked toward devolving political and administrative authority for development purposes and strengthening the responsible subnational institutions. These efforts include a new constitution sensitive to these issues (UCC 1990), and the strengthening of districts to be more responsible for and control local administration and development. District authorities now have the support of the central government to establish district policies and by-laws on local issues to meet these goals.

In addition to establishing the five-tier structure of Resistance Councils and Committees, the government is reviewing and redefining the various units of administrative levels to make them more efficient managerially and more responsive to local circumstances. The new units are geographically smaller and include fewer people than the old. They also reflect recent demographic and land use changes and better recognize ethnic groupings and ecological conditions. Coupled with increasing support, the new structure can respond to local environment and development needs.

As part of its multipronged program to strengthen local administration, the Ministry of Planning and Economic Development and the Ministry of Local Government launched an effort in 1989 to develop a methodology for district development planning and to identify financing options (Government of Uganda 1990a, 1990c, 1990d). Pilot planning exercises were conducted in three districts. In addition, the government, as part of the NEAP, expects to prepare district environmental profiles and action plans.

RECOMMENDATIONS

Government efforts have advanced local natural resource management and development issues. Following are several options for policy-makers to further strengthen these initiatives.

Land Tenure Policies and Sound Environmental Management

The relationship between public policy and local natural resource management is not well-understood. Yet, it is recognized that land-tenure policies influence local resource management (McAuslan 1967; Barrows and Roth 1990; Bruce and Fortmann 1989; Roth et. al. 1989; LTC 1990; Lawry 1990). Nyarurembo farmers' perceived security in land and resources is a primary reason for their effective soil conservation. This security is based on customary tenure, but national laws permit the government to take away customary rights at any time with no advance notice and only minimum compensation.

The Land Reform Decree of 1975 declared that all land (including most resources) is public land administered by the Uganda Land Commission (Government of Uganda 1975). With the exception of limited free licenses for short-term land use, the leasehold became the only land estate legally permissible in Uganda. All forms of private ownership were abolished or by default, became customary tenancies on public land that should be converted into leaseholds -- 199 years to public and religious bodies, 99 years to individuals.

Leaseholds entail an exclusive right to use and occupy land. Use is strictly controlled by the conditions set forth in the agreement as well as by national and district statutory regulations, such as the soil-conservation by-laws. Most lease agreements contain "development conditions" intended to promote building and industrial/agricultural development. Much land has been degraded in the name of development; few if any leases have been granted for subsistence farming (MISR 1988, 1989; LTC 1990).

The Land Reform Decree allows the system of occupying land by customary tenure to continue but significantly denigrates its status by failing to provide customary rights holders with national legal protection of their land and investments. The Land Commission can terminate customary tenure and lease occupied land without even giving notice to the customary occupants. An evictee is entitled to be resettled on other land and to be compensated -- but, only for structures erected, other developments or growing crops. At present, labor-intensive improvements, such as bench terraces and irrigation systems, are not recognized as developments and thus do not warrant compensation.

Customary rights can no longer be passed on from one person to another, whether by succession or sale, though lease rights and land developments can be transferred for value. New customary tenure can be acquired only with the Land Commission's consent.

The decree assumes that customary tenure and private ownership invite poor land management and that static customary

rights and obligations are "incapable of rising to the challenges posed by the modern needs of conservation and development" (UNEP 1989b, p. 18; but see also Migot-Adholla 1991). Customary rights are perceived as obstacles to development, and private ownership is thought to make centralized control of land difficult. Centralized control assumes that state ownership of land -- through lease conditions and statutory regulations -- is the best way to control land use and achieve "optimal utilization of the land" (UNEP 1989b, p. 6).

Despite the decree, customary tenure predominates in rural Uganda. Farmers perceive security in their land because they have confidence in their customary tenancy. Further, few know many details of the decree or its implications; and many recognize the government's inability to implement and enforce it effectively (MISR 1988, 1989; LTC 1990). At the time of the study, only two Nyarurembo farmers had sought and acquired government leases.

