MAKERERE INSTITUTE
OF SOCIAL RESEARCH
Makerere University
Kampala, Uganda

LAND TENURE CENTER
College of Agricultural
and Life Sciences
University of Wisconsin-Madison

Potential for Community-Based Forest Resource Management in Uganda: The Case of Non-Gazetted Forests of Western Uganda

by

Abwoli Y. Banana
Department of Forestry, Makerere University

and

Turiho-Habwe Godfrey Pereza
Department of Agricultural Economics, Makerere University

ACCESS TO LAND AND OTHER NATURAL RESOURCES IN UGANDA:
RESEARCH AND POLICY DEVELOPMENT PROJECT

Research Paper 14

Prepared for Makerere Institute of Social Research and the Land Tenure Center

May 1996

Potential for Community-Based Forest Resource Management in Uganda: The Case of Non-Gazetted Forests of Western Uganda

by

Abwoli Y. Banana
Department of Forestry, Makerere University

and

Turiho-Habwe Godfrey Pereza
Department of Agricultural Economics, Makerere University

ACCESS TO LAND AND OTHER NATURAL RESOURCES IN UGANDA:
RESEARCH AND POLICY DEVELOPMENT PROJECT

Research Paper 14

Prepared for Makerere Institute of Social Research and the Land Tenure Center

May 1996

This report is one of a series of research reports presenting findings of the Access to Land and Other Natural Resources: Research and Policy Development Project. Funding for this research has been provided by the United States Agency for International Development (USAID)/Kampala, through the Land Tenure Center's Cooperative Agreement with USAID/Washington, and through the World Bank's ASAC programme in Uganda.

All views, interpretations, recommendations, and conclusions expressed in this paper are those of the authors and not necessarily those of the supporting or cooperating organizations.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

ACKNOWLEDGEMENTS

We thank the residents of Nyamagita, Bwinamira, Bulyango, Kyamongi, and Nyabigoma villages in Budongo Sub-county, Masindi District and the residents of Mpunda, Birungu, Kihamba, and Kitembeka villages in Kitoba Sub-county, Hoima District for taking time to answer the numerous questions needed to complete this research.

Funding for this study was provided by USAID under the Land Access Project executed by the Makerere Institute of Social Research and the Land Tenure Center of the University of Wisconsin-Madison. We are especially grateful to the project leader, Dr. Mark Marquardt of the Land Tenure Center, who facilitated this research. The role he played as project leader and coordinator of the research programme cannot be over-emphasised.

Special thanks to Mr. John Okidi of the Department of Agricultural Economics, University of Wisconsin-Madison, who was part of the research team. Other members of the team included Ms. L. Nyangoma, Ms. L. Mbanza. Mr. R. Musinguzi, A. Ruhunda, J. Kugonza, S. Sekindi, S. Isingoma, A. Ndolerire, and S. Aire and M. Kigundu who carried out data collection. Without their input, this research would not have been successfully carried out.

ABSTRACT

Uganda's forest resources are important for the country's growth and development, but these resources are disappearing rapidly at the rate of between 500km^2 or 650km^2 per year, as reported by the National Environmental Action Plan (NEAP) and the Food and Agriculture Organisation (FAO), respectively. Though there is a mechanism for controlled use of gazetted forests, lack of an organised management institution has left non-gazetted, communal resources at the helm of whomever it may concern. This study covered the districts of Hoima and Masindi where non-gazetted, common-pool forest resources are abundant. The objective was to identify a tenure system that can lead to sustainable use of communal forest and tree resources by local people. The project also aimed at determining the potential for increased involvement of local communities in managing non-gazetted forested areas.

Specific objectives were to:

- identify and describe the conditions of non-gazetted forest resources found in selected study areas;
- identify how these forest resources are used;
- identify the formal and informal institutional structures that govern the use, access, management and development of these resources;
- determine potential institutions that may be developed to promote local participation in forest management; and
- identify economic, social, and political forces that affect the relationship between user-groups and the resources.

The Participatory Rural Appraisal (PRA) tool of scientific enquiry was used. In addition, a semi-structured questionnaire was administered to 405 households to address questions on resource use on both farm and non-farm activities (see Appendix 8). The 405 households were randomly selected from a list of all households in the nine villages that were covered. Key informants, discussion groups, and participant observation methods also were used. A forest survey was carried out in four forests under different tenure regimes in order to determine the condition of the forests used by the communities studied. Descriptive information was summarised and illustrated with graphic analysis. Chi-square and t-tests were carried out to test for statistical differences between variables.

The study area comprised multi-ethnic communities of diverse sociocultural backgrounds. The Banyoro were dominant (60.2%) and more permanently settled, while the rest were immigrants mainly from the West Nile districts of Nebbi and Arua and aliens from Zaire and Sudan. The majority owned 5 acres or fewer of land per household, were less than 0.5 km from the nearest forest, and had annual household incomes between Shs100,000-5,000,000. The majority (78.5%), reported that the forest had rapidly dwindled at the hands of irresponsible harvesters; yet, they have a lot of attachment to the resource as a major source of their household items and regulation of rainfall. There was evidence to show that the forest resources in the study area were degraded through over-exploitation for both commercial and subsistence use. The causes were clearing for

agriculture, pitsawing, and pole and firewood cutting. Not all forests experienced this problem equally. In some forests, there was less degradation.

Among the most important factors that were found to affect the level and type of consumptive utilisation of forests was the level of rule enforcement related to the use of the forest resource. This variable plays an important role because if rules regulating access and use of forest resources are not adequately enforced, the de facto condition becomes one of open access rather than secure tenure.

Relationships among wealth, government policy, ethnicity, gender, and the communal spirit in terms of ability and willingness of people to manage a resource held in common were established. That people with low incomes are the most likely to answer to the need for collective action was strongly supported. Gender, population size, size of landholding, and formal employment were established as socioeconomic factors that influence levels of forest product consumption. Age, quantity and resource use levels, gender, and time allocated to community resource management were established as factors affecting the willingness to manage a resource held in common.

The study came up with the following recommendations:

- non-gazetted forest resources should be left to the local user groups to manage;
- local user groups should be managed by a locally composed and constituted community association with assistance from the Forest Department through joint forest management schemes;
- land titles on which non-gazetted forests are found should be given to District Councils who would then lease them to community-based organisations for a specified period of time;
- policies designed to improve activities that are technically sound and supported by local people should involve an economic benefit;
- people's opinions on common pool resources policy decisions can be useful to better understand these issues;
- improved education and training programmes for social forestry are necessary; and,
- research on common property resources in Uganda should be intensified as there is paucity of data and information at the moment.

I. INTRODUCTION

A. TENURE AND NATURAL RESOURCES ISSUES IN UGANDA

The governance of natural resources used by many individuals in common is an issue of increasing concern to policy analysts. State control, privatisation, and joint management of resources have been advocated; yet, neither the state nor the market has been uniformly successful in solving common-pool resource problems.

Uganda has a multiplicity of tenure systems, which has led to confusion and insecurity (Marquardt 1994). Tenure of non-gazetted forested areas in Uganda is often communal. Individuals do not have exclusive rights to discrete areas of the forest, as compared to farmland, where even under shifting cultivation the rights of the individual farmer usually are clearly defined.

Where there is land shortage, common-pool resources such as forests, wetlands, and grazing areas have been rapidly decreasing in size and quality. For example, individuals bring pieces of communal forest land under their personal control for arable purposes by the usual process of starting to cultivate it. Communal forest areas are not vested in any authority that would preserve them from encroachment in this way. For land once acquired from the common pool, individual land rights develop quickly and do not revert to the pool to be taken up by someone else but pass directly from one to another, usually within the family. This process can be referred to as individualisation of the commons. This leads to a reduction of community control over land use and distribution and enhances the rights of the individual landholder.

A workshop on land tenure reform held in Jinja, Uganda in 1993 recognised that there are information gaps on existing tenure rights and management structures controlling access to and use of common-pool resources. How can common-pool resources be managed and exploited in a way that avoids both excessive consumption and high administrative costs? The issue at hand is how best to limit the use of natural resources so as to ensure their long-term economic viability. Some scholars recommended that the state should control most natural resources to prevent their destruction, while others argue that privatising these resources would solve the problem. However, experience has shown that neither state control nor privatisation has been uniformly successful in enabling individuals to sustain long-term, productive use of natural resource systems (Ostrom 1990). Some communities have relied on institutions resembling neither the state nor the market to govern some resource systems with reasonable degrees of success over long periods of time.

According to Bromley (1989), there are three categories of property regimes under which resources can be held: private property, state property, and common property. Common property, which is the main focus of this study, is a property regime where more than one user has access to the same resource (McGranhan 1991). Members of the community who have access to this resource establish rules and regulations and share rights and duties towards a resource. Stable and strong traditional institutions have managed communal areas with varying degrees of success. The weakening of these institutions recently has led to over exploitation and long-lasting damage to the resources, particularly the forest resource.

The creation of new and adequate institutional arrangements for management of the commons is a complex task but not inherently impossible. During the technical committee on land tenure reform consultation exercise in the various districts of Uganda, there was an expressed desire to give ownership of communal forest resources to local authorities who would manage them as common property. However, there was a need to determine which existing local institutions or institutional arrangements are more likely to manage these resources sustainably.

B. ADVANTAGES OF COMMON PROPERTY REGIMES (CPRS)

It is crucial to recognise that common property is *shared private property* (McKean and Ostrom 1995), similar to business partnerships, joint stock corporations, and cooperatives. Property rights in a CPR are exclusive to the co-owners (members of the user group), and they are secure if they receive appropriate legal support from governments.

CPRs provide the means of privatising rights to a resource without dividing the resource itself. Such a regime is desirable and the resource system is most productive when it is managed as an intact whole rather than in small units. Forests need to be managed in large units, especially where they are managed for both tangible and intangible services such as environmental protection or watershed catchment areas. For example, deforesting a hillside ruins the water supply and downhill soil quality. If different individuals own different parts of the forest and make their decisions about resource use independently, they may cause harm to each other. An institutional arrangement suitable for the management of such a resource is to create a CPR to make resource management decisions jointly (McKean and Ostrom 1995).

CPRs may also be appropriate in situations where individuals cannot own their own holdings and where forests on the commons provides a viable option for reaching large numbers of individuals. Common property arrangement also may be suitable in situations where the resource requires frequent and complex care and where a few trained individuals representing the community can handle the special equipment.

C. CHARACTERISTICS OF LONG-ENDURING CPRS

There is no ideal institutional arrangement suitable for each CPR. The managers/user groups of each common property resource must adapt to the social conditions prevailing in each particular physical and institutional set up. According to Wade (1987), Ostrom (1990), McKean (1992), and Ostrom, Gardner, and Walker (1994), long-enduring CPRs have the following characteristics:

- user groups have the right to organise their activities without external interference:
- the boundaries of the resource are clear;
- the criteria for membership in the group of eligible users of the resource are clear;
- users have the right to make and modify their use rules over time;
- use rules are clear and easily enforceable;
- infractions of use rules are monitored and incur punishment;
- quantitative limits on the amount of different products that an individual user may extract from the resource correspond to what the system can tolerate and are environmentally conservative to allow a margin of error;

- distribution of decision-making rights and use rights to co-owners of the commons are viewed as fair;
- inexpensive and rapid methods of resolving conflicts are devised; and,
- institutions for managing very large systems are "nested" with considerable authority devolved to small components.

D. LIMITATIONS OF CPRS

Management of resources used in common presents difficulties. For example, coordination of individuals in their use of common resources presents logistical problems. Many people believe that common use of a resource encourages individuals to maximise short-run consumption of the resource without regard to long-term resource productivity, thereby leading to the "tragedy of the commons" (Hardin 1968).

Well-managed commons have regulations in place that govern how individuals use the commons. The trend toward bringing common resources under private or government control often has been based on a thesis that confuses degradation due to unregulated use under open access and breakdown of common property resource management arrangements (Arnold and Stewart 1991).

CPRs mainly are concerned with resources and users who have similar rights to this resource. Well-managed CPRs have a well defined-user group(s) which is/are able to exclude non-members. In CPRs, users have rights to resource use as individual members of a group. Bromley and Cernea (1989) describe user groups as social units with definite memberships, boundaries, common interests, some interaction among members, and some common cultural norms. Many CPRs are under stress partly because the user group expands rapidly or is unable to exclude non-members and does not develop a method to match its size or its aggregate demand for resources to the capacity of the resource system (McKean and Ostrom 1995).

In addition to having a well-defined membership, both the physical and legal boundaries of the forest owned by that community must be clearly identified and defined. Well-known boundaries can be an inexpensive substitute for fencing. Without defining the boundaries of the CPR and closing it to outsiders, user-group members face the risk that any benefits they produce by their efforts will be reaped by others who have not contributed. While members of the user group may have a legal right to prevent others from using the resources, in communities based on a system of reciprocal rights and obligations this is often difficult to do. The personal and institutional capacity to enforce exclusionary rights by local communities is very limited.

Planning and maintaining trees on the commons not previously owned by anyone can lead to problems. As land becomes valuable, a group with a dominant claim or the elites almost inevitably come forward to take over the benefits of the resource. Therefore, when crafting institutions to manage forest areas in common, tenure issues must be carefully examined since, in the long run, these affect community participation. Distribution of decision-making rights and use rights to co-owners of the commons must be viewed as fair. If any group feels cheated or denied adequate access or a fair share, it will be unwilling to participate in decision-making and unwilling to invest in maintaining or protecting the commons. There must be clear and convincing provisions on long-term distribution among the whole community of benefits from the trees. Most importantly,

beneficiaries must be convinced that the trees are their trees, not the government's. If the trees are regarded as belonging to government, the planting and maintenance may well be regarded as land grabbing by government. In such circumstances, trees have a very low survival rate.

E. DEVELOPMENT OF ROBUST LOCAL INSTITUTIONS TO MANAGE CPRS

The existence and development of robust and effective local institutions to manage CPRs is essential for sustainable utilisation of these resources. Institutional arrangements include the rules and conventions that bestow entitlement on individuals and groups; they comprise socially recognised structures which define the "rules of the game" (Cousins 1993). How appropriate local institutions emerge and develop to take ownership of and control the development of CPRs is not clear; often, external intervention is needed.

Local institutional arrangements are likely to be effective in managing a CPR when:

- it is legally recognised;
- its leadership is respected; and,
- its framework is well structured and stable.

Well-managed commons have rules in place that govern how individuals use the commons. In the absence of rules, the property arrangements become one of open access. The rules may be informal or formal, depending on the extent of formalisation of the CPR. Formalisation tends to bring about a more formal and complex set of rules. Well organised CPRs have flexible rules. Since resource users are the first to detect evidence of resource deterioration and resource recovery, they need to be able to adjust rules to ecological changes and changing economic opportunities. In addition flexible rules, well-managed CPRs have clear, enforceable rules that make life easier for resource users as well as for monitors representing the user group. Clear and enforceable rules also reduce misunderstandings and conflicts. CPRs frequently establish quantitative limits on the amounts of different products that individual users may extract.

Oakerson (1986) and Kiser and Ostrom (1982) categorised rules into three levels that cumulatively affect the actions taken and outcomes obtained in using CPRs. Operational rules are those that directly affect the day-to-day decisions made by the user groups concerning when, where, and how to withdraw resource units, who should monitor the action of others, and what rewards or sanctions are assigned to different combinations of actions and outcomes. Collective choice rules are used by officials of the user group or external authorities in making policies about how a CPR should be managed. Constitutional choice rules determine who is eligible to be a member and also determine the specific rules to be used in crafting the set of collection choice rules that in turn affect the operational rules.

Rules minimise conflict and also serve to regulate competition concerning the use of CPR resources. Conflict in the use of a CPR may be between:

- individual families and a CPR member;
- the user group(s) and the community; and/or
- the user group(s) and the state.

Although rules minimise conflicts and disputes, they are ineffective and can be the cause of conflict if they are unclear, unacceptable to the members of the user group, or rigid and/or imposed by external authorities with no participation by most of the individuals affected by those rules. In addition to having clear, flexible, and acceptable rules, well-organised CPRs have access to rapid, low-cost mechanism to resolve conflict among members of the user group or between user group members and officials. If there are no effective institutional arrangement and associated organisational mechanisms to monitor and enforce the rules, the resource is most likely to be over-harvested and degraded (Banana and Gombya-Ssembajjwe 1995).

The above arguments indicate that there are circumstances where CPRs may be quite suitable for forest management. There are many examples where forest users themselves have crafted institutions to manage communal forests.

F. OBJECTIVES OF THE STUDY

The overall objective of this study was to identify a tenure system that can lead to sustainable use of communal forest and tree resources by the local people. The project aimed at determining the potential of increased involvement of local communities in managing non-gazetted forested areas. This information is needed in order to develop appropriate policy initiatives for the control and sustainable utilisation of non-gazetted forest resources.

The specific objectives were to:

- identify and describe the conditions of non-gazetted forest resources found in selected study areas;
- identify how these forest resources are used, who has access to these resources, and what is the role of the resources in the local economy;
- identify the formal and informal institutional structures that govern the use, access, management and development of these resources;
- determine the effectiveness of various property regimes (private, government or communal);
- establish the property regime under which the resource is being managed sustainably;
- identify factors that are contributing to sustainable/unsustainable use of the resource;
- identify the presence of dispute resolution mechanisms and means to enforce sanctions for violation of rules;
- determine the potential for increased involvement of local communities in managing forests and trees;
- determine potential institutions that may be developed to promote local participation in forest management; and,
- identify economic, social and political forces which have and continue to affect the relationship between user-groups and these resources.

G. JUSTIFICATION FOR THE STUDY

The Land Tenure Systems Workshop in Jinja, Uganda, held in 1993, recognised that there are information gaps on the existing tenure rights and management structures controlling access to and use of common property resources in Uganda. Allowing these communal forest areas to be

dissipated would bring considerable hardship to the rural communities who depend on them for provision of goods and services; therefore, there is a need to identify a tenure system that can lead to sustainable use of communal forest and tree resources by the local people. Analytical models such as the Oakerson model (Oakerson 1986) and the multi-person prisoner's dilemma (Runge 1992) have been suggested. However, these models have not adequately addressed the socioeconomic analysis of resource use as a means to justify investment into communal resource management by local communities.

H. HYPOTHESES TESTED

The major guiding hypotheses of the study were as follows:

- People with low incomes, and hence poor, are the most likely to make joint-use rights a necessity.
- People who perceive the resource as beneficial to them are the ones most likely to protect it.
- The size of community and ethnic diversity have a direct bearing on the use of the commons.
- The effectiveness of a village as an authority system is dependent upon the exercise of influence and control over actions of individual members of the community to effect an optimal use of the resource for the welfare of the whole community.
- The existence of economic, social, and political forces have and continue to affect the relationships between user-groups and the common property resources.

II. LITERATURE REVIEW

A. INTRODUCTION

According to Ostrom (1994), the current challenge in natural resources management is how best to limit the use of these resources so as to ensure their long-term economic viability. It has been observed that neither the central government nor the private individual, i.e. the state and market respectively, is uniformly successful in enabling individuals to sustain long-term, productive use of natural resource systems. We know that strengthened market forces tend to cause indigenous tenure to evolve toward individual rights and weaken community rights (Bruce 1992).

Communities or individuals in many cases, however, have relied on institutions resembling neither the state nor the market to govern some resource systems with reasonable degree of success over long periods of time. A distinction should be made between common use situations characterised by an absence of defined property rights governing access and use, often referred to as open access, and common property, defined as a distribution of property rights in resources in which a number of owners are co-equal in their rights to use the resource (Ciriacy-Wantrup and Bishop 1975).

In spite of the foregoing statements, centralised authorities continue to deny, on the whole, the ability of local decision-making bodies to manage their environment, and government legislation has become necessary for the smallest changes to established practice, dissuading groups from organising (World Bank 1985). As a result, fallows, rested for years, well wooded and almost ready to be felled again, were gazetted by the state and turned into forest reserves, turning intensively managed CPRs at a stroke of a pen into open access land as far as local communities were concerned, to be poached from rather than managed. People became wary of fallowing their land and overworked it instead (Thomson 1985).

Convey (1995) observed that there have been great difficulties in applying regulatory or command central policy instruments in resource allocation in most African economies. This leaves use of prices and incentives as a favourable alternative. However, this can only survive in the presence of well developed markets, improved infrastructure, availability of adequate information, and in a monetised economy. Most of these requirements are lacking in most developing countries. In addition, using prices to allocate scarce resources often favours those with the means to acquire the asset and discriminates against those without.

B. LOW TRANSACTIONS COSTS: AN INCENTIVE TO ADOPT CPRS

The above assertion has been supported by Runge (1984) who observed that transactions costs of a well-defined and enforced private property typical of the western world were simply too great for a subsistence economy to bear. The fair enforcement of formalised private rights and duties may be prohibitively costly compared with customary arrangements, which may involve some private rights that are enforced locally, as well as common rights and a wide variety of mixed arrangements. Hence price mechanism falls short of allocation of resource use in a developing economy due to:

- a malfunctioning approximation of a Western bureaucratic system;

- an agricultural and natural resource dependent economy; and,
- a high degree of uncertainty with respect to income streams.

Ostrom (1994) observed that when appropriators act independently in relationship to CPR generating scarce resource units, the total benefits they obtain usually will be less than could have been achieved if they had coordinated their strategies in some way. At minimum, the returns they receive from their appropriation efforts will be lower when decisions are made independently. At worst, they can destroy the CPR itself. However, in all cases in which individuals have organised themselves to solve CPR problems, where rules have been established and followed, resource units will be allocated more predictably and efficiently, conflict levels will be reduced, and the resource system itself will be sustained over time.

C. LOCAL OWNERSHIP: A REQUIREMENT FOR SUSTAINABLE MANAGEMENT OF RESOURCES

Shepherd (1991) concluded that best management of natural woodland is practised by those to whom it belongs. For instance, Turkana elders in Kenya in the 1980s issued new instructions about lopping of *Acacia tortilis* so that only side branches were taken and the leader shoot was given a chance to grow rapidly above goat-browsing height (Kerkhof 1990). As has been seen so clearly in the case of tree planting, no serious investment of time and effort will be made unless the resource is owned.

By and large, under common property, the use rights of individuals could be defined and limited to prevent overuse of the common resource. In many settings, communal use has economic and ecological advantages over individual use. The costs of delineating clear private property rights to many kinds of resource needs of poor people and small-scale users are more likely to be met within CPRs.

According to Shepherd (1991), local people were keen for the benefits of the forest to go more to local people and wished to see charcoal burners dealt with severely; yet, they did not want to take part in management, which they saw as the Forest Department's job. Local interest was minimal until it became clear that there would be financial benefits from the fuelwood cooperative to which villagers could sell the wood they cut, and there was then much more enthusiasm. But local communities were not prepared to do any unpaid management work until ownership and control questions were settled.

