# AN ASSESSMENT OF THE FUELWOOD SITUATION IN BUSHENYI AND MBARARA DISTRICTS, UGANDA

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ABSTRACT

The main focus of this thesis is the current fuelwood situation in the districts of Bushenyi and Mbarara, Uganda. Its assessment comprises identification and analysis of the cause-effect relationships within the fuelwood industry. By its very nature, fuelwood availability has close links with various physical, demographic, social, economic, financial, political, technical and other factors. Singly or jointly, these have already engendered fuelwood shortages and problems in Bushenyi and Mbarara Districts and Uganda at large. They are also central to programmes targeted at realising self-sufficiency in fuelwood production and supply. Thus, fuelwood scarcities are considered as one of a variety of disamenities prevailing in the districts of Bushenyi and Mbarara and Uganda as a whole. Redress of these environmental undesirables consists of a multi-pronged approach involving all the people at both local and national levels. In so doing, this strategy is capable of solving more than fuelwood problems at a time and in a given situation. Sustained per capita fuelwood sufficiency is one significant key to improved rural development and better living standards.

PREFACE

It has not been possible to keep the length of this thesis within the range set for work at Masters level. Owing to scanty literature on the subject, it was unavoidable that a historical background to the current fuelwood situation be given. Also, fuelwood production, supply, scarcities, problems and their possible remedies were perceived in a broad framework that embraces all the people and sectors of Bushenyi and Mbarara Districts and Uganda at large.

A number of people and institutions made invaluable contribution towards this thesis. In Uganda, these include the National Research Council, Management Information Services (Office of the President), Ministry of Education, Ministry of Planning and Economic Development, Commissioners for Agriculture and Forestry and their staff, and relevant institutions in both Bushenyi and Mbarara Districts. In particular, the Office of the District Commissioner, Bushenyi, together with the District Agriculture and Forest Offices, played a very important role. Not only did they organise and attend a very useful meeting at short notice, but they did display an all-time willingness to help as and when it was requested of them. Special thanks also go to the local community in both districts (and also in Kabale District and Kampala City) who, despite considerable uncertainty about the application of the study to their more pressing economic and security issues at the time, provided whatever information was sought by the researcher.

Elsewhere, Mr Gaafar Karrar, Acting Head of UNEP's Desertification Branch, deserves credit for the valuable literature he availed to me. I am also grateful to the World Bank for granting me permission to use data contained in its 1983 publication on energy in Uganda. The

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Without the material and moral support from my family, relatives, and friends, this thesis might not have reached a timely end. In particular, to Dorothy Kahangire, Lilian Byaruhanga, Betsy Mama-Susan, and Fred Kabunga, I say 'In future, do the same, if not more'.

CONTENTS

# CHAPTER ONE

# INTRODUCTION

## 1.1 Objectives of the Study

The issue of energy supply and demand in Less Developed Nations (LDNs) has attracted considerable attention, especially at the international level. Production and consumption of commercial energy have been documented by different agencies, such as the World Bank. The 1973 oil crisis not only led to sharp rises in petroleum prices, but, for both the more developed nations and their less developed counterparts, there was the realisation that finite resources had to be managed efficiently, while, at the same time, exploration and development of renewable energy sources, in particular, had to be accorded more emphasis than had hitherto been the case. On the other hand, energy's non-commercial sector has so far received comparatively less detailed study and action within many LDNs. The role of the latter sector in many a nation's socio-economic and industrial development is generally regarded as crucial, even though it is not always clearly defined.

In a number of countries, the causes of shortages in non-commercial energy supply, as well as various problems ensuing therefrom, have been investigated. For instance, deforestation is one of the factors responsible for fuelwood scarcities in Nepal, and, although 'better' (or 'improved') cooking stoves have been undergoing development, many households will continue to face shortages in the supply of this badly needed fuel item for some years to come. In South Korea, community forestry was conceived and undertaken as one of the measures through which fuelwood shortages and problems could be redressed and/or avoided. Social forestry in India has been encouraged, among other things, as a means of ensuring that woodfuel users realise self-sufficiency in the supply of this energy type.

Within South America, extensive commercial exploitation of the tropical forests (e.g. in Brazil) has been criticised for its impact on the region's ecology, as well as the fact that, for the people in the low-income group especially, traditionally cheap sources of woodfuel are increasingly on the decline. In Africa, research has already been conducted in Upper Volta, Kenya, Zambia, and other countries with regard to the current state of woodfuel supplies and consumption. Some 'improved' cooking stoves have been developed and tested in the laboratory (e.g. in Kenya), but their application to the realities outside such controlled conditions has had limited success.

Unfortunately, Uganda is one of those Less Developed Nations where the fuelwood issue appears to have received little attention thus far. Yet, as a low-income, oil-importing LDN, her near- and long-term socio-economic development, in particular, will invariably require and entail increased consumption levels of energy. At present, the country imports all her petroleum requirements and there is reason to believe that, in the near future at least, fossil fuels will continue to figure significantly in such sectors as industry and transport. Exploration and development of alternative energy sources are heavily constrained by many factors, such as unavailability of technology, scarce investment and development finance, manpower shortages, lack of preinvestment studies, inadequate planning, low levels of supporting infrastructure, inequalities in income and wealth distribution, and political instability.

Currently, electricity use countrywide is mostly limited to the urban areas (and places in the immediate neighbourhood), industrial centres, and schools, hospitals, religious centres, and the like. Over 90% of the national population resides in the countryside where fuelwood (or firewood as it is locally known) is very often the only household fuel item available and in use. And, although fuelwood is also consumed in the urban areas and some industries, it is fair to characterise most of

its causes, as well as impact, with the countryside.

Thus, the purpose of this study is sixfold. Firstly, it seeks to highlight the crucial role played by fuelwood in the daily lives of most Ugandans and the national economy at large. Secondly, the connection between fuelwood and other energy types is emphasised. Thirdly, this thesis dispels one view that fuelwood scarcities in many countries, including Uganda, are the result of inadequate harvesting methods. Instead, land clearance, mainly for agricultural purposes, is singled out as the most immediate cause. Fourthly, there is need for a holistic approach towards redressing fuelwood shortages and their demerits. This is so, for instance, owing to the fact that to realise more wood supplies involves a number of issues. Chief among these is the high national population growth rate of over 2.5% annually. Equally important is the recognition that lack of an energy policy, and one particularly suited to fuelwood, also explains some of the existing problems facing wood and other energy users. Fifthly, self-reliance in fuelwood supply is recognised and emphasised as one key factor for improved living standards, particularly in the countryside. Lastly, active public participation in fuelwood and other issues is seen as crucial and, therefore, worth encouraging. One requirement here is that, not only is the public to be kept informed of what is happening near and far, but its views must be listened to and utilised, and, simultaneously, its various rights must not be abused by parochial politicians and others alike.

## 1.2 Study Area

Other than the two main urban centres of Kampala and Jinja, almost any area in Uganda could have been chosen for this type of study. However, a number of factors weighed in favour of Bushenyi and Mbarara Districts.

Prior to 1979, Bushenyi and Mbarara Districts were essentially one district known as Ankole. My place of birth is in present-day Mbarara District, but, during the course of my primary and secondary school education (i.e. 1959-1970), as well as the time during which I have been a government employee in Uganda (i.e. since 1976), I have travelled quite extensively throughout both Bushenyi and Mbarara Districts and acquired useful knowledge on various topics. Therefore, since provision for a field study in Uganda was not included in my scholarship, it was hoped that this knowledge would prove very handy. (The interviews I carried out in Uganda in January-March 1984 were done during the time of my annual family reunion holiday.)

Secondly, the language factor was significant since the methodology to be used included interviews with the local people in both Bushenyi and Mbarara Districts (section 1.3 below). Different languages are spoken in Uganda and tend to be closely related to the tribal groupings. For example, over 90% of the residents of both Bushenyi and Mbarara Districts are Banyankore and their mother tongue is Runyankore. In Kabale and Rukungiri Districts, the Bakiga are the predominant tribe and speak Rukiga which, save for slight variations, is akin to Runyankore. In Moroto and Kotido Districts (i.e. North-east Uganda), the Karamojong use Akaramojong, their mother tongue, while, around Kampala City (i.e. the national capital), Luganda is the dominant language in use. In eastern Uganda, Lunyole, Lusoga and other languages are used, while, in the northern area of the country, Acholi, Alur, Jonam, Lugbara and others are widespread. This language multiplicity sets geographical limits regarding the area where such interviews can be conducted. Accordingly, the districts of Bushenyi and Mbarara were chosen for the purpose.

Thirdly, the 1980 census in Uganda showed Bushenyi and Mbarara Districts ranking high in terms of total population and, particularly for Mbarara District, annual population growth rates as well. For instance, with a

total of 687 803 people in 1980, Mbarara District was in first position nationwide, while Bushenyi District came eighth, with 523 170 people. To study fuelwood consumption and production in any area requires consideration of such factors. Of greater concern, though, is population density (i.e. the number of persons per square kilometre). As is shown later, in 1980, Bushenyi District had a population density of nearly 103. For Mbarara District, it was 62. Viewed against other densely populated districts in Uganda, Bushenyi was seventh and Mbarara sixteenth. Further to this, Mbarara District was among the fastest growing areas countrywide, recording an annual population growth rate of 4.2% between 1969 and 1980. The corresponding rate for Bushenyi District was 2.4%, while 2.8% was the national one. Therefore, given that energy issues in Uganda are still inadequately documented, analyses of these demographic features can offer useful guidelines regarding planning, development, and management of fuelwood and various other needs.

Yet another reason for the choice of this study area relates to the rate at which secondary urbanisation and rúral development have been undertaken in the aftermath of the administrative redivisions of 1979. In that year, the number of districts in Uganda was raised from 20 to the present 33. Officially, this redivision was part of government plans to bring services closer to the people. Desirable as it was and must be, this exercise would appear to have been inadequately planned. For instance,

a) very little time was allowed for the preliminary establishment of the infrastructure required by the newly-born districts in particular;
b) no due attention was given to the services which could easily be transferred from the hitherto operational offices or centres to the new ones, nor was it clear as to how the remaining ones were to be smoothly administered under the new arrangement without inconveniencing the services, on the one hand, and the administrators and recipients on the other;

c) the physical-cum-demographic growth of the new district headquarters, in particular, was, at the time, hardly planned for;
d) planning for the course and effects of secondary urbanisation (i.e. growth of new towns and their suburbs and trading centres) in all the 33 districts seems to have been shelved, if it was ever perceived as significant, till the aftermath of the whole exercise; and
e) the spin-off effects of this administrative split-up were hardly taken cognizance of by the political expediency instrumental in the whole exercise.

Thus, between 1979 and 1984, Bushenyi District, especially, has experienced rapid and, in several instances, improperly planned growth in both urban centres and rural socio-economic infrastructure. For town planning purposes, for example, the present location of Bushenyi Town is not ideal in physical terms, and, if the town is to grow and establish itself as the commercial headquarters of Bushenyi District, this will undoubtedly involve removal of people who have lived in parts of the area for very many years. In addition, the growth of these new urban centres, in particular, will lead to more urban woodfuel demand while, at about the same time, a number of wooded areas are still being cleared in preparation for the establishment of trading centres, schools, private residential houses, and the like. In this regard, this thesis makes a twofold emphasis. Firstly, if the people in Bushenyi District as a whole are to be beneficiaries of the creation of this district, any growth of social and economic facilities and services, especially, requires proper planning, establishment and management. Secondly, there must be some lessons which planners, developers, managers, politicians and all those concerned with the overal development of Bushenyi District can learn from other areas in Uganda. For instance, construction of new housing units in Bushenyi Town and other urban centres should reflect the type of household energy to be used by the potential inmates. In addition, a non-politically biased decision needs to be arrived at, at the earliest time possible, regarding

the ideal site of the commercial, let alone administrative, headquarters of Bushenyi District. To the best of my understanding, neither the present Bushenyi Town nor Ishaka Trading Centre qualify for this.

One other major consideration underlying the choice of Bushenyi and Mbarara Districts as my study area is to do with possible measures to be undertaken for redressing and/or preventing fuelwood shortages and the problems associated therewith. As is shown later in the thesis, some form of fuelwood farming will have to be launched as part of the programmes for ensuring sustainable fuelwood supplies. Within Bushenyi and Mbarara Districts, individual woodlots, rather than community forests, are likely to figure significantly. This is so due largely to the private land tenure system found in both Bushenyi and Mbarara Districts - and, indeed, throughout the rest of Uganda. Furthermore, any measures aimed at providing adequate wood supplies for all the people must assume a broad outlook. It is in this regard, therefore, that emphasis is laid on formulation of appropriate management policies for all land-based operations. In this respect, it is not only the professional agriculturalist, forester, veterinarian, and the like alone to be entrusted with such task. Rather, desirable management of the environment in both Bushenyi and Mbarara Districts, as well as in Uganda as a whole, must involve all the people, including the peasant farmers. It is for this reason, for instance, that the role of the media is regarded as crucial in informing everyone about a number of environmental disamenities already in existence or likely to occur in Bushenyi and Mbarara Districts and the country at large. In one sense, therefore, attainment of sustainability in fuelwood supplies is (i) a primary responsibility of many people, (ii) a key factor towards realisation of rural development, and (iii) an insurance against land-based cutbacks in the subnational and national production of both food and cash crops.

## 1.3 Methodology

Three principal methods have been employed in gathering data for this thesis. The first method centred around published works relevant to the theme of this study. Unfortunately, there is as yet very little by way of literature on fuelwood in Uganda. In 1983, the United Nations Development Programme (UNDP) and the World Bank published a joint report on energy in Uganda. This followed a survey they conducted in the country in 1982. Needless to say, the material contained in this document derives heavily from estimates rather than actual data. Useful though these estimates might be in making broad projections in economic and social development at the national level, they are extremely deficient, albeit justifiably, with regard to planning for and management of fuelwood production and consumption at the subnational level in particular. One most commendable merit about this report, however, is its contribution towards bringing to the fore the general picture regarding fuelwood and other forms of energy in Uganda. Similar to a number of studies done on fuelwood in other countries (e.g. Kenya and Zimbabwe), the report spells out the need for availability of reliable data as one of the prerequisites for undertaking meaningful programmes aimed at tackling fuelwood shortages and, I might add, problems associated with them.

The second means by which data was gathered consisted of face-to-face contacts and/or correspondence with a number of institutions. In Uganda, for instance, the Ministries of Agriculture and Forestry, Culture and Community Development, Education, Planning and Economic Development, Power, Posts and Telecommunications, and Tourism and Wildlife were approached for material relevant to the theme of this study. For example, woodfuel (i.e. charcoal and fuelwood) is traditionally associated with the Department of Forestry. Among other things, information was sought from this department with regard to the woodfuel situation in the country at large and in Bushenyi and Mbarara Districts in partic-

ular. Unsurprisingly, the department had some records of estimates on charcoal production, but very little data was forthcoming on fuelwood. On the other hand, as the public agency directly connected with the immediate cause (i.e. land clearance) of the diminution in the size of the fuelwood resource base, the Department of Agriculture, it was hoped, would have statistics on how much land is cleared for agriculture in each district per annum. Equally important, the department was looked to to provide information relating to the effects already engendered on agriculture, in particular, as a result of the unchecked land clearance countrywide. The Department of Agriculture scored rather well on the latter, but the only reliable statistics available on land use in Uganda were those of 1972. (Any information provided to me by the Departments of Agriculture and Forestry was through face-to-face contacts.)