As the need for land increases, land values will continue to rise. Competition for available land will intensify, and the number of requests for leases on rural land occupied by customary tenants will increase. Increasing levels of support for the Land Commission and its subcounty land committees would enable them to expedite lease applications and many customary rights holders could be evicted. Poor land use and civil unrest would probably ensue.

Sensitive to these and other potential land problems, in 1987 the government began reviewing its existing land policies and legislation. The results of these studies

and a land policy workshop in 1989 recommended a repeal of the 1975 Land Reform Decree and the establishment of a uniform national system of private ownership. These recommendations, after further discussion, were incorporated into a proposal, including a legislative draft, and are currently before a senior government committee for review and approval prior to submission to Cabinet (Paul Bakashabaruhanga, Permanent Secretary of the Ministry of Lands, Housing and Urban Development, and Lawrence Eturu, Director of the Agricultural Secretariat of the Bank of Uganda, *pers. com.*).

Uganda's land-tenure policies and practices should facilitate the evolution of tenure systems that protect farmers' access to land and resources, encourage sound land use and management, and contribute to socioeconomic development. Based on this case study, three recommendations are proposed to strengthen Uganda's legal land tenure system:

First, the government of Uganda should repeal the Land Reform Decree of 1975. The decree does not ensure that people have access to land or adequate protection from eviction. It discourages sound land use, interferes with local resource management, and, thus hinders agricultural development. It also assumes that the government can effectively manage all land and resources, administer all leaseholds, and enforce all land use regulations. In fact, the tenure policies in many African nations ensure state jurisdiction over most land and resources, but few governments, if any, have effectively managed all public lands (Mugerwa 1966; Lawry 1990; LTC 1990). Other African countries' experiences suggest that lease conditions and sanctions

do not necessarily promote sound agricultural development or resource management (MISR 1988, 1989; LTC 1990).

Second, Uganda's government should consider converting most types of legally constituted and practiced land tenure into some form of private property. Private property includes a range of rights regarding the use and disposal of land and resources at various ownership levels -- individual, household, extended family, community, and village cluster, for example. Private property offers real security in land and investments and enables people to use their land as collateral for obtaining credit. Local resource management is more effective and efficient than centralized control, and it frees scarce government resources for activities that better contribute to socioeconomic development (Chambers 1983, 1985, 1988; Leonard and Marshall 1982; Uphoff 1986). To facilitate the switch to a private property regime, relevant government institutions will need to be strengthened. Incentives could also be developed to encourage customary tenants to initiate conversion and the private sector to participate in land surveys and other aspects of the titling process.

Third, Uganda's government should enact a flexible legal tenurial system in which the existing customary tenure systems, if appropriate, are recognized in the institutionalized form of private property. No single form of tenure is suited for all people. Legal tenure systems should recognize and incorporate the variability of customary rights to land and resources (Shipton 1989). When appropriate (i.e., when the customary system meets the above stated tenure policy objectives), the form and level of ownership of private

property and the rules and obligations of land use should be based on local customary tenancy and traditional land use. For example, the legal form of private property in Nyarurembo should emphasize ownership at the individual and household levels. While among the pastoralists in semi arid and arid northeast Uganda, the legal system should recognize the traditional tenure system based on communal ownership and use of grazing land.

Conditions for conversion to private property will vary, depending on the nature of the existing tenure system in practice. Many customary tenants on public lands could be formally recognized and granted title to their land. Public land legally leased by smallholders could simply be converted to private property at the individual level. In Buganda, where the British established mile-square estates (*mailo*) for members of the Buganda nobility -- many of which are now leased to smallholders -- the government should return the land to the family of the original customary owner/occupier or give it to the current tenant, and the current owner compensated for the lost interest. When public interests would, in fact, best be served if the government controlled certain tracts of occupied land, compensating the current users/owners for the land, its resources, and the developments at market values will need to be considered.

Flexible District Guidelines and By-laws

Private property does not necessitate state relinquishment of land use regulation.

36

Statutory regulations, such as zoning restrictions on private property at the national and subnational levels are a well-established means of controlling some land and resource uses that have undesirable effects on public welfare. Equally effective are incentives (e.g., such as land taxes) to encourage resource management and discourage unsound development, land monopolization, land speculation, and landlessness.