D. SOCIOLOGICAL VARIABLES IN COMMUNAL RESOURCE USE

Noronha and Spears (1985) identified basic sociological variables that lead to understanding of group processes and socioeconomic and cultural patterns necessary to implement a community-based project. They state, for instance, that where settlements are clustered together, one nursery may suffice to provide seedlings for the population. Where they are dispersed, assessments must be made of the distances people travel to collect seedlings, and the potential for seedling wastage is high in such a situation. Estimates of population growth rates are important since they support inferences about the future demand for land for food crops, the need for fuelwood and the constraints on the availability of land for the project. Population heterogeneity rather than homogeneity is the rule in most developing countries; there are divisions by ethnic affiliation. This

segmentation often affects the ability of the beneficiary population to work in common. The heterogeneity of the population gives rise to cultural differences that need to be taken into account. Different groups in the same area may need special extension approaches that relate to their needs; access to a common resource may be based on ethnic affiliation.

Socioeconomic characteristics such as wealth, landholding, or education are used to explain the differences between those who use the resource and those who do not. Although such an approach may be interesting, the type of analysis requires a more careful examination of the resource and the characteristics of the farmers and farming systems that might relate to the resource.

The choice between willingness or non-willingness to take part in the resource management is influenced by the economic organisation of farm enterprises and by the characteristics and attitudes of individual farmers. It can be hypothesised that variables such as farm size, age, family size, and others are significant in explaining a farmer's decision to use a resource or to participate willingly in managing it.

Size of landholding. This is a crucial element in social forestry. An examination of the ways in which land is used, held, transferred, or inherited is essential. As Noronha and Spears (1991) put it, land is one of the most important determinants of status, and landholding patterns reflect both the philosophy of the group and the level of their technology. An examination of landholding and land use patterns provide some estimate of the area of land actually available for afforestation purposes.

Age of the farmer. It is said that old farmers may have the experience, resources, or authority that would allow them more possibilities for accessibility to and control of resources. The effect of age exerts its influence on responsiveness to stimuli at the time the decision is made (Hill and Kau 1993).

Education level. Education may make a farmer more receptive to advice or recommendations that require a certain level of literacy.

Wealth. Wealthier farmers are more able to take risks or have better access to information. They may be able to use their own cash resources to experiment on the new property rights system. Wealthier farmers also have access to alternative sources of resources. Thus their dependency on the commons and their willingness to participate in communal work may be lower than poor farmers. However, one must note that wealth per se is a difficult parameter to measure on a survey. A PRA method of "wealth ranking" in which knowledgeable members of a community are asked to divide households into groups according to locally recognised wealth standards may be employed. Besides, a proxy for cash or liquidity constraint can be taken to be the holding size reflecting a farmer's wealth.

Gender. The effect of gender may be related to access to and control of resources such as fuelwood, building materials and water. The PRA tool of ranking may be employed to capture the extent of access by both males and females within a household.

Distance from the forest. The further away from the forest, the less likely that the forest is of any significant value to the farmer. The cost of travelling to a distant forest to collect daily provisions for the household may be too high if the forest is not in easy walking distance. Such a farmer's willingness to participate in the management of such a forest would be significantly diminished.

E. COMMERCIALISATION OF PRODUCTS

One of the most significant threats to CPRs is the commercialisation of products, especially non-timber products from forest-based common property resources (McElwee 1993). Commercialisation can have many effects on a resource, its users and the institutions used to manage the resource.

While over-harvesting can certainly result from subsistence use, it is a significant factor in declining resource availability, mainly for those products for which there is commercial demand (Fong 1992). Often, local communities are unable to craft new rules and regulations to control over-harvesting. Commercialisation can have rapid and drastic changes on rural economies ill-equipped to deal with it. Communities who are able to adapt to commercialisation are either those who are able to control how much commercialisation occurs or are those in which change has been less rapid.

III. METHODOLOGY

A. INTRODUCTION

The extent of deforestation or forest degradation depends on local needs, perceptions, commercial interests, and institutional arrangements guiding the stewardship of forested areas (Ostrom et al 1993). Indeed, if ecological conditions are the same, major structural and biological differences between local patches of forests may be almost the consequence of human rules and use patterns. Thus, communities and their institutions living around a communal forest, a private forest, and a government reserve were selected for study.

1. SITE SELECTION

The area studied in Masindi District covered the stretch along Nyamagita Forest and included Bwinamira, Bulyango, Kyamongi, and Nyabigoma villages, in Budongo Sub-county. The area studied in Hoima District covered the stretch along Sangwe and Kyamugongo Forests and included Kihamba, Mpunda, Birungu, and Kitembeka villages, Kitoba Sub-county. Both study sites were located in western Uganda. These areas were chosen on basis of the following:

- these districts have fairly large areas of communal forest resources;
- these forests are extensively used by the local communities;
- the sites have diverse historical settlement periods, with Hoima having the longest and most stable settled community and Masindi having intermediate settlers and fairly recent, unstable communities;
- the Hoima site is settled by a homogeneous community while the Masindi site is settled by a heterogeneous community; and,
- some of the forests in the study areas appeared to be sustainably utilised by the local communities while others are being degraded.

2. MASINDI SITE

Nyamagita Forest, a natural communal tropical rain forest on public land in Masindi District was selected for the study. Adjacent to Nyamagita Forest, was Muzinduki Forest, a natural, privately owned tropical rain forest (see Figure III.1). Both forests were in the same watershed and ecological zone and differences in the condition of these forests could be attributed mainly to governance, rules, incentives, and local use patterns under the two different institutional settings.

MASINDI SITE

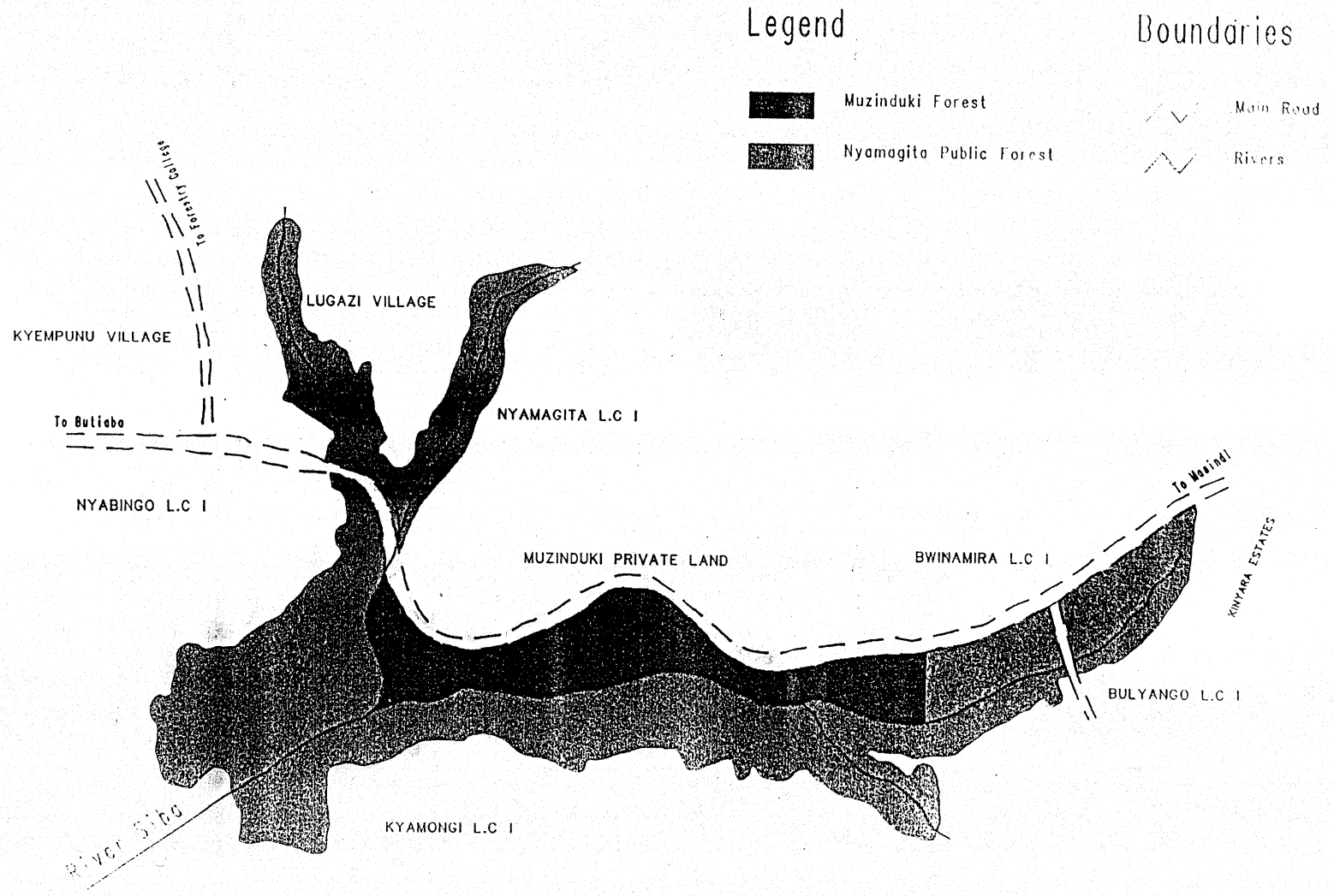


Figure III.1: Map showing the location of Nyamagita and Muzinduki forests

Nyamagita Forest, located approximately 25km west of Masindi along the Masindi-Butiaba road, was selected as a representative non-gazetted communal forest occurring on public land in Budongo Sub-county in Masindi District. Adjacent to Nyamagita Forest and separated by the Siba river is Muzinduki Forest. This forest patch was leased by Muzinduki's father in 1975. It has been managed as a private forest since then. Both patches are riverine, medium altitude, moist semi-deciduous forest, as several of the dominant species are at least briefly deciduous. Both are part of the Budongo Forest ecosystem. Both forest patches are used by the nearby villages of Nyamagita, Bwinamira, Bulyango, Kyamongi, and Nyabigoma.

Bwinamira, one of the settlements closest to both forests, has been settled since 1912 by labourers working in nearby coffee, rubber, and sugar plantations. Towards the end of the second world war, a sawmill, a Polish refugee camp, and a forest college were established nearby. These establishments attracted people to settle in Nyamagita, Bulyango, Kyamongi and Nyabigoma. These settlements are inhabited by Alur, Lendu/Logo, Okebo, Lugbara, and Sudanese. Political instability in West Nile region of Uganda and Zaire, the land shortage in West Nile, and the attraction of employment in forest and sugar industries all help to explain the present ethnic heterogeneity of these communities. At the time of the study, there were approximately 400 households with a total population of 2,500. The population declined significantly after the wars of 1979 and 1986 due to ethnic conflict between migrants from West Nile and the native Banyoro. Appendix 2 shows the relationships among local user groups in these settlements, the two forests, and the local institutions managing these forests.

3. HOIMA SITE

From Hoima District, Sangwe Forest, which is a communal natural forest occurring on public land, was selected for the study (see Appendix 1). Adjacent to this forest is the Kyamugongo Government Forest Reserve. Both forests are in the same watershed and ecological zone, and differences in the condition of these forests could be attributed mainly to governance, rules, incentives, and local use patterns.

Sangwe Forest, located approximately 14km northwest of Hoima town (Figure III.2) along the Hoima-Butiaba road, was selected to represent non-gazetted forests on public land. The adjacent Kyamugongo Forest Reserve has been central government property since the late 1930s. Both forests are riverine, medium altitude, moist semi-deciduous rain forest with closed canopy along the Sangwe River, a tributary of the Hoima River that drains into Lake Albert in the Western Rift Valley. Both forests are utilised by the residents of Mpunda, Birungu, Kitembeka and Kihamba villages. These villages have been settled since the 15th century. There is evidence that the area has been relatively densely populated for a long time. There was a significant increase in population in the 1930s due to the introduction of cash crops such as coffee, cotton, sugar cane, and tobacco. In September 1995 there were about 420 households and a population of 2,500.

HOIMA SITE

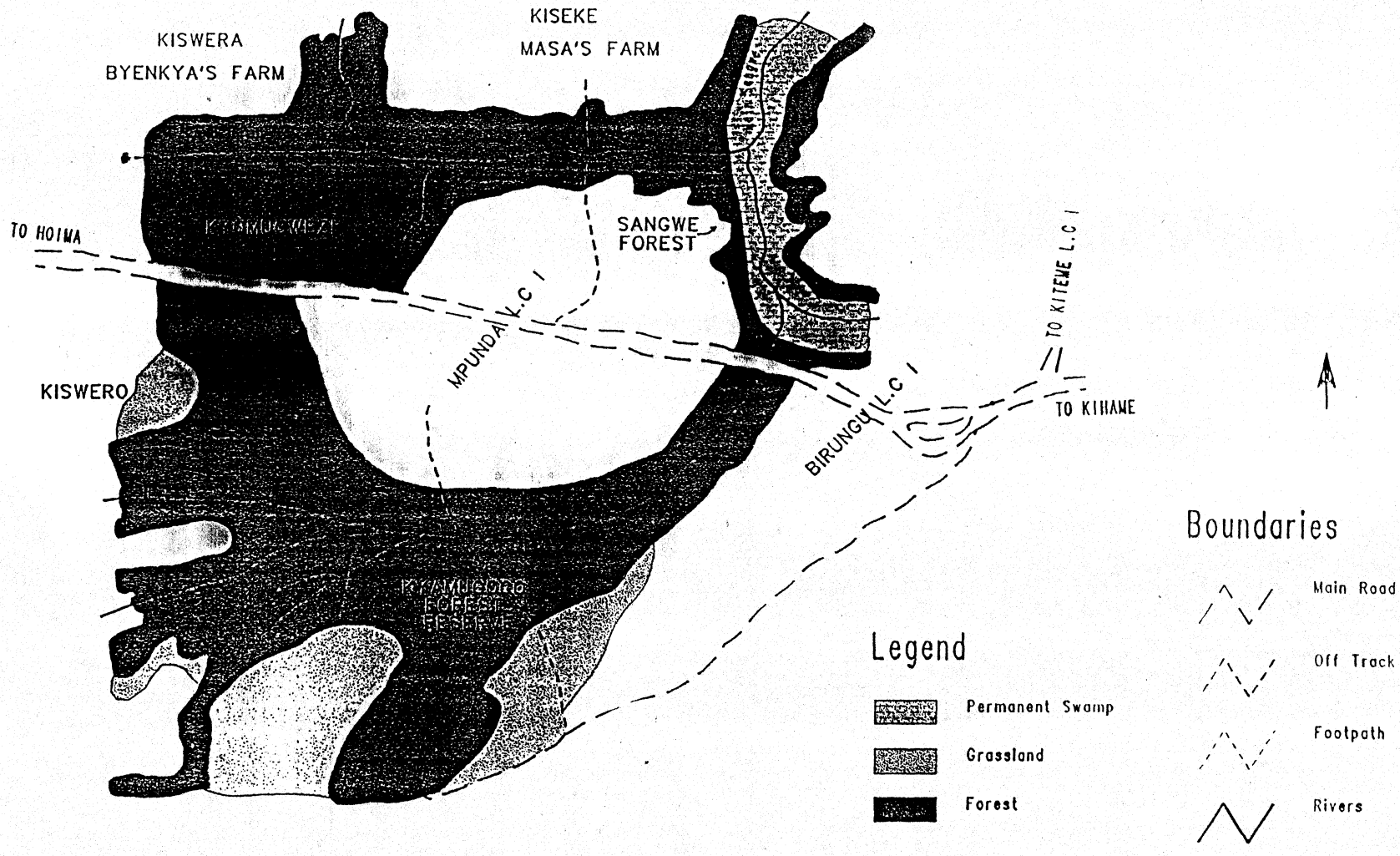


Figure III.2: Map showing the location of Sangwe and Kyamugongo forests

SCALE 1:50

The area was first settled by the Bahamba clan, who were the official bodyguards of the Banyoro kings. The land was allocated to this clan as a reward for their bravery by King Rugambanabato, the 19th King of Bunyoro under the Batembuzi dynasty. Through intermarriages, other clans also migrated into the area, but the Bahamba is still the dominant clan and this helps explain the present homogeneity of these communities. Appendix 3 shows the existing relationships among the local user groups in the nearby settlements, the two forests, and the local institutions in the Hoima study site. Thus in the two study sites, one government reserve, one private forest, and two non-gazetted communal forests were studied (see Table III.1).

Table III.1 Forests and tenure regimes studied

Study site	Forest	Tenure regime		
		Communal	Private	State
Masindi	Nyamagita	X		
Masindi	Muzinduki		X	
Hoima	Sangwe	X		
Hoima	Kyamugongo			X

C. METHODOLOGY

A combination of methodologies were used to collect data about the condition of the forests, the users of these forests, the products they withdraw, and the rules, including those crafted by the users themselves and those imposed upon them by government officials. Information also was collected on sanctions, level of enforcement of the rules, and the presence of any conflict-resolution mechanisms.

1. PRA METHODOLOGY

In two villages, at each site, a PRA was first conducted. The PRAs typically lasted 14 days and provides a core around which other activities took place. The attributes of the community were obtained during the meetings with the men, women, and children of Nyamagita and Bwinamira villages in Masindi District and Mpunda and Kihamba villages in Hoima District. Follow-up focus groups and in-depth discussions were held on topics identified as issues in PRA meetings. These focused discussions were held with forest officers, Resistance Council (RC) members, the forest owner, and user groups.

2. HOUSEHOLD SURVEY

Following the PRA, a household survey was conducted and questionnaires were administered to 405 randomly selected (from a household list of each village) households as shown in Table III.2. The household survey gathered standardised information that could be systematically compared and analysed across communities and sites.

Table III.2 Households surveyed

Settlement	Nearby forest	Total H/hold	No. of H/hold interviewed	Predominant tribe
Nyamagita	Nyamagita	84	41	Alur
Bulyango	Muzinduki	100	34	Lugbara
Bwinamira	same	80	43	Nyoro
Kyamongi	same	63	40	Lugbara
Nyabigoma	same	50	32	Lugbara
Mpunda	Sangwe/ Kyamugongo	80	50	Nyoro
Kihamba	same	120	71	Nyoro
Birungu	same	120	51	Nyoro
Kitembeka	same	80	43	Nyoro
		Total 777	Total 405	

Data was gathered on variables such as size of landholdings, gender of household head, level of education of household head, ethnic background, and size of household with the view that such socioeconomic factors affect attitudes about common property use and management. Questions on resource use were asked on both farm and non-farm activities. Logistic regression was carried out to test whether "opinion" responses were dependent on specific socioeconomic factors and to test for significant differences among particular variable categories.

In order to run the chi-square and t-tests for significant differences between the means of certain harvesting practices and "opinion" responses, age was put into two groups: 0-36 years and 36 years and above. Education levels were put into six groups: no education, primary one to three, primary four to seven, junior, ordinary and advanced level secondary, and post-secondary education. Landholding was put into two groups: 0-5 acres and 5 acres and above. Family size was put into two groups: 1-6 people and 7 people and above. Income level was put into two groups: Sh1-100,000 and Sh100,001 and above. Households were put into three groups by distance from the forest: 0-0.5km, 0.51-1.0km, and 1.1km and above.

Farm activities such as opening new areas of crop land and cropping patterns are assumed to affect the rate of forest encroachment. Non-farm activities such as pitsawing, charcoal burning, craftmaking, and house construction also affect the rate of deforestation. Also factors external to individual decisions on resource use affect how much individuals are willing to contribute to collective resource management. Government fiscal policy, commercial resource exploitation policies, and infrastructural development are crucial factors.

3. DATA COLLECTION ON FOREST CONDITION

After surveying and mapping the boundaries of the forests, 30 randomly selected plots were established in each forest (Ostrom et al 1993). Muzinduki's forest consisted of 300ha. For comparison, an equivalent total area of the Nyamagita communal forest adjacent to Muzinduki's forest was demarcated and randomly sampled. Similarly, Sangwe communal forest consisted of 200ha. For comparison, an equivalent total area of Kamugongo forest reserve adjacent to Sangwe forest was demarcated and randomly sampled.

A four-person forest survey team located the randomly selected plots in the forests and collected data on soil texture, erosion, and the presence or absence of evidence of recent forest exploitation (such as firewood collection, pole cutting, charcoal making, pitsawing, or grazing); botanical data were also collected (Becker, Banana, and Gombya-Ssembajjwe 1995). Two people skilled at identification of local flora were on the team to assist with identification of plants.

After locating the centre of the plot, three concentric circles were established around it at radial distances of one, three, and ten metres. Species of herbs and woody seedlings were identified in the smallest circle and the percentage of the ground covered by each species was recorded. In the next circle, tree saplings and shrubs were identified and each individual's maximum stem diameter (cm) and height (m) were recorded. Trees were classified as saplings when their stem diameters were between 2.5 and 10cm. Trees with at least a 10cm diameter at breast-height (DBH) were enumerated in the largest circle. The DBHs of the trees were measured using callipers and the heights estimated using a hypsometer.

4. DATA ANALYSIS

Data collected on the trees in the sample plots and the types of exploitation observed in the plots were compiled to assess the physical and biological condition of the forests in the two sites. Exploitation reflects current use, while diameter class structure and biological diversity of the forest, reflects both past and present use pattern (Becker, Banana, and Gombya-Ssembajjwe 1995). Biological diversity in the four forests was estimated by *ds*, an inversion of the Simpson's Dominance index (equation 1) and by the Shannon Diversity Index, H (equation 2). The inversion of the Simpson's Dominance Index is defined as:

$$ds = N(N - 1)/\sum n_i(n_i - 1) \quad \text{.....equation 1}$$

where N is the total number of individual trees in the sample and n_i is the abundance of each species in the sample.

The Shannon Diversity Index is defined as:

$$H = (N \ln N - \sum n_i \ln n_i)/N \quad \text{.....equation 2}$$

where In refers to the natural log (base e), approximately equal to 2.718.

The distribution of size classes (by DBH) of trees and importance values of trees were calculated. Importance value was calculated by summing relative density (number of trees of each species/hectare), relative dominance (basal area of each species as a percentage of all species), and relative frequency (percentage of sample plots containing each species) for each species, and then dividing by three to obtain a value between 0 and 100. Tree species were ranked by importance value and compared to see if any species differed greatly in rank in the two forests at each study site or if certain species were missing in one forest but were present in the other.