When it comes to considering the social and cultural impact of fuelwood shortages and/or problems in Uganda, the Ministry of Culture and Community Development can be cited as one of the public organisations that ought to be closely interested and involved in studying the nature of such socio-cultural disamenities and devising measures to counter them. But, as of now, my correspondence to this ministry has not been answered. On the other hand, the National Curriculum Development Centre of the Ministry of Education did furnish me with photocopies of some parts of the Biology and Physical Science syllabi for primary and secondary schools in Uganda. As is mentioned later, education, especially at both primary and secondary levels, offers a useful medium for disseminating information on such environmental issues as fuelwood production, management of ecosystems, rural development, urbanisation, and so forth.

Correspondence with the Ministry of Planning and Economic Development made it possible for me to obtain a copy of the Background to the Budget 1984-1985. (I had already purchased a similar document for 1983-1984, as well as other relevant publications from the Government Printery in

Entebbe, Uganda.) Most unfortunately, however, the information I sought from the Ministry of Power, Posts and Telecommunications was never provided. As the main government agency dealing with energy in Uganda at present, it was hoped that a lot of data would be forthcoming from this ministry. (Perhaps this will be done in future.) Also, the Ministry of Tourism and Wildlife has so far not provided the information I sought from or through it. In particular, I had asked about the possible effects that fuelwood procurement in the areas neighbouring on national parks and/or game reserves might be having on the character of the latter. Such setbacks serve to illustrate some of the problems confronting a researcher in Uganda (and, maybe, in some other countries too).

The third and most important method I used for collecting data centred around interviews with the general public, especially the local community in the districts of Bushenyi and Mbarara. (As used hereinafter, local community refers to those people physically living in a given area, e.g. district, county, subcounty or parish, and who hold no position of responsibility in the government or similar service. It includes peasant farmers, self-employed people, students, and others.) The choice and use of this method was considered crucial for a number of reasons. More often than not, what one reads in government-controlled newspapers or hears over the national radio and T.V is never a true and/or full picture of what is actually obtaining in a given area. For a variety of reasons, many politicians and even grassroot-level government administrators are very fond of publicising more of the good but very little of the disamenities existing in their constituencies and areas respectively. Therefore, through direct contacts with the local community in Bushenyi and Mbarara Districts, I sought to and did obtain a true picture of what the fuelwood situation is like therein and what it is that has created it, as well as the impact it has already had on the lives of different people and/or their activities.

As is mentioned below, this thesis has one part (i.e. Part Three) whose focus is on ways and means of solving and/or preventing fuelwood scarcities in both Bushenyi and Mbarara Districts and Uganda at large. To the best of my knowledge, economic planners hardly give due attention to what the local community or the people planned for have to say about a proposed development scheme or measure. But, after careful analysis, one will often find that failure of some otherwise beneficial measures is partly explained in terms of lack of participation by the local community. For example, the Prevention of Grass Burning Decree of 1974 had little effect, if any, largely because many lay people saw it as an unnecessary imposition on them. What the government of the day never realised was that, without public participation, enforcement of such a decree would be virtually impossible. Therefore, as the people most affected by different forms of fuelwood scarcities and the problems ensuing therefrom, the local community was asked for their views on what needs to be done to ensure that fuelwood supplies are made sustainable.

As is discussed later in this thesis, communication plays a crucial role in different aspects of man's life. Partly owing to human nature, most people dwell a lot upon their 'daily bread' and amassing economic wealth. What is not often realised, however, is the fact that inelasticity of most resources sets limits to what can be reaped therefrom by man. Accordingly, it is only through desirable forms of man-resource interaction that such 'daily bread' can be guaranteed and economic wealth attained by different people. Since Uganda still has a substantial adult illiteracy, in particular, information dissemination through newspapers reaches a limited audience. Worse still, some newspapers (e.g. Uganda Times) publish in English in a country where ability to read and speak this language is mainly acquired through formal school education. Therefore, unless there is an information dissemination exercise that is planned and made appropriate to a given area (e.g. Bushenyi District), it is

fair to point out that the general public will remain ill-informed of even some environmental dangers that are immediately around them. The views expressed by nearly all the interviewees in the districts of Bushenyi and Mbarara lend support to the feeling that only a minority of the people in Uganda believe there are fuelwood shortages already in the country. This is in sharp contrast to what is actually the situation nationwide.

While the syllabi already mentioned did include course units relating to the general topics of devegetation and soil degradation, most of the responses received from the pupil/student interviewees cast suspicion on what is actually taught and how. For instance, there was general agreement that, in class, teachers of Agriculture, Biology, and Geography had talked about agents of edaphic impoverishment as including soil erosion by water and wind, compaction, bush fires, poor agricultural methods, and the like. Secondary school students of Physical Science also pointed out some of the possible ill-health effects emanating from exposure to fuelwood smoke,exhaust fumes by motor vehicles, various household chemicals, and so on. On the other hand, the majority of these students also agreed that, very often, certain issues were treated in what can be termed a compartmentalised manner. For example, when teaching about devegetation, almost all the teachers in question never dwelt fully on the wide-ranging nature of this theme. Perhaps, owing to the bias for an academic examination, it was frequently emphasised that land clearance and bush fires are principal agents of devegetation and, singly or jointly, promote soil impoverishment. According to these student respondents, however, the full cycle of this process must be addressed. For instance, often land clearance by peasant farmers is aimed at ensuring more crop production, sales and revenue. Use of artificial fertilisers is still low, while not all the peasant people have cows to provide an adequate source of cowdung for fertilising the soil. But, even where artificial fertilisers are used, there is never full information given to their actual users as to their pros and cons. At the same time, bush fires, despite their various demerits, facilitate

growth of new vegetation which can be grazed upon by domestic animals. Also, while government leaders and others alike decry such activities as unmanaged bush-firing, they are rarely exemplary. In addition, when dissuading people from such actions, one needs to offer an alternative that will enable them realise what they are aspiring to.

The views expressed by the pupil/student and other respondents are an indication of the complex nature of such issues which an environmental planner, manager or researcher must fully appreciate if anything worthwhile is to be achieved. Therefore, school curriculum developers, teachers and pupils/students are some of the interdependent parties in an environmental education system. Furthermore, government leaders, public servants, the news media, and the lay public each have an important role to play in ensuring that there are adequate fuelwood supplies and a desirable environment for all. To me, the local community was a very useful source of information and any downplay of its contribution would be one feature of an undesirable "top-down" type of research.

During the interviews with members of the local community, a number of guideline sub-themes were used. For example, people were asked about the different purposes for which they used fuelwood. In conjunction with a sub-topic regarding the fuelwood amount used daily or weekly, this revealed certain interesting features. For instance, while fuelwood was used for cooking food - and this ranked on top in all situations - variations in the amount consumed were due to such factors as the type of food being cooked, the person in-charge of the cooking, and the time of the day and/or week. Thus, while a meal of bananas mixed with pounded groundnuts may involve only one open fire, preparation of the two items separately consumes more fuelwood since at least two open fires will be used. Also, nearly all the interviewees observed that, unlike clay pots, saucepans have a poor heat retention ability. As such, while food preserved in a clay pot will usually not require re-heating (or warming up) - except if

it is after six hours or so - this is not always the case with that kept in saucepans.

Unlike the situation found mostly in towns, the majority of the people in the rural areas rarely use eucalyptus wood for cooking purposes on a daily basis. It was with this in mind that I sought to know the wood types they used, what procurement methods were employed, and the kind of storage people had for their fuelwood requirements. Use of soft wood types for the mid-day meal was widespread, while, for the evening cooking, hard fuelwood was commonly used. Accordingly, procurement and storage methods depended, among other things, upon what type of wood a given person was to use. Quite often, the need for storage provision did not arise since there would be little fuelwood, if any, left over after the evening cooking.

An assessment of the current fuelwood situation in both Bushenyi and Mbarara Districts involves some study of what has been happening, say, in the last 20-30 years. Most of the factors that explain fuelwood shortages here have been unfolding for some time. Inevitably, peopled aged 25 and above were target candidates for this part of the research. Through carefully thought-out questions, some of which took the form of interjections, it was possible to learn about how and where fuelwood has been procured during the last 20 years or so. And, of the two groups of people, females proved extremely patient and consistent in their responses. In part, this is a reflection of the sensitivity of fuelwood to them. They are not only the cooks in nearly 100% of the homes where fuelwood is used, but, in about 9 out of every 10 households, fuelwood procurement is one of the chores shouldered by them.

Household use of commercial fuelwood in Bushenyi and Mbarara Districts is mostly found in the towns. It was from among both inner and outer urbanites that I hoped to find data regarding the proportion of an individual or family income that was spent on fuelwood. But this proved

more difficult than a lay observer might expect. Firstly, direct and/or indirect questions relating to expenditure of one's personal income tend to meet with distaste among many people. Secondly, there was hardly anyone who appeared to be fully reliant on fuelwood purchases. Very often, people either secure non-commercial fuelwood from the countryside, or, particularly among those very close to some urban trees, gather branches from the latter. Thirdly, owing to the inflationary climate Uganda as a whole has been facing, nearly all working urban dwellers have had to devise other means to make two ends meet. One effect of this is that, apart from the regular wage/salary received at the end of the month, other cash incomes earned are characterised with ups and downs. For instance, when a given person earns a reasonable sum of nearly tax-free side income, there is usually a tendency to overspend. When the reverse occurs, expenditure is almost always restricted to what is very basic for the survival of the individual. For these and similar reasons, therefore, comparatively little time and effort were expended upon obtaining the necessary information from this group of people.

All the interviewees were asked for their views on the present-day fuelwood situation in their areas. Once again, the women were unsurprisingly very forthcoming with their answers. In expressing such views, the respondents did cover more than what they would provide had they been presented with a questionnaire each. For example, one question concerned what action each individual would take against a person caught in the act of or known to be engaged in stealing fuelwood from other people's woodlots, forests and the like. Here, the majority of the female respondents were of one voice in showing a great measure of sympathy for the culprit if the latter were a woman. (Many among the male interviewees shared the same view.) In a way, this suggests that, among other things, reason and humaneness still play an important role even at such times. (As regards male culprits, however, there was an overwhelming male and female lack of sympathy for them.)

One last sub-theme used in the interviews concerned what people had as plans and/or recommendations for countering fuelwood shortages and the problems associated therewith. As daily consumers of this energy item, members of the local community, especially in those areas already experiencing scarcities in its supply, are increasingly worried about what to cook the food with. Nearly all of them saw appropriate fuelwood farming and its proper management as one immediate and least cost-effective answer to the problem. However, many were quick to add that, while the will is or may be there, certain man-made problems were proving hurdles that could not be surmounted easily. In particular, the interviewees cited the effect present party politics and its functionaries in Uganda are having at both national and subnational levels.

Thus, unless one is content to always work with estimates, it is unavoidable that one must seek data from such grassroot sources as have been mentioned above. In addition, when conducting research work among a population where the right to learn how to read and write has not been realised by all as yet, conventional questionnaires have limited application. Owing to this, as well as the limited temporal and other resources with which I had to conduct the research in both Bushenyi and Mbarara Districts, it was decided that a cassette recorder be used. (The latter proved extremely useful, especially, in cases involving interviewees who, for some reason, were unwilling to provide true information on a number of issues.)

For one tackling a theme about which there is very little that has so far been written, it is unsurprising that, to a great extent, one has to start from a scratch. In addition, different people hold varying views about such issues as fuelwood. It came as no surprise, therefore, to find that, even among government authorities at both national and local levels, talk of fuelwood problems in Uganda made no appeal to them. Worse still, travel between Kampala, the capital city and headquarters of most government

ministries, and Bushenyi and Mbarara Districts - a distance of over 200 kms - was never always smooth. For one trying to collect as much data as possible within a limited time, the security roadblocks on the road from Kampala to Bushenyi and Mbarara Districts often caused set-backs and, more than once, a feeling that it is not always easy for academic-type researchers and people at such roadblocks to compromise their respective priorities.

There are two factors that are worth mentioning under this section. My Geography training at Makerere University, Kampala (1973-76) and secondary school teaching experience (1976-80) proved extremely helpful in this undertaking. Also, having been born and brought up amidst considerable hardships common to many Ugandan villages, I found it reasonably easy to use field study methods according to the respondent's rural setting and lifestyle.

## 1.4 Thesis Structure

The thesis has been divided into three parts. Part One provides a general background of Uganda in terms of its geography and the energy industry. In order to fully appreciate the fact that the fuelwood industry interacts with many other sectors of Uganda's economy and society, one needs to know something about the land tenure system, population, and people's economic activity. Discussion of these and the national energy industry sets a framework against which the fuelwood situation in Bushenyi and Mbarara Districts must be assessed.

The core of the thesis is to be found in Part Two. As much as is possible, the current fuelwood situation in the districts of Bushenyi and Mbarara is dealt with in detail in terms of what it is like, its causes, and the effects it has already engendered or are likely to result therefrom. With regard to ways and means by which these disamenities are to be redressed,

the discussion shifts from the district to the national level, thus justifying the need for Part Three. In Uganda, most, if not all, policy matters are handled at the national level, and, in turn, the districts, counties, subcounties and parishes are some of the institutions through which such policies can be translated into action. Since these subnational levels of government administration have very little autonomy, if any at all, it is to be expected, for instance, that a programme involving fuelwood farming can only be undertaken with sanction by the national government. District staff in the Departments of Agriculture and Forestry are employees of the Public Service Commission (i.e. the government agency that handles appointments, promotions, transfers and dismissals of all civil servants). Consequently, much as one might endeavour to devise possible solutions to fuelwood problems at the micro (i.e. district ) level, the reality is that one might not go far in such an undertaking.

# PART ONE

## BACKGROUND

# CHAPTER TWO

## UGANDA: BRIEF GEOGRAPHY

Understanding energy supply and consumption in Uganda requires knowledge of certain aspects of the country's geography. Since Uganda has no ocean or sea port of its own, its petroleum imports must pass through another country, and, therefore, maintenance of friendly political relations with neighbouring countries underscores flow of such fuels. Territorially, the country is small and, as such, its high population growth rate is already a source of mounting pressure upon the land. As energy demand in both rural and urban areas remains on the increase, such factors as the predominantly peasant agricultural economy and private land tenure system cannot be ignored by energy - let alone economic development - planners and managers. And, for the urban population especially, their energy consumption is closely related to their income versus other life necessities. All of these issues form the focus of this chapter.