In Uganda, the district -- already legally empowered to establish policy and enact laws to regulate local affairs, including land use -- is an appropriate level for controlling most environmental externalities. The colonial policy of leaving soil conservation to local authorities persists, but few districts use their power well to manage local soil resources (MUIENR 1992). Like all districts, Kabale has opted for more-or-less standard soil-conservation by-laws to implement and enforce its soil-management policies. These by-laws, which are limited to soil conservation instead of management, order specific practices instead of a suite of options for farmers to select from and focus on punitive sanctions rather than incentives. Several recommendations follow.

The Kabale District soil-conservation by-laws should be repealed. The Nyarurembo experience indicates that, even within a small geographical area, socioeconomic and ecological variability warrants use of multiple soil-conservation strategies and practices. Bund terracing, ordered in the Kabale by-laws, is not among the most appropriate forms of terracing for Nyarurembo. The by-law sanctions, periodically stiffened in real and absolute terms, are not implemented or enforced. There is no flexibility in the by-laws for

alternative actions that may be equally or even more effective in conserving or managing soil for sustained agricultural productivity. For example, in addition to the terracing activities undertaken that fall outside the by-laws, many Nyarurembo farmers also practice good soil husbandry -- such as using organic fertilizers, green manures, legumes, and crop rotations. Because most district soil-conservation by-laws are similar to Kabale's, all districts should carefully review their range of environmental policies and by-laws.

The central government of Uganda and the Kabale District authorities should establish policies that encourage farmers to adopt effective soil-management practices.

Uganda's national policies should articulate central goals and provide a framework for districts to develop locally appropriate policies. District policies should offer flexibility in specific actions to meet the national/district interests and enable policy implementors to work with the grassroots to develop subdistrict strategies and action plans that address local needs, resources, and constraints. To date, however, there is no national soil (or land use) policy in Uganda to encourage, guide, and legitimize district-level soil policies and by-laws (MUIENR 1992).

If, for instance, the goal of national and district soil policies is improved and sustained agricultural production, extension officers would work with farmers to develop locally appropriate soil-management strategies and action plans. The policies and perhaps by-laws could include a schedule for the development and full implementation of the plans. Incentives and sanctions would encourage early adoption of multiple practices that exceed

minimum government requirements and discourage the use of inappropriate practices. (Incentives could also be put into place that reward local authorities and extension officers for their work in facilitating adoption.) Further, certain or all agricultural activities could be restricted on highly erodible land until appropriate soil-management techniques are developed and can be implemented.

The specific terms of the government - approved soil management plans would depend on the local socioeconomic and ecological factors, the threat of soil degradation or loss, and the potential for sound management. Governments can increase the likelihood of early and effective implementation if they offer farmers and extension officers packages of scientifically proven practices that meet district/national requirements. Farmers can review the range of options in consultation with the agricultural officer and with each other (*see below*). *In this way, the farmer-developed, extension officer-facilitated, and government-approved soil-management plans are sure to meet local circumstances, needs, and opportunities, as well as district objectives and national goals.*

Extension Services in Policy Implementation

Policymakers and development professionals generally agree that an appropriate policy and legislative framework is a necessary but not sufficient condition for sustainable resource management. There are as many reasons why some policies are not translated into effective natural resource management

(particularly at the local level) as there are requisites for effective policy implementation. Many sound policies exist on paper, but they are not implemented largely because political will, personnel, funding, equipment, and other resources are lacking. Others are not implemented simply because extension officers and local authorities are not well-informed about both the policy benefits and their responsibilities and thus elect not to implement or enforce them.

The Nyarurembo experience suggests that ill-conceived policies and laws are sometimes not implemented because local authorities know they are culturally or environmentally inappropriate. The position of civil servants responsible for implementation and enforcement is then difficult. Extension officers are required to implement public policy, and they are evaluated at least in part on their ability to promote and facilitate change toward policy directives. But, extension officers are criticized for forcing inappropriate change on rural people, even though they did not help write the policy they are enforcing. *Flexible policies, coupled with sufficient ground support and appropriate performance evaluation criteria, will help cultivate commitment among extension officers and enable them to be more effective agents of change.*

Nyarurembo's agricultural officer is an effective agent of change because, in addition to his technical competence, he possesses important interpersonal skills. Although many extension officers are technically well-trained and sensitive to local needs and issues, few can effectively listen, resolve conflicts, arbitrate, and negotiate compromises. This study

38

supports the conclusions of other research that *extension officers would benefit from training to develop the skills that facilitate better working relationships with the rural people* (Benor and Harrison 1977; Howell 1988; Oakley and Carforth 1985; Roberts 1989; Safo et. al. 1990).