Data collected from the household survey was coded and analysed using a computer. A variable description file was prepared and run with the raw data to produce a complete the SPSS data file. The data were then analysed using SPSS software statistical package. Chi-square and t-tests were carried out to test for statistical differences between different variables such as ethnic groups, education levels, age, and patterns of forest resource use and management. Chi-square is particularly the most appropriate test for investigating differences between certain descriptive data.

The information provided by residents of the local communities in the study area, the local RC members, and local forest management authorities was used to generate a set of sustainability factors for each forest. The information gathered also provided an idea of incentives that currently determine the use-patterns in the forests studied.

IV. THE COMMUNITY AND ITS USER GROUPS

A. THE COMMUNITY

PRA, a qualitative research methodology that puts a particular emphasis on tapping the knowledge of local people and incorporating their perspectives as an integrated part of the research process, was employed in the initial stages of the study in order to understand the communities in the study area.

Although only two villages were selected at each study site for this purpose, the natural resource management and tenure systems therein characterised conditions that can be found in much of the study area. The area comprised multi-ethnic communities of diverse sociocultural backgrounds. These are the Banyoro who are predominant (60.2%) and are more permanently settled, the Lugbara (19.3%), the Alur (12%), the Okebo (4.1%), and a few others who did not feature prominently (4.4%). Other than the Banyoro, who are the natives of the area, the rest mainly are immigrants. Survey data indicates that 63% of the respondents who migrated from outside districts came from the West Nile districts of Nebbi and Arua, while 98% of those who are alien are of Zairean and Sudanese origin (Table IV.1).

Table IV.1 Distribution of survey respondents by ethnic groups

Ethnic Group	District	
	Masindi (%)	Hoima (%)
Alur	24.1	
Lendu/Logo	5.1	
Okebo	8.2	99.5
Nyoro	20.9	
Lugbara	38.6	0.5
Other*	3.1	

* These include Ganda, Gungu, Samia, Kiga, and other isolated cases.

Source: survey data.

Whereas there were no significant differences between the two districts in characteristics such as age structure, education levels, average family size, proximity to the nearest forest, and commercialisation of forest products, socioeconomic characteristics such as average landholding, gender composition, formal employment, and household income varied to some degree (Table IV.2).

It was found that the majority of the respondents in both cases did not own more than 5 acres (2ha) of land (71.2% and 65.2% in Masindi and Hoima, respectively, with an average of 5 acres each). Although this may look reasonable enough compared to other areas such as Kabale and Mbale and

conforms to the national average as recorded by World Bank (1993), it remains only within the bounds of cash and food crop commitments.

B. THE LIVELIHOOD SYSTEM

Respondents from both Masindi and Hoima agreed that agriculture was their major source of income. As shown in Table IV.2, both community groups live within 0.5km of the forest. However, sale of forest products forms an insignificant component of their sources of income, 7.1% and 21.2% for Masindi and Hoima, respectively. The data indicate that 90% of the people sampled grow at least one or two crops. The most commonly grown crops are cassava, maize, groundnuts, finger millet, sweet potatoes, and bananas. Tobacco and coffee feature most prominently as major sources of cash income. Some portion of the food crops grown may be sold to meet urgent cash needs for the family.

Income levels were significantly higher in Hoima than in Masindi. About 84.3% of the respondents in Hoima had annual incomes within the Sh100,000-5,000,000 range compared to 43.5% in Masindi. The difference in income levels between the two communities may be due to the migrant nature of the majority of residents, 79.1% in Masindi as opposed to 99.5% Banyoro in Hoima who are more settled.

Table IV.2 Socioeconomic characteristics of respondents by district (%)

Farmers' characteristics	District	
	Masindi	Hoima
Age (yrs):		
0-35	43.0	51.5
36-90	57.0	48.5
Gender:		
Male	77.8	43.5
Female	22.2	56.5
Land (acres):		
0-5	70.9	65.0
5.1-48	29.1	35.0
Land tenure:		
Customary	91.6	93.5
Leased	8.4	3.7
Borrowed	0	3.7
Family size:		
0-6	58.2	67.0
7-28	41.8	33.0
Head's education level:		
None	19.6	17.0
P1-P3	9.5	12.0
P4-P7	51.9	47.5
Junior	3.2	6.5
O'Level	6.3	12.5
A'Level	0.6	2.5
Post-secondary	1.3	1.0
Missing	7.6	1.0
Formal employment		
No	69.6	67.5
Yes	30.4	32.5
Household income:		
0-100,000	55.7	15.5
100.001-551,000	44.3	84.5
Distance from forest:		
0-0.5km	61.4	68.5
0.51-4km	38.6	31.5

Source: survey data

C. VILLAGE SOCIOECONOMIC STRUCTURE

The relationships among various socioeconomic factors were analysed using chi-square tests (Table IV.3). The chi-square statistic is a test of independence or relationship; it provides little information about the strength or form of the association between two variables. In order to ascertain the strength of the relationships between different variables and more especially the strength and dependence of variables as of prime concern, indexes that attempt to quantify the relationships between various variables and for purposes of hypotheses testing have been developed.

Table IV.3 Chi-square analysis of the relationship between various other socioeconomic factors

Relationship	
Income vs. tribe	
X^2	66***
d.f.	5
Significance	0.000
Tenure type vs. tribe	
X^2	23.13**
d.f.	15
Significance	0.04
Income vs. gender	
X^2	5.83**
d.f.	1
Significance	0.01
Income vs. age	
X^2	94.83***
d.f.	64
Significance	0.000

*** significant at 1% level of significance.
** significant at 5% level of significance.
* significant at 10% level of significance.

Source: survey data

The a priori expectation was that there would be a significant relationship between household income and tribe, age group and gender. Immigrants, youth, and women were significantly less well off. The wealthiest group, less than 5% and 15% of the population in Masindi and Hoima, respectively, have more than 20 hectares of developed land. They have permanent buildings, assets, and livestock, and often engage in off-farm remunerative activities such as trade. This class is mainly middle aged civil servants and successful traders who have accumulated wealth over time. The

youth, immigrants, and widows were generally in the poorest economic strata. The majority of people in this group do not own land and depend on their relatives, friends, and well-wishers for their livelihood. Upward mobility by this group is limited by lack of access to resources such as land and capital.

The most important resource for the population is land for settlement and crops. Some of the land in Masindi District is public, while a sizeable chunk is an individual's private estate. In Hoima, most of the land is held under customary tenure and only 3.7% of the respondents had leased the land. In Masindi District, where the majority of villagers are immigrants, initial access to the public land was sanctioned by the RC1[1] and the elders who would allocate a vacant portion of the land to a newcomer. At the time of allocation, these authorities would educate the new occupant on the rules governing land access in the village. Such rules are:

- When emigrating, only improvements on the land are sold but not the land itself.
- Adherence to boundary definition is mandatory to avoid conflict.
- There is freedom of bequest.
- The RC1 officials and the elders have the power to evict bad elements from the village directly or by appealing to the RC hierarchy.

According to the villagers, there was no more public land left unoccupied in either Masindi or Hoima. This has led to some families settling on privately-owned leased land. In Nyamagita village in particular, one landlord (Muzinduki) with 450 acres of land let immigrants use his land. No permanent structure was allowed on the land, nor were sales allowed except those improvements on the land; nonetheless, the inheritance facility prevailed and the land was managed on customary principles.

D. THE FOREST RESOURCE BASE

Three types of forests were identified in the study area: public forests (which refer to non-gazetted forests on public land), a private forest, and a government forest reserve. Pitsawing, charcoal burning, and the harvest of any forest product on a commercial basis were carried out in all three types of forests with licences provided by the Forest Department. The villagers were free to collect dry firewood and other non-wood forest products (NWFPs) for subsistence from forests on public land and the government forest reserve. As agents of the government at the grassroots level, the RC1 is expected to help enforce the rules governing sustainable harvesting of the forest resources.

The private forest was less accessible to the local communities than was the public forest and the government forest reserve. Villagers have open access to collect deadwood and NWFPs such as

[1] Resistance Council 1 (so called at the time of the survey) is the lowest level of local authority in Uganda. It has since been renamed Local Council 1 under Uganda's new constitution.

mushrooms, water, craft material, and herbal medicine but could cut building poles or fell a tree only with the approval of the owner. Despite an increase in crop raiding by monkeys and baboons from the forest, 93% of the respondents reported that this was a serious problem and 43% reported an increase of these animals. The communities expressed a strong attachment to the forest, declaring that they would wish to have the forest in place forever and to expand it by planting eucalyptus species. In separate interviews, villagers and the owner of the private forest concurred that there were no serious encroachments into the private forest; however, 75% of the respondents reported a decrease in area occupied in the government and communal forests due to encroachment and attempts at individualisation of the commons.

In conclusion, the communities described in this chapter are typical rural communities depending largely on subsistence agriculture. The forest resources around them are primarily used for subsistence. The residents have open access to the harvesting of NWFPs from the communal, private, or government reserves.

V. CONDITION OF THE FORESTS UNDER DIFFERENT TENURE REGIMES

A. INTRODUCTION

No significant differences in the soil types, slopes, or drainage patterns were found in the forests at each study site. Both Nyamagita and Muzinduki's forests shared similar topography. Both were drained by the Siba River with a relatively narrow, moderately sloping watershed. Similarly, both Kyamugongo Forest Reserve and Sangwe Forest shared similar topography and are drained by the Sangwe River which has a wide, gently-sloping watershed. All the forests are well served with roads and footpaths and are bordered by agricultural land and settlements.

B. EVIDENCE OF CONSUMPTIVE DISTURBANCE

Evidence of exploitation of the forest for both commercial and subsistence use was observed in all forests studied. However, evidence of consumptive use was more frequently recorded in Muzinduki's forest plots than in plots in the Nyamagita, Sangwe, and Kyamugongo forests. Indications of pitsawing, pole cutting, commercial firewood cutting, and conversion of forest land to agricultural use were observed in more than 90% of the plots in Muzinduki's forest, while the Kyamugongo Forest Reserve had the lowest level of disturbance (17 out of 30 plots) (Table V.1). Such high level of exploitation in all the forests studied suggests that these forests are utilised almost on an open-access basis with limited regulation and control of harvesting levels.

C. BIODIVERSITY DATA FOR MASINDI

In Masindi, the number of trees/ha was significantly greater in Nyamagita than in Muzinduki's forest by about 20 trees/ha (Table V.2). Nyamagita had at least 14 more species of trees than did Muzinduki's adjacent forest. The Simpson and Shannon's diversity indices suggest that Nyamagita had a more even distribution of different species resulting in high values (Table V.2). The Shannon index is particularly sensitive to the presence or absence of rare species and indicates that Nyamagita has slightly a higher number of rare species than Muzinduki's forest. The Simpson diversity index, which is sensitive to evenness of distribution, was higher in the Nyamagita forest samples than in those from Muzinduki's.

Table V.1 Types and frequency of exploitation in plots sampled in Masindi and Hoima sites (n=30)

Name of forest	Tenure type	Type of exploitation					
		None	Pitsaw	Pole	Firewood	Agri	Graze
Sangwe	Communal	9	8	13	1	5	0
Kyamugongo	Government	13	4	8	2	5	3
Nyamagita	Communal	7	7	19	3	1	0
Muzinduki	Private	3	13	22	5	6	0

Table V.2 Data collected for trees in samples forests (n=30)

Trait	Forest and tenure regime			
	Hoima site		Masindi site	
	Kyamugongo (government)	Sangwe (communal)	Muzinduki (private)	Nyamagita (communal)
Species richness	40	33	52	66
Shannon index	3.24	2.5	3.6	3.8
Simpson's index	20.8	7.9	33.0	38.7
Trees in 30 plots	227	238	190	216
Mean no. of trees	7.5+ 3	8.0+3.3	6.3+4.2	7.2+3.8
Mean DBH (cm)	34.2+0.8	28.4+1	30.7+1.1	29.6+1.4

The distribution of different-sized trees was not significantly different between the two forests: both forests had 80% of trees having DBHs in the range of 10-40cm. Large merchantable trees such as those with DBHs greater than 60cm were rare in both forests, representing less than 7% and 4% of the number of trees in Muzinduki and Nyamagita forests, respectively (Figures 5.1a and 5.1b). There was significantly more trees in the 11-20cm diameter class in Nyamagita than in Muzinduki's forest. The overall average DBH for both forests was approximately 30cm.

Figure V.1a: Number of stems per diameter class in Muzinduki and Nyamagita forests

Fig. 5.1a

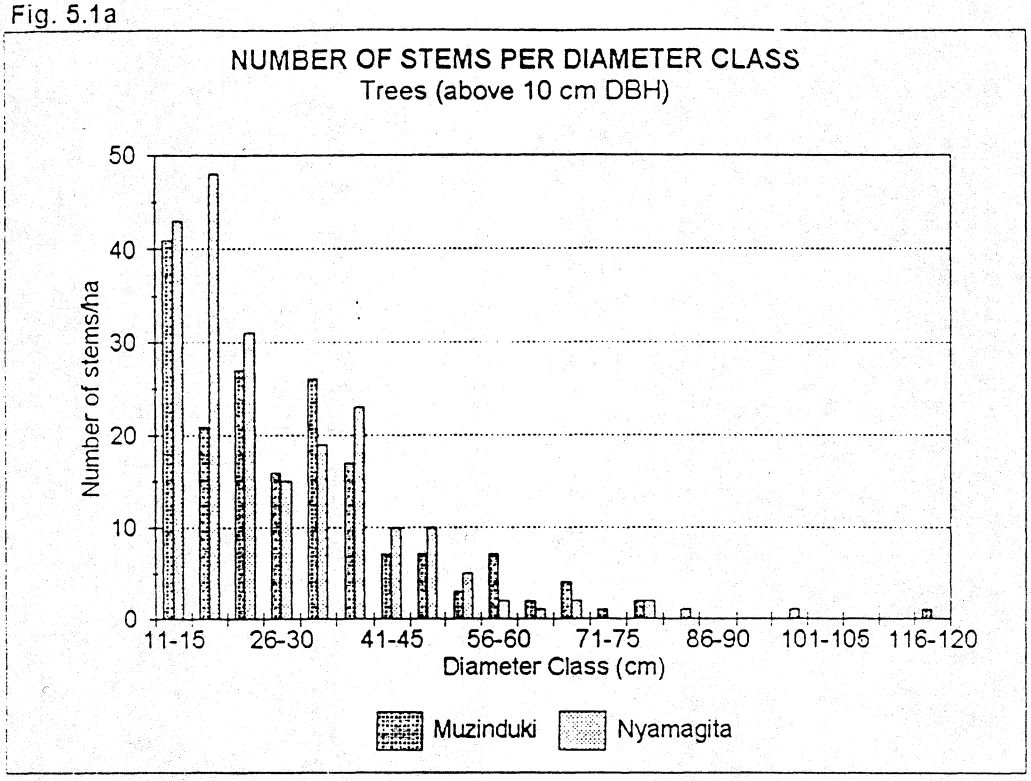
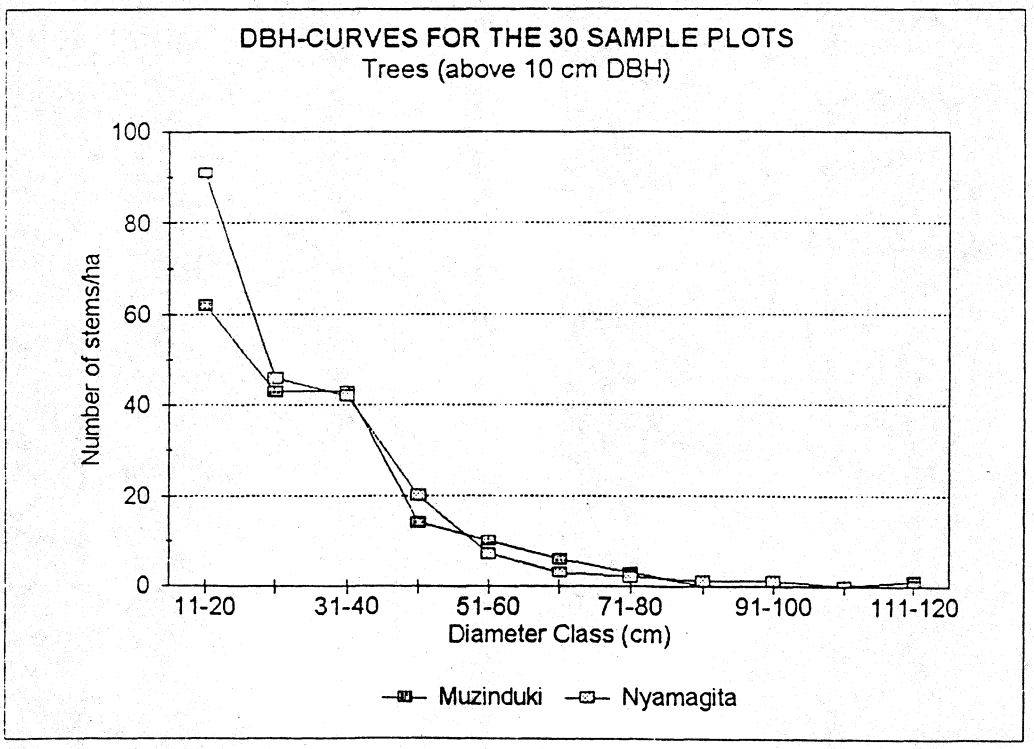


Figure V.1b: DBH-curves for the 30 sample plots in Muzinduki and Nyamagita forests



By summing relative density (number of trees of each species/ha), relative dominance (basal area of each species as a percentage of all species), and relative frequency (percentage of sample plots containing each species) for each species and then dividing by three, an estimate of the biomass contributed by each tree species can be made. This is referred to as the importance value of that particular tree species. Tree species can then ranked by importance value. Since the forests in each study site were located in the same watershed and ecological zone, one would expect the importance value of each species to be the same in each forest. If any species differed greatly in rank in the two forests at each study site or if certain species were missing in one forest but were present in the other, it would most likely be due to different use patterns and not due to ecological factors.

Table V.3 shows the ten most important tree species in Nyamagita and the rank of the same species in Muzinduki's forest for comparison. Table V.4 shows the ten most important tree species in Muzinduki's forest and the rank of the same species in Nyamagita for comparison. Valuable timber and firewood species such as *Macaranga schweinfurthii* (firewood), *Khaya anthotheca* (mahogany for furniture timber) and *Croton microstachys* (timber) were conspicuously less abundant in Muzinduki's forest (Table V.3). On the other hand, good pole species such as *Funtumia elastica, Myrianthus arboreus, Piptadeniastrum africanum, Blighia unijugata* and *Aningeria altissima* were significantly less abundant in Nyamagita (Table V.4). These figures suggest that Muzinduki, the private owner, has converted most of the economically viable species to timber in order to cash in from the prevailing high demand for quality timber, while local residents obtain building poles from the Nyamagita communal forest.

D. BIODIVERSITY DATA FOR HOIMA SITE

In Hoima, the number of trees/ha was greater in Sangwe Forest than in Kyamugongo Forest Reserve, but only by 11 trees/ha. However, the mean values for the number of trees per plot was not significantly different between the two forests. The trees were significantly bigger in Kyamugongo Forest Reserve than in Sangwe. The mean of the DBHs for all trees was 34.2cm in Kyamugongo compared to 28.4cm in Sangwe. Similarly, the distribution of different-sized trees was significantly different in the two forests (Table V.2, Figures V.2a and V.2b, and Appendix 5).