### 2.1 Location and Size

Uganda is a landlocked country in East Africa and shares borders with Sudan in the north, Kenya to the east, Tanzania in the south, Rwanda to the south-west, and Zaire in the west (Figure 2.1). It bestrides the equator and extends from approximately $1^{o}$ South to $4^{o}$ North and $30^{o}$ to $35^{o}$ East. Most of the country consists of the high African plateau, with an average elevation of 1200 metres above sea-level. Approximately 9% of the country is below 900 metres in altitude. The downwarped part of the country is mainly occupied by Lake Victoria. From the centre, the land generally rises - eastwards and westwards - culminating in such high peaks as Mt Ruwenzori (over 4870 metres) in the west and Mt Elgon (over 4260 metres) in the east. The western arm

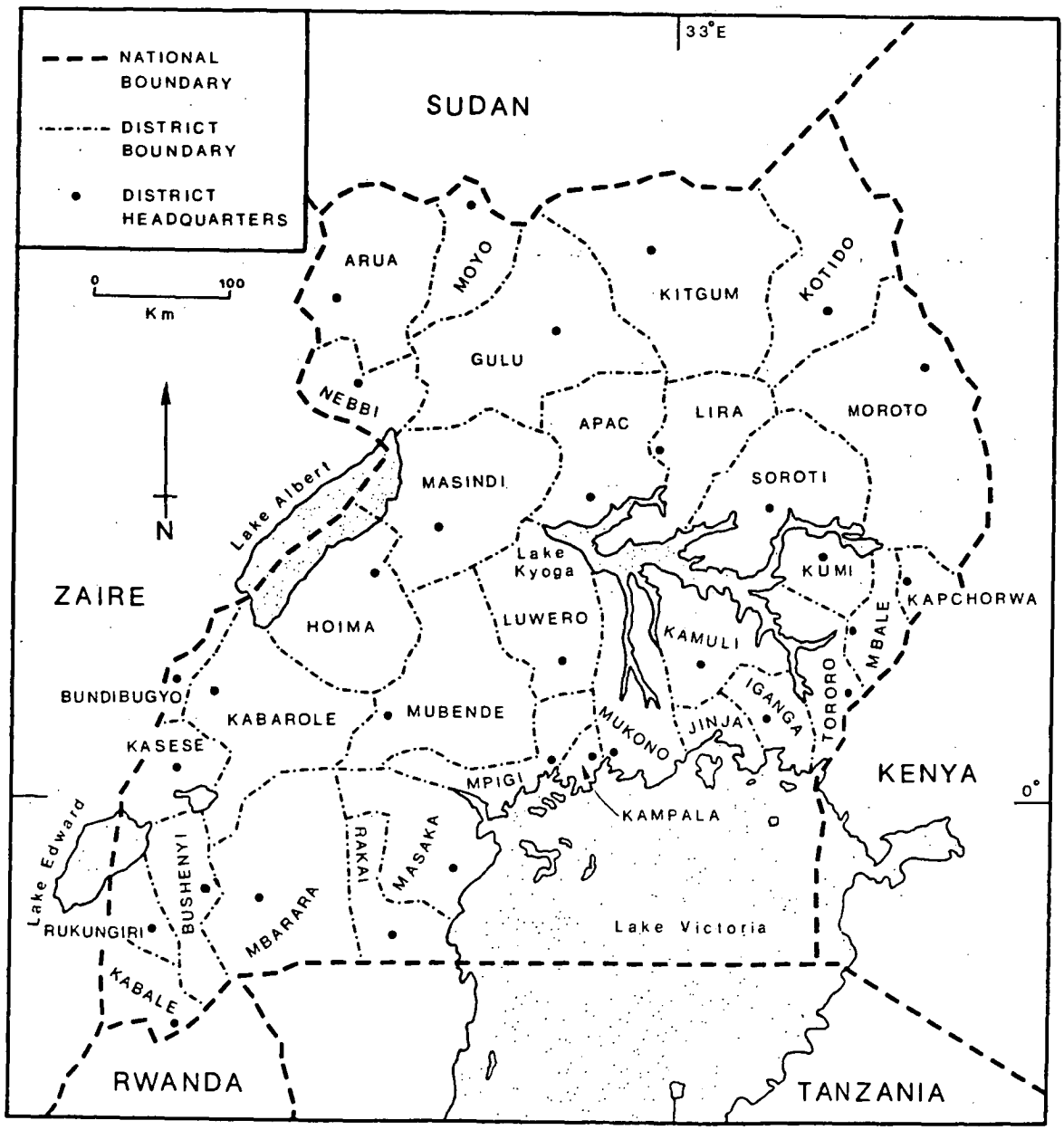


Figure 2.1 Map of Uganda showing the 33 districts and the neighbouring countries.

of the East African Rift Valley is occupied by Lakes Albert, Edward and George.

Climatically, the country is characteristically equatorial, with the Lake Victoria region, in particular, having high, frequent and reliable rainfall. Save for some modification caused by altitude and the influence of Lake Victoria especially, temperatures are constantly high, averaging 15°C at night and 26°C during daytime. Most rainfall is received between March and May and from October to November. Over most of the country, the dry season lasts between June and August/September.

According to the 1972 land utilisation statistics (Table 2.1), Uganda had a total area of approximately 241 021 $km^2$. Of this, 196 986 $km^2$ were land area, while water and permanent swamps covered nearly 44 035 $km^2$. In a 1983 Forest Department report[1], closed forest and woodland were estimated to cover 19 243 $km^2$, of which about 14 812 $km^2$ were gazetted and consisted mostly of tropical high forests and savanna woodland, and 2807 $km^2$ of the 14 812 $km^2$ were on privately owned land.

## 2.2 Population

Uganda's total population for 1969 and 1980 was 9 535 051 and

[1] UGANDA FOREST DEPARTMENT, 1983; Uganda Forest Department National Progress Report for African Forestry Commission Sixth Session, Arusha, Tanzania.

Table 2.1 Land Utilisation in Uganda, 1972
(Area in $km^2$)

| DISTRICT | Total Area of District | Area under water | Area under permanent swamp | Cultivated land | Uncultivated arable land | Area under forest reserves | Area under game reserves | Area under mts (2000 m+) | Area under urban centres | Area under ranches | Total land area of district |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E.Buganda | 23439.83 | 9324.09 | 983.06 | 3493.61 | 9565.69 | 1006.42 | - | - | 67 | - | 13132.68 |
| W.Buganda | 6559.84 | 1211.41 | 565.02 | 1744.81 | 2975.79 | 386.25 | - | - | 238 | 79 | 4783.41 |
| Mubende | 10309.71 | 2.42 | 487.59 | 2049.14 | 1710.26 | 757.35 | - | - | 7 | - | 9819.70 |
| Masaka | 21300.04 | 10685.61 | 762.01 | 2327.41 | 7013.99 | 397.02 | - | - | 12 | 272 | 9852.42 |
| Busoga | 18195.42 | 8586.66 | 775.82 | 4709.43 | 3928.87 | 330.08 | - | - | 82 | - | 8832.94 |
| Bukedi | 4553.09 | 101.21 | 552.38 | 2520.15 | 1404.35 | 52.05 | - | - | 7 | - | 3899.50 |
| Bugisu | 2545.80 | - | 42.22 | 1142.40 | 683.00 | 527.55 | - | 297 | 15 | - | 2503.58 |
| Sebei | 1738.31 | - | - | 319.51 | 865.19 | 671.67 | - | 590 | - | - | 1738.31 |
| Teso | 12920.77 | 1055.47 | 882.41 | 8259.90 | 1898.00 | 133.72 | - | - | 8 | 251 | 10982.89 |
| N.Karamoja | 13207.82 | - | - | 192.10 | 10463.13 | 2133.36 | | | | | 13207.82 |
| S.Karamoja | 14013.54 | 0.21 | 26.37 | 141.72 | 16118.00 | 1084.43 | | | | 480 | 13986.96 |
| Lango | 13739.64 | 916.43 | 785.66 | 4518.71 | 7169.49 | 212.88 | (6552 ( | (110 ( | (5 ( | 190 | 12037.98 |
| E.Acholi | 16135.85 | 0.31 | 3.42 | 1814.32 | 10653.14 | 742.30 | | - | | | 16132.12 |
| W.Acholi | 11717.12 | 73.29 | 100.65 | 2112.70 | 14000.26 | 310.32 | 1989 | - | 14 | 555 | 11543.18 |
| W.Nile | 10720.86 | 95.45 | 248.75 | 2857.34 | 6720.96 | 705.38 | 182 | - | 8 | - | 10376.66 |
| Madi | 5006.05 | 72.63 | 265.09 | 1367.14 | 1977.06 | 344.99 | - | - | 2 | 4 | 4668.33 |
| Ankole | 16235.40 | 440.72 | 363.96 | 3428.40 | 10562.00 | 973.22 | 1450 | - | 12 | 264 | 15430.77 |
| Bunyoro | 19536.48 | 2982.85 | 324.04 | 1705.36 | 10295.94 | 1670.45 | 2431 | - | 5 | 471 | 16229.59 |
| Kigezi | 5241.37 | 207.08 | 135.75 | 2434.15 | 2519.45 | 585.90 | 655 | 35 | 5 | - | 4898.54 |
| Toro | 13903.58 | 571.92 | 403.26 | 1776.31 | 8020.50 | 2224.97 | 2361 | 1004 | 14 | - | 12928.40 |
| UGANDA | 241020.52 | 36327.76 | 7707.46 | 48914.61 | 128545.07 | 15250.31 | 15620 | 2036 | 501 | 2566 | 196985.78 |

Source: This information was obtained from a loose sheet of paper provided by the Ministry of Agriculture and Forestry, Entebbe, Uganda.

12 636 179 respectively[1], while, in 1981, it was estimated at 13.6 million[2]. Throughout the country, birth rates are still high and mortality has generally been on the decline (Table 2.2). During the

Table 2.2 Key social indicators (around 1980)

| | |
|---|---|
| Population | 12.6 million |
| Child population (0-15 years) | 6.3 million |
| Population growth rate | 2.8% |
| Life expectancy (years) | 53 |
| Male | 51 |
| Female | 54 |
| Crude birth rate (per 1000 pop.) | 50 |
| Crude death rate (per 1000 pop.) | 18 |
| Infant mortality rate (0-1 year) (per 1000 live births) | 96 |
| Child death rate (1-4 years) (per 1000 children) | 17 |
| Primary school enrolment ratio | 50% |
| Male | 58% |
| Female | 42% |
| Adult literacy rate (age 15+) | 52% |
| Physical quality of life index | 40 |
| Access to clean water (% of pop. in 1975) | 35 |

Sources: 1. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.
2. SMIL, VACLAV and KNOWLAND, WILLIAM, E. (eds), 1980; Energy in the Developing World: The Real Energy Crisis; Oxford University Press, Oxford.

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

[2] RAKE, ALAN (ed), 1982; New African Yearbook 1981-2; Ic. Magazines Ltd., London.

1969-1980 intercensal period, the population increased by nearly 2.8% annually. This figure was below the 3.4% estimated annual population growth rate[1]. The latter figure, made towards the close of the 1960s, was not realised largely owing to a sharp decline in socio-economic conditions and living standards during the 1970s. The same factors also go to explain why urban population growth was lower than had been anticipated. For instance, in 1969, about 7.8% of the total population were urban, and the corresponding figure for 1980 was 8.7%[2], giving an increase of about 0.9%.

With the capital city (i.e. Kampala) aside, the population in Uganda is predominantly rural. This does reflect, in particular, the status of the country's subsistence economy. Industrialisation - which has contributed a lot to urban growth, say, in the more developed countries - is still low in the country. For example, Uganda has only one main industrial town (i.e. Jinja). The latter accounts largely for the 19.7% urban population of Jinja District shown in Table 2.3 below. Nationwide, the urban population is dominated by Kampala and Jinja whose intercensal (i.e. 1969-1980) annual urban population growth rates were 3.2% (against a projected 8.0%) and -0.7% respectively.

Population densities are uneven throughout the country (Table 2.3). Other than Kampala and Jinja, wherein are the capital city and industrial town respectively, districts with high population densities (i.e. persons per square kilometre) include Mbale (219), Kabale (187), Tororo (147), Rukungiri (116), Bushenyi (103) and

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

[2] As above. (The figure shown in Table 2.3 is 8.0%. Attempts to have this discrepancy explained have so far been unsuccessful.)

Table 2.3 Uganda: District population (1969 & 1980), area, population density, intercensal annual growth rates (IAGRs), and urban population (in %).

| District | Population 1969 | Population 1980 | Area ($km^2$)* | Pop. density* | IAGRs (%) | Urban pop.* |
|---|---|---|---|---|---|---|
| Apac | 225 413 | 313 333 | 6502 | 48 | 3.1 | 0.5 |
| Arua | 369 620 | 472 283 | 7761 | 61 | 2.3 | 1.8 |
| Bundibugyo | 79 420 | 112 126 | 1880 | 60 | 3.4 | 3.8 |
| Bushenyi | 410 170 | 523 170 | 5079 | 103 | 2.4 | 0.8 |
| Gulu | 223 708 | 270 185 | 11 664 | 23 | 1.8 | 5.9 |
| Hoima | 189 057 | 294 221 | 8077 | 36 | 4.7 | 2.4 |
| Iganga | 470 189 | 643 801 | 8251 | 78 | 3.0 | 4.7 |
| Jinja | 196 262 | 228 520 | 730 | 313 | 1.5 | 19.7 |
| Kabale | 403 400 | 455 471 | 2430 | 187 | 1.2 | 5.6 |
| Kabarole | 327 962 | 520 141 | 8825 | 59 | 4.6 | 5.4 |
| Kampala+ | 351 796 | 476 895 | 176 | 2710 | 2.8 | 100.0 |
| Kamuli | 278 296 | 349 551 | 4350 | 80 | 2.3 | 1.6 |
| Kapchorwa | 64 461 | 74 517 | 1738 | 43 | 1.4 | 2.8 |
| Kasese | 164 132 | 277 708 | 3123 | 89 | 5.2 | 10.2 |
| Kitgum | 240 136 | 308 711 | 16 086 | 19 | 2.4 | 5.0 |
| Kotido | 105 576 | 161 445 | 13 274 | 12 | 4.2 | 2.0 |
| Kumi | 190 715 | 238 809 | 2861 | 83 | 2.1 | 0.7 |
| Lira | 278 902 | 370 252 | 7290 | 51 | 2.8 | 3.0 |
| Luwero | 315 204 | 412 474 | 9199 | 45 | 2.6 | 4.9 |
| Masaka | 458 024 | 631 156 | 11 727 | 54 | 3.0 | 6.1 |
| Masindi | 167 846 | 223 250 | 9078 | 25 | 2.8 | 2.7 |
| Mbale | 421 438 | 557 241 | 2547 | 219 | 2.8 | 5.6 |
| Mbarara | 450 462 | 687 803 | 11 121 | 62 | 4.2 | 3.5 |
| Moroto | 164 695 | 189 463 | 13 538 | 14 | 1.4 | 5.7 |
| Moyo | 89 978 | 106 492 | 5007 | 21 | 1.6 | 3.0 |
| Mpigi | 492 402 | 638 348 | 6326 | 101 | 2.6 | 5.3 |
| Mubende | 330 955 | 510 260 | 10 053 | 51 | 4.2 | 3.2 |
| Mukono | 541 016 | 634 255 | 8451 | 75 | 1.5 | 8.1 |
| Nebbi | 204 142 | 232 980 | 2891 | 81 | 1.3 | 1.5 |
| Rakai | 182 572 | 274 598 | 4266 | 64 | 4.0 | 1.5 |
| Rukungiri | 244 588 | 297 659 | 2567 | 116 | 1.9 | 2.1 |
| Soroti | 379 913 | 476 629 | 10 461 | 46 | 2.2 | 3.8 |
| Tororo | 572 090 | 668 334 | 4554 | 147 | 2.3 | 4.2 |
| UGANDA | 9 535 051 | 12 634 081 | 221 883 | 57 | 2.8 | 8.0 |

Notes: (1) Data for population and intercensal annual growth rates are derived from Background to the Budget 1983-1984, while the percentages for urban population have been obtained from Background to the Budget 1984-1985. (A population figure of 400 was used to designate a centre as urban.)