Policy is made more appropriate when rural people are involved in its formulation, and the implementation of sound policy is more effective when they know its implications. Extension officers, chiefs, and RCs are important in facilitating two-way communication between policy-makers and local people. They are well-positioned to share insights with district policymakers about local priorities and options, and can provide information to farmers about existing policies, legislation, as well as their implications.

Agricultural extension officers could also contribute more to the formulation and implementation of policies that are traditionally outside the agricultural sector. For example, the agricultural officer can inform local people about current land-tenure policies and their effect on farmers' security in resources and can discuss with the subcounty land committee the problems that could arise from legal tenure policies. He can also help in the process of granting land leases or titles.

The Nyarurembo agricultural officer, familiar with the customary tenure systems as well as with the boundaries of household landholdings, could help survey land, a first step in titling. The good working relationships he has with the local people and their trust and confidence enable him to deal effectively with such sensitive matters as land titling.

Farmer-to-farmer contact is another way to disseminate information, create awareness, and facilitate change (Benor and Harrison 1977; Howell 1988; Roberts 1989; Rahm 1988). It can also significantly reduce the workload of extension officers. By working to establish Nyarurembo's three hills as model sites in soil conservation, the agricultural officer will create opportunities for farmers and development officers from neighboring areas to view various soil-conservation techniques in practice, interact with participating farmers directly, and discuss the advantages and disadvantages of their practices. Such exchanges could help visiting farmers evaluate alternative soil-management practices and develop appropriate soil-management plans for their farms. Model sites can also be used in training new agricultural and other extension officers in soil-management issues.

V. Conclusions

The farmers of Nyarurembo Subparish's accomplishments in soil conservation are significant. Although the enormity and complexity of environmental difficulties in Africa dwarf Nyarurembo's success, the lessons that emerge have implications for communities, governments, and international donor agencies across the continent.

Foremost among these lessons is a recognition that many resource management problems and options can best be addressed by activities organized at the community or village-cluster level. Traditionally, local leaders coordinated collaboration within and among communities. Given the modern overlay of government-sponsored administration and authority, many local leaders may no longer be capable of or able to perform these functions effectively. Community cooperation today may need to be facilitated by an external institution. For Nyarurembo, the agricultural officer is the principal facilitator for community - community collaboration and linking villages with local authorities and external agencies. Decentralized government authorities throughout Africa can better catalyze change if they take responsibility for facilitating such coordination.

Second, the Nyarurembo experience indicates that public policies and legislation at both the national and subnational levels, can have significant local impacts. Although most projects and programs are geographically, sectorally, or otherwise bounded, public policies -- whether environmental, social, or economic -- often have broad impacts, including many unforeseen and potentially detrimental effects to community-level natural resource management. The socioeconomic and environmental diversity in many parts of Africa is large even within a small geographic area. This factor argues for the devolution of *political* authority to the level of public administration that can most effectively evaluate implications of alternative policy and programming options and address local variability.

Local policies and by-laws that are clear on goals and objectives and are flexible with regard to specific actions will enable policy implementors and enforcers to work better with rural people to meet community needs and policy objectives. African nations can follow Uganda's lead in reviewing its existing policy and legislation for gaps, inconsistencies, and missed opportunities.