Table V.3 Comparison of tree species by importance value in Nyamagita and Muzinduki forests (Nyamagita as a reference)

Species	Use	Importance value	
		Nyamagita	Muzinduki
Macaranga schweinfurthii	Firewood	1	25
Croton microstachys	Timber	2	16
Antiaris toxicaria	None	3	8
Khaya anthotheca	Timber	4	31
Tichilia rubscens	None	5	14
Tabernamontana holstii	None	6	10
Afrosersalia ceracifera	Poles	7	33
Lavoa trichiliodes	Timber	8	6
Calancoba schweinfurthii	None	9	4
Pseudospondias microcarpa	None	10	11

Table V.4 Comparison of tree species by importance value in Nyamagita and Muzinduki forests (Muzinduki as reference)

Species	Use	Importance value	
		Muzinduki	Nyamagita
Cola gigantea	None	1	11
Funtumia elastica	Poles	2	13
Myrianthus arboreus	Poles	3	24
Calancoba schweinfurthii	None	4	12
Piptadeniastrum africanum	Poles	5	37
Lavoa trichiliodes	Timber	6	8
Blighia unijugata	Poles	7	64
Antiaris toxicaria	None	8	36
Aningeria altissima	poles	9	3
Tabernamontana holstii	None	10	6

Figure V.2a: Number of stems per diameter class in Kyampoma/Sangwe and Kyamugongo forests

Fig. 5.2a

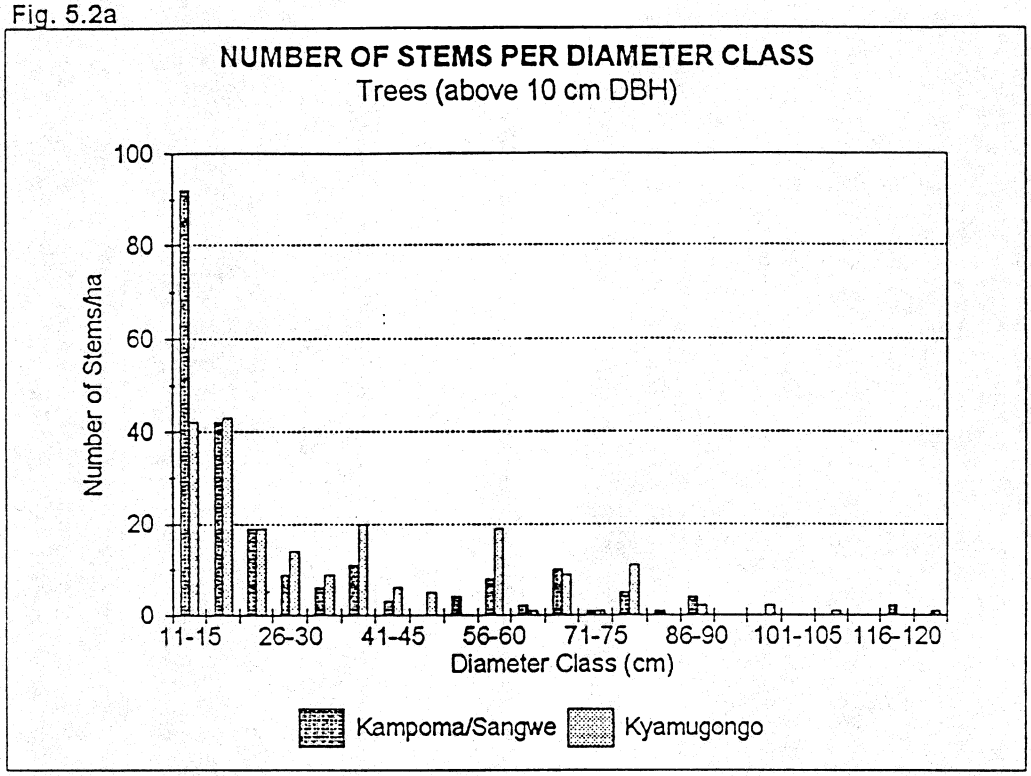
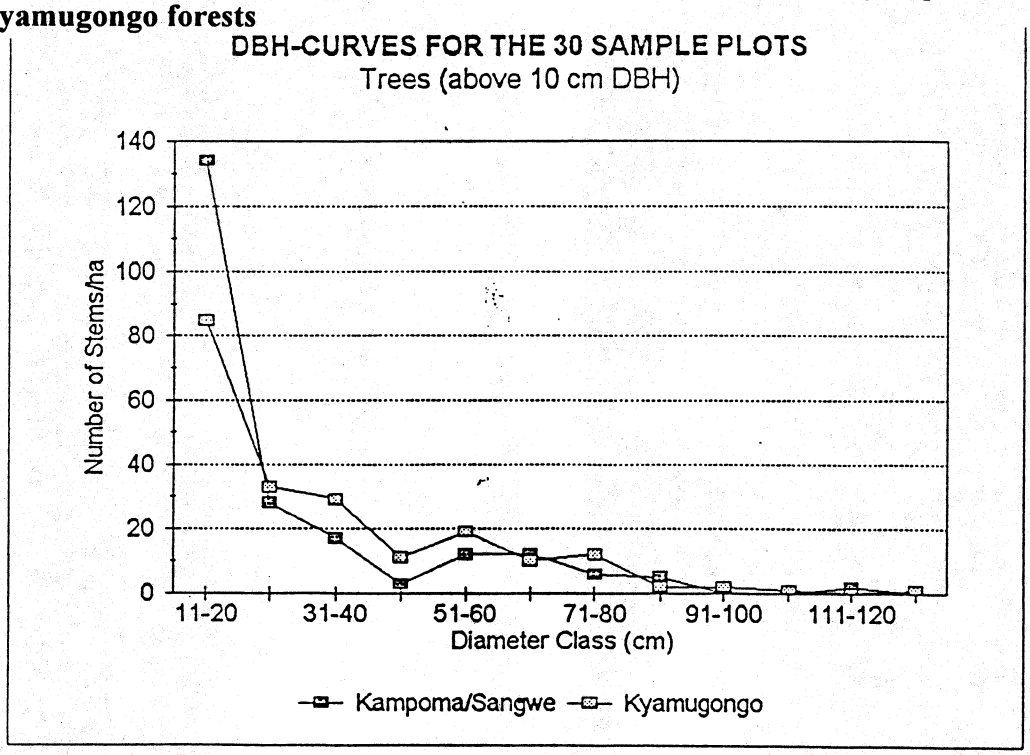


Figure V.2b: DBH-curves for the 30 sample plots in Kyampoma/Sangwe and Kyamugongo forests



Although both forests were dominated by trees having DBHs between 10-40cm, 60% of the trees in Sangwe were below the 20cm diameter class. Harvestable trees, such as those with DBHs greater than 60cm, were more common in the Kyamugongo Forest Reserve, representing 20% of the total number of trees in the forest. Kyamugongo had at least seven more species of trees than did the adjacent Sangwe communal forest.

The Simpson's and Shannon's diversity indices suggest that Kyamugongo had a more even distribution of different species resulting in high values (Table V.2). The Shannon index was significantly higher in Kyamugongo (20.87) than in Sangwe (7.93). This indicates that Kyamugongo has significantly more species diversity. The most important tree species in Sangwe (*Macaranga schweinfurthii, Pseudospondias microcarpa,* and *Neoboutonia schweinfurthii)* represent 54% of the total number of trees in the forest. Since large areas of Sangwe is swamp, diversity of species would be expected to be low.

Table V.5 shows the most important tree species in Kyamugongo and the ranking of the same species in Sangwe. *Piptadeniastrum africanum* and *Funtumia elastica* (species used for poles by the community) were conspicuously less abundant in Sangwe (Table V.5). Five of the 10 most dominant species were not being utilised by the local communities; only *Maesopsis eminii* (colonising species) and *Mitragyna stipulosa* (a swamp species) were valuable timber species. Table V.6 shows the most important tree species in Sangwe and the rank of the same species in Kyamugongo. *Neoboutonia schweinfurthii* and *Cathormion altissimum* were significantly less abundant in Kyamugongo than in Sangwe. Six of the 10 most dominant species in Sangwe forest were of no economic value to the local communities. Appendix 5 shows the frequency and average diameter of trees encountered in these forests.

E. Discussion

The stand dynamics (physical conditions) of the forests studied reflect the local rules, incentives, and day-to-day actions of the local people on the forests under the three different institutional settings. The most significant similarity among the forests is the high levels of disturbance as indicated by the number of plots with evidence of use. There are extreme deviations in the more important tree species, probably resulting from the pattern of exploitation rather than from ecological differences. The Nyamagita patch of the forest is a major source of poles for both migrants and local inhabitants for both house construction and construction of tobacco barns. Muzinduki does not allow cutting poles from his property. Thus, tree species favoured by the local people for poles are significantly less abundant in Nyamagita than in the adjacent Muzinduki patch.

Table V.5 Comparison of tree species by importance value in Kyamugongo and Sangwe forests (Kyamugongo as a reference)

Species	Use	Importance value	
		Kyamugongo	Sangwe
Pseudospondias microcarpa	None	1	2
Lannea welwitschii	None	2	7
Maesopsis eminii	Timber	3	8
Macaranga schweinfurthii	Firewood	4	1
Mitragyna stipulosa	Timber	5	3
Antiaris toxicaria	None	6	10
Piptadeniastrum africanum	Poles	7	*
Funtumia elastica	Poles	8	21
Pycnanthus angolensis	None	9	6
Tabernamontana holstii	None	10	9

* Not recorded in Sangwe

Table V.6 Comparison of tree species by importance value in Kyamugongo and Sangwe forests (Sangwe as a reference)

Species	Use	Importance value	
		Sangwe	Kyamugongo
Macaranga schweinfurthii	Firewood	1	4
Pseudospondias microcarpa	None	2	1
Mitragyna stipulosa	Timber	3	5
Neoboutonia schweinfurthii	Firewood	4	*
Cathormian altissimum	None	5	21
Pycnanthus angolensis	None	6	9
Lannea welwitschii	None	7	2
Maesopsis eminii	Timber	8	3
Tabernaemontana holstii	None	9	10
Antiaris toxicaria	None	10	6

The prevailing high demand for timber products is an incentive for Muzinduki to over-exploit his forest. *Khaya anthotheca* (the most valuable timber species in Uganda) was conspicuously rare in Muzinduki's forest compared to the adjacent Nyamagita forest. The highest number of plots with

evidence of pitsawing was observed in Muzinduki's forest. The highest number of plots with evidence of conversion to agricultural use was also observed in Muzinduki's forest. Twenty percent of the plots were located in an area converted to agriculture, compared to only 3% in Nyamagita. The private forest owner is more likely to utilise his natural forest or transform it according to market demand. At the time of the study, Muzinduki had already cleared two hectares of natural forest and planted it with *Eucalyptus grandis*. Thus, privatisation is clearly no guarantee of sustainable use or conservation of natural tropical forest. Privatisation can indeed favour expansion of open-access exploitation onto nearby poorly-protected communal and government owned forests (Bromley and Cernea 1989).

Some differences were noted in indices of species diversity. Nyamagita had more species per unit area than did Muzinduki's. Although this could be a chance sampling difference, clearing the arable land for agricultural use and leaving only the swamp under forest cover could reduce the overall species diversity of the forest. Tree species evenness was higher in Nyamagita. The lower density of trees in the Muzinduki forest reflects probably greater harvesting levels and decline in forest biomass due to current over-exploitation and conversion of forest land to agricultural use.

The Sangwe communal forest is a major source of poles for the local communities for house construction and for construction of tobacco barns for the residents of Birungu, Kitembeka, and Kihamba settlements. Thus, *Piptadeniastrum africanum* and *Funtumia elastica*, the tree species favoured by local residents for poles, were either absent or rare in Sangwe compared to the adjacent Kyamugongo Forest Reserve. Although local residents have a right to collect building poles from the Kyamugongo, they are prohibited by law from cutting "desirable" timber species for use as poles. The desirable pole species in the area are also valuable timber species.

Due to some local respect for state property coupled by some degree of monitoring and rule enforcement by the state, 50% of the most abundant tree species in Kyamugongo were valuable timber, firewood, and pole species. Therefore, differences in accessibility to the forest by the local community could explain the observed differences in stand dynamics between the two forests (Table V.2). The highest number of plots with no evidence of consumptive disturbance and the lowest number of plots with evidence of pitsawing were observed in Kyamugongo; however, the number of plots with evidence of encroachment and conversion to agricultural use were similar in both forests.

There were significant differences in indices of species diversity between the two forests. Kyamugongo had more species which were also bigger in size than those in Sangwe. The presence of rare species (as indicated by Shannon diversity index) and even distribution (as indicated by Simpson's diversity index) were significantly better in Kyamugongo than in Sangwe (Table V.2). The absence of rare species and uneven distribution of species in Sangwe may be attributed to the extensive individualisation (privatisation) of the commons which had been taking place for two to three decades. Over 80% of the area left under the commons is under swamp.

As the value of land increases due to shortage of land, stabilisation of agriculture, or the emergence of cash cropping, individuals start to bring pieces of communal forest land under their personal control for arable purposes by starting to cultivate it. As a result, land under communal use

decreased. Individualisation leads to a reduction of community control over land use and distribution, enhancing the right of the individual farmer.

F. FACTORS AFFECTING SUSTAINABLE UTILIZATION OF FORESTS STUDIED

After analysing long enduring common pool resources, Ostrom, et al. (1993) suggest that sustainable management of the forests is more likely to result when:

- markets for forest products are distant;
- population pressure in surrounding areas is low;
- population growth rate is low;
- the distributions that govern the forest system have been stable for a long period of time and are understood by forest users;
- the population is stable and homogenous;
- rapid access is available to low-cost arenas to resolve any conflicts between users, or between users and their officials;
- forest users who violate rules governing the day to day uses of a forest are likely to be punished by the other users, officials accountable to these users or both;
- the institutions that govern a forest system minimise opportunities for free riding, shirking and corruption through effective procedures for monitoring the behaviour of forest users and officials;
- the individuals who are most affected by the rules that govern the day to day users of a forest system are included in the group that can modify the rules; and,
- local forest users participate in and have continuing authority to design the institutions that govern the use of the forest.

A forest with a higher sum of the above sustainability factors should show less open access exploitation and forest degradation than a forest with a low sum. On the other hand, degradation associated with scrambling or open access exploitation should theoretically take place more rapidly in the forest having the lower sum of sustainability factors (Table V.7).

Factors predicted to affect institutional sustainability differed in the four forests under the different tenure regimes, especially the quality of monitoring and enforcement of rules (Table V.7). Kyamugongo Forest Reserve had six factors that are hypothesised to affect sustainability positively while Muzinduki had four and the two communal forests had only three.

Demand for high-quality timber from Masindi and Hoima is very high, thereby giving negative sustainability value for the forests in both sites. Although local people could influence the rules regulating forest use through local governing bodies at the village level (local council 1) and sub-county level (local council 3), local users were not using collective choice to modify day to day rules and design institutions governing the use of these forests. Thus, factor 9 and 10 were scored as negative for all the forests. However, local governing bodies at local level provide access to low-cost conflict resolution. Thus, factor 6 was given a positive score for all the forests.

Table V.7 Factors hypothesised to influence the sustainability of forests with qualitative values; - sign means that the factor reduced sustainability of the forest; + sign means that the factor increases sustainability of the forest.

Factor	Forest and tenure regime			
	Nyamagita (communal)	Muzinduki (private)	Sangwe (communal)	Kyamugongo (govt.)
1. Demand for forest products	-	-	-	-
2. Population pressure	+	+	-	-
3. Population growth rate	+	+	+	+
4. Institutional stability	-	+	-	+
5. Homogeneity of population	-	-	+	+
6. Access to low-cost conflict resolution	+	+	+	+
7. Quality of monitoring	-	-	-	+
8. Enforcement of rules	-	-	-	+
9. Local users modify rules	-	-	-	-
10. Local users design inst. governing use	-	-	-	-
Sum of sustainability factors	3	4	3	6

According to the 1991 population census, population growth in Masindi and Hoima is estimated to be 2.6%, below the national average of 3.0%. Therefore, demand for firewood and charcoal is low, giving a positive sustainability value for this factor in both sites. Factors that were hypothesised to influence sustainability were qualitatively different in the four forests: homogeneity of the population, population pressure, institutional stability, and enforcement of sanctions. With the exception of population pressure, these factors were all ranked as positive for Kyamugongo.

For over 400 years, the areas around Sangwe and Kyamugongo have been settled by an ethnically homogenous community. It is hypothesised that effective community control of resources is most likely to result when there are strong ties of kinship. On the other hand, high population mobility as was found in areas around Nyamagita and Muzinduki does not encourage the development of stable institutions to manage the resource. In addition, in such situations community membership is harder

to define and enforce effectively (Bruce 1989). Thus, this factor was ranked as positive for Sangwe and Kyamugongo and negative for Nyamagita and Muzinduki.

For over 30 years, Kyamugongo has been managed by the state, while for 20 years Munziduki's forest has been in private stewardship. Both forests have had well-defined boundaries and rules that are well understood by the local communities. Thus, institutional stability was ranked as positive for Kyamugongo and Muzinduki and as negative for Sangwe and Nyamagita.

There was no sufficient monitoring of rule compliance and no effective rule enforcement in all the forests except in Kyamugongo, where the government employs forest guards to monitor rule compliance. Rule breakers are fined and their tools confiscated if caught appropriating illegally. Effective monitoring by the state is possible because the reserve is relatively small (500ha), close to the main road, and only 14km from the district forest office. Kyamugongo had a larger total of sustainability factors than Sangwe, Nyamagita, and Munzinduki because it was better monitored and had rules that were enforced. The other three forests were poorly monitored, lacked clear and well-defined rules, and had no guards to monitor and enforce the rules. Local governing bodies at the village level were not involved in crafting rules related to forest use. Under these conditions, Kyamugongo should be more ecologically sustainable than Sangwe, Nyamagita, and Muzinduki. According to predictions, Kyamugongo should show less open access exploitation (fewer plots with evidence of illegal pitsawing, pole cutting, and firewood collection) and have large-sized trees. The condition of Kyamugongo was clearly in the direction predicted.

Muzinduki's forest was expected to be more sustainable than Nyamagita and Sangwe because it had a higher sum of sustainability factors. However, this forest showed more signs of open access commercial exploitation (more plots with evidence of pitsawing, pole cutting, firewood cutting, and conversion to agricultural use). If left unabated, this pattern of open access utilisation could lead to severe forest degradation and loss of many biotic resources and amenities. The condition of Muzinduki's forest was clearly not in the direction predicted by the sum of sustainability factors.

As a private owner, Muzinduki has ultimate control over his forest, and its sustainability cannot be easily predicted because it depends greatly upon his ethics, values, knowledge, and priorities. As incentives for exploitation of forests increase, private owners are more likely to utilise their natural forests or transform them according to market demand. Therefore, the impact of wholesome leasing or privatising natural forests on sustainable resource utilisation cannot easily be predicted.

G. CONCLUSIONS

There is evidence that the forest resources in the study area were being degraded through over-exploitation for both commercial and subsistence use. The proximate causes of degradation are clearing for agriculture, pitsawing, pole, and firewood cutting. However, not all forests were experiencing this problem equally. In some forests, there was less degradation. Among the more important factors that were found to affect the level and type of consumptive utilisation of forests was the level of rule enforcement related to the use of the forest resource. This variable plays an important role because if rules regulating access and use of forest resources are not adequately enforced, the de facto condition becomes one of open access rather than secure tenure. The study indicates that forest resources are more likely to be sustainably utilised if an effective structure of

institutional arrangements exists which gives rise to an authority system meaningful at the local level. A government forest reserve (state property) and a private forest (private property) can be as degraded as a communal forest (communal property) if there is no effective institutional arrangement and associated organisational mechanism to monitor and enforce rules in order to prevent wanton harvesting of the resource (Bromley 1990). Regardless of the de jure property regime, all forests can be de facto open access regimes if there is no effective institutions and mechanisms to enforce the rule.

VI. PRODUCTS HARVESTED FROM FORESTS

A. INTRODUCTION

A lot of products are obtained from forests by the local population, the most important being building poles, firewood, medicinal products, craft materials, wild foods, and game. Most respondents by omission or commission did not indicate timber as a major resource to them. Other non-tangible benefits such as clean water, windbreak, and rainfall are attributed to the presence of forests. Products harvested from the forests by local communities can be categorised into two groups: NWFPs and woody forest products. NWFPs generally include all tangible products other than timber, poles, firewood, and charcoal derived from the forest. Examples of NWFP include fibre products, wild foods, extractives, medicinal plant products, animal and animal products, water, and minerals. When properly carried out, harvesting NWFPs does not degrade the forest or kill the exploited trees but comes close to conforming to the ideal sustainable utilisation of forest resources.

B. UTILISATION OF NWFPS BY LOCAL COMMUNITIES

The use of NWFPs by the local communities in both Masindi and Hoima was not as extensive as reported in other ethnobotanical surveys. Apart from water, which over 88% of the respondents collect from water points located in the forests, most of other NWFPs were gathered by less than 20% of the respondents (Table VI.1). Such low consumption levels of NWFPs also was reported by Kirstin (1993) in Nyabyeya Parish, Budongo Sub-county. Kirstin attributed this to the recent nature of the settlement and, consequently, unfamiliarity with available species. However, this argument may not be correct since consumption of wild NWFPs also was low in Hoima where the settlements studied have been continuously inhabited since the 16th century. It is possible that most of the non-wood products consumed by the local communities such as mushrooms, honey, game, and green vegetables are gathered from the savannah grass lands. Some of the products have been domesticated and are therefore being grown in home gardens. During the PRA, it was reported that there is no food scarcity at any one time of the year because the land is fertile and the climate is favourable for crop production. Most local people are primarily farmers who are self-sufficient in food and do not need to supplement their staple foods with wild foods. However, respondents reported that during occasional prolonged droughts, more extensive collection of wild plant foods takes place.

Table VI.1 Use of NWFPs by local communities

Product	% respondents who use		
	Masindi n=190	Hoima n=215	Total n=405
Mushrooms	26.3	19.1	22.7
Green veg.	19.5	2.8	11.2
Honey	13.7	20.0	16.8
Fruits	11.6	6.5	9.0
Roots	6.8	4.2	5.5
Wild meat	6.8	6.0	6.4
Medicinal	11.1	8.9	10.0
Water	88.4	88.8	88.6

Although the availability of mushrooms is highly seasonal, they were the most gathered wild foods. Twenty two percent of all respondents interviewed gather mushrooms when they are in season. Leafy vegetables add flavour to the staple foods of rural populations. Nearly 11% of all respondents consumed leafy vegetables from the forest at some point during the year. Kirstin (1993) reported that nearly 80% of respondents in Nyabyeya parish consumed at least one type of leafy vegetables; however, many of these plant species were cultivated in home gardens. There was significant variation in the utilisation of leafy vegetables in the two sites. In Hoima, the consumption of this product was extremely limited. Only 2.8% of the respondents use green vegetables from the forest compared to 19.5% in Masindi. The observed differences may be due to differences in cultural habits of the different ethnic groups found in Masindi. Honey is another important wild food resource that is gathered from the forest. About 17% of the respondents reported that they harvest honey from the forests. Kirstin (1993) reported that there was no collection of honey from Budongo Forest; however, availability of honey is highly seasonal and the study might have occurred during the off season.

Forest plants are a source of medicine. In addition, they are used for rituals and as a charm potions. Approximately 10% of the respondents regularly collect plant medicines. The limited use of plant medicines may be due to the introduction of Western medicines. During the colonial period, use of plant medicines were discouraged.

Consumption of roots/tubers, game meat, and fruits was very limited. Fewer than 10% of the respondents gathered these products. Again, consumption of these products may be low because the communities are self sufficient in food supplies and do not supplement their staple foods with wild ones.

C. USE OF WOODY FOREST PRODUCTS BY LOCAL COMMUNITIES

Increasing domestic demand for woody forest products is one of the leading causes of degradation of forested areas. Woody forest products are used for construction, firewood, crafts, household items, and timber. The majority of homeowners in Masindi (90.5%) and Hoima (93.5%) build their homes using poles and rafters (Table VI.2). Pole cutting pressure seriously threatens the survival of forested areas. Pole cutting is species selective, seriously affecting small and emergent species (5-10cm diameter class).

Table VI.2 Use of woody forest products by local communities

Product	% Respondents who use		
	Masindi n = 190	Hoima n = 215	Total n = 405
Firewood	90.5	93.5	92.0
Poles	90.0	86.4	88.2
Crafts material	51.6	72.1	61.8
Equipment	10.5	0.5	5.5
Timber	8.9	3.7	6.3

The extraction of poles was predominantly more in forests on public land ($X^2 = 16.4$, df = 3, p = 0.000[xxx]) than in government and private forests. The private owner restricts cutting of poles from his forest while forest officials discourage cutting live trees from the government reserves without licence.

The source of energy in Masindi and Hoima exclusively is firewood. Local communities are permitted to collect firewood for domestic purposes in all forest reserves. Approximately 92% of the respondents collect firewood from the forest at least once a week. The majority of the respondents consume between 2.5 and 6.5m^3 of wood per year. Consumption of firewood varied greatly between households depending on family size, income level, age of respondent, and education level of household head. From the forest survey, it was observed that tree species preferred for firewood are still abundant in both Masindi and Hoima. Firewood for domestic use is collected by women and children and there were no reported difficulties in accessibility to the preferred species under 0.5 km. from their homesteads.

A lot of forest plant materials are used for the manufacture of handicrafts, household equipment, hunting and agricultural equipment, musical instruments, mats, baskets, and furniture. The household survey results show that collection from the forest of raw materials used in the production of handicrafts is still very widespread. On average, 61.8% of the respondents reported that they collect raw materials used for the manufacture of these products from the forests.