(2) District areas (in $km^2$) have been computed using constituency area figures from Report of the Electoral Commission 1980.

* Area, population density and urban population figures are for 1980.

\+ Kampala District includes Kampala City and Entebbe Township.

Mpigi (101). Generally speaking, these are some of the areas in the country which have relatively fertile soils and favourable climatic conditions (especially precipitation). Mbale District has a textile manufacturing plant (i.e. African Textile Mill), while Tororo District has one of the country's two cement works. Industrially, Kabale, Rukungiri and Bushenyi Districts are insignificant. Accordingly, their high population densities are almost entirely due to agriculture, as well as high birth rates. (Owing to its high altitude, Kabale District is generally malaria-free.)

On the other hand, there are some areas with very low population densities. Examples of these are Kotido (12), Moroto (14), Kitgum (19), Moyo (21) and Gulu (23). All of these districts are located in the northern half of the country where both climatic and edaphic conditions are less favourable compared to the southern half. In addition, nomadic pastoralism was until recently the mainstay of the population of Kotido and Moroto Districts (i.e. the former Karamoja District). Unlike its southern counterpart, northern Uganda is still poor in industrial development.

Internal movement of people from one area to another is common in Uganda. Basically, there are two types. Rural-urban migrations are partly responsible for the high populations of major urban centres, notably Kampala and Jinja. In these and a few other towns, paid employment opportunities are comparatively higher. Socio-cultural infrastructure in the urban centres is also generally more developed than in the countryside, thereby increasing the urban "pull" and rural "push" forces and subsequent effects upon both the towns and rural areas.

The second type of internal migration relates to people moving from densely populated, land-scarcity areas to places which are relatively sparsely populated. Kabale and, to some extent, Rukungiri Districts are examples of net emigration. Kabarole, Kasese and Masindi are some of the net immigration districts. For example, during the 1959-69 intercensal period, the then Bunyoro District (now subdivided into Hoima and Masindi Districts) experienced a 28% rural immigration[1]. Kasese and Masindi Districts are further advantaged by industrial employment provided by Lake Katwe Salt Factory and Hima Cement Factory (Kasese), and Kinyala Sugar Works (Masindi). (Since the late 1970s, the Lake Katwe Salt Project, which was not yet completed, has been beset by a number of problems - essentially of a technical and financial nature.)

It is worth noting that rural-rural migrations are also greatly affected by sociological factors. For instance, despite land shortages in Kabale District, it is near to impossible - at least in present-day Uganda - for someone from this district (in the south of the country) to migrate to and settle in Moroto District in northern Uganda. In terms of ethnicity, Moroto, like most of northern Uganda, is inhabited by Nilotic groups unlike Kabale and the rest of the southern half which are occupied mainly by Bantu-speaking tribes.

One further demographic factor concerns transnational migrations. Since the 1950s, Uganda has hosted refugees, especially from Rwanda, Zaire and Sudan. For instance, in 1969, Uganda had approximately

[1] UGANDA, 1978; Country Review Paper of Uganda; FAO, Rome.

750 000 African non-nationals, of whom 34% were Rwandese, 31% Zaireans, 10% Kenyans, 10% from Burundi, and 7% from Sudan[1]. Mbarara District has been the major recipient of Rwandese refugees, while Kasese District and others in the west have such refugees mainly from Zaire. (Refugees from Sudan have largely settled in northern Uganda.) As regards Ugandan refugees residing in foreign countries, they are mostly composed of the well-trained, professional manpower. They are to be found both within countries neighbouring on Uganda, especially Kenya, and in places as far away as United States of America and Papua New Guinea. Most of these have been forced out of their country for their political views - actual or otherwise. Sudan, in particular, is host to many refugees, mainly from northern Uganda. Since 1979, most of these have been victims of acts of revenge meted out on those classified as having been pro-Amin. (Idi Amin was head of the military government in Uganda from 1971 until its overthrow in 1979.)

These demographic phenomena are very crucial to the country's economy and welfare. High population growth rates engender considerable strain upon the country, both in terms of food supplies and revenue for provision of various services. Land shortages, as well as declines in soil fertility, easily erode the nation's economic mainstay (i.e. agriculture). At the same time, population distribution patterns have a lot of implication for socio-economic and development planning and management. While investment in various

[1] UGANDA, 1978; Country Review Paper of Uganda; FAO, Rome.

infrastructure and development projects should ideally be evenly distributed, this becomes unworkable - at least in the foreseeable future. Among other things, there is uneven distribution of actual and/or potential demand for a number of facilities and services.

Uneven distribution of paid employment, as well as aggregated socio-economic facilities and services, serves to strengthen the rural-urban dichotomy that exists at present. Migrations - be they rural-rural or rural-urban - are likely to destabilise population structures of both net emigration and immigration areas. Secondly, provision of housing, health and other necessary facilities and services is unlikely to match demand. Thirdly, present patterns of urban growth, if allowed to continue, will exacerbate the current rural-urban inequality. Fourthly, supplies of woodfuel largely depend upon land management practices. Demand for charcoal is greatest in the urban and periurban areas, while fuelwood remains the principal energy source for the rural population who make up over 90% of Uganda's total population. It is imperative that inventories and systematic studies be undertaken to determine the country's woodfuel potential, supply and demand trends in the sector, and their linkages with the aforementioned population aspects and overall economic growth.

## 2.3 Economic Activity

Because Uganda is basically agricultural, with over 90% of the people living in the countryside, it is directly reliant upon agriculture for a living. Most of this agriculture - for both food and cash crops - is of the peasant type. Of all the economically active population in

the country, over 80% are employed in agriculture (Table 2.4). As is shown in Table 2.4, this percentage has declined from 89.4% in

Table 2.4 Total population and economically active population ('000) engaged in agriculture in 1960, 1965, 1970 and 1975-1981.

| Year | Population | | Economically active population | | |
|---|---|---|---|---|---|
| | Total | Agric. | Total | In agric. | % in agric. |
| 1960 | 7551 | 6750 | 3366 | 3009 | 89.4 |
| 1965 | 8578 | 7520 | 3776 | 3310 | 87.7 |
| 1970 | 9806 | 8427 | 4262 | 3662 | 85.9 |
| 1975 | 11 337 | 9474 | 4792 | 4005 | 83.6 |
| 1976 | 11 701 | 9717 | 4915 | 4082 | 83.0 |
| 1977 | 12 062 | 9953 | 5035 | 4155 | 82.5 |
| 1978 | 12 406 | 10 170 | 5147 | 4219 | 82.0 |
| 1979 | 12 797 | 10 422 | 5277 | 4298 | 81.4 |
| 1980 | 13 201 | 10 678 | 5415 | 4380 | 80.9 |
| 1981 | 13 620 | 10 933 | 5558 | 4461 | 80.3 |

Source: FAO Production Yearbook Vols. 29(1975), 30(1976), 33(1979) and 35(1981).

Note: Population figures, e.g. for 1980, do not agree with those appearing elsewhere in the text. Some of the data used by FAO were presumably estimates.

1960 to 80.3% in 1981. And, although this trend is expected to continue as the manufacturing sector, in particular, recovers from the ups and downs it underwent in the 1970s, agriculture will remain the leading employer in the country for many years to come.

Coffee, cotton, tea and tobacco are the major export crops, while

food crops include plantains, maize and sweet potatoes (Table 2.5). For the cash crop sector, in particular, production declined from 1973 until the close of the 1970s. For example, coffee exports[1] in 1973 reached a record level of 212 600 tonnes, but, thereafter, this level was not maintained, and, in 1979, the figure was down to 103 000 tonnes (Table 2.5). Comparatively speaking, 'food' crop production performed well. The latter must be understood in terms of the cash these 'food' crops fetched. Without exception, all the 'food' crops listed in Table 2.5 (and others not mentioned) became major sources of cash. Unlike such perennial-cum-export crops as coffee and tea, they (i.e. 'food' crops) require less man-days to produce. Since they are annual, they were easy to rotate (where applicable), while their marketing was hardly formalised. In particular, the latter, despite occasional problems from crafty buyers, guaranteed ready cash to the growers. (Almost always, these buyers - sometimes also referred to as traders - employed grassroot-level middlemen who did the actual buying of the crops. The grower rarely incurred transportation costs. This was a significant incentive which, in the case of traditionally cash-cum-export crops sold officially, was lost through individual peasant growers having to transport their produce to designated collecting centres.)

In 1983, Uganda was estimated to have 15.5 million poultry birds, 5 million cattle, 2 million goats, 1 million sheep and 250 000 pigs[2]. As regards fishing, the industry is mainly geared towards

[1] Despite their usefulness, these coffee export statistics can be misleading. According to some unofficial sources, smuggling of coffee from Uganda became a lucrative, albeit risky, business during the 1970s (and even beyond). Thus, one can expect actual coffee production to have been more than what was purchased and exported through official channels.

[2] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

Table 2.5 Uganda: Production of major crops for 1972 to 1983 (in '000 tonnes)*

| Item | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Export Crops | | | | | | | | | | | | |
| Coffee | 183.7 | 212.6 | 199.1 | 199.1 | 137.1 | 155.9 | 121.3 | 103.0 | 135.2 | 97.5 | 166.6 | 157.4 |
| Cotton lint+ | 76.0 | 79.4 | 50.0 | 31.9 | 24.7 | 13.8 | 20.2 | 7.6 | 6.1 | 4.1 | 5.1 | 9.7 |
| Tobacco | 5.0 | 3.9 | 3.2 | 4.0 | 3.7 | 2.5 | 1.4 | 0.8 | 0.4 | 0.1 | 0.6 | 1.6 |
| Tea | 23.4 | 22.0 | 22.0 | 18.4 | 15.4 | 15.2 | 11.0 | 1.8 | 1.5 | 1.7 | 2.6 | 3.1 |
| Sugar (Raw) | 121.4 | 68.6 | 40.5 | 23.9 | 18.2 | 11.4 | 7.9 | 5.3 | 4.3 | 3.8 | 3.3 | 2.8 |
| Food Crops | | | | | | | | | | | | |
| Plantains | 7634 | 8126 | 8879 | 9106 | 8137 | 8531 | 8844 | 6090 | 5699 | 5900 | 6595 | 6875 |
| Cassava | 2650 | 2132 | 2350 | 2992 | 2838 | 2993 | 2028 | 2110 | 2072 | 3000 | 3127 | 3800 |
| Maize | 500 | 419 | 430 | 570 | 674 | 566 | 594 | 353 | 286 | 342 | 401 | 450 |
| Sorghum | 419 | 389 | 345 | 467 | 390 | 344 | 350 | 316 | 299 | 320 | 358 | 470 |
| Beans | 237 | 170 | 196 | 325 | 337 | 253 | 291 | 182 | 186 | 240 | 300 | 238.3 |
| Groundnuts | 234 | 212 | 200 | 194 | 177 | 193 | 187 | 80 | 65 | 80 | 90 | |
| Finger millet | 594 | 643 | 591 | 682 | 576 | 578 | 561 | 481 | 458 | 480 | 528 | 600 |
| Sweet potatoes | 1224 | 1232 | 1786 | 1953 | 2002 | 1658 | 1688 | 1272 | 1200 | 1300 | 1487 | 1700 |

* Figures for food crops are estimates of total production, while figures for export crops are of official purchases only.

+ Figures for crop year ending in September of the year shown.

Sources: 1. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

2. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1984; Background to the Budget 1984-1985; Government Printer, Entebbe.

meeting domestic demand. On the side of mining, the country has deposits of tin, wolfram, tungsten and others, but it is copper that was significant until it, too, was beset by, among other things, the country's economic ills of the 1970s. The manufacturing sector also has not remained immune to the country's political and economic traumas experienced since the early 1970s.

In 1972, the then military government launched an 'Economic War' which resulted in many Asians, including those having Ugandan citizenship, being dispossessed of their commercial and industrial firms. Among other things, the majority of those who became the new owners of such enterprises lacked the necessary know-how (and selfless interest) and/or capital to keep these firms in full operation. Hitherto, the manufacturing sector, in particular, had been dominated by Asians, and their exodus in 1972-73 and its negative effects, coupled with inflation in the wake of the 1973 oil crisis, resulted in steady declines in domestically manufactured products. Simultaneously, prices of imported items kept on the upward move. One corollary of this was a high cost of living. Consequently, wages/salaries soon failed to satisfy even half of an individual's requirements - more so for the urbanites than the rural population. (Nearly all the rural population grow their own food and, as such, their monetary expenditure on basic family needs is greatly reduced.) In response to the rising cost of living, many urban workers engaged in two or three (and sometimes four) jobs to supplement the wages/salaries forthcoming from their officially recognised employment.

To this day, urban workers, especially, still battle against a high cost of living. Since 1981, public servants have been awarded more than two wage/salary increments, the most recent being in June 1984.

Following this latest revision, the new salary scales for public servants are as shown in Table 2.6 below. However, these still fall

Table 2.6 Salary scales for public servants in Uganda as of July 1984.

| Scale | Gross Annual Salary | | | |
|---|---|---|---|---|
| | Uganda Shillings | | US$ | |
| | Minimum | Maximum | Minimum | Maximum |
| U1 | 889 056.00 | 1 096 416.00 | 2540.00 | 3133.00 |
| U2 | 634 171.00 | 668 736.00 | 1812.00 | 1911.00 |
| U3 | 488 592.00 | 600 696.00 | 1396.00 | 1716.00 |
| U4-3 | 306 180.00 | 600 696.00 | 875.00 | 1716.00 |
| U4 | 306 180.00 | 417 420.00 | 875.00 | 1193.00 |
| U5-3 | 245 700.00 | 600 696.00 | 702.00 | 1716.00 |
| U5-4 | 245 700.00 | 417 420.00 | 702.00 | 1193.00 |
| U5 | 245 700.00 | 314 820.00 | 702.00 | 900.00 |
| U6 | 164 592.00 | 213 152.00 | 470.00 | 609.00 |
| U7 | 131 760.00 | 172 368.00 | 377.00 | 493.00 |
| U8 | 88 074.00 | 122 095.00 | 252.00 | 349.00 |

Source: Uganda Times, 1 July 1984. (This data was part of an advertisement for vacancies by the Public Service Commission, Uganda.)

Notes: 1. Salary scale U1 is fixed, while all the others are basic.
2. The exchange rate used for purposes of this thesis is US$1.00 = Ug. Shs 350.00.

far below what the majority of workers spend on basic family requirements. For instance, for a Kampala City-based family of two working parents - with the salary of the husband falling in U4 and that of the wife in U5 scales - two pre-school children and one housegirl (i.e. a domestic servant receiving a wage), its monthly expenditure

can hardly be less than Uganda Shs 70 475.00 or US$ 201.43 (Table 2.7 below). And, yet, the total of their basic monthly earnings falls within the range of Uganda Shs 45 990.00 to 61 020.00 (i.e. US$ 131.40 to 174.30).