40

References

- Bagoora, F.D.K. 1989. "A Preliminary Investigation into the Consequences of Inadequate Conservation Policies on Steep Slopes of the Rukiga Highlands, South-western Uganda." In *Soil and Water Conservation in Kenya*, edited by D.B. Thomas, E.K. Biamah, A.M. Kilewe, L. Lundgren, and B.O. Mochoge. Nairobi: Department of Agricultural Engineering, University of Nairobi and Swedish International Development Authority.
- Barrows, R. and M. Roth. 1990. "Land Tenure and Investment in African Agriculture: Theory and Evidence." *Journal of Modern African Studies*, 28(2):265-97.
- Benor, D., and J.Q. Harrison. 1977. *Agricultural Extension: The Training and Visit System*. Washington, D.C.: World Bank.
- Bruce, J. and L. Fortmann. 1989. "Agroforestry: Tenure and Incentives." LTC Paper 135. Madison: University of Wisconsin, Land Tenure Center.
- Byres, A. 1986. "A Comparative Analysis of Soil Loss in Three Ecological Zones of Ruhengeri Prefecture Rwanda, 1987-88." RRAM Technical Report. Kigali, Rwanda: U.S. Agency for International Development.
- Chambers, R. 1983. *Rural Development: Putting the Last First*. New York: John Wiley & Sons Inc.
1985. *Managing Rural Development: Ideas and Experience from East Africa*. West Hartford: Kumarian Press.
1988. *Managing Canal Irrigation: Practical Analysis from South Asia*. Cambridge: Cambridge University Press.
- Denoon, R. 1972. "Migration and Settlement in South-west Uganda." Kampala: Makerere University, Department of History. Mimeo.
- Ford, E.R. 1990. "The Dynamics of Human-environment Interaction in the Tropical Montane Agrosystems of Rwanda: Implications for Economic Development and Environmental Stability." *Mountain Research and Development* 10(1):43-63.
- Government of Uganda. 1975. *The Land Reform Decree (Decree 3 of 1975)*. Kampala: Government Printer.
1987. *Resistance Councils and Committees Statute: Statute 9*. Kampala: Government Printer.
1988. *Resistance Committees (Judicial Powers) Statute: Statute 1*. Kampala: Government Printer.
- 1990a. "District/Regional Planning in Uganda: Country Study on the Establishment of an Effective Planning Capability at the District/Regional Level." Kampala: Ministry of Planning and Economic Development, Ministry of Local Government, European Economic Community.
- 1990b. *Ten Point Programme of NRM*. Kampala: National Resistance Movement, Directorate of Information and Mass Mobilization, NRM Secretariat.
- 1990c. "Training Report on Decentralization Efforts in Uganda." Kampala: Ministry of Planning and Economic Development, and European Economic Community.

- 1990d. "Training Report on District Development Planning, Project Planning: Mbarara District, Uganda." Kampala: Ministry of Planning and Economic Development, and Ministry of Local Government, European Economic Community.
- 1991a. *NRM Achievements 1986-1990*. Kampala: NRM Publications.
- 1991b. *Report of the Task Force on National Environment Action Plan (NEAP) for Uganda*. Kampala: Ministry of Environmental Protection.
- Hamilton, A.C. 1984. *Deforestation in Uganda*. Nairobi: Oxford University Press.
- Harrop, J.F. 1960. *The Soils of Western Province of Uganda Protectorate*. Memoirs of the Research Division, Kawanda Research Station, Series 1, No. 6.
- Howell, J., ed. 1988. *Training and Visit Extension in Practice*. London: Overseas Development Institute.
- International Union for Conservation of Nature and Natural Resources Tropical Forest Programme. 1988. *Uganda: Conservation of Biological Diversity*. Cambridge, United Kingdom: World Conservation Monitoring Centre.
- Kramer, J.M., G.E. Karch, W. Kisamba-Mugerwa, D. Pomeroy, and A. Vedder. 1989. *Uganda Natural Resources Action Program*. Washington, D.C.: U.S. Agency for International Development.
- Land Tenure Center (LTC). 1990. *Security of Tenure in Africa. A Presentation to the Agency for International Development: Findings of a Program of Comparative Research and Their Policy and Programmatic Implications*. Madison, Wisconsin: LTC.
- Langdale-Brown, I., H.A. Osmaston, and J.G. Wilson. 1964. *The Vegetation of Uganda and Its Bearing on Land-use*. Kampala: Government of Uganda.
- Lawry, S. 1990. "Tenure Policy Toward Common Property Natural Resources in Sub-Saharan Africa." *Natural Resources Journal*, 30:403-22.
- Leonard, D. and D. Marshall, eds. 1982. *Institutions of Rural Development for the Poor: Decentralization and Organizational Linkages*. Berkeley: University of California.
- Makerere Institute of Social Research and Land Tenure Center (LTC). 1988. *Land Tenure Study: Rujumbura Pilot Land, Registration Scheme-Kigezi (Rukungiri District): The Impact of Titling on Agricultural Development*. Madison, Wisconsin: LTC.
1989. *Land Tenure and Agricultural Development in Uganda*. Madison, Wisconsin: LTC.
- Makerere University Institute of Environment and Natural Resources (MUIENR). 1992. *Uganda: Environmental and Natural Resource Management Policy and Legislation, Issues and Options, Vol.I-II, Summary and Documentation*. Kampala: Makerere University.
- Maquet, J. 1961. *The Premise of Inequality in Ruanda: A Study of Political Relations in a Central African Kingdom*. London: Oxford University Press.
- McAuslan, J.P.W.B. 1967. "Control of Land and Agricultural Development in Kenya and Tanzania." In *East African Law and Social Change*, edited by G.F. A. Sawyerr. Nairobi: East Africa Publishing House.
- Migot-Adholla, S., et al. 1991. "Indigenous Land Rights Systems in Sub-Saharan Africa: A Constraint on Productivity?" *The World Bank Economic Review* 5:155-175.