However, production of traditional household equipment such as wooden utensils is reported to be on the decline as local populations prefer the cheaper plastic ones purchased from the shops. Only 10.5% of the respondents in Masindi reported that they collect raw materials for manufacturing household equipment. In Hoima, such artisans were almost non-existent.

Most respondents did not indicate timber as one of the resources they get from the forest. Approximately 6.3% of the respondents are engaged in pitsawing. Kirstin (1993) reported that in Nyabyeya Parish, 31.7% of the respondents obtained wood from the few pitsawyers operating in the area. Although few local people engage in pitsawing activities, a forest survey showed that there was extensive pitsawing leading to degradation of the resource. For example, the number of stems/ha. of high quality timber species such as the mahoganies is very low (see Appendix 4 and Appendix 5). Apparently, most pitsawyers are not members of the local communities, and where they exist, the illegal aspect of the activity inhibits their willingness to admit to the activity.

Apart from timber species, no other plant species collected from the forest appears to be in short supply or overused.

D. RANKING FOREST PRODUCTS

Preference ranking was carried out during the PRA in two of the villages at each site to determine which products and services were the most important to the people. The results (Table VI.3) were obtained during the PRA exercise and show the seven most important forest products harvested from the forests. Water was the most important resource for the people of Nyamagita, Mpunda, and Kihamba villages, whereas building materials were the most important product for the Bwinamira community. Most water sources for the villages of Nyamagita, Mpunda, and Kihamba were situated in the forest, whereas for Bwinamira village, the water wells were protected and near, but not in, the forest. Also, most construction activities used local materials, in which case the ranks were reasonable for all villages.

Firewood was ranked second for Nyamagita, Mpunda, and Kihamba villages because the nearby forests were the most important source of firewood for these communities. In Bwinamira village, firewood did not command a significant position because most of it was collected from the hilltops, fallow land, and gardens.

Table VI.3 Preference ranking of forest products obtained in PRA

Product	Masindi		Hoima	
	Nyamagita	Bwinamira	Mpunda	Kihamba
Water	1	4	1	1
Firewood	2	5	2	2
Building poles	3	1	4	4
Craft materials	4	3	5	5
Timber	5	-	-	-
Medicine	6	7	3	3
Foods/Fruits	7	2	7	7

Source: PRA

Foods were ranked high in Bwinamira. Although it was discovered that the amounts involved are very small, the people believed that forest foods play a vital role in the survival of the community during periods of food shortage. In Nyamagita, Mpunda, and Kihamba villages, however, they occupied last position since, with exception of mushrooms and honey, people seldom gather forest foods.

The study found that many tree products enter into traditional pharmacopoeia. While this use has diminished as people have gained access to Western medicines, it continues to be particularly important for the elderly, children, and women who rely on many local products during pregnancy and childbirth. Plant medicine was ranked relatively high in the two Hoima villages and low in the two Masindi villages; yet, it was reported during the PRA that most herbs used for medicinal purposes are obtained from gardens and fallow land.

Since there are very few households involved in pitsawing, timber was not reported as one of the products harvested by local communities in Bwinamira, Mpunda, and Kihamba; in Nyamagita, it was ranked fifth. Use of sawn wood for either house construction or furniture manufacture was not widespread.

Although the residents exposed their awareness of the role of the forest in environmental protection, this non-tangible product was not ranked among the top seven products harvested in any of the villages; however, most respondents believed the forest should be protected against destruction so that they could continue to benefit from the forest.

E. SOCIOECONOMIC FACTORS AFFECTING COMMUNAL RESOURCE USE

Socioeconomic characteristics such as age, gender, wealth, education, heterogeneity of the population, household size, landholding, and distance from the forest all bring about differences in the community that need to be taken into account when assessing willingness to participate in the

management of the commons. Different social groups in the community need different products from the commons. In addition, access to a communal resources may be based on certain social affiliations. Therefore, socioeconomic characteristics may be used to explain the differences between those who use the resource and those who do not.

1. EFFECT OF GENDER

Gender may determine who has access to and control of resources such as land, firewood, building materials, and water. The a priori expectation was that there would be a significant relationship between gender and harvesting of certain products from the forest. Table VI.4 shows the relationship between gender and level of harvesting of various forest products.

Table VI.4 Chi-square analysis of the relationship between gender and harvesting level of forest products

Product harvested								
Mushrooms	Green vegetables	Honey	Game	Medicinal	Water	Firewood	Poles	Crafts
X_2- 2.04	10.49	2.22	8.2	0.92	6.9	0.13	17.97	5.34
df- 1	1	1	1	1	1	1	1	2
P- 0.15	001^{xxx}	0.32	0.004^{xx}	0.26	0.08^{xx}	0.71	0.000^{xx}	0.069^{x}

It is clear from the analysis that men and women harvest different products from the forest and at different levels of exploitation, although one could not say that either men or women have significantly higher exploitation or use levels than the other. Chi-squire analysis of the results show that women collect significantly more green vegetables and water than men, at 1% significance level. On the other hand, the results show that men hunt more often and obtain building materials more frequently, at 1% level of significance.

Although it is traditionally the work of females to collect firewood, its use was found not to be based on gender. The hypothesis that there is no relationship between fuelwood consumption and gender of respondent is accepted. The low observed significance levels indicate that there is a very small but non-zero linear relationship between the two variables. Such low significance levels also were observed in the harvesting of mushrooms, honey, roots, and medicinal products. On the whole, there did not seem to be any significant competition between men and women over most of the resources from the commons, which may be due to the fact that these resources are still abundant.

2. EFFECT OF AGE ON RESOURCE UTILISATION

It is assumed that older members of the community have resources, experience, and authority that allows them more accessibility to and control of resources. On the other hand, the income-generation potential of certain forest product harvesting activities may be attractive to the young

members of the community who do not have adequate land and meaningful employment. Table VI.5 shows the results of the chi-square analysis of the relationship between age and level of utilisation of forest products.

Table VI.5 Chi-square analysis of the relationship between age and use of various forest products

Product harvested								
Mushrooms	Green vegetables	Honey	Game	Medicinal	Water	Firewood	Poles	Crafts
X^2= 1.23	0.63	25.93	4.4	0.45	0.83	6.16	3.21	13.19
df= 1	1	1	1	1	1	1	1	1
P= 0.26	0.42	0.000^{xxx}	0.03^{xx}	0.49	0.35	0.01^{xx}	0.07^{x}	0.000^{xxx}

Different age groups play distinct roles in the community, and their use and exploitation of resources varies. It is, therefore, not surprising to find that chi-square analysis shows that the youth were more involved in commercial harvesting of forest products than the older members. The youth were cutting significantly more firewood, poles, and crafts, and were hunting more wild game and honey than the older members. It is possible that a significant portion of these products were for sale. Chi-square tests indicate that the differences in gathering of wild foods, medicinal plants, and water by the two age groups were not significant at 10% level of significance.

3. EFFECT OF INCOME

Wealthier members of the community have access to alternative resources. They may be able to use their wealth to purchase alternative goods and services. As it is difficult to measure income accurately during a household survey, the proxy for wealth (cash or liquidity) for people with no fixed salary was taken to be the amount of produce harvested in the previous two seasons. Regression analysis and chi-square test indicate that there was a negative but significant relationship between income and dependence on the commons for resources at 1% significant level (Table VI.6). The negative relationship indicates that the higher the income, the less the amount of forest products harvested by the household from the forest.

Table VI.6 Chi-square analysis of the relationship between income level and use of various forest products

Product harvested								
Mushrooms	Green veg.	Honey	Game	Medicinal	Water	Firewood	Poles	Crafts
X^2 = 0.40	7.24	13.84	0.74	1.39	0.00	5.02	1.93	22.53
df = 1	1	1	1	1	1	1	1	1
P = 0.52	0.07	0.00^{xxx}	0.38	0.23	0.97	0.02^{xx}	0.16	0.000^{xxx}

As reported during the PRA, a number of households use their gardens and land under fallow as a source of firewood, wild foods, and other products. Members of the community with high income tend to have larger landholdings. The more land one has, the less likely one is to depend on the forest as a source of forest produce. On the other hand, members of the community with a lower income depend significantly more on the forest for green vegetables, honey, and firewood than those with high income. Many poor members of the community depend on the forest resource for their livelihood. In addition, they cannot afford substitutes from the market.

4. EFFECT OF ETHNICITY ON RESOURCE UTILISATION

Kirstin (1993) demonstrated that a relatively larger proportion of the immigrants from Zaire living in Nyabyeya Parish were hunters and that they hunted primates, mostly baboons. It can be expected, because of cultural differences, that different ethnic groups utilise different resources from the forest (Table VI.7).

Table VI.7 Chi-square analysis of the relationship between ethnic group and use of forest products

Product harvested								
Mushrooms	Green veg.	Honey	Game	Medicinal	Water	Firewood	Poles	Crafts
X_2 =11.98	33.5	10.51	8.5	6.95	13.98	4.45	15.55	25.76
df = 5	5	5	5	5	5	5	5	5
P = 0.03	0^{xxx}	0.39	0.12	0.22	0.01^{xx}	0.48	0.008^{xxx}	0.00^{xxx}

The data show that a relatively larger proportion of immigrants (Alur, Lugbara, and Zairean tribes) consume wild foods, especially green vegetables. Chi-square tests indicate that the differences in consumption of green vegetables is significant at the 99% confidence interval while tribal differences in consumption of game meat, mushrooms, and medicinal herbs is not significant at the 95% confidence interval. This indicates that immigrants who do not have adequate land to grow both cash and food crops are more likely than the native Banyoro community to gather wild green vegetables to supplement their diet.

During PRA, it was reported that there is a shortage of building poles in the two areas. The chi-square tests also show that differences in frequency of harvesting poles between the different ethnic groups is significant at the 95% confidence interval. Immigrants often build very temporary structures since they have no incentive to construct permanent ones. These structures need to be rebuilt or repaired more often, thereby increasing the demand for poles. There are significant differences between ethnic groups and craft-making activities. Immigrants were more likely to be involved in craft making than the native population. The income potential of craft making is attractive to immigrants who need cash and are without adequate land to grow cash crops.

5. EFFECT OF DISTANCE FROM FOREST ON DEPENDENCY ON THE COMMONS

It can be assumed that the further away from the forest, the less likely the forest is of any significant value to the community. Table VI.8 shows the relationship between distance from the forest and use of various wood products. Closeness to the forest gives the households an advantage in gathering wild forest foods, honey, game, medicinal herbs, and water. A significant but negative relationship between distance from the forest and consumption of the above forest products was observed. Since these products are consumed often, it would be very costly to travel long distances in order to gather them. The results, however, show that distance from the forest did not have a significant effect on levels of firewood, poles, and crafts consumed. These products are necessary for rural communities, irrespective of distance from the forest. These rural communities have no affordable substitutes for firewood and building materials. Households living close to the forest were found to collect small quantities of forest produce and to do so more frequently. They do not see the need to stock large quantities of forest produce since small quantities can be collected according to demand. Households located far away from the resource collect larger quantities at a time but do so less frequently.

Table VI.8. Chi-square analysis of the relationship between distance from the forest and level of resource utilisation

Product harvested								
Mushrooms	Green veg.	Honey	Game	Medicinal	Water	Firewood	Poles	Crafts
x^2= 4.66	1.77	11.42	6.3	6.39	7.19	2.85	0.29	2.04
df = 2	2	2	2	2	2	2	2	2
P 0.096[x]	0.41	0.02[xx]	0.04[xx]	0.04	0.02[xx]	0.24	0.86	0.72

6. EFFECT OF TYPE OF PROPERTY REGIME AND ACCESS TO RESOURCES

Three types of property regimes were identified in the study area: communal non-gazetted forests on public land, the government forest reserve, and the private forest. At the time of the study, harvesting of forest produce on a commercial basis was allowed on public forest with licenses provided by the Forest Department. The local communities were allowed to collect dry firewood, cut building poles, and collect NWFP for subsistence from the forests on public land and from the government forest reserve. The private forest was less accessible to the local communities. They were permitted to collect deadwood and NWFP but could cut building poles or fell a tree only with the approval of the private owner. Chi-square analysis results (Table VI.9) show that there was no significant difference in rate of collection of wild food and honey from the three property regimes at 95% confidence interval.

Table VI.9. Chi-square analysis of the relationship between property regime and use of forest products

Product harvested								
Mushrooms	Green veg.	Honey	Game	Medicinal	Water	Firewood	Poles	Crafts
x^2= 5.32	5.39	6.56	7.4	7.6	17.29	13.55	16.43	24.7
df= 3	3	3	3	3	3	3	3	3
P = 0.14	0.14	0.36	0.05^{xx}	0.05^{xx}	0.000^{xxx}	0.003^{xx}	0.000^{xxx}	0.000^{xxx}

On the other hand, hunting and collecting medicinal herbs, water, firewood, poles, and craft materials were carried out significantly more often in forests on public land than in the government and private forests, at 1% significance level. During PRA, the local communities and the private owner concurred that there was virtually no major poaching of forest produce from the private forest. It is clear from the results that accessibility to woody forest products was determined by the nature of the property regime while NWFPs could be exploited on an "open-access" basis regardless of the tenure regime

7. EFFECT OF HOUSEHOLD SIZE

Family size was found to positively influence the quantities and frequency of collection of certain forest produce. The relationship between family size and use of herbal medicine, firewood, building poles, and craft materials was found to be significant at either 5 or 10% level (Table VI.10). This suggests that the more people there are in a household, the more the quantities of products consumed. However, there was no significant relationship between family size and consumption of wild foods. This may be attributed to the fact that there is no dependency of the population on wild foods.

Table VI.10 Chi-square analysis of the relationship between household size and utilisation of forest resources

Product harvested								
Mushrooms	Green veg.	Honey	Game	Medicinal	Water	Firewood	Poles	Crafts
x^2= 0.45	0.57	2.35	0.04	7.02	1.05	4.06	3.34	10.42
df= 1	1	1	1	1	1	1	1	1
P = 0.49	0.44	0.30	0.99	0.08^{xx}	0.03^{xx}	0.10^{x}	0.06^{x}	0.005^{xx}

8. EFFECT OF FORMAL EMPLOYMENT AND EDUCATION LEVEL

There is a relationship between education and formal employment. Likewise, there is a relationship between formal employment and income. It can be argued that the more the people are formally employed, the more income exists for purchasing land, expanding the acreage under agriculture, and substituting forest produce with other products. Therefore, the higher the education level, the higher the chances of getting a well-paid job and the less dependence on forest produce. The relationship between utilisation of forest resources and certain socioeconomic factors help to explain which section of the community utilise the commons most. Different social groups in the community need different products from the commons. Therefore, socioeconomic characteristics may be used to explain the differences between those who use the resource and those who do not.

F. LOGISTIC REGRESSION MATRIX

In order to determine the direction of the relationship between the various socioeconomic factors and level of use of various forest products, logistic regression was carried out and the results are shown in Appendix 6 and Appendix 7. Age and distance from the forest had a negative but significant effect on consumption of many forest products. On the other hand, family size had a positive but significant effect on the consumption of many forest products. Income, education level, employment, and landholding did not appear to have any significant relationship with the amount of forest produce consumed.

G. COMMERCIALISATION OF PRODUCTS FROM THE COMMONS

As Julia (1990) reported, forest products can contribute to household income. Some products such as mushrooms, fruits, honey, animal meat were found to be seasonally marketed. Trade in forest produce is at its peak during the agricultural slack periods when less time is required for farming activity and the need for cash income is high. FAO (1978) reports that throughout the developing world, building materials, woodwork, furniture, tools, and other agricultural inputs are made locally within the communities. The products together with wooden handicrafts and other products of non-wood raw materials also can be marketed outside the community. FAO (1978) reported that in India the income from gathering and selling fuelwood is an important part of the economy of forest villagers, especially for the poor. Though not significantly, this study also identified a reasonable percentage of respondents, 21.5% and 7.0% in Hoima and Masindi respectively, who indicated they had sold forest products in the previous year. However, a significantly larger number of respondents (55.6%) reported that they buy forest produce at least once in a year.

H. THE TENURE SYSTEM

Trees growing on an individual's land is private property; however, one is required to purchase a felling permit from the Forest Department when the tree is mature and the owner wants to convert the tree into timber. Trees growing on public land are part of the common property resources of the village; yet one is still required to purchase a felling permit from the Forest Department before one can harvest trees for sawn wood. Forests on public land, however, can be cleared for agriculture by members of the community. Uganda's forest policy, both in the colonial and post-colonial era, has been characterised by the strong concentration of state power over trees and forest resources and the corresponding lack of tree tenure and participation in forest and tree management by the local communities. This was supported by the views of the local population when asked about who owns

the forests in their settlements. Over 58.8% reported that the forests belong to the Forest Department (or government). Ugandan law, according to the 1967 Forest Act states that:

- no one may reside, cultivate or graze livestock in a forest reserve without written permission of a senior forester;
- local communities may enjoy special rights in the use of less commercially important forest produce which they appropriate from reserved or communal forests in "reasonable" quantities without a permit or payment of fees for their own domestic use;
- with exception of planted exotic species, commercial harvesting of forest products is subject to a use permit;
- access to forests for other benefits such as recreation and cultural activities is open to all local users; and,
- trees which are of high economic value are classified as "reserved" tree species, whether they are growing within the government reserve, on private or public land. These trees can only be cut with the Forest Department's approval.

Thus the law permits the collection of firewood, building poles, fibres, and craft materials for subsistence use. The members of the community have easy access to these resources. It is only access to timber and cutting poles from economically important species such as the mahoganies which is restricted. However, the state is unable to effectively enforce rules related to timber harvest in government reserves and forests on public land, while the owner of the private forest is able to exclude the community from harvesting his/her trees.

For those NWFPs where individual's rights are not very well defined, exploitation is on an open access basis. However, because these resources still are abundant due to low population pressure and lack of commercialisation, none of these resources appear to be over-exploited.

I. RESOURCE MANAGEMENT DECISION MATRIX

When asked whether the government was effective in regulating access to the forest resources, only 33 out of 214 people who answered the question reported that the Forest Department had failed to monitor and enforce the access rules. According to survey results, 5.4% of the respondents reported that RC officials are responsible for regulation of forest harvesting. The role played by RC officials in the regulatory use and protection of the forest is noteworthy. At least 90% of people who responded said that RC officials did a good job in their role in forest management. The role played by elders, though subservient to the RC authority, cannot be ignored. Although the other institutions would play a more active role in daily management, elders held moral and decision-making roles and therefore were consulted before important decisions were made and whenever conflicts would arise.

A matrix (Table VI.11) was used to map out what decisions/rules are made and by whom concerning forest resource use and management. Across the top of the matrix are the different management activities carried out by the community. The rows indicate the various levels of decision-making, starting at the level of operational activities, concerned with day-to-day decisions and actions made by users of a forest as to when, where, and how to withdraw products or how to improve the condition of the forest, the monitoring of actions by others, the imposition of sanctions

and rewards, and the exchange of information about the forest. The second row charts out the collective-choice activities, which include the policymaking activities of users, their officials (RCs), or an external authority about operational activities. The third row charts out the constitutional activities, which include basic decision-making about who is eligible to use a forest and how future collective choice decisions will be made. The matrix helps us to see where the loci of decision-making are for various activities and sorts out which decisions are made informally and which are regulated more formally by rules made within or outside the community.

The resource management decision matrix shows that:

- apart from operational level activities, local forest users do not participate in and have no authority to design the institutions that govern the use of a forest system;
- individuals most affected by the rules that govern the day-to-day use of a forest system are excluded in the group that can modify these rules;
- local RC officials however provide rapid access to low-cost arenas to resolve conflict between users or between users and their officials; and,
- the District Forest Officer makes all decisions about who is eligible to use a forest and how future collective choice decisions will be made.

Table VI.11 Resource management decision matrix

Level of activity	Maintenance	Protecting	Enforcing rules	Harvesting	Processing/ producing	Selling
Operational activities	Private owner Local forest officer	Priv. owner Local forest officer	Priv. owner Local forest officer	Individuals Family head Priv. owner	Individuals Family head Priv. owner	Individuals Family head Priv. owner
Collective choice activity	Private owner Local forest officer	RC officials Local forest officer	RC officials Local forest officer.	RC officials Local forest officer Priv. owner	Local forest officer District forest officer	Family head Private owner
Constitutional activities	District forest office	District forest office	District forest office	District forest office	District forest office	District forest office

Although the RCs (Local Government) Statute, 1993, and the National Environment Statute, 1995, provide the legal framework for involving local communities and institutions in decision-making, these have not been effected. In addition, community-level organisation has been constitutionalised under the local councils, which provide avenues for conflict resolution at local level and are empowered to make bylaws and to ensure their upholding. However, these councils are not yet versed with issues involved in natural resource management. Rule violations by subsistence forest harvesters were resolved at RC1 level. Violations by commercial harvesters were forwarded to the Forest Department. Such cases usually were prosecuted by the department; if a violator was convicted, a nominal penalty was administered. To enforce such a nominal penalty, the Forest Department seized the tools used in the violation. In the PRA exercise, the villagers reported that there was abundant forest resources and as a result there were no marked conflicts over their use.

This augured well with the findings from the household survey, where 80.4% agreed to have had no disputes over common pool resource use; where they occurred, these disputes were resolved either by elders or RC1 officials. Nevertheless, although the idea of conflict was reported to be rare, a hierarchical system of resolution was still in place. Once the disputants determined that they could not resolve the issue at hand, elders and RC1 to RC3 were appealed to in respect of the order. It was under extremely rare cases that the conflict was transferred to the district level and the civic court. As for the private owners, it was reported that rule violation by villagers and subsequent conflict was resolved through dialogue and a word of warning by the owner. In conclusion, it can be stated that local institutions exist in the two areas studied but their involvement in resource management is minimal.

J. CONCLUSIONS

The regression findings established gender, family size, landholding, and formal employment as the socioeconomic factors that influence levels of consumption of forest products.

The forest resource was used by the local communities mainly for subsistence. There was little evidence to suggest that the resource was being commercialised. The PRA findings established that though women tend to have limited control over some of these resources, it was evident that they have access to most forest products. Although the RCs (Local Government) Statute, 1987, and the National Environment Statute, 1995, provide the legal framework for involving local communities and institutions in decision-making, there was little evidence to suggest that the local communities were involved in the management of the resource.

VII. POTENTIAL FOR JOINT FOREST MANAGEMENT OF NON-GAZETTED FOREST RESOURCES

A. INTRODUCTION

Around gazetted and non-gazetted forest areas, there are adjacent populations that depend on these resources. Past government policies ignored or dismissed such dependence, thereby causing serious hardship to local communities and conflicts. In recent times, the importance of people's participation in natural resource management and environmental conservation has been recognised. A recommended approach that attempts to achieve this is Joint Forest Management (JFM). JFM is a partnership for sustainable use of natural resources through an agreement that specifies the roles, rights, and responsibility of each partner. JFM agreements have been in operation in India and Philippines for a considerable time. Up to now, Uganda followed the conventional model of resource management, which attempts to keep people outside gazetted areas. This model has been costly and therefore unsustainable and has led to numerous conflicts between the state and the communities.