Table 2.7 Estimates of minimum monthly expenditure[a]* by a family[b] in Kampala City (Uganda), July 1984.

| Item | Quantity | Price[c] | |
|---|---|---|---|
| | | Ug. Shs | US$[d] |
| House rent[e] | | 15 000.00 | 43.00 |
| Transport by taxi[f] for two | | 6440.00 | 18.00 |
| Wage to housegirl | | 4000.00[g] | 11.40[g] |
| Food | | | |
| Bananas | 6 bunches | 4500.00 | 13.00 |
| Sweet potatoes | 20 kgs | 4000.00 | 11.00 |
| Irish potatoes | 20 kgs | 2000.00 | 6.00 |
| Beans (dry) | 3 kgs | 450.00 | 1.30 |
| Meat | 8 kgs | 4000.00 | 11.00 |
| Medium-sized fish | 12 | 4200.00 | 12.00 |
| Eggs | 2 trays | 3000.00 | 9.00 |
| Rice | 4 kgs | 1200.00 | 3.00 |
| Sugar | 6 kgs | 2100.00 | 6.00 |
| Salt | 1½ kgs | 225.00 | 0.65 |
| Milk | 30 litres | 3900.00 | 11.00 |
| Maize meal | 3 kgs | 450.00 | 1.30 |
| Tomatoes | 5 kgs | 1000.00 | 3.00 |
| Onions | 5 kgs | 1000.00 | 3.00 |
| Cabbage | 4 kgs | 400.00 | 1.20 |
| Oranges | 6 kgs | 900.00 | 2.60 |
| Coffee (500 gm) | 1 pkt | 500.00 | 1.40 |
| Tea (500 gm) | 1 pkt | 850.00 | 2.40 |
| Bread (680 gm) | 30 loaves | 6000.00 | 17.00 |
| Margarine | 1 kg | 200.00 | 0.60 |
| Cooking oil | 2 litres | 2000.00 | 6.00 |
| Others | | | |
| Charcoal | 2 bags | 1800.00[h] | 5.15[h] |
| Electricity | 300 KWh | 360.00[i] | 1.03[i] |
| TOTAL | | 70 475.00 | 201.43 |

* For footnotes, see next page.

Notes for Table 2.7

[a] These estimates do not include taxes (e.g. graduated tax which is usually deducted from an employee's wage/salary in four monthly instalments, i.e. from January to April annually). Nor are such items as clothing, entertainment, incidentals, etc. covered.

[b] This is a family of two working parents, two pre-school children, and a housegirl. Both parents are employed in the public service, with the husband's monthly basic salary falling in U4 scale (i.e. Uganda Shs 25 515.00 - 34 785.00 or US$ 72.90 - 99.40) and that of the wife in U5 scale (i.e. Uganda Shs 20 475.00 - 26 235.00 or US$ 58.50 - 75.00). (These salaries are gross and based on Table 2.6 above.)

[c] These prices are based on data from the Uganda Commercial Bank Quarterly Economic Review 2(2), April-June 1984. This review was made prior to the recent wage/salary increments announced in June 1984. It is likely that these prices went up after that.

[d] A rate of US$ 1.00 = Ug. Shs 350.00 has been used.

[e] This is rent for a two-bedroomed, self-contained but unfurnished flat. Government employees are entitled to consideration for pool (i.e. government) houses/flats (or housing subsidies). However, there is now a serious shortage of such accommodation, largely due to (i) a slow growth of the housing industry since the 1970s, and (ii) some government houses/flats being occupied by non-government employees whose eviction from such premises is complicated by their close links with influential political and/or other personalities. (A government employee refers to anybody employed with either the Uganda Public Service or Uganda Teaching Service.)

[f] The Uganda Transport Corporation (UTC) owns a fleet of buses for both city and upcountry public transport. But, since the early 1970s, UTC bus services have generally been inadequate. Instead, taxis have played a very important role, particularly in the major urban areas. These taxis range from 5-seater saloons (or sedans) to 25-seater mini-buses, are owned by individuals and/or cooperative societies, and usually have fixed routes on which they operate. (The Ugandan equivalent of an Australian taxi/cab is called a 'special hire' vehicle.)

[g] Although the minimum wage even for domestic servants (e.g. housegirls) should be 6000.00 a month (i.e. as from 1 July 1984), the actual amount paid to them is very often determined by the employer (e.g. husband and/or wife for whom they are to work) and revised upwards according to the employer's financial status or work performance by the employee(s).

[h] The cost of a bag of charcoal has been put at Ug. Shs 900.00 (i.e. about US$ 2.60).

[i] Each KWh has been estimated at Ug. Shs 1.20.

It is such imbalance between income and expenditure which significantly underlies the practice of many public servants seeking and/or having more than one job at any given time. To a great extent, the benefits (e.g. untaxed income) accruing to the individuals in question have very often been realised at the expense of reduced working hours, say, in government offices. While any government will seek to curb such practices, the realities appear set to frustrate the effort. Thus, continued rises in living costs, though often unavoidable, are bound to sustain the existence of this phenomenon. More especially, the type and quantity of household energy a family is to use will continue to fluctuate in accordance with the ups and downs in its (i.e. family) income.

## 2.4 Land Ownership and Use

In 1975, the then military regime passed a Land Reform Decree, declaring all land in Uganda public and under the administration of the Uganda Land Commission, assisted by District Land Committees[1]. Until that date, there were three broad categories of land in the country[2]. Firstly, individuals, companies and public bodies held land in registered freehold. The second category was that of land which included National Parks, Game Reserves and Forest Reserves. The Uganda Land Commission held this land in freehold on behalf of the government. Lastly, all land not falling under the foregoing categories was public land. All vacant land and any held under either

[1] UGANDA, 1978; Country Review Paper of Uganda; FAO, Rome.
[2] As above.

customary tenure or leases was included within this last category. Despite the 1975 Decree, and not withstanding the country's land laws[1] which give every Ugandan the right to land, it is noteworthy that individual landowners remain the sole decision-makers regarding the use to which their land is to be put.

As mentioned in the preceding section, Uganda's economy is based on agriculture to meet both domestic food and industrial, as well as export, requirements. Coffee, which accounts for about 97% of total export revenue nowadays, is mainly grown in the central region, as well as in the districts of Mbale, Masaka, and Mbarara. Tobacco is cultivated in Arua and Kabale Districts. Across the country, the cultivated area, as well as that under permanent crops, has increased during the period 1961-65 to 1980 (Table 2.8). For example, 992 000 ha were under permanent crops in 1965, and, as is shown in Table 2.8 below, the acreage remained on the increase and, in 1980, was estimated at 1 600 000 ha. Although the area under permanent pasture is not clearly known, it is possible that there have been slight decreases and/or increases. This is explained - at least in part - by factors relating to trends in the size of livestock numbers, land clearance for crop cultivation, establishment of new grazing areas (largely on private basis), changes in climate, and internal migration of the human population.

Forests are a major supplier of, among other things, energy, construction and industrial materials. They cover nearly 12% of the land area[2], and forest land includes woodlands, gazetted forests

[1] UGANDA, 1966; Laws of Uganda VI; Government Printer, Entebbe.
[2] UGANDA, 1978; Country Review Paper of Uganda; FAO, Rome.

Table 2.8 Uganda: Land use ('000 ha), 1961-65 to 1980

| Year | Total area | Land area | Arable and permanent crops | Arable land | Permanent crops | Permanent pasture | Forest and woodland | Other land |
|---|---|---|---|---|---|---|---|---|
| 1961 to 1965 | 23604 | 19971 | 4427 | 3434 | 992 | 5000* | 7560F | 2984 |
| 1966 | 23604 | 19971 | 4885 | 3776 | 1109 | 5000* | 6000F | 4086 |
| 1967 | 23604 | 19971 | 4888 | 3772 | 1116 | 5000* | 5500F | 4583 |
| 1968 | 23604 | 19971 | 4925F | 3780F | 1145F | 5000* | 5000F | 5046 |
| 1969 | 23604 | 19365 | 4890F | 3780F | 1110F | 5000* | 4500F | 9214 |
| 1970 | 23604 | 19971 | 4980F | 3780F | 1200F | 5000* | 4000F | 5991 |
| 1971 | 23604 | 19971 | 5030F | 3800F | 1230F | 5000* | 3500F | 6441 |
| 1972 | 23604 | 19971 | 5100F | 3850F | 1250F | 5000* | 2759 | 7112 |
| 1973 | 23604 | 19971 | 5180F | 3900F | 1280 | 5000* | 2759* | 7032 |
| 1974 | 23604 | 19971 | 5264F | 3950F | 1314 | 5000* | 6305* | 3402 |
| 1975 | 23604 | 19971 | 5251F | 3900F | 1351 | 5000* | 2759* | 6961 |
| 1976 | 23604 | 19971 | 5030F | 4000F | 1380F | 5000* | 2759* | 6832 |
| 1977 | 23604 | 19971 | 5538 | 4023 | 1515 | 5000* | 2759* | 6674 |
| 1978 | 23604 | 19971 | 5610F | 4080F | 1530F | 5000* | 2759* | 6602 |
| 1980 | 23604 | 19971 | 5680F | 4080F | 1600F | 5000* | 6060* | 3231 |

F = FAO estimate.

* = Unofficial figure.

Sources: FAO Production Yearbook Vols. 29(1975), 30(1976), 31(1977), 32(1978), 33(1979), and 35(1981).

Note: Data for 1979 could not be obtained.

and forest reserves (Table 2.9 below). But some of the forest land

Table 2.9 Classification of forest land
(area in $km^2$)

| | |
|---|---|
| Forest and woodland 10% cover or more | 19 243 |
| Gazetted forest land | 14 812 |
| Forest reserves for production | 5946 |
| Forest reserves for protection | 5168 |
| Forest reserves for fuel | 3482 |
| Open grass or bare rocks | 301 |

Source: UGANDA FOREST DEPARTMENT, 1983; Uganda Forest Department National Progress Report for African Forestry Commission Sixth Session, Arusha, Tanzania.

is protected, and, as is shown in Table 2.9 above, the total area so affected is 5168 $km^2$. Of the 961 900 ha of productive forests, natural forests cover nearly 576 200 ha and account for over 80% of Uganda's industrial needs[1]. Forest plantations cover about 31 290 ha, with 1477 ha of it being privately owned by individuals, companies and cooperative societies[2]. These forest plantations do provide for both domestic and industrial use. On the whole, forest estates cover only a small area (Table 2.10). This is particularly so

[1] UGANDA FOREST DEPARTMENT, 1983; Uganda Forest Department National Progress Report for African Forestry Commission Sixth Session, Arusha, Tanzania.

[2] As above.

Table 2.10 Area of forest estate as at December 1982

| | ('000 ha) |
|---|---|
| Total area of land covered by forest | 1924 |
| Gazetted forest reserves | 1481 |
| Forest area set aside for production | 595 |
| Forest area set aside for protection | 517 |
| Forest area set aside for woodfuel and building poles | n.a |
| Grassland and bare rock within gazetted forest land | 30 |

Source: UGANDA FOREST DEPARTMENT, 1983; Uganda Forest Department National Progress Report fcr African Forestry Commission Sixth Session, Arusha, Tanzania.

n.a = no figures are available within the source of these statistics.

for woodfuel production which is currently dominated by non-forest plantation sources (Table 2.11 below).

Table 2.11 Forest production and processing 1982

| | ('000 $m^3$) |
|---|---|
| Fuelwood from plantation* | 130 |
| Fuelwood from indigenous forests** | 75 600 |
| Charcoal (metric tonnes) | 35 |
| Saw logs ($m^3$) indigenous | 66 |

*Stacked and not true volume.
**Estimated from population census.

Source: UGANDA FOREST DEPARTMENT, 1983; Uganda Forest Department National Progress Report for African Forestry Commission Sixth Session, Arusha, Tanzania.

It can be said, therefore, that, owing to its landlocked nature, Uganda must continue to rely heavily upon such countries as Kenya (to the east) for both exports (e.g. coffee) and imports (e.g. petroleum products). The rapid population growth rate in the country is one major promoter of land clearance which, whatever its merits, is a serious threat to agriculture, forestry and the like. A desirable nationwide socio-economic development involves many considerations. Raising the status of the manufacturing sector, for instance, will require more resource inputs, including energy. Improving the living standards countrywide, too, is inextricably dependent upon adequate supplies and consumption of energy, especially fuelwood. But, before any suggestions can be made towards improving the fuelwood situation, in particular, it is necessary to look at the energy industry - at the national level - in terms of its past and present. This theme is dealt with in the following two chapters.

# CHAPTER THREE

## ENERGY CONSUMPTION AND SUPPLY IN UGANDA

Hitherto, Uganda's energy industry has been dominated by woodfuel (i.e. fuelwood and charcoal), electricity and petroleum, and this is unlikely to change in the near future. All petroleum requirements are imported, thus constituting a significant, albeit inevitable, drain on the revenue earned from agricultural exports and the like. Electricity supply is likely to be stepped up following the construction and completion of another hydroelectric power station. However, the electricity-using population will not increase sharply since its household use among the rural peasants is constrained by both physical and financial factors. Consequently, the present-day high rural consumption of fuelwood, in particular, is expected to rise further, but, already, many places nationwide are experiencing an increasing disequilibrium between fuelwood demand and supply. This chapter, therefore, discusses energy consumption and supply in Uganda, as well as spelling out the role played by each of the three primary energy types.

Inventorying of both energy use and supply in Uganda is still inadequate. However, since it is demand - actual or potential - for energy that significantly determines its (i.e. energy) supply, most of the focus will be on energy consumption. Furthermore, any statistics available on energy use, except in the case of electricity and charcoal, can serve as indicators to what the supply situation might be.

### 3.1 Energy Consumption

Woodfuel has been and still is the leading energy type used in Uganda. For instance, in 1980, it accounted for approximately 95% of the total

energy consumed countrywide (Table 3.1 below), with petroleum and

Table 3.1 Actual total energy consumption in Uganda, 1980.

| Energy type | '000 TOE* | % of total energy consumption |
|---|---|---|
| Woodfuel | 4222 | 94.76 |
| Gasoline | 89 | 2.00 |
| Auto diesel | 58 | 1.30 |
| Kerosene | 29 | 0.65 |
| Fuel oil | 22 | 0.50 |
| Electricity | 20 | 0.45 |
| Aviation fuel | 13 | 0.30 |
| Industrial diesel | 1 | 0.02 |
| L.P Gas | 1 | 0.02 |
| TOTAL | 4455 | 100.00 |

*The data has been obtained from Table A2.3 of UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

electricity ranking second and third respectively. This order remained unchanged in the years that followed. In 1982, for example, woodfuel increased its share of the total energy used to nearly 96% (Table 3.2 below).

Throughout Uganda, the energy consumed is predominantly non-commercial[1]. For instance, in 1970 alone, total energy consumption amounted to about

[1] Non-commercial energy refers to energy types in whose supply or consumption money is almost excluded. In the Ugandan case, for instance, most of the fuelwood used by the rural population is procured freely (i.e. in monetary terms). Commercial energy, on the other hand, relates to those kinds of energy whose transactions involve money. These include petroleum products, electricity, most of the charcoal, and some fuelwood.