42

- Mugerwa, P.J.N. 1966. "Land Tenure in East Africa: Some Contrasts." *East African Law Today* 5:101-114.
- Muwonge, J.W. 1977. "Environment and Rural Development in Uganda." *African Environment* 77 (12):3-14.
- Nyamulinda, V. 1988. *Erosion Agricole Acceleree et Techniques Biologiques et Mechaniques de Conservation des Soils Applicables en Prefecture Ruhengeri*. RRAM Technical Report. Kigali, Rwanda: U.S. Agency for International Development.
- Oakley, P., and C. Carforth. 1985. *Guide to Extension Training*. Rome: Food and Agriculture Organization of the United Nations.
- Rahm, C. 1988. "Neighbor-to-neighbor Conservation." *Journal of Soil and Water Conservation* 43(4):280-81.
- Roberts, Nigel, ed. 1989. *Agricultural Extension in Africa*. Washington, D.C.: World Bank.
- Roth, M., Barrows, R., Carter, M. and D. Kanel. 1989. "Land Ownership Security and Farm Investment: Comment." *American Journal of Agricultural Economics* 71(1):211-14.
- Safo, M., D. Topouzis, S. Horst, S. Amakoye, N. Kariithi, S. Ouattara, C. L. Morna, and L. Kilimwiko. 1990. "Making Extension Work." *African Farmer* 30:28-33.
- Shipton, P. 1989. "The Kenyan Land Tenure Reform: Misunderstandings in the Public Creation of Private Property." In *Land and Society in Contemporary Africa*, edited by S. Reyna and R. Downs. Hanover: The University Press of New England.
- Slade, G., and K. Weitz. 1991. "Uganda: Environmental Issues and Options." Center for Resource and Environmental Policy and Research, Working Paper #91-3. Durham: Duke University.
- Tabor, G.M., A.D. Johns, and J.M. Kasenene. 1990. "Deciding the Future of Uganda's Tropical Forests." *Oryx* 24(4):208-14.
- Thomas-Slayter, B., C. Kabutha, and R. Ford. 1991. *Traditional Village Institutions in Environmental Management: Erosion Control in Katheka, Kenya*. Nairobi: ACTS Press.
- Tindituza, R.J. and Kateete, B.M. . 1971. "Essays on Land Fragmentation in Kigezi District." Kampala: Makerere University, Department of Geography. Occasional Papers No. 22.
- Tukahirwa, E.M. 1991. "Soil Conservation Activities in Kisoro, South-Western Uganda." Paper presented at the Environment and the Poor Conference.
- Tukahirwa, J.M. 1991. "An Analysis of Small Scale Farmers in Northern Kigyeyo Watershed, Uganda. Paper presented at the Environment and the Poor Conference.
- Uganda Constitutional Commission (UCC). 1990. *Guidelines on Constitutional Issues*. Kampala: U.C.C.
- Uganda Protectorate. 1949. *Soil Conservation Report for 1941-49*. Entebbe: Government Printer.
- United Nations Development Programme and World Bank (UNDP/WB). 1989. *African Economic and Financial Data*. Washington, D.C.: World Bank.
- United Nations Environment Programme (UNEP). 1989a. *Strategic Resources Planning in Uganda Vol. I-IX: Land Tenure Systems and Environmental Laws*. Nairobi: UNEP.
- 1989b. *Strategic Resources Planning in Uganda Vol. VII: Land Tenure System and Environmental Laws*. Nairobi: UNEP