B. RESPONDENTS' OPINIONS ON PREFERRED PROPERTY REGIME IN NON-GAZETTED FOREST AREAS

In order to seek local people's preference on the type of ownership of non-gazetted forest resources government should adopt, respondents in Hoima and Masindi Districts were asked whether non-gazetted forest areas should be managed by the state or leased to individuals or local forest associations. Respondents were asked if they were willing to participate in communal management of the forest resources in their areas. In addition, four PRAs were conducted in four villages and the same questions addressed to the residents and opinion leaders of these communities.

According to the results, 72.8% and 76.5% of Masindi and Hoima respondents, respectively, agreed that they would participate in communal resource management. In response to the statement that there is a traditional institution in place managing the forest resource, the respondents were overwhelmingly negative (Table VII.1). The lack of traditional resource management institution is a result of many decades of centralised control of forest resources, with limited participation of the local people. This arrangement did not only disempower the community-based resource management institutions but also led to their devaluation and disintegration.

The respondents overwhelmingly rejected the idea of leasing the forest, in both cases advancing the reason as loss of access. Of course, some had already experienced the repercussions of private ownership of the forest where accessibility to using certain resources like poles for construction was already lost. The population was aware that the private owner is likely to convert the forest into other uses, depending on the prevailing market. In such a case, the community would lose the benefits they derive from the commons. As a result, the majority of the respondents (87.3% and 76.0% in Masindi and Hoima, respectively) agreed to the protection of the forest and a similar percentage of respondents were ready to pay for any maintenance costs involved.

From the results, it was clear that the population did not favour privatisation of the commons but instead preferred to own the resource in common (as common property). Approximately half of the respondents in Masindi and 72.5% in Hoima consented to the idea of forming a local forest association to manage the forest on behalf of the community. The respondents insisted that the association be formed only by the communities that use the resources. However, the respondents did not agree on whether such an association should be formed in each Local Council or whether all Local Councils using a single forest should form one association. In Masindi, only 19% of the respondents wanted all Local Councils using the forest to form one association, while 27.8% preferred each Local Council to form its own association. In Hoima, only 13% of the respondents wanted one association formed by all the Local Councils using the forest while 57.5% preferred each Local Council to form its own association. The former seemed to carry the day according to results, although not convincingly so.

Communities prefer that forest resources are controlled at the lowest level of administration. Whether such a small unit of administration would have the capacity to manage these resources and enforce the bylaws is doubtful. In addition, it would be very difficult to coordinate the numerous associations managing the same forest resource.

In case the management was successful and the local communities started realising proceeds from their management efforts, 75.9% and 82.5% of the respondents in Masindi and Hoima, respectively, supported the idea of using the income earned to start development projects in the area, such as schools, health clinics, or protected wells, rather than the other immediate alternative of sharing revenue in the form of cash. Local governments should have a 25% share of the proceeds realised each year—this was the view of about 50% of all respondents; many in the remaining group supported the idea of sharing 50% of the proceeds with central government, while others thought that government should get the majority share. When asked how much they would be willing to contribute for the maintenance of the forest as some form of investment, about 80% of respondents were willing to pay Shs10-20,000/=per year. This shows that the local communities were willing to pay for the management of the forests although they may be constrained by the overall income at their disposal.

Table VII.1 Summary of farmer response to communal management issues used in analysis by district (%)

Statement	District	
	Hoima	Masindi
Willing to manage?		
No	25.9	23.0
Yes	72.8	76.5
Local management organisation present?		
No	98.1	99.5
Yes	1.9	0.5
Need for forest association?		
No	44.3	27.5
Yes	51.3	72.5
How association should be formed?		
All villages form one association	19.6	13.0
Each village form own association	27.8	57.5
Based on user groups	1.9	2.0
Others	0.6	0.5
Should forest be leased?		
No	74.7	78.5
Yes	18.4	21.0
Why not lease?		
Loss of access	53.2	70.5
Other	21.4	9.0
Protect forest?		
No	12.0	23.5
Yes	87.3	76.0
Willing to pay?		
No	16.5	12.0
Yes	81.0	87.0
Revenue for project?		
Yes	16.5	17.1
No	75.9	82.5
Government share 25%?		
Yes	44.3	40.5
No	46.2	58.5

C. SOCIOECONOMIC FACTORS AFFECTING INDIVIDUAL DECISION TO PARTICIPATE IN COMMUNAL MANAGEMENT

The a priori expectation was that there would be a significant relationship between household income and commitment to the principle of communal resource management, and the results are presented in Table VII. 2. The rest of the results in the table indicate a significant relationship between willingness to carry out community resource management and various other socioeconomic factors such as age, gender, and formal employment.

The young were more keen than the older groups to be involved in communal management. Most female respondents were unwilling to get involved in forest resource management. Many of them were of the view that resources are owned by men and could be managed by them. Formal employment was significant at a 10% level in Masindi but not significant in Hoima. This indicates that employment did not influence one's decision to participate in communal management. The results show that respondents in either study area differ when the chi-square is calculated for each of them with respect to whether or not there is communal work done in the area. Many more communal activities were carried out in Masindi. Immigrants in Masindi were found to participate in communal activities more often than the homogenous community found in Hoima. The reasons for the observed differences were not clear but could be due to differences in culture. This implies that the hypothesis of independence by district cannot be rejected. The theory that different areas respond differently is supported by the presented results.

Table VII.2 Chi-square analysis of the relationship between willingness to participate in communal resource management and various socioeconomic factors

Willingness vs:	District	
	Masindi	Hoima
Age X^2 d.f. Significance	13.46^{xxx} 2 0.000	6.26^{xx} 2 0.04
Income X^2 d.f. Significance	14.83^{xxx} 2 0.00	5.69^{xx} 2 0.05
Gender X^2 d.f. Significance	13.57^{xxx} 2 0.000	4.47^{x} 2 0.10
Formal employment X^2 d.f. Significance	5.18^{x} 2 0.07	0.92 2 0.62
Management by Forest Dept. X^2 d.f. Significance	7.57 4 0.27	8.77^{x} 4 0.06
Done communal work X^2 d.f. Significance	4.63^{x} 2 0.09	3.04 2 0.21
Need for forest association X^2 d.f. Significance	53.20^{xxx} 2 0.00	14.65^{xxx} 2 0.000
Willingness to pay X^2 d.f. Significance	62.05^{xxx} 4 0.000	8.12^{x} 4 0.08

*** Significant at 1% level of significance.
** Significant at 5% level of significance.
* Significant at 10% level of significance.

D. JFM: A RECOMMENDED OPTION

From the results above, it is clear that local communities would like to manage forest resources in their neighbourhood. Since local institutions managing forest resources broke down under the pressures of colonial and past government policies, it is suggested that formation of JFM schemes among the local community, the Forest Department, and resource users may be a necessary first step in empowering rural people and their institutions so that they may better contribute to sustainable management of their resources.

If the concept of JFM is acceptable to government, the Forest Department together with the district authorities should assist in the formation and establishment of these forest associations. The level at which forest associations can be formed should depend on the size of the forest. A small woodlot located in one village could be managed by an association formed at village level, while large forested areas with regional and national interests would be managed by an association formed at a higher level but with local branches in the various villages using that particular forest.

It is further recommended that the land title on which the communal forests are located could be issued to the District Council with an encumbrance that the land remain under natural forest cover. The district would then lease the forest to registered association(s) for a specified period of time with a possibility of renewal if the association has in that period managed the resource sustainably. Empowering local people and sharing revenue from the forests through JFM can improve the livelihoods of women and men in the area (especially the rural poor) and contribute to sustainable conservation of the resource. JFM is a possibility when the state does not want to relinquish all its control over resources or where communities need outside assistance in management. At present, the Uganda Forest Department does not wish to relinquish all their control of forest resources and have therefore re-centralised the resource. At the same time, local institutions and community associations are at present not involved in forest management and therefore need outside assistance in management of these resources.

We suggest that JFM:

- is the needed and acceptable tool for involving other stakeholders in Forest Resources Management;
- promotes sustainable resource utilisation and conservation with reduced monetary and manpower input from the state and increased input from other stakeholders; and,
- empowers rural people and their institutions so that they may better contribute to the sustainable management of their resources.

E. ISSUES, CONSTRAINTS, AND OPPORTUNITIES FOR JFM

The main issues of concern regarding the establishment of JFM include the following:

Changing the existing law and policy. The existing law and policy do not promote people's participation in natural resource management. There is a need to enact new legislation in which the role of the state in management of forest resources is significantly diminished. The state's role in resource management should be primarily that of advisor, providing communities and individuals information and modern techniques needed to manage their resources on a sustainable basis. JFM

would help to marry indigenous knowledge and modern methods of forest management. The traditional and modern methods of management should complement and not compete with each other.

There is no doubt that the reserved tree species concept has not achieved its intended objectives of protecting economically important tree species. Removing ownership of trees from the local communities acts as a disincentive for the farmers to be involved in JFM. There is a need for this law to be revised to improve tree tenure security.

As the JFM concept is new in Uganda, forest officials are sceptical and fear that local communities may demand a wide range of forest products. However, the 1987 Forest Policy provides for limited attempts to increase people's participation as a viable management option. In addition, Uganda is undergoing an extensive process of democratisation and decentralisation, giving greater opportunities for local communities' involvement in resource management.

Institutional reform. Changes in forest law without changing the institutions concerned with management of natural resources will only provide individuals and communities less control over their resources than now. The following institutional changes are essential:

- Government forest services must retrain foresters and change from acting as "police" to being extension agents.

- Incorporate new institutional arrangements that combine elements of traditional practices with newer, more formal arrangements (Cousins 1993).

- Consider "nesting" local institutions within a larger structure (Ostrom 1990) and work out the relationship between the different hierarchy of institutions and organizations dealing with natural resource management.

Identifying stakeholders. Communities are very heterogeneous with diverse interests in the resource. Consequently, certain categories of users may be unable to benefit from the resource (Bruce 1989). The poor, women, and politically weak individuals may not have equal access to the resource. The ability to exclude non-members from using the resource is essential if the community is to reap benefits of its investment. However, in many cultures, it is customarily or religiously wrong to exclude others from the use of trees (Bennett 1988).

In preparation of JFM agreements, how can all stakeholders be identified? How can the expertise of different stakeholders be tapped to manage the resource? Often the relationship between the government officials (the professional foresters) and stakeholders from the local communities is poor. For JFM to succeed, there must be trust among the various stakeholders. Therefore, there is a need to carry out JFM pilot study projects using non-gazetted forest reserves. Lessons from these case studies will be useful in implementing other JFM agreements.

Working out benefits and cost sharing schemes. In JFM agreements, it is necessary to work out the benefits and costs the local communities and Forest Department authorities will share. Often the

cost to the community is in terms of the required labour and compensation for crops destroyed by wild animals. When working out the benefits, the amount of products harvested must not cause negative ecological impact.

Benefits and cost sharing schemes acceptable to all parties bring about increased access to resources to all sections of the community, greater trust and co-operation from the authorities, greater sense of security and stability, significant reduction in conflicts, and increase in the morale of all stakeholders.

Setting out modalities for monitoring and evaluation. There is some risk in placing the forests in the hands of local communities. It is naive to assume that all communities are capable of managing their resources in a more sustainable way than the state (MaClain 1992). After implementing the JFM agreements, it is necessary to put in place a program to monitor whether the new institutions, structures, and incentives are leading to either deforestation or sustainable utilisation of the commons.

External constraints. Poverty, illiteracy, rapid population growth rate, increasing landlessness, poor infrastructure, and low benefits are among the major external constraints to the development of JFM agreements. Therefore, there is need to integrate family planning, land use planning, education, and poverty eradication into JFM agreements. This can be achieved if there is integrated planning at various levels at the national government level, at Department of Forestry level, and at the level of each forest resource area to be managed jointly.

F. CONCLUSION

From the results, it is clear that local communities would like to manage forest resources in their neighbourhood. In order to retard the rate of forest degradation in Uganda's non-gazetted forest areas, it is necessary to create local institutions that can work with the state to sustainably manage these resources. A new forest code that provides incentives for individuals and communities to participate in the management of trees growing on the commons should be crafted. The state should play an advisory role and facilitate the development of local institutions and the integration of indigenous tree management skills with modern forestry practices. It is recommended that the land title on which the communal forest is located should be issued to the district council, which would in turn lease the forest to an association(s) for a specified period.

VIII. CONCLUSIONS AND POLICY ISSUES

A. CONCLUSION

This section sets out to answer questions that were posed to guide the study. Already it was established that instability and corruption of many governments in developing countries either make the state ownership politically risky or, in many cases, the resource in question is too insignificant (as in the case of non-gazetted forests) to the state to motivate it to avert overuse (McCay and Acheson 1987a). As McElwee (1994) says, the lack of financial and labour resources in many governments, especially with regard to low-value, dispersed, or distant resources, makes enforcement of state access unlikely and often unsuccessful.

Without successful enforcement, situations of overuse are likely to result, turning de jure state property into de facto open-access (Berkes 1989). As a result, donors and Western governments have been advocating the privatisation of state enterprises, including forest reserves and national parks. Nevertheless, common property may be as viable as private property on grounds of both efficiency and equity. The real problem that could turn common property into open access is the absence of an effective group management regime that allows the sustainable use of the resource base over time.

The study has presented findings to support the assertion that a CPR promotes general access to and optimum utilisation of non-gazetted forest resources. Local people are willing to voluntarily put in their time to manage the resource or contribute to the cost of forest maintenance. A reasonable number of them are ready to offer themselves for patrol services and to report rule breakers. Experience has revealed that response to community work has been good. At least 50% of the respondents consented to government receiving a 25% share of proceeds from the forest resources. Immigrants cannot settle on private lands but can settle on communal or customary lands, which they are obligated to manage well.

The findings that no local organisation was in place to oversee use of the resources, that a number of species are already endangered, and that there is overwhelming support for the idea of forming a local association comprising local user groups at village level, concur with the theory that the existence and development of robust and effective local institutions to manage CPRs is essential for sustainable utilisation of these resources.

In chi-square analyses, the significance of the findings that there is a relationship between wealth and need for collective action, government policy and ethnicity, communal spirit and degree of response to community work, tenure type and ethnicity, wealth and ethnicity, income and age plus gender is enough to support the theories of community-based resource management as
presented in the text in terms of hypotheses.

The regression findings did not only establish gender, family size (proxy for population size), landholding, and formal employment as socioeconomic factors that influence levels of forest product consumption, hence increasing demand for the resource as the factors increase, it also established factors such as gender, age, quantity, and resource use levels, and time allocated to

community resource management as directly affecting the willingness to manage a resource held in common.

The PRA findings established that though women tend to have limited control over some of these resources, it was evident that they have absolute access on all resources and absolute control over fuelwood and water.

In general, it seems that the public is ready to endorse:

- less government involvement in the management of small forests;
- increased community participation; and,
- unwillingness to lease out these small forests to individuals.

Overall, survey responses indicated that decision-making on these resources, if left to the local user population, would decrease uncertainty on their sustenance hither to increased by lack of responsibility on the part of government.

B. POLICY RECOMMENDATIONS

It is against the background of the summarised findings that the following policy recommendations are put forward:

1. The survival of Uganda's non-gazetted forestry resources depends predominantly on the efforts of the local community user groups who have negligible access to big forests and reserves that are gazetted.

2. A local community association is necessary, and the responsibility for deciding on what forms and functions the community association should undertake rests upon the various user groups acting collectively, with the government Forest Department taking an advisory role. Formation of JFM schemes among the local community (local association) the Forest Department, and resource users may be a necessary first step in empowering rural people and their institutions so that they may better contribute to sustainable management of their resources.

3. Land titles on which communal forests are located should be issued to the District Councils with an encumbrance that the land would remain under natural forest cover. The District Councils would in turn lease the land for a specified period of time to local community-based associations, which would then manage the resource jointly with the Forest Department.

4. Policy decisions to be reached should not be without empirical analysis of the technical, social, and economic constraints of traditional tenure to define an environmental policy that would lead to changes that are of benefit to the farmer.

5. Policies that are designed to improve activities that are both technically sound and are likely to be well supported by local people should involve an economic benefit; for instance, investing in tree growing for production of commercial firewood should be encouraged. Thus communal resource ownership and management policy would be politically popular.

6. Information on public preferences for policies on the community-based management of common pool resources and increasing the decentralisation of policy decisions can be useful to better understand these issues.

7. Improved education and training programmes for social forestry are necessary. The communities require training in basic forest management techniques so they can make informed management decisions.

8. At present, there is little information in Uganda on the non-gazetted common pool resources and decision-making behaviour; research based on existing data cannot lead to a better policy for rapid redress of the already disappearing features of the resource as well as rapid progress in agriculture and forestry expanded businesses. This points out the need to put in place effective operating programmes as well as research on high priority problems that relate to the subject matter involving these farmers who were described as ignorant, yet have a lot of knowledge that needs to be shared by the forest researcher.

Notwithstanding all this, according to Bruce (1994) "Recognition of indigenous land rights, including acceptance of local communities' rights to areas used as commons, is likely to be a more reliable barrier against land-grabbing than any expectation of probity or restraint on the part of those who administer land for the state."

REFERENCES

Arnold, J.E.M., and W.C. Stewart. 1991. *Common Property Resource Management in India.* Tropical Forestry Papers No.24, Oxford Forestry Institute, University of Oxford.

Banana, A.Y., and W. Gombya-Ssembajjwe. 1995. *Successful Forestry Management: The Importance of Security of Tenure and Rule Enforcement in Ugandan Forests.* Rome: Food and Agriculture Organisation of the United Nations.

Becker C.D, A.Y Banana, and W. Gombya-Ssembajwe. 1995. "Early Detection of Tropical Deforestation: An IFPRI Pilot Study in Uganda." *Environmental Conservation* 22(1): 31-38.

Bennett, L. 1988. "Religious Customs and Tree Rights." In *Whose Trees? Proprietary Dimensions of Forestry,* edited by Louise Fortmann and John W. Bruce, pp. 49-50. Boulder, CO: Westview Press.

Berkes, F. 1989. "Common Property Resources." *Ecology and Community-based Sustainable Development.* London: Belhaven Press.

Bromley, D.W. 1989. "Property Relations and Economic Development; The Other Land Reform." *World Development* 17: 867-877.

Bromley, D.W. 1990. "Property Rights as Authority Systems: The Role of Rules in Resource Management." *Journal of Business Administration.* 19(2).

Bromley, D.W., and M.M. Cernea. 1989. *The Management of Common Property Natural Resources: Some Common Conceptual and Operational Fallacies.* World Bank Discussion papers No.57. Washington, DC: World Bank.

Bruce, J.W., and C. Tennar. 1994. "Structural Adjustment, Land Concentration and Common Property: The Case of Guinea Bissau." In *Tenure and Management of Natural Resources in Sub-Saharan Africa.* Madison, WI: Land Tenure Center, University of Wisconsin.

Bruce, J. W. 1989. *Rapid Appraisal of Tree and Land Tenure. Community Forestry Note 5.* Rome: Food and Agriculture Organisation of the United Nations.

Ciriacy-Wantrup, S.V., and R.C. Bishop. 1975. " 'Common Property' as a Concept in Natural Resources Policy." *Natural Resources Journal* 15: 713- 727.

Convey F.J. 1995. *Applying Environmental Economics in Africa.* World Bank Technical Paper, No. 277 Africa Technical Series. Washington, DC: World Bank.

Cousins, Ben. 1993. *Common Property Institutions in Land Redistribution Program in South Africa: Rural Restructuring Program.* Washington, DC: World Bank.

Food and Agriculture Organisation of the United Nations. 1978. *Forestry for Local Community Development.* Forestry Paper 7. Rome: Food and Agriculture Organisation of the United Nations.

Fong, F.W. 1992. "Perspectives for Sustainable Resource Utilisation and Management of Nipa Vegetation." *Economic Botany* 46(1): 45-54.

Hardin, G. 1968. "The Tragedy of the Commons." *Science* 1343-1348.

Hill, L., and P. Kau. 1993. "Application of Multivariate Probit to a Threshold Model of Grain Dryer Purchasing Decisions." *American Journal of Agricultural Economics*: 55 (1).

Julia, F. 1990. *The Major Significance of 'Minor' Forest Products: The Local Use and Value of Forests in the West Africa Humid Forest Zone*. Rome: Food and Agriculture Organisation of the United Nations.

Kerkhof, P. 1990. "Turkana Rural Development Project, Kenya." In *Agroforestry in Africa: A Survey of Project Experience,* edited by G. Foley and G. Bannard. London: Panos Institute.

Kirstin, R. J. 1993. *Local Use of Budongo's Forest Products*. Unpublished M.Sc. Thesis, University of Oxford.

Kiser, L.L, and E. Ostrom. 1982. "Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches" In *Strategies of Political Inquiry*, edited by Elinor Ostrom and Beverly Hills.

McCay, B., and J. Acheson. 1993. *The Question of the Commons: The Culture and Ecology of Communal Resources.* Tucson: University of Arizona Press.

McElwee, D. 1993. *Common Property and Commercialisation: Developing Appropriate Tools of Analysis.* M.Sc. Thesis, Oxford Forestry Institute U.K.

McKean, M.A. 1992. "Success on the Commons: A Comparative Examination of Institutions for Common Property Resource Management." *Journal Theoretical Politics* 4(3): 247-282.

McKean, M., and E. Ostrom. 1995. "Common Property Regimes in the Forest: Just a Relic from the Past?" *Unasylva* 46 (1): 3-15.

McLain, R.J. 1992. *Recommendations for a New Malian Forest Code: Observations from the Land Tenure Center's Study of Land and Tree Tenure in Mali's Fifth Region.* Paper no 109. Madison, WI: Land Tenure Center, University of Wisconsin.

Marquardt, M. 1994. "Land Reform in the Making." Paper presented at the Developing Uganda Workshop. 2-5 June, Lyngby-Denmark.

McGranahan, G. 1991. "Fuelwood, Subsistence, Foraging and the Decline of Common Property." *World Development Report* 19: 1275-1287.

McKean, A. M. 1994. "Management of Traditional Common Lands (Iriaichi) in Japan." In *Tenure and Management of Natural Resources in Sub-Saharan Africa.* Reading Package 1. Madison, WI: Land Tenure Center, University of Wisconsin..