Table 3.2 Total energy consumption estimates for Uganda, 1982.

| Energy type | '000 TOE* | % of total energy consumption |
|---|---|---|
| Woodfuel | 4379 | 96.03 |
| Auto diesel | 49 | 1.07 |
| Gasoline | 45 | 0.99 |
| Kerosene | 29 | 0.64 |
| Electricity | 24 | 0.53 |
| Aviation fuel | 17 | 0.37 |
| Fuel oil | 15 | 0.33 |
| Industrial diesel | 1 | 0.02 |
| L.P Gas | 1 | 0.02 |
| TOTAL | 4560 | 100.00 |

*The data is derived from Table A2.3 of UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

4.2 m TOE (i.e. tonnes of oil equivalent), with approximately 3.1 m TOE of it being non-commercial[1]. Given that total energy consumption in 1980 was nearly 4.5 m TOE (Table 3.1), there had been an increase of about 0.3 m TOE from 1970 to 1980, while, between 1980 and 1982, consumption rose by about 0.1 m TOE (or 2.4%[2]).

Per capita commercial energy consumption in Uganda is low, averaging 0.35 TOE in 1980[3]. This is attributable to such factors as the high status of the non-commercial energy sector, low national per capita income, and, especially since the beginning of the 1970s, a negative

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

[2] UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

[3] As above.

growth experienced in the economy as a whole and the commercial energy-using sectors (e.g. transport and industry) in particular (see also Chapter Four). In addition, the household sector dominates consumption of both commercial and non-commercial energy. For example, in 1980 (Table 3.3 below), approximately 80% of the total energy and 37% of all the commercial energy - i.e. about 3.6 m and 0.3 m TOE respectively - were used by households. Most of this household energy is non-commercial fuelwood which, in 1970, for instance, made up 83% of the 3.1 m TOE of non-commercial energy consumed then[1] and will undoubtedly continue to figure significantly in the foreseeable future.

### 3.1.1 Petroleum Fuels

As is shown in Table 3.3 below, transport is the sole domestic consumer of such petroleum products as aviation fuel, gasoline and auto diesel. Industrial diesel and fuel oil are used in industry, while, with exports aside, all the kerosene consumed is accounted for by the household sector.

#### a) Transport

This sector is still poorly developed, and major roads - both paved and all-weather - are unevenly distributed nationwide (Figure 3.1). Urban areas (e.g. Kampala City and Jinja Industrial Town), despite the negative effects of the socio-economic traumas of the 1970s, are better supplied - both in terms of road connections and number of motor vehicles - than the rural side. For instance, it is likely that, of the 23 602

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

Table 3.3 Estimated energy consumption by type and end-use, 1980
(in '000 TOE)

| Energy type | Households | Commerce | Industry | Transport | Total Ugandan consumption | Exports |
|---|---|---|---|---|---|---|
| Commercial Energy | 295 | 167 | 172 | 160 | 794 | 57 |
| Aviation fuel | - | - | - | 13 | 13 | - |
| Gasoline | - | - | - | 89 | 89 | - |
| Kerosene | 29 | - | - | - | 29 | 19* |
| Auto diesel | - | - | - | 58 | 58 | 14 |
| Industrial diesel | - | - | 1 | - | 1 | - |
| Fuel oil | - | - | 22 | - | 22 | - |
| L.P Gas | 1 | - | - | - | 1 | - |
| Electricity (hydro & thermal) | 7 | 6 | 8 | - | 21 | 24 |
| Fuelwood | 146 | 96 | 141 | - | 383 | - |
| Charcoal | 112 | 65 | - | - | 177 | - |
| Non-commercial Energy | | | | | | |
| Fuelwood | 3267 | 351 | 44 | - | 3662 | - |
| TOTAL | 3562 | 518 | 216 | 160 | 4456 | 57 |

*Includes illegal smuggling.

Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

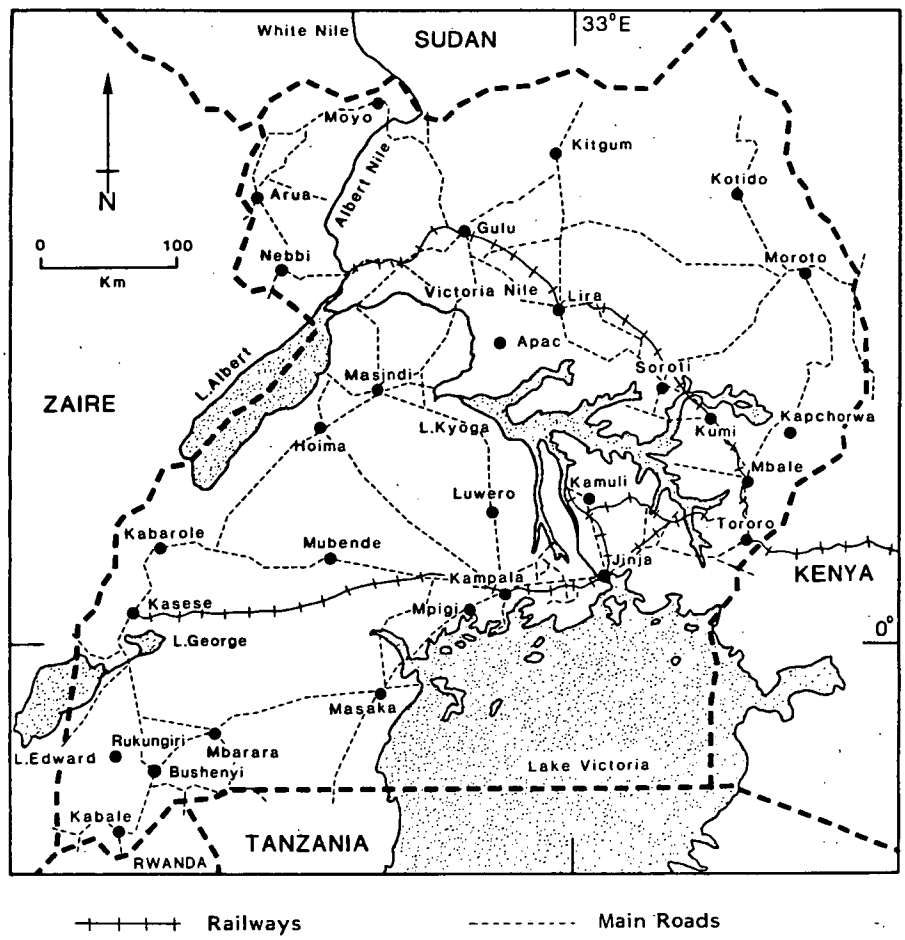


Figure 3.1 Map of Uganda showing the main roads, railways, and district headquarters. (This map is based on Map IBRD 16933R supplied by the World Bank.)

private motor vehicles expected to have been on the road in Uganda in 1983[1], about half of them were in the urban centres. On the other hand, railway connections are also few (Figure 3.1 above), while water transport is minimal and largely confined to the few navigable waterways in

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1984; Background to the Budget 1984-1985; Government Printer, Entebbe.

the country. Likewise, air transport is less important domestically.

Kampala City dominates urban petroleum consumption by the transport sector. This high demand is so owing to its (i.e. Kampala City) high urbanisation, as well as its role as the national administrative and commercial capital. Prices of petroleum products are low in Kampala compared to other areas. Countrywide, however, these prices have been on the rise, particularly since the start of the 1980s (Table 3.4). In part, this is a result of the government having lifted subsidies on domestic petroleum prices.

b) Industry

Industrial development in Uganda is dominated by the manufacturing sector whose products are largely consumed within the country. Examples of domestically manufactured items include textiles, sugar, beverages and footwear. Partly owing to the political and economic downturn Uganda has passed through in recent years, industry remains poorly developed and heavily centred in Jinja Town and, to some extent, Kampala City. It is expected that consumption of industrial diesel, fuel oil and other energy types, which is low at present, will rise in line with future growth in this economic sector.

c) Households

As is shown in Table 3.3, nearly 29 000 TOE of kerosene were consumed by the household sector in 1980. Most of this kerosene is used for lighting, particularly in the countryside where, in the majority of cases, household fuels are only two (i.e. kerosene and fuelwood). Within the urban centres, however, many low-income residents use

Table 3.4 Retail prices of petroleum products in Kampala, Uganda
(in Uganda Shs/litre at end of year)

| Fuel item | 1972 | 1975 | 1979 | 1980 | 1981 | 1982 | 1983 |
|---|---|---|---|---|---|---|---|
| Aviation fuel | n.a | 1.20 | 2.50 | 4.30 | 24.30 | 70.00 | n.a |
| Gasoline | | | | | | | |
| Premium | 1.42 | 2.60 | 7.38 | 7.44 | 85.00 | 150.00 | 190.00 |
| Regular | 1.32 | 2.50 | 7.14 | 7.21 | 80.00 | 140.00 | 180.00 |
| Auto diesel | 1.16 | 2.09 | 4.26 | 4.30 | 50.00 | 90.00 | 150.00 |
| Industrial diesel | n.a | 1.00 | 2.20 | 4.00 | 24.60 | n.a | n.a |
| Fuel oil | n.a | 0.80 | 1.70 | 3.40 | 21.60 | 50.00 | n.a |
| Kerosene | 0.79 | 1.42 | 3.38 | 3.78 | 30.60 | 80.00 | 150.00 |
| L.P Gas (Ug. Shs/kg) | n.a | 2.70 | 8.40 | 10.60 | 63.70 | n.a | n.a |

n.a = not available

Sources: 1. UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.
2. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.
3. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1984; Background to the Budget 1984-1985; Government Printer, Entebbe.

kerosene for both lighting and cooking. Since most of the country is still faced with a limited household energy base, kerosene use, especially for household lighting, should continue to rise as the population grows and the country experiences a sustained economic growth. But, especially for a good many low-income rural dwellers, one cannot dismiss the possibility that the ever-rising kerosene prices will remain a decisive factor regarding how much kerosene they are able to buy, and therefore use, at any given time.

With regard to household use of Liquid Petroleum (L.P) Gas, nearly all of it is accounted for by urban households, but, with more availability of reasonably priced electricity especially, its consumption is unlikely to witness a significant increase in the near future.

### 3.1.2 Electricity

This energy type accounts for about 4% of all the commercial energy consumption in the country, and, around the end of 1981, 71% of the 93 156 electricity connections nationwide were for domestic consumers[1]. (Estimates for 1983 put the electricity-using population in Uganda at 5 million[2].) Nearly all the electricity consumed is accounted for by three sectors (i.e. industry, households and commerce). But even then, the amount consumed by each of these is not substantial. For example, in 1980, about 8000 and 6000 TOE were used in industry and commerce respectively (Table 3.3). These two statistics reflect the low status

[1] UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

[2] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

of industry and commerce versus the dominant subsistence economy in Uganda. And, as for electricity use in households, limited electrification of the rural areas, in particular, is one reason why there is a high urban versus low rural household electricity consumption.

### 3.1.3 Woodfuel

An average Ugandan family (i.e. six persons) uses approximately 6 $m^3$ of woodfuel a year on cooking alone[1]. On the basis of the 1980 total population of about 12.6 million (Table 2.3), Uganda had nearly 2.1 million families, with a total of about 12.6 million cubic metres of woodfuel spent on cooking. As is the case with woodfuel supply (Section 3.2.3 below), the non-commercial sector - especially fuelwood - makes up the bulk of all the woodfuel consumed. For instance, nearly 3.7 m TOE of non-commercial fuelwood were consumed in Uganda in 1980 (Table 3.3). During the same year, total consumption of commercial woodfuel amounted to nearly 0.6 m TOE (Table 3.3). This implies that total consumption of non-commercial woodfuel in 1980 was approximately six times higher than commercial woodfuel use. And, as is already shown in Table 3.3, the household sector dominated consumption of both commercial and non-commercial charcoal and fuelwood.

#### a) Charcoal

Urbanites, together with commerce and industry, are the principal charcoal consumers in Uganda (Table 3.5 below). In particular,

[1] UGANDA FOREST DEPARTMENT, 1983; Uganda Forest Department National Progress Report for African Forestry Commission Sixth Session, Arusha, Tanzania.

Table 3.5 Estimated charcoal consumption in Uganda

| | '000 tons | | | | | '000 TOE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1965 | 1970 | 1975 | 1980 | 1982 | 1965 | 1970 | 1975 | 1980 | 1982 |
| Urban Commercial | 22 | 62 | 134 | 198 | 205 | 17 | 48 | 104 | 153 | 158 |
| Households | 14 | 40 | 85 | 126 | 130 | 11 | 31 | 66 | 97 | 100 |
| Commerce | 8 | 22 | 49 | 72 | 75 | 6 | 17 | 38 | 56 | 58 |
| Industry | - | - | - | - | - | - | - | - | - | - |
| Rural Commercial* | 25 | 31 | 38 | 32 | 33 | 19 | 24 | 29 | 24 | 25 |
| Households | 4 | 6 | 12 | 20 | 20 | 3 | 5 | 9 | 15 | 15 |
| Commerce | 7 | 8 | 10 | 12 | 13 | 5 | 6 | 8 | 9 | 10 |
| Industry | 14 | 17 | 16 | - | - | 11 | 13 | 12 | - | - |
| Total End-use | 47 | 93 | 172 | 230 | 238 | 36 | 72 | 133 | 177 | 183 |
| Households | 18 | 46 | 97 | 146 | 150 | 14 | 36 | 75 | 112 | 115 |
| Commerce | 15 | 30 | 59 | 84 | 88 | 11 | 23 | 46 | 65 | 68 |
| Industry | 14 | 17 | 16 | - | - | 11 | 13 | 12 | - | - |

*Includes some charcoal used for non-commercial purposes.

Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

charcoal use by urban households has been rising steadily, while, owing to their traditionally low contribution to the Ugandan economy, compounded by domestic political and economic instability experienced since the 1970s, commerce and industry have not yet witnessed a significant growth in their charcoal use. However, it is hoped that, with the recovery in the national economy since the beginning of the 1980s, charcoal consumption by both sectors will rise.

It is estimated that about four tonnes of wood are required to produce one tonne of charcoal[1]. However, the end product (i.e. charcoal) has certain advantages. For example, it has a higher energy content per unit of weight than fuelwood. Secondly, it is less bulky to transport and more convenient to use and store. The factor of transportation costs becomes particularly significant once fuelwood's economic distance is exceeded, while convenience of storage is noteworthy given that not all urban housing units - especially flats - have adequate room for storing such bulky items as fuelwood. In addition, a charcoal stove, commonly known as sigiri in Uganda, is easy to light, use and store, while, at present, fuelwood can only be used where it is possible to make an open fire.

Charcoal use in the countryside is very limited. This is explained by two major factors. The extent of industry and commerce in the rural side is low, while, and more significantly, fuelwood remains the dominant energy type used for nearly all household and many related purposes.

[1] EARL, D.E., 1975; Forest Energy and Economic Development; Oxford University Press, Oxford.

b) Fuelwood

Per capita fuelwood consumption in Uganda has been put at two cubic metres[1], and, nationwide, cooking accounts for the greatest energy concentration found in the household sector. Space-heating, which is important in cold areas (e.g. Europe), is minimal in Uganda and tends to be associated with the wet season and/or homes wherein old people live.