43

1991. *A Bill for the Management of the Environment Act*. Nairobi: UNEP.
- University of Arizona. 1982. *Environmental Profile of Uganda* (Draft Report). Washington, D.C.: U.S. Agency for International Development.
- U.S. Agency for International Development (USAID). 1991. *Program Assistance Initial Proposal Uganda: Action Program for the Environment*. Kampala: U.S. Agency for International Development.
- Uphoff, N. 1986. *Local Institutional Development: An Analytical Sourcebook with Cases*. West Hartford: Kumarian Press.
- World Bank (WB). 1989. *Sub-Saharan Africa: From Crisis to Sustainable Growth*. Washington: World Bank.
1990. *World Development Report*. New York: Oxford University Press.
- World Resources Institute (WRI). 1990. *World Resources Report 1990-91*. New York: Oxford University Press.

APPENDIX A Example of Kigezi District Soil Conservation Bye-laws that also Operated in Kisoro, Modified from Those Enacted in 1939

Legal Notice No. 1961. Appendix "B"

THE DISTRICT ADMINISTRATION (DISTRICT COUNCILS)

ORDINANCE 1955

(NO. 1 OF 1955)

THE KIGEZI DISTRICT COUNCIL CONSTITUTIONAL REGULATIONS, 1956

BYE-LAWS

(Under regulation 20 of the above mentioned Regulations)

THE KIGEZI SOIL CONSERVATION BYE-LAW 1961

1. These Bye-laws shall be called the Kigezi Soil Conservation Bye-Laws 1961.
2. All land under cultivation or cleared for cultivation, or land planted to Black Wattle trees, shall be provided with bunds across the slope at intervals not exceeding 16 yards apart.
3. Bunds shall be a minimum width of three feet.
4. On land planted to annual crops, trash lines consisting of the vegetation shall be laid parallel at the top end of garden.
5. When crops are planted in lines, the lines shall be across the slope. In the case of sweet potatoes, planting shall be done on soil ridges across the slope.
6. No fields or plots shall be demarcated by furrows or gulleys.
7. No annual crop shall be cultivated within 9 feet of any perennial or seasonal water course or any maintained road.
8. All paths, cattle tracks, ditches and access roads shall be protected against erosion by run off channels, soak away pits or stakes to prevent erosion.
9. Paths or tracks may be closed by a Gombolola Chief to prevent erosion and alternate routes provided.

40

10. All house compounds, except the winnowing area and compounds around buildings, shall be grassed over with a low-growing grass.
11. Land planted to bananas or coffee shall be covered with a mulch, where possible.
12. All Black Wattle trees, whether in lines or plantation, shall be thinned in the year of germination to four and a half feet apart, and at the age of three years, to a minimum of nine feet apart.
13. Any person disobeying the provisions of these bye-laws shall be guilty of an offense and shall on first conviction be liable to a fine not exceeding Shs: 5/= and shall on any subsequent conviction be liable to a fine not exceeding Shs: 10/= or to imprisonment not exceeding 15 days or to both the fine and imprisonment.

Made under the common seal of the Kigezi District Council this __ day of August 19...

SECRETARY GENERAL

KIGEZI DISTRICT COUNCIL

Approved this ____ day of _____ 19....

PROVINCIAL COMMISSIONER,

WESTERN PROVINCE.