Noronha, R., and J. Spears. 1985. "Sociological Variables in Forestry Project Design." In *Putting People First*, edited by M. Conea, pp. 227-267. Oxford: Oxford University Press.

Oakerson, J.R. 1986. "A Model of Analysis of Common Property Problems." In *Proceedings of the Conference on Common Property Resources Management.* Washington, DC: National Academy Of Sciences.

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.

Ostrom, E. R., Gardener, and J. Walker. 1994. *Rules, Games, and Common-pool Resources.* Ann Arbor, MI: University of Michigan Press.

Ostrom, E. 1994. "Institutional Arrangements for Resolving the Commons Dilemma: Some Contending Approaches." In *Capturing the Commons*, edited by B. McKay and J. Acheson, Tucson, AZ: University of Arizona Press.

Ostrom, E., S.K. Huckfeldt, C.M. Schweik, and M.B. Wertime. 1993. *IFRI Data collection Instrument Manual.* Bloomington, IN: Workshop in Political Theory and Policy Analysis.

Runge, C. 1984. "Institutions and the Free Rider: The Assurance Problem in Collective Action." *The Journal of Politics* 46.

Runge, C. F. 1992. "Common Property and Collective Action in Economic Development." In *Making the Commons Work: Theory, Practice and Policy,* edited by W.B. Bromley, pp 17-40.

Runge, C. Ford. 1994. "Common Property and Collective Action in Economic Development." In *Making the Commons Work: Theory, Practice and Policy* in *Tenure and Management of Natural Resources in Sub-Saharan Africa.* Reading Package 1. Madison, WI: Land Tenure Center, University of Wisconsin.

Shepherd, Gill. 1991. "The Communal Management of Forests in the Semi-Arid and Sub-Humid Regions of Africa: Past Practice and Prospects for the Future." *Development Policy Review* 9: 151-176.

Swallow, Brent, M. 1984. *Common Property Regime for African Rangeland Resources (Lesotho).* Ph.D. Dissertation, University of Wisconsin Madison.

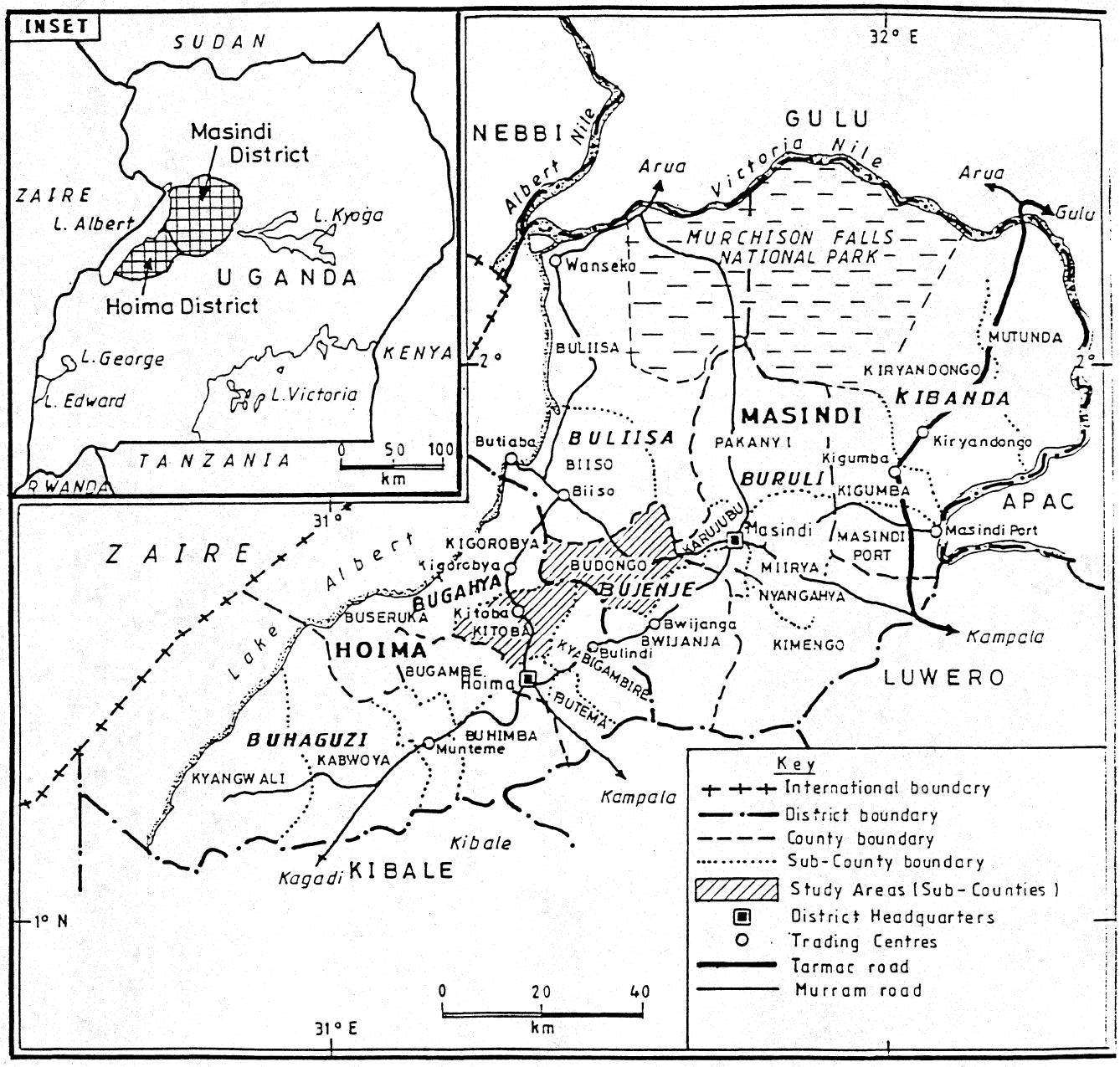
Thomson, J.T. 1985. *Local Environmental Management Practices and Orientations for Rural Forestry in Mali's Fifth Region.* Paper prepared for USAID, Bamako.

Wade, Robert. 1987. "The Management of Common Property Resources: Collective Action as an Alternative to Privatization or State Regulation." In *Cambridge Journal of Economics* 11: 95-100.

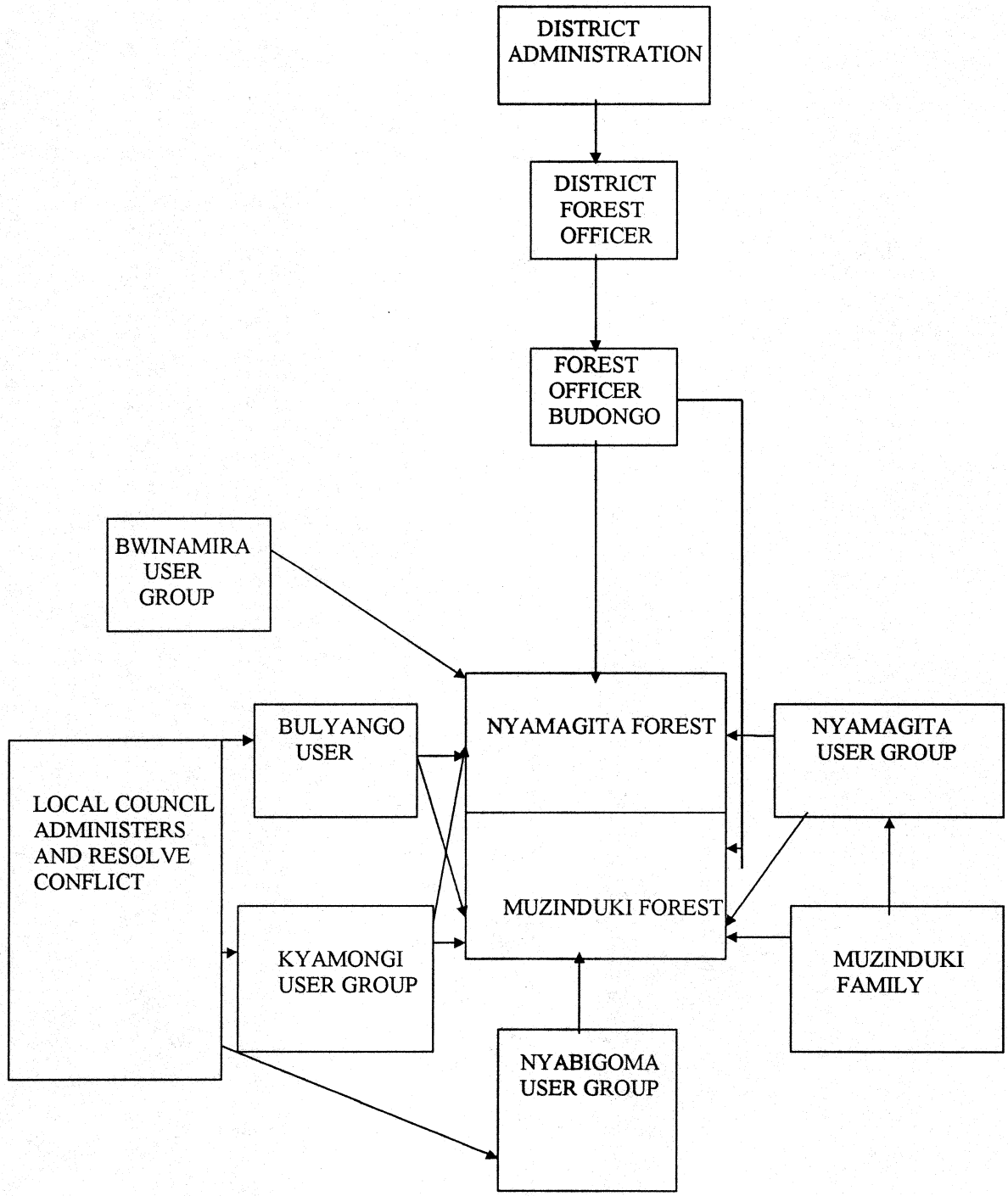
World Bank. 1985. *Desertification in the Saharian and Sudanian Zones of West Africa.* Washington, DC: World Bank

World Bank. 1993. *Uganda Growing Out of Poverty.* Washington, DC: World Bank.

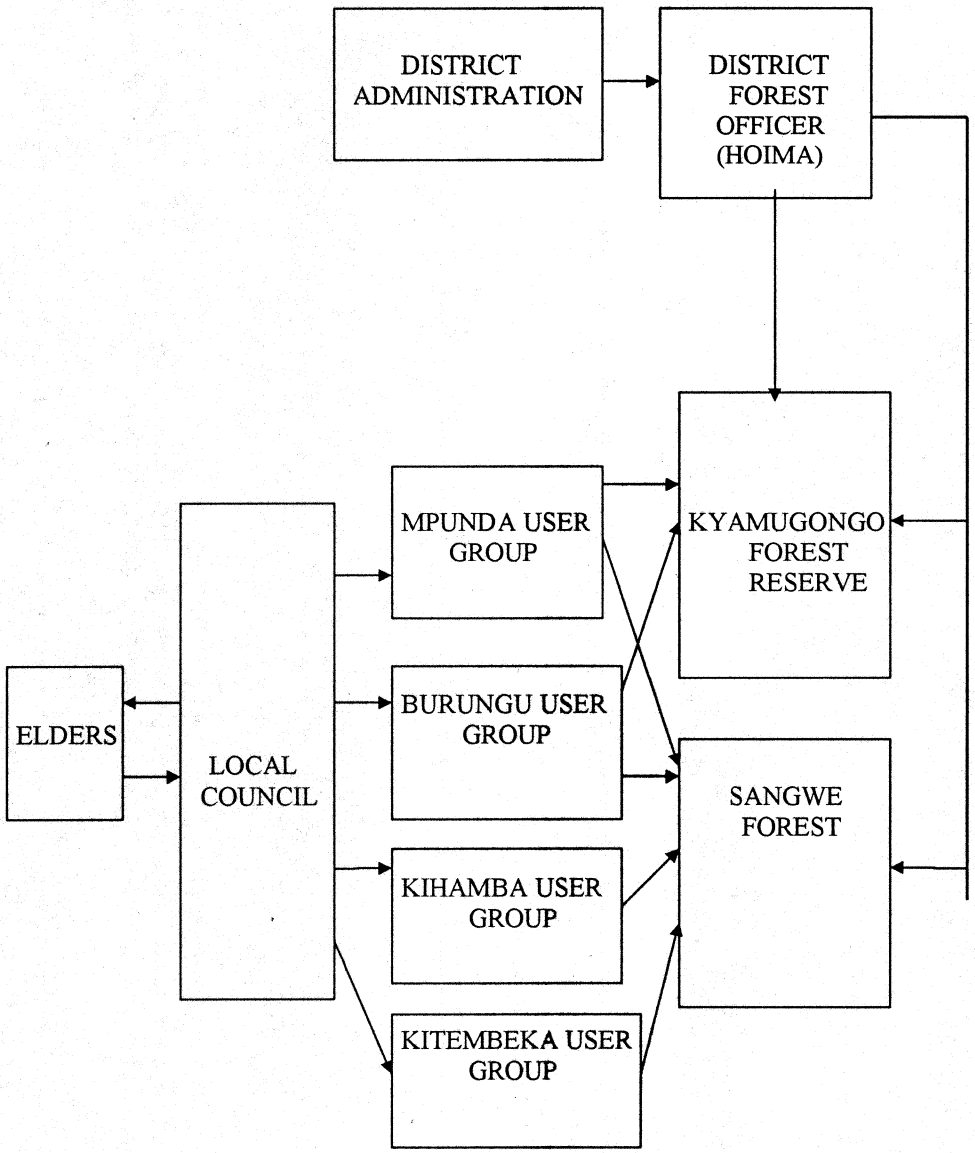
APPENDIX 1. MAP OF UGANDA SHOWING THE LOCATION OF THE STUDY SITES



APPENDIX 2. SCHEMATIC REPRESENTATION OF RELATIONSHIPS AMONG LOCAL USER GROUPS, THE FORESTS AND LOCAL INSTITUTIONS IN MASINDI SITE



APPENDIX 3. SCHEMATIC REPRESENTATION OF RELATIONSHIPS AMONG LOCAL USER GROUPS, THE FORESTS AND LOCAL INSTITUTIONS IN HOIMA SITE



APPENDIX 4. LIST OF TREES ENCOUNTERED IN NYAMAGITA AND MUZINDUKI FORESTS

Botanical Name	Local Name	Muzinduki Forest		Nyamagita Forest	
		Stems	Av. DBH	Stems	Av. DBH
1. *Dichrostacys cinerea*	Mukinga	3	23.67		
2. *Afrosersalisia Ceracifera*		2	14.00	6	22.83
3. *Alangium chinense*				5	23.40
4. *Albizia coriaria*	Musisa	1	80.00	2	49.00
5. *Albizia ferruginea*	Murongo			1	49.00
6. *Albizia glaberrima*	Murongo	1	43.00	1	61.00
7. *Albizia zygia*	Murongo	4	33.75	2	35.00
8. *Allophylus dummeri*		2	12.75		
9. *Alstonia boonei*	Mujwa	2	30.50	2	38.25
10. *Aningeria altissima*	Mutoke	6	34.53	2	16.50
11. *Antiaris toxicaria*	Mukede	7	32.74	11	30.59
12. *Blighia unijugata*	Nkongoranwa	6	36.67	1	12.00
13. *Blighia welwitschii*				1	35.20
14. *Bosqueia phoberos*	Katomatoma	4	27.18	2	25.00
15. *Bridelia micrantha*	Katozamiti	1	10.20	1	18.00
16. *Calancoba schweinfurthii*	Muhekeheke	14	20.98	6	23.28
17. *Cathormion altissimum*	Mucholi			1	100.00
18. *Canaruim schweinfurthii*	Mubani	2	84.00		
19. *Celtis mildbraedii*	Mukomakoma			2	10.00
20. *Celtis zenkeri*	Mukomakoma	1	14.00		
21. *Chaetacme aristata*	Mubambanjobe	1	13.00	4	23.00
22. *Cleistopholis patens*				1	17.20
23. *Cola gigantea*	Mujugangoma	12	34.08	5	39.30
24. *Croton megalocarpus*	Munyabakaikuru	4	27.25		
25. *Croton macrostachys*	Munyabakaikuru	4	24.75	12	26.64
26. *Dictyandra arborescens*				1	14.00
27. *Dombeya mukole*	Mukole			4	26.38
28. *Drypetes ugandensis*		1	33.00		
29. *Ehretia cymosa*				1	18.00
30. *Entandrophragma utile*	Mufumbi			1	14.50
31. *Entandrophragma angolense*				1	19.50
32. *Fagara angolensis*	Mulemankobe	1	12.00	1	15.50
33. *Ficus capensis*		1	43.00		
34. *Ficus exasperata*	Musomoro			1	50.00
35. *Ficus natalensis*	Mutoma			4	33.75
36. *Ficus Vallis-choudae*	Muho	1	23.00	2	41.50
37. *Flacourtia indica*				3	12.33
38. *Funtumia elastica*	Musanda	13	27.78	5	18.54
39. *Holoptelea grandis*	Mumuli	6	25.48	5	21.00
40. *Irvingia gabonensis*				1	46.00

Botanical Name	Local Name	Muzinduki Forest Stems	Av. DBH	Nyamagita Forest Stems	Av. DBH
41. *Khaya anthotheca*	Munyama	2	18.50	11	25.77
42. *Lannea welwitschii*		2	51.50	2	29.75
43. *Leptonychia milbraedii*		1	11.00	2	14.00
44. *Lovoa trichiliodes*	Nkoba	6	40.75	6	28.87
45. *Macaranga schweinfurthii*		2	41.00	19	28.99
46. *Maesopsis eminii*	Musizi	1	61.00	2	26.00
47. *Majidea fosteri*		1	27.00	2	11.20
48. *Melanodiscus sp.*	Mwatibale	2	14.10		
49. *Mitragyna stipulosa*	Munywamaizi			3	27.00
50. *Monodora myristica*		1	11.00	1	11.00
51. *Morus lactea*	Nyakatoma	2	68.00	4	30.25
52. *Myrianthus arboreus*	Musinyanuro	12	28.27	3	19.73
53. *Neobuotonia africana*				2	12.00
54. *Newtonia buchananii*	Mugeye	1	22.00	1	18.00
55. *Oxyanthus speciosus*	Kanyamwani	7	14.07	4	15.75
56. *Parkia filicoidea*	Mujojo	2	42.00	4	36.25
57. *Phoenix reclinata*	Mukindo	4	19.50	4	20.38
58. *Phyllanthus discoideus*		4	45.25	1	54.00
59. *Piptadeniastrum africanum*	Mugeye	5	52.60	2	13.50
60. *Pseudospondias microcarpa*	Bagambanimpyata	6	24.37	8	82.19
61. *Pycnanthus angolensis*	Mugwanekiniga			2	26.85
62. *Ricinodendron heudelotii*	Mudoti	2	49.00	2	37.00
63. *Scolopia rhamnophylla*				1	21.00
64. *Spondianthus preusii*	Mimbiri			4	27.00
65. *Sterculia dawei*	Mulemangoma	4	35.88	1	80.00
66. *Tabernaemontana holstii*	Kinyamagosi	7	17.21	9	14.21
67. *Teclea nobilis*	Nzo			1	70.00
68. *Tetrapleura tetraptera*		1	40.00	2	21.50
69. *Tetrochidium didymostemon*	Muikaranacura			2	36.50
70. *Trema orientalis*	Mukuraijo	2	29.00		
71. *Trichilia drageana*	Senkoba	2	21.25		
72. *Trichilia prieureana*	Muralike			1	25.00
73. *Trichilia rebescens*	Mugaba	9	14.40	8	23.28
74. *Trichilia splendida*	Mugaba			1	19.00
75. *Vomitoria sp.*		1	10.60	1	14.00
76. *Zanha golungensis*		1	17.00	2	50.00

APPENDIX 5. LIST OF TREES ENCOUNTERED IN KYAMUGONGO AND KYAMPOMA/SANGWE FORESTS

Botanical Name	Local Name	Kyamugongo Forest		Kampoma/Sangwe	
		Stems	Av.DBH (cm)	Stems	Av. DBH (cm)
1. *Acacia hokai*	Rugando	2	11.00		
2. *Albizia coriaria*	Musisa	3	33.00	1	90.00
3. *Albizia Zygia*	Murongo	3	30.00		
4. *Allophylus macrobotrys*				3	13.00
5. *Aningeria altissima*	Mutoke	1	80.00		
6. *Antiaris toxicaria*	Mukede	15	28.40	2	49.00
7. *Blighia unijugata*	Nkongoranwa	3	40.67	1	15.00
8. *Bosqueia phoberos*	Katomatoma	5	31.80	3	12.33
9. *Calancoba schweinfurthii*	Muhekeheke	2	21.50	1	18.00
10. *Canarium schweinfurthii*	Mubani	2	62.50		
11. *Cathormion altissimum*	Mucholi	2	70.00	20	31.15
12. *Cola gigantea*		1	60.00		
13. *Croton macrostachys*	Munyabakaikuru			2	17.00
14. *Croton megalocarpus*	Munyabakaikuru	6	19.25		
15. *Entada abyssinica*	Muyoora	2	16.50		
16. *Entandrophraqma angolensis*	Mukusu	1	30.00		
17. *Erythrina abyssinica*	Muko	4	29.25		
18. *Ficus capensis*		1	20.00	3	17.67
19. *Ficus exasperata*	Musomoro			1	16.00
20. *Funtumia elastica*	Musanda	14	24.21	2	15.00
21. *Harungana madagascariensis*	Mulirila			4	14.50
22. *Khaya anthotheca*	Munyama	2	12.00		
23. *Lannea welwitschii*		12	53.25	2	72.50
24. *Macaranga schweinfurthii*	Mujagarra	25	23.72	63	24.59
25. *Maesopsis eminii*	Musizi	10	61.70	4	22.50
26. *Milicia excelsa*	Mutumba	1	125.00		
27. *Mitragyna stipulosa*	Munywamaizi	14	43.64	21	49.86
28. *Musa sapientum*	Isubi			3	10.33
29. *Myrianthus arboreus*	Musinyanuro	5	16.60		
30.Neoboutonia schweinfurthii	Muhongera			29	16.76
31. *Newtonia buchananii*	Mugeye	2	55.50		
32. *Oxyanthus speciosus*	Kanyamwani	1	11.00		
33. *Pachystela brevipes*	Nkarate	6	25.83	1	54.00
34. *Parkia filicoidea*	Mujojo	4	47.50	1	11.00
35. *Phoenix reclinata*	Nkindo			1	16.00
36. *Phyllanthus discoideus*	Muhanjara	5	26.60	3	28.33
37. *Piptadeniastrum africanum*	Mugeye	15	31.53		
38. *Pseudospondias microcarpa*	Bagambanimpyata	22	32.41	38	25.95
39. *Pycnanthus angolensis*	Mugwanekiniga	9	25.78	10	16.80
40. *Sapium ellipticum*	Musasa	4	35.25	1	70.00
41. *Scolopia rhamnophylla*		2	10.00		
42. *Spathodea campanulata*	Munyara	2	27.00	3	20.67