Owing to limited availability of energy substitutes in rural Uganda, fuelwood is of crucial importance and, among other things, its consumption will keep on rising with increases in population. For instance, it is estimated that in 1965, households used approximately 3.0 m TOE of fuelwood (Table 3.6 below), and, despite the fact that the second half of the 1970s saw an intensification of the socio-economic downturn in the country, fuelwood consumption by the rural household, commercial and industrial sectors maintained a positive growth. Thus, as of 1980, nearly 3.4 m TOE of fuelwood were consumed by the rural households, implying a rise of more than 3% over the 1975 consumption figure (Table 3.6).

Since urban areas have more than one energy substitute (e.g. electricity and L.P Gas), fuelwood consumption within urban households, in particular, has generally been governed by trends in the relevant substitutes (Chapter Four). For the countryside, however, the limited energy choice, if any, serves to enhance the sensitivity of fuelwood to its users. The living standards among the latter are closely linked to its (i.e. fuelwood)

[1] UGANDA FOREST DEPARTMENT, 1983; Uganda Forest Department National Progress Report for African Forestry Commission Sixth Session, Arusha, Tanzania.

Table 3.6 Estimated fuelwood consumption in Uganda

| | '000 tons | | | | | '000 TOE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1965 | 1970 | 1975 | 1980 | 1982 | 1965 | 1970 | 1975 | 1980 | 1982 |
| Urban Commercial | 357 | 381 | 314 | 204 | 210 | 133 | 143 | 118 | 76 | 79 |
| Households | 252 | 283 | 243 | 168 | 173 | 94 | 106 | 91 | 63 | 65 |
| Commerce | 105 | 98 | 71 | 36 | 37 | 39 | 37 | 27 | 13 | 14 |
| Industry | - | - | - | - | - | - | - | - | - | - |
| Rural Commercial | 1040 | 1130 | 929 | 819 | 837 | 390 | 424 | 348 | 307 | 313 |
| Households | 388 | 390 | 301 | 223 | 228 | 145 | 146 | 113 | 83 | 85 |
| Commerce | 154 | 170 | 193 | 221 | 232 | 58 | 64 | 72 | 83 | 87 |
| Industry | 498 | 570 | 435 | 375 | 377 | 187 | 214 | 163 | 141 | 141 |
| Rural Subsistence* | 7814 | 8340 | 9071 | 9773 | 10152 | 2928 | 3126 | 3399 | 3662 | 3804 |
| Households | 7389 | 7760 | 8278 | 8719 | 8999 | 2769 | 2908 | 3102 | 3267 | 3372 |
| Commerce | 345 | 490 | 691 | 937 | 1030 | 129 | 184 | 259 | 351 | 386 |
| Industry | 80 | 90 | 102 | 117 | 123 | 30 | 34 | 38 | 44 | 46 |
| Total End-use | 9211 | 9851 | 10314 | 10796 | 11199 | 3451 | 3693 | 3865 | 4045 | 4196 |
| Households | 8029 | 8433 | 8822 | 9110 | 9400 | 3008 | 3160 | 3306 | 3413 | 3522 |
| Commerce | 604 | 758 | 955 | 1194 | 1299 | 226 | 285 | 358 | 447 | 487 |
| Industry | 578 | 660 | 537 | 492 | 500 | 217 | 248 | 201 | 185 | 187 |

*Includes some fuelwood used for commercial purposes.

Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

availability, and, to a great extent, disruption in supplies is easily mirrored by reduced frequency in cooking and similar end-uses. As is shown in Part Two of this thesis, this disamenity is already in existence in some parts of Uganda.

## 3.2 Energy Supply

Since levels of demand for energy are principal determinants of energy supply, the same order that was noted under energy consumption is to be found here. That is, woodfuel dominates commercial supply, with fossil fuels and electricity in second and third positions respectively. For instance, in 1980, net commercial fuelwood supply amounted to approximately 383 000 TOE - i.e. 45% of the total net commercial energy supply available for use (Table 3.7 below). During the same year, petroleum products, with a total supply of 246 000 TOE, accounted for nearly 29% of all the net commercial energy supply and ranked second to fuelwood. As is shown in Chapter Four, the increases realised in fuelwood, charcoal and electricity supply during 1980-82 owed largely to a recovery in the national economy, while the 8% decline (i.e. from 29% in 1980 to 21% in 1982) in petroleum fuels was one result of government measures aimed at scaling down petroleum imports.

### 3.2.1 Petroleum Fuels

To date, Uganda has no domestic supplies of fossil fuels. In 1980, for example, about 247 000 TOE were imported, with gasoline, auto diesel and kerosene making up approximately 89 000, 72 000 and 48 000 TOE

Table 3.7 Estimated energy supply in Uganda, 1980
(in '000 TOE)

| Energy Type | Production | Imports | Total primary supply | Supply after transmission | Transmission and distribution losses | Net supply for consumption |
|---|---|---|---|---|---|---|
| Commercial Energy | 1280 | 247 | 1527 | 1527 | 9 | 851 |
| Aviation fuel | - | 13 | 13 | 13 | - | 13 |
| Gasoline | - | 89 | 89 | 89 | - | 89 |
| Kerosene | - | 48 | 48 | 48 | - | 48 |
| Auto diesel | - | 72 | 72 | 72 | - | 72 |
| Industrial diesel | - | 1 | 1 | 1 | - | 1 |
| Fuel oil | - | 23 | 23 | 22 | - | 22 |
| L.P Gas | - | 1 | 1 | 1 | - | 1 |
| Electricity | | | | | | |
| hydro | 159 | - | 159 | 53 | 9 | 44) |
| thermal | - | - | - | 1 | - | 1) |
| Fuelwood | 1121 | - | 1121 | 383 | - | 383 |
| Charcoal | - | - | - | 177 | - | 177 |
| Conversion losses | | | | | | |
| electricity | | | | 106 | | |
| fuelwood | | | | 561 | | |
| Non-commercial Energy | | | | | | |
| Fuelwood | 3662 | - | 3662 | 3662 | | 3662 |
| TOTAL ENERGY | 4942 | 247 | 5189 | 5189 | | 4513 |

Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

respectively (Table 3.7 above). These supplies are influenced by various factors - both external and domestic. For instance, any reductions in petroleum supply on the international market would most likely result in higher prices payable by consumers, particularly when there is an inadequate stock to cater for such emergencies. Such an eventuality is especially severe for a low-income, oil-importing country like Uganda. Secondly, owing to its landlocked nature, Uganda has had to rely very heavily upon Kenya, to the east, for both its imports and exports through the latter's Indian Ocean port of Mombasa.

The political climate between the two sister states (i.e. Kenya and Uganda) has a direct bearing on such transit trade. For example, in 1977, bitter political relations between the two countries led to a brief but sharp fall in Ugandan petroleum imports, with the inevitable increases in domestic petroleum prices, transportation costs and prices of agricultural produce in particular. In an attempt to reduce the risk inherent in dependence upon one external routeway, the present government in Uganda is experimenting with an alternative that stretches from Jinja to Mwanza - i.e. Uganda's and Tanzania's Lake Victoria ports respectively - and on to Tanzania's Indian Ocean port and harbour of Dar es Salaam. However, the use of and success with this second outlet for Uganda are underlain by (i) political relations between Tanzania and Uganda, and (ii) adequate provision of handling and port facilities at Dar es Salaam. Currently, both Tanzania and Uganda enjoy apparently amicable relations, and this is not surprising since Tanzania played an active role in toppling the military regime of Idi Amin in Uganda in April 1979. On the other hand, Dar es Salaam port and harbour has a large hinterland which includes Rwanda and Zambia. In the past, its services have not been

without blemish, and it is hoped that the planned transfer of Tanzania's capital city from a peripheral location at Dar es Salaam to a continental one at Dodoma will provide some relief. Thus, this additional routeway for Uganda might, after all, not be any more reliable than the traditional one via Kenya.

Within Uganda itself, a number of forces influence petroleum supplies. Major urban areas, notably Kampala City and Jinja Industrial Town, receive the greatest proportion of the national petroleum supplies. This is solely explained in terms of the high demand, say, for gasoline, auto diesel, fuel oil and industrial diesel in such centres. Throughout the country, Kampala City and Jinja Town have the highest percentages in terms of urbanisation, urban population and concentration of administrative, commercial, industrial and similar activities. A look at Table 2.3, for instance, shows that more than half of the districts in Uganda have an urban population of below 5% each, while, for Kampala and Jinja Districts, their urban population is 100% and 19.7% respectively. Accordingly, there is a comparatively low demand for and, therefore, supply of petroleum products in the former districts. Since the country is basically agricultural, and over 90% of this agriculture is of the peasant type, demand for petroleum fuels in the rural areas is likely to remain low for another ten years or so.

Petroleum supplies to upcountry areas, in particular, are also influenced by other factors. For example, during the 1978-79 war against the military regime in Uganda, the country experienced declines in its supplies of petroleum products. One consequence of this was in the form of increased retail prices of petrol and diesel especially. These price rises continued even in 1980 and 1981, although; this time, the cause was more to do with government moves to lift subsidies on domestic petroleum prices. Officially, for instance, a litre of premium gasoline retailed

for Uganda Shillings 7.38 in 1979, 7.44 in 1980 and 85.00 in 1981 (Table 3.4). But, at the same time, black-marketeering in and smuggling of petrol, as well as diesel and kerosene, led to higher prices in the unofficial (or 'black') market. For example, in 1981, the unofficial price of premium gasoline in many places in Uganda was not less than Uganda Shillings 100.00 a litre.

It is worth noting that, for the rural transporters especially, such increases in petroleum prices do not yield the kind of profit levels that one might find obtaining, say, in Kampala City. The peasant agricultural population in the countryside is generally slow to respond positively to these price rises. Its income is derived almost entirely from crops and, as such, is characteristically seasonal. On the other hand, urban transporters can raise their charges overnight and, despite some complaints, most users of such forms of transport will still pay the new rates. These operations are fully known to illegal dealers in petroleum products. Thus, when shortages do occur, urban petroleum consumers become a prime target of these opportunists and comparatively little attention is given to the rural areas.

### 3.2.2 Electricity

Uganda's electricity supply is dominated by Owen Falls Hydroelectric Power Station which is located in Jinja (Figure 3.2 below). The country's hydro potential is estimated at 1955 MW, with an annual generation potential of 10 048 GWh[1]. Currently, Owen Falls Power

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

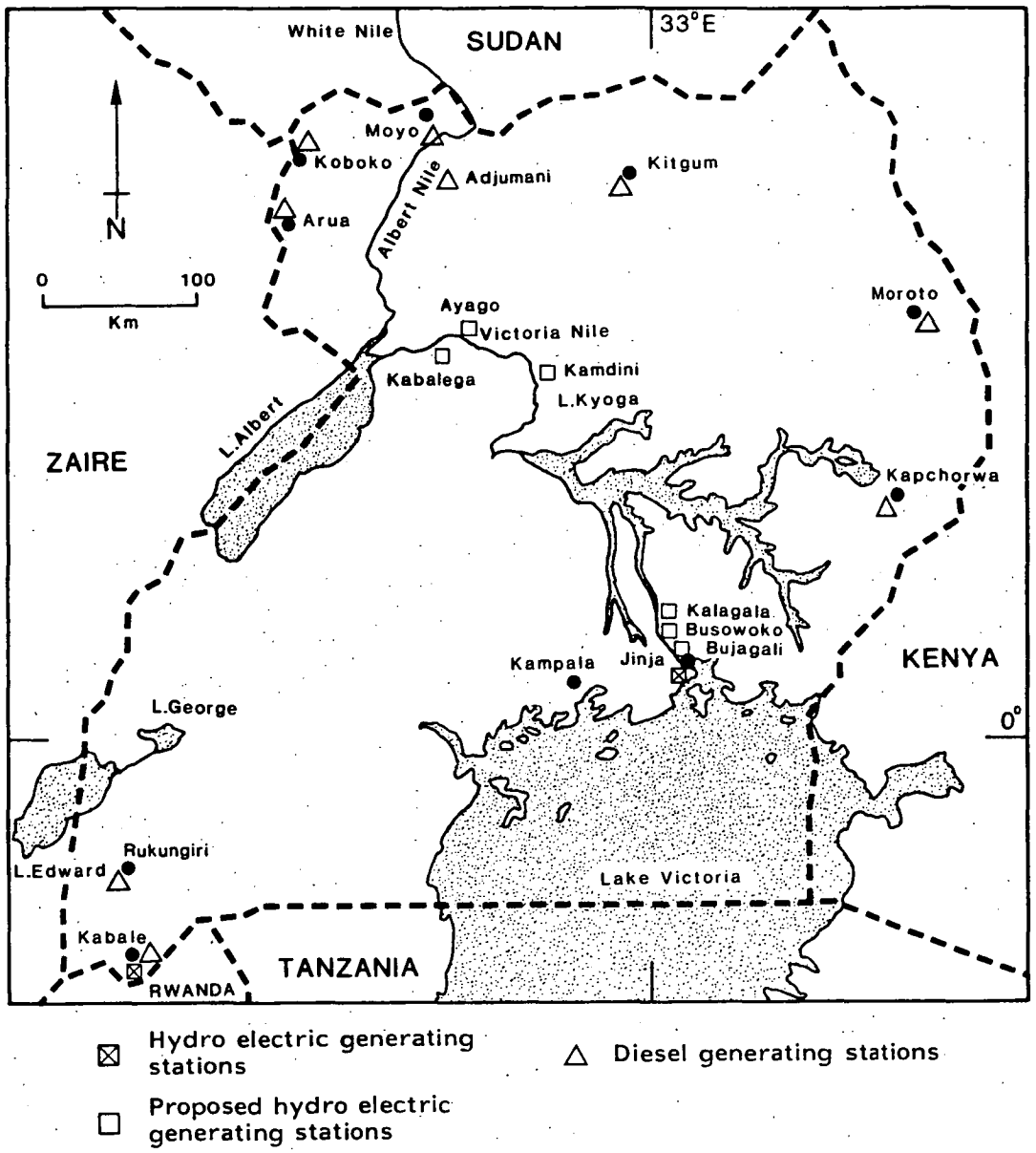


Figure 3.2 Uganda: Power system development as of 31 December 1982. (This map is based on an original one supplied by the World Bank.)

Station (or Owen Falls Dam as it is often referred to) has an installed generation capacity of 150 MW (Table 3.8 below), and, apart from catering for the domestic market, the station also supplies electric-

ity to Kenya (e.g. 217.5 KWh in 1983[1]).

Table 3.8 Installed power generation capacity

| Plant name | Installed capacity | | | %
|---|---|---|---|---|
| | Unit size (MW) | No. | Total (MW) | |
| Hydro | | | | |
| Owen Falls | 15.0 | 10 | 150.0 | |
| Kabale | 1.0 | 1 | 1.0 | |
| | | | 151.0 | 97 |
| Diesel | | | | |
| Kitgum | | 3 | 0.375 | |
| Rukungiri | | 2 | 0.360 | |
| Kabale | | 6 | 1.350 | |
| Moyo | | 2 | 0.330 | |
| Arua | | 3 | 0.580 | |
| Moroto | | 4 | 0.820 | |
| Kapchorwa | | 2 | 0.115 | |
| Koboko | | | 0.250 | |
| Adjumani | | | 0.250 | |
| | | | 4.430 | 3 |
| Total installed capacity | | | 155.430 | 100 |

Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

There are also government-owned diesel power stations (Table 3.8 above), but they all have a low installed generation capacity. In addition, there is a number of small diesel power stations owned and

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1984; Background to the Budget 1984-1985; Government Printer, Entebbe.

managed privately. For instance, some religious mission stations provide their own electricity from such stations. However, the politico-economic ills which hit the country since the early 1970s had their toll on such installations, too, and it is unsurprising that some of them might not be operational now.