Botanical Name	Local Name	Kyamugongo Forest		Kampoma/Sangwe	
		Stems	Av.DBH (cm)	Stems	Av. DBH (cm)
43. *Spondianthus preusii*	Mimbiri			1	12.00
44. *Syzygium cordatum*				1	90.00
45. *Tabernaemontana holstii*	Kinyamagosi	11	14.82	5	10.20
46. *Terminalia glaucescens*	Mukara	4	49.25		
47. *Trema orientalis*	Mukuraijo	1	11.00	2	12.00
48. *Trichilia dregeana*	Senkoba			2	29.50
49. *Trichilia rubescens*	Mugaba			3	14.67
50. *Unknown 2 sp.*	Muteweta - (Luganda)			1	20.00
51. *Unknown 5 sp.*	Mukaawe	1	10.00		
52. *Vernonia amygdalina*	Mubirizi	1	10.60		

APPENDIX 6. LOGISTIC REGRESSION MATRIX FOR NON-WOODY PRODUCTS

FACTOR

Non-wood prod.	Age	Distance	Income	Land-holding	Family size	Gender	Mgmnt	Tribe	Edu.	Employ.
Medicine	-0.38 (1.26)	-0.86 (5.19)**	0.12 (0.10)	0.64 (3.67)**	0.69 (4.21)**	-0.25 (0.56)	-0.04 (0.57)	0.11 (0.45)	-0.00 (0.08)	-0.09 (0.06)
Honey	-1.44 (19.46)**	-1.08 (10.47)**	0.91 (5.72)**	0.17 (0.55)	0.24 (0.55)	0.42 (1.81)	0.01 (1.64)	-0.17 (1.92)	-0.04 (0.72)	-0.22 (0.48)
Mush-rooms	-0.41 (2.39)*	-0.52 (3.83)**	-0.24 (0.72)	0.16 (0.32)	0.21 (0.64)	0.21 (0.60)	-0.01 (1.42)	-0.15 (2.03)	-0.01 (1.39)	-0.24 (0.71)
Fruits	-1.06** (0.64)	-0.24 (0.38)	0.68 (1.93)	0.76 (3.37)*	0.68 (2.58)*	0.36 (0.69)	0.02 (4.98)**	-0.65 (19.26)***	-0.02 (0.46)	0.11 (0.77)
Water	-0.32 (0.83)	-0.85 (6.72)**	-0.12 (0.09)	0.69 (2.99)*	-0.40 (2.99)*	0.82 (5.73)**	-0.01 (4.04)**	-0.05 (0.10)	0.00 (0.26)	-0.05 (0.02)
Vegetables	-0.75 (4.20)**	-0.46	-0.91 (6.15)**	0.38 (0.98)	0.39 (1.13)	1.12 (6.13)	-0.00 (0.13)	-0.18 (2.16)	0.00 (0.06)	-0.21 (0.24)
Animal products	-1.01 (4.59)**	-0.69 (2.15)	0.49 (0.91)	-0.48 (0.86)	0.44 (0.82)	1.38 (5.62)**	0.00 (0.06)	-0.26 (2.57)*	-0.19 (1.01)	0.29 (0.36)

*,**,*** Significant at 10, 5 and 1 respectively.

APPENDIX 7. LOGISTIC REGRESSION MATRIX FOR WOODY PRODUCTS

Wood product	Age	Distance	Income	Land-holding	Family size	Gender	Mngmnt	Tribe	Edu.	Employ.
Firewood	-0.88 (3.82)**	-0.83 (4.35)**	0.71 (2.84)*	-0.07 (0.02)	0.75 (2.62)*	-0.07 (0.02)	-0.02 (9.13)**	-0.15 (0.71)	0.00 (0.36)	-0.11 (0.07)
Poles	-0.62 (2.93)	-0.22 (0.41)	0.30 (0.67)	0.11 (0.08)	0.79 (4.04)**	1.37 (14.64)**	-0.01 (4.58)**	-0.27 (2.02)	-0.00 (0.15)	0.05 (0.02)
Timber	-1.35 (7.11)**	0.33 (0.58)	1.19 (3.68)**	0.35 (0.51)	0.77 (2.51)*	1.19 (4.65)**	-0.03 (0.35)	-0.21 (1.37)	0.02 (2.59)*	-0.65 (1.49)
Equipment	-0.85 (2.36)	-1.35 (4.11)**	-1.22 (4.67)**	0.36 (0.40)	1.33 (3.13)	1.45 (3.13)*	-0.05 (0.11)	-0.42 (6.29)**	-0.012 (0.10)	-0.83 (1.06)
Crafts	-0.69 (8.28)**	0.06 (0.08)	0.76 (9.43)**	0.52 (4.01)**	0.67 (7.12)**	-0.43 (3.06)	-0.02 (7.69)**	0.00 (0.01)	-0.00 (0.63)	-0.24 (0.93)

x, xx, xxx; Significant at 10%, 5%, and 1% respectively.

APPENDIX 8. POTENTIAL FOR COMMUNITY-BASED NON-GAZETTED FOREST RESOURCE MANAGEMENT IN UGANDA

HOUSEHOLD QUESTIONNAIRE AND SUMMARY OF FINDINGS

Note: Quantitative results are averages while the rest are percentages

Village	NYAMAGITA	10.1
	BWINAMIRA	10.6
	BULYANGO	8.4
	KYAMONGI	9.9
	NYABIGOMA	7.9
	MPUNDA	12.3
	KIHAMBA	17.5
	BIRUNGU	12.6
	KITEMBEKA	10.6
Parish	KABANGO	17.8
	KASONGOIRE	11.4
	NYANTONZI	9.9
	NYABYEYA	7.9
	BIRUNGU	53.1
Sub-county	BUDONGO	46.9
	KITOBA	53.1
District	MASINDI	46.9
	HOIMA	53.1

Name of interviewer _____

Date of interview _____

Name of respondent _____

Age		41
Tribe	ALUR	9.9
	LENDU/LOGO	1.5
	OKEBO	3.2
	NYORO	63.0
	LUGBARA	19.0
	OTHER	3.5

Description of respondent

___59.5_ male head of household

___11.6_ female head of household
___25.4_ housewife
___ 3.5_ other(specify)___

Marital status
___79.8_ married
___ 6.9_ divorced/separated
___ 8.9_ widowed
___ 4.4_ single

SECTION 1. HOUSEHOLD CHARACTERISTICS

___How many people normally live in this family?
___6.1_ people

___1.3_ males > 18 years of age
___0.6_ males 11 - 18
___0.5_ males 6 - 10
___0.7_ males < 6

___1.4_ females > 18 years
___0.4_ females 11 - 18
___0.5_ females 6 - 10
___0.7_ females < 6

1.2- What is household head's highest level of education?
___21.2_ never went to school
___10.6_ primary 1 - 3
___47.9_ primary 4 - 7
___ 4.7_ junior
___9.1_ O'level
___1.6_ A'level
___1.0_ postsecondary(specify)_____
___3.9_ Not Applicable

1.3- What is the spouse's highest level of education?
___34.6_ never went to school
___12.1_ primary 1 - 3
___30.9_ primary 4 - 7
___ 1.0_ junior
___ 4.7_ O'level
___ 0.5_ A'level
___ 0.0_ post-secondary(specify)_____
___16.3_ not applicable

1.4 -Is/was anyone in this family formally **employed?**

___67.7_ No

___32.3_ Yes

Indicate the family member's **relation to** the respondent (husband, wife, daughter, son, etc.) and describe **the job**

Family member's relation to respondent	Job description

1.5 -Did you have income from any of the following sources last year/season? *(answer yes(Y) or no(N) in the first column and ask for amount sold last year/season and the price)*

ITEM	Y/N	Rank	Quantity produced	Amount sold last year/ season	Unit price	Total average
1)tobacco						
2)coffee						
3)maize						
4)cassava						
5)						
6)						
AGRICULTURE						170009
fishing						
brewing						
working fam. member(s)						
livestock product name.....						
Forest produce;** name up to 3 1) 2) 3)						
brickmaking						
OTHER THAN AG.						146500
TOTAL HH INCOME						316510

**Note: Check that if this row is left blank then the answer to question 3.5 is "No."

HOUSEHOLD IDENTIFICATION NUMBER_____

SECTION 2: LAND TENURE

2.1 Landholding *(The rows are to **take care of** different pieces or periods when different pieces were acquired)*

amount of land in acres, pieces/fields	years possessed	how acquired**	tenure type**
5.66	17.8	1 = 37.5	1 = 92.6
		2 = 14.1	2 = 2.0
		3 = 6.2	3 = 0.2
		4 = 18.0	.
		5 = 38.3	

***-Answers for "how acquired"- Fill codes 1,2,.. in the relevant column*

___1_ inherited
___2_ purchased
___3_ borrowed
___4_ opened unclaimed public land
___5_ given
___6_ other(specify)_____

***-Answers for "tenure type"- Fill codes 1,2,.. in the relevant cell*

___1_ customary
___2_ leasehold
___3_ other(specify)_____

2.1.2 -How much of the land is under

a) crops 2.78_____(fields/acres/pieces)
b) woodlot 0.19_____ "
d) fallow/pasture 2.27_____ "
e) virgin 0.45_____ "

2.1.3 -Indicate if you have ever open virgin land in the following periods:

___19.6_ the last 2 years
___10.1_ the last 3 - 5 years
___5.2_ the last 6 - 10 years
___64.6_ other (land already open)_____

2.2 -Were you born in this village?

___45.7_ Yes
___54.3_ No

2.2.1 -Where did you come from?

___18.3_ neighbouring village
___ 4.2_ sub-county
___84.2_ district
- country
1 = 15.8
2 = 4.4
3 = 0.2
4 = 0.2
Not applicable = 79.3

2.2.2 -Why did you settle on this land?
___10.1_ did not have enough land where I was
___22.0_ to live with my relatives
___ 7.4_ to look for a job
___ 3.0_ to occupy this land my parents/my grandparents had bought.
___10.6_ other(specify)_____
___46.9_ not applicable

2.2.3 -How long have you lived in this village?
___ 9.4_ years

2.2.4 -Was your choice of settlement influenced by the existence of the forest?

___48.1_ No.
___ 3.5_ Yes.
___48.4_ not applicable

2.2.4.1 -In what way did the forest influence your choice of settlement?
___1.7_ availability of building materials from the forest
___0.0_ availability of firewood
___0.5_ availability of grazing land in the forest
___0.5_ availability of medicinal products
___1.0_ availability of unclaimed land in the forest as the only unclaimed land available
___ 0.2_ other (specify)
___96.1_ not applicable

2.3 -Have you had any land disputes?
___80.2_ No

___19.8_ Yes
2.3.1 -What kind of land disputes?

HOUSEHOLD IDENTIFICATION NUMBER_____

Ownership

___ 3.7_ within the family
___ 5.9_ with neighbours
___ 1.7_ with outsiders
___ 0.5_ other (specify)
___88.1_ not applicable

2.3.1.1 -How often has such a dispute occurred?

___ 9.9_ once
___ 2.0_ more than once
___88.1_ not applicable

2.3.1.2 -Who resolve(d) the disputes? *(multiple answers allowed)*

___ 1.7_ between disputants
___ 2.7_ by elders/neighbours
___ 4.0_ by RC's/Chief
___ 3.4_ other (specify)
___88.1_ not applicable

Boundary

___ 1.5_ within family
___ 7.2_ with neighbours
___ 0.0_ with Forest Department
___ 0.0_ other (specify)
___91.4_ Not applicable

2.3.1.4 -How often has such a dispute occurred?

___ 7.4_ once
___ 1.2_ more than once
___91.4_ not applicable

2.3.1.5 -Who resolve(d) the disputes? *(multiple answers allowed)*

___ 1.0_ disputants
___ 2.5_ elders
___ 3.7_ RC's
___ 1.4_ other (specify)
___91.4_ not applicable

SECTION 3. FOREST RESOURCE USE

3.1 -List the names and the ownership of the forests near you

NAME	OWNERSHIP
1)_____	_____

2)_____ _____
3)_____ _____
4)_____ _____
5)_____ _____

3.2 -From which one of the above forests do you get most of the forest products you use?

_____

3.3 -How far is this forest from your home?

___0.56_ kilometres *(cross out one)*

3.4 -Fill in the following table, information about the use and importance of the different forest products.

PRODUCT	tick forest products the family uses	how many times a day week/ month/year is the product collected in this family?	what quantity is collected each time?	how long does this quantity last the family?	rank three most used by males	rank three most used by females
firewood	92.1					
building poles	88.1					
medicinal products	11.9					
animal products 1) 2) 3)	6.4					
wild fruits 1) 2) 3)	8.9					
honey	17.0					
mushrooms	22.5					
timber	6.2					
water	88.6					
craft materials 1) 2)	62.5					
household equipment	5.2					
wild roots	5.4					
green vegetables	10.6					

HOUSEHOLD IDENTIFICATION NUMBER_____

others: 1) 2) 3)	0.2					

3.5 -Have you ever sold any product(s) from this forest?

___86.4_ No

___13.6_ Yes

3.5.1 -Indicate the products, the quantity sold last year and the price

PRODUCT	Quantity sold last year	Unit price	Income earned
___timber			
___firewood			
___charcoal			
___building poles			
___water			
___medicinal			
___handicrafts 1) 2) 3)			
___animal meat 1) 2) 3)			
___fruits and roots 1) 2) 3)			
___other_____			

3.6 -Do you buy forest products?

___44.4_ No

___55.6_ Yes

3.6.1 -Indicate the products, **the amount** bought last year and the price.

PRODUCT	Quantity **bought last** year	Unit price	Amount of money spent
___timber			
___firewood			
___charcoal			
___building poles			
___water			
___medicinal			
___handicrafts 1) 2) 3)			
___animal meat 1) 2) 3)			
___fruits and roots 1) 2) 3)			
___other_____			

3.7 -In the course of your stay here have you noticed any significant change in the stock of the forest resources?

___24.0_ No (explain)

_____

_____

___76.0_ Yes

HOUSEHOLD IDENTIFICATION NUMBER_____

3.7.1 -How has it changed, **why, and** what should government and/or the local community do?

PRODUCT	No change (0) Decreased (1) Increased (2)	REASON** *(multiple answers)*	**Action** needed by **Gov't** (if product **decreased**)	Action needed by local community (if product decreased)
timber trees 1) 2) 3).				
firewood				
charcoal				
building poles				
water				
medicinal				
craft materials 1) 2)				
wild animals 1) 2)				
fruits and roots 1) 2)				
other(name)__ _____ _____				

**-*Reasons for decreases in stocks - Indicate codes 1, 2,... in the relevant cell*

___*1- Increased population of the forest resource users*
___*2- clearing land for agriculture*
___*3- timber harvest*
___*4- brick burning*
___*5- charcoal burning*
___*6- tobacco curing*
___*7- other(specify)*_____

3.8 -Have you ever planted trees including **fruit trees?**

___8.4_ No. Why not?

____I use borrowed land on which I can not plant trees
____when I need forest products I go to this forest
____I don't have enough land to spare for tree planting
____other (specify)_____

___91.6_ Yes
___3.8.1_ Name the tree(s)_____
___3.8.2- Name source of seedlings_____
___3.8.3 -For what reason(s) did you plant the trees? *(multiple answers)*
___25.2_ to have own source of fuelwood
___82.0_ fruits for the family
___ 5.2_ for timber
___15.1_ to sell for money income
___21.2_ to serve as windbreak
___ 4.0_ as an anti-erosion
___ 8.6_ as a boundary between my land and other people's land
___31.6_ other (specify)

3.9 -What problems associated with the forest(s) in this area do you have?
___90.6_ vermin
___17.3_ source of diseases (e.g. mosquitoes)
___18.5_ snakes
___ 2.0_ other (specify)

3.10 -What is your view about the forest nearest to you?
___80.7_ protected, why?
_____
_____
_____
_____

___18.5_ cleared, Why?
____it is a source of vermin that destroy our crops
____because of land shortage for agriculture
____the local people do not benefit much from the forest(s), most benefits from the forest(s) go to outsiders; e.g., pitsawyers
____other(specify) _____

HOUSEHOLD IDENTIFICATION NUMBER_____

SECTION 4. COMMUNITY-BASED MANAGEMENT

The government is considering motivating local communities to better manage the resources near them. The question is whether the existing system of access and use pattern can ensure future availability of the resources.

4.1 -Name any on-going communal activities in this area *(multiple answers)*

___37.3_ communal farming
___83.7_ water point management
___21.2_ school building
___ 0.2_ grazing land management
___93.3_ road maintenance
___ 5.9_ other(specify)

5.2 -Have you ever been involved in communal work?

___8.4_ No

___91.6_ Yes, what activity(ies) *(fill the table)*

ACTIVITY	*Tick all that apply*	RESPONSE: good, fair or bad	REASON
communal farming	27.4		
forest management	-		
water point management	69.6		
school building	17.3		
grazing land management	-		
road/path maintenance	78.3		
other	2.2		

4.3 -Have you ever carried out forest maintenance/improvement activities?

___97.8_ No. Why not? *(multiple answers allowed)*

__23.7_ it is a government property and the Forest Department should be the one responsible
__ 7.9_ discouraged by non-participation (the prospects of non-participation) by others
__51.9_ I have never been asked to do any such activities
__. 4.9_ the forest resource is abundant and none of the above activities is necessary.
__24.0_ other(specify)

___2.2_ Yes. Indicate the activities, the number of times undertaken and reason for doing it in the last five years

Activity	Number of times done in last five years	Reason**
seedling planting		
patrolling and reporting rule breakers		
fire protection or fighting		
other: _____ _____ _____		

***-Possible reasons for doing the activity-indicate code no.*

___1-my awareness of the importance of the forest
___2-encouraged by past success of communal work
___3-encouraged by keen participation of other people during this(these) activity(ies)
___4-was forced to do so
___5-other(specify)_____

4.4 -Which organisation(s) manage the forest nearest to you?

None, 5.4____RC, 58.8____Forest Department, 17.3____private

___4.4.1_ Resistance council (RC)

4.4.1.1- What does it do?

_____
_____
_____

4.4.1.2-Is the RC managing the forest well?

___0.2_ No, explain

_____
_____
_____

___4.9_ Yes, explain_____

___94.9- not applicable

4.4.1.3-Have you ever had any conflict with the RC over forest resource use?

___5.2_ No

____Yes, describe_____
___94.9_ not applicable

4.4.1.4-Explain how it was resolved

_____
_____
_____
_____

___4.4.2_ Forest Department

4.4.2.1-What does it do?

_____
_____
_____

4.4.2.2-Is the Forest Department managing the forest well?

___ 8.1_ No, explain_____
___44.7_ Yes, explain_____
___47.2_ not applicable

4.4.2.3-Have you ever had any conflict with the Forest Department over forest resource use?

___54.6_ No
___1.0_ Yes, describe_____
___44.5_ not applicable

4.4.2.4-Explain how it was resolved

_____
_____
_____
_____

___4.4.3_ Private owner

4.4.3.1-What does he/she do?

_____
_____
_____

4.4.3.2-Is the person managing the forest well?

___6.4_ No, explain

_____

_____

_____

___8.6_ Yes, explain_____

___84.9_ not applicable

4.4.3.3-Have you ever had any conflict with that person over forest resource use?

___16.8_ No

___ 0.2_ Yes, describe_____

___82.9_ not applicable

4.4.3.4-Explain how it was resolved

_____

_____

_____

_____

4.5 -Is there an organisation of the local people to manage the forest?

___98.5_ Yes, name the organisation(s)

_____

_____

___1.5_ No

4.5.1 -Do you think the local people around this forest should organise themselves into a forest association to manage the forest?

___36.0_ No, why not?

____the Forest Department and the RCs are already doing a good job

____from past experience communal work can not succeed in this village

____in my opinion the local people can not organise themselves to manage this forest.

Explain: _____

_____

____other (specify)_____

_____

___61.5_ Yes, why

____the authority managing the resource are not doing a good job

____to ensure a more equitable distribution of the benefits from the forest

____to ensure resource availability for the next generation

____for better regulation of the resource use by outsiders

____because I believe they can work together to manage the forest

____other(specify)_____

4.5.2 -How should this association be formed?

___15.6_ all villages which use the resource form one association

___43.2_ each village form a separate association to manage its part of the resource

___1.7_ based on formal user groups; e.g., pitsawyers, charcoal burners.

___0.4_ other (specify) _____

___39.0_ not applicable

4.6 -Should the forest be leased to any of the following?

individuals
formal village association
formal user group
RCI, RCII, RCIII
District council

___74.6_ No, why not?

___ 3.9_ no response

___21.5_ Yes, to whom?

___ 4.0_ individuals
___12.1_ formal village association
___ 2.0_ formal user group
___ 2.7_ RC I
___ 0.2_ RC II
___ 0.2_ RC III
___ 0.2 _District council
___78.6_not applicable

4.7 -If the forest is given to the community to manage, are you willing to undertake any management activities?

___24.2 _No, why not

_____

___74.6_ Yes, which activities*(multiple answers)*

___42.5_ patrolling and reporting rule breakers
___55.5_ planting
___22.5_ fire protection
___28.4_ boundary maintenance
___ 2.2_ other (specify) _____

___1.2_ no response

4.8 -How much time will you be willing to spend working to manage the communal forest?

___54.3_ once every week
___ 5.4_ once every two weeks
___10.4_ once every month
___ 2.9 _ a few times in a year (state) ____
___26.9_ not applicable

4.9 -If you are requested to contribute money to manage the communal forest, how much money will you be willing to give for this purpose per week, per month or per year? *(only one answer is required.)*

Shs_____ per week
Shs_____ per month
Shs**12282.65** per year

4.10 -If the community manages this forest well and some revenue is realised, in your opinion, how should the money be used? *(multiple answers)*

___ 9.6_ distributed to individuals in the community
___79.0_ used on a community-based project such as school and dispensary building or maintenance
___16.8_ ploughed back into the forest
___ 3.2_ remit some to local government
___ 6.4 _other (specify) _____

4.11 -If you are to share this revenue with government, how much do you think government should take out of every Shs100?

___52.6_ Shs25
___39.3_ Shs50
___ 3.2_ Shs75

Thank you very much