At the national level, hydroelectricity ranks third after woodfuel and petroleum products. For example, its share of the total energy supply in 1982 was 21%[1]. At present, government plans are for a second major hydro power station at Ayago on the River Nile (Figure 3.2) so as to raise the overall hydroelectric supply - more so in view of the expected growth in demand by households, industry and the like. However, it appears that considerably less attention is being given to the need for an inventory of both actual and potential electricity demand before the planned power station is constructed. Such an inventory can be justified on two grounds. Firstly, Uganda has a limited fuel resource base, both now and in the short-term. Improving the welfare of the general population will no doubt require more power - for households, industry, transportation, and other end-uses. But research into and development of alternative fuel resources are largely constrained by such factors as shortage of funds, lack of trained manpower, unavailability of appropriate technological infrastructure and technical know-how, and inadequate data on such resources. Thus, preinvestment studies are necessary to ensure that any proportion of Uganda's limited resources spent on such a scheme yields maximum benefit to as wide a community as possible.

The second reason for inventorying electricity demand relates to the status of electricity in the energy industry in the whole country.

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

Much as this energy type has merits for its household consumers, the majority of the population will, for the foreseeable future, continue to live outside the urban areas and rely heavily on fuelwood. In other words, growth in demand for fuelwood will remain higher than that for electricity. Government plans for increasing electricity production and supply need to recognise and reflect this fact. For example, there is an urgent need for broad-based meaningful and integrated development planning and management wherein priorities are set and implemented in accordance with what it is that the country's majority population require. As aforementioned, for instance, fuelwood supply should be receiving all the attention due to it. Unfortunately, and as the next sub-section and Chapter Four will show, this is not what is happening.

### 3.2.3 Woodfuel

As is the case in several other Less Developed Nations (e.g. Kenya, Tanzania, India and Nepal), woodfuel occupies the top position in terms of energy supply sources in Uganda. It accounts for over 75% of the country's total energy needs annually. For example, in 1980, it constituted approximately 94% of the total net energy supply available for consumption (Table 3.7). Woodfuel is decentralised and, unlike petroleum products in particular, is less prone to regressive forces originating outside Uganda. In addition, the amount of foreign exchange involved in its supply is extremely small, and, except for charcoal, most woodfuel activities have hitherto been predominantly non-commercial.

Reliable data on woodfuel production or supply is hard to come by, but one estimate puts the annual production at 10.9 million tonnes (i.e.

about 4.1 m TOE)[1]. But production of woody biomass (e.g. woodfuel and crop residue) is unevenly distributed in terms of land types (Table 3.9 below). For instance, natural forests and rangelands account for approximately 22.9% and 20.6% of the country's total sustainable annual yield of wood available as fuel (or SAYWAF) respectively. Arable land and woodlands are the next largest contributors and their respective proportions are 18.4% and 18.2%. And, as for the growing stock of woody biomass nationwide, 36.1% is to be found in natural forests, 17.8% within rangelands, 17.2% in woodlands, and 15.2% on arable land. Of the remaining 13.7%, meadows and pastures account for 11.6% (Table 3.9).

There are sharp contrasts regarding the distribution of the woody biomass in Uganda. In a way, these are largely a reflection of an area's altitude, climate, edaphic characteristics, pattern and length of settlement, population density, economic activity, land husbandry, administration, neighbourhood effects, and the like. For example, the Annual Forest Report Appendices for 1980/81 indicate that Mbarara District has no natural forests. This implies that all the growing stock of woody biomass in this district is mainly found in rangelands and woodlands, on arable land, and also in meadows and pastures. However, unlike in the case of natural forests, most of such areas are relatively easy to invade, clear, settle and cultivate. Accordingly, the levels of such woody biomass stock will be closely influenced by these factors and others alike.

It is also noteworthy that not all the growing woody biomass is accessible to the consumers. A number of forested areas are classified as

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

Table 3.9 Estimated production of woody biomass in Uganda

| Land type | Land area (mill. ha) | Growing stock (mill. tons | Sustainable annual yield of wood Total air dry) | Available as fuel (million TOE) | |
|---|---|---|---|---|---|
| Arable land | 5.54 | 68.52 | 2.42 | 2.01 | 0.75 |
| Meadows and pastures | 5.00 | 52.50 | 1.75 | 1.46 | 0.55 |
| Natural forests | 1.08 | 162.60 | 3.96 | 2.48 | 0.93 |
| Plantations | 0.04 | 7.04 | 0.83 | 0.65 | 0.24 |
| Bamboo | 0.01 | 0.19 | 0.01 | 0.01 | - |
| Alpine and open forest areas | 0.08 | - | - | - | - |
| Woodlands | 1.55 | 77.50 | 2.38 | 1.98 | 0.74 |
| Rangelands | 5.55 | 80.48 | 2.68 | 2.24 | 0.84 |
| Urban areas | 0.62 | 2.21 | 0.06 | 0.05 | 0.02 |
| Swamps | 0.50 | - | - | - | - |
| TOTAL | 19.97 | 451.04 | 14.09 | 10.88 | 4.07 |

Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

protected and, according to Part V (Offences and Legal Proceedings) of the 1966 Forests Act[1], any unauthorised harvesting of wood and other forest products is an offence and punishable. For instance, according to the aforesaid 1980/81 Forest Report Appendices, North Maramagambo (in Bushenyi District) is a forest reserve purely for protection. The total area of this reserve is given in these Appendices as 29 127.14 ha, of which 28 987.28 ha lie within Ruwenzori National Park and the remaining 139.86 ha are in a game reserve. Thus, it is important, especially at the lowest subnational level possible, that inventories are made to determine the percentage of a given area's sustainable annual yield of wood (SAYW) that is actually available as fuel (SAYWAF). On the basis of the data in Table 3.9 above, Uganda's total SAYWAF is less than the SAYW, and this imbalance is expected to be greater in some areas than others.

Climate, in particular, plays a significant role in woodfuel supply. While, for example, the rainy season per se facilitates growth of various woody species, thereby contributing to the general stock of the wood resource base, it also engenders abrupt and serious cutbacks regarding harvesting and transportation of fuelwood for sale in the urban centres and other market places. Even at the rural household level, rainy days are often characterised by fuelwood shortages, especially if such rains are the first ones after a dry spell.

Climate interacts with woodfuel in other ways too. For instance, the dry season (i.e. usually June-August/September) expedites natural drying of the wood, thus minimising the moisture content found, say, in the fuelwood used by rural households. It also allows for relative ease of harvesting and transportation. Unfortunately, the dry season

[1] UGANDA, 1966; Laws of Uganda VI; Government Printer, Entebbe.

in many parts of the country (e.g. Mbarara District and North-eastern Uganda) is often harsh and lasts beyond the average three-month duration. A number of shrubs and other woody plants are unable to withstand the high temperatures and excessive evapotranspiration rates at this time. Subsequent wilting reduces woodstock levels in absolute terms, while, simultaneously, plant regeneration is considerably reduced.

The human factor in woodfuel supply in Uganda can be illustrated by one agriculture-related activity. Many peasant farmers still practise extensive land clearance annually as one means of increasing both food and cash crop acreage. One traditional, common and, in monetary terms, cheap tool deployed in such clearance is fire. Bush fires are a common feature over a wide area during the later part of the dry season. Not only do many of these fires often and inadvertently eventuate in property losses (e.g. banana plantations and grass-thatched houses), but they also (i) engender indiscriminate destruction of woody vegetation, (ii) kill off some of the useful soil micro-organisms (especially those in the top layers of the soil), and (iii) burn plant seeds and thus reduce further the regeneration potential for many vegetation types. Viewed against this background, the dry season is identifiable with a greater number of factors which, singly or jointly, contribute towards a relative decrease in fuelwood production especially.

Unlike petroleum and electricity, woodfuel - particularly its procurement - has a female and child predominance. In addition, inventorying in woodfuel supply is extremely inadequate. Owing to this latter factor especially, it is uncertain whether, under current conditions, the woodfuel resource base in Uganda can remain sustainable for many years to come.

a) Charcoal

Available statistics suggest that there were annual increases in charcoal production, say, between 1977 and 1983 (Table 3.10 below). But such data represents official records only and, as such, ought

Table 3.10 Charcoal production in Uganda, 1977-83

| Year | Quantity ('000 tonnes) |
|---|---|
| 1977 | 25 |
| 1978 | 27 |
| 1979 | 27 |
| 1980 | 28 |
| 1981 | 30 |
| 1982 | 35 |
| 1983 | 37 |

Sources: 1. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.
2. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1984; Background to the Budget 1984-1985; Government Printer, Entebbe.

to be viewed with caution. Charcoal production and supply nationwide are not closely and consistently monitored. Nor is any statistical value available, for example, on the amount of charcoal lost during loading and transportation. Given the current politically unstable climate obtaining in Uganda, charcoal losses incurred during transportation, especially, can sometimes be substantial. This is so be-

cause, at virtually all the roadblocks found in the country, transporters of charcoal (and other items) are forced to make payments[1], in either cash or kind, to those people manning them (i.e. roadblocks). Thus, a more realistic account of the charcoal industry must canvass the whole spectrum - from the production site, through all the official and panya (i.e. unofficial) transportation routes, and, finally, to the end-user.

Charcoal production in Uganda is largely done using earthen kilns and tends to be mostly site-specific. Although each charcoal-maker is expected to have a licence[2], it is not too far-fetched to suggest that this requirement is not always strictly adhered to. Presently, both full-time and itinerant workers engage in charcoal production, and sale of the product is not uniformly organised. Many small-scale producers and/or sellers transport their product to the nearest market - usually a town, trading centre or private home - by bicycle, on foot, or, in a few cases, by truck.

During the survey I undertook in Bushenyi and Mbarara Districts in January-March 1984, it was learnt that charcoal producers tend to be

[1] Payments in cash, especially, are also made by passengers. The vernacular term commonly used to refer to all such payments is chai, a word in Swahili language whose true English translation is tea. The origins of chai as it is used here, however, are not clear. But one opinion is that it refers to an amount of money which can buy one a cup of tea. Unfortunately, while, say, in February 1984, a cup of tea cost Uganda Shs 20.00 (i.e. about US$ 0.05) on average, nearly all the people demanding chai fixed the figure at Uganda Shs 50.00 (i.e. approximately US$ 0.15) and above. This discrepancy is so because, nowadays, cash payments at such roadblocks serve various purposes. Unofficial sources point out that, largely owing to their poor living conditions, people manning these roadblocks use chai as a supplementary, if not major, source of income.

[2] EARL, D.E., 1975; Forest Energy and Economic Development; Oxford University Press, Oxford.

indiscriminate in their procurement of the raw material. (This was corroborated by some members of staff of the Forest Department.) This is possibly due to lack of proper management and monitoring of their activities by both district forest and administration staff. It also reflects the nature of most recent charcoal operations. Until a few years ago, charcoal production in Uganda was largely confined to the immediate environs of major urban and/or industrial areas, e.g. Kampala, Jinja, Mbale, and Masaka. In part, consumption levels then mostly depended upon an area's urban and/or economic status, fuelwood supply and use, as well as the possibilities for interfuel substitution[1]. But, owing to depletion of the raw material close to the major markets, charcoal supplies nowadays come from distant sources, and, especially in the towns, charcoal consumption is still on the rise.

b) Fuelwood

Despite lack of data on the actual fuelwood supply countrywide[2], it is fair to say that there exist regional imbalances, particularly in densely populated and/or land-scarcity areas which, in addition, also have few or no available substitutes. Mbale District in eastern Uganda is one such

[1] There is said to be interfuel substitution when, for example, one is able to substitute one energy type (e.g. charcoal) with another (e.g. electricity).

[2] In two publications (i.e. Background to the Budget 1983-1984 and Background to the Budget 1984-1985) by the Uganda Ministry of Planning and Economic Development, statistics are given for commercial fuelwood production for 1977-83. However, since most of the fuelwood supply in Uganda is non-commercial, such data cannot be considered representative of the true situation nationwide.

example. But even some of the moderately populated parts of the country already face fuelwood shortages. For example, in northern Uganda, Apac District, with a population density of 48 (Table 2.3), is experiencing fuelwood scarcities. One possible explanation for the latter case relates to the generally poor fuelwood resource endowment throughout most of the northern half of the country. In addition, there is uneven distribution of household energy substitutes partly owing to kerosene prices, in particular, being prohibitively high for some rural households. And, as already mentioned, electricity use nationwide is still low. Lastly, unequal income and wealth distribution countrywide are also significant determinants of one's energy use type and pattern.

Perhaps the greatest pressure on Uganda's fuelwood resource base is on savanna woodland and arable land which provide most of the nation's rural household fuel. Approximately 3482 $km^2$ are covered by reserved woodland[1], but most fuelwood is harvested from non-reserved woodland and shrub-supporting areas. Supplementary sources include individual woodlots, mainly consisting of eucalyptus. Savanna woodland fuelwood species include Combretum and Terminalia which, like many others, are partly disadvantaged by slow annual growth rates[2]. Given that fuelwood consumption nationwide has to be raised as one way towards uplifting the living standards of the majority of the population, it might be expected that, under current conditions, such slow growth rates can only serve to widen the gap between fuelwood supply and demand.

[1] UGANDA FOREST DEPARTMENT, 1983; Uganda Forest Department National Progress Report for African Forestry Commission Sixth Session, Arusha, Tanzania.

[2] As above.

One conclusion that can be drawn from the foregoing discussion is that operations within the energy industry in Uganda are still ill-defined. Total energy consumption is low at present, but, other things remaining the same, it will rise - at least in the foreseeable future. Of greater significance is the fact that the principal energy type (i.e. fuelwood) for over 90% of the population is under mounting pressure, and most of this stress originates from activities associated with Uganda's economic lifeblood (i.e. agriculture). But, before looking at the subnational supply-demand disequilibrium in Part Two, it is necessary to analyse the ups and downs which have been witnessed in the national energy industry since about 1965. This theme is the focus of the following chapter.

# CHAPTER FOUR

## TRENDS IN UGANDA'S ENERGY INDUSTRY SINCE 1965

During the last eighteen years or so, the energy industry in Uganda has not had an all-time good performance. Ups and downs have been witnessed, and planning for future supply and consumption of the different energy types is heavily underscored by a thorough understanding of their causes and impact. Performance in the national economy offers one main explanation for these trends. Thus, the first section of this chapter analyses, though not in detail, the growth pattern in both the monetary and subsistence economy versus different energy consumers since about 1965. The second and last section of the chapter discusses each energy type, spelling out the reasons for the low growth rates experienced by each of the four major end-users (i.e. households, commerce, industry and transport).

The analysis covers the years since 1965. The choice of this period was due to two major factors. Firstly, data on energy in Uganda is still scanty, and this is particularly so for the years prior to 1965. Secondly, the 1970s, in particular, were characterised by a sharp decline in the national economic growth, while, since about 1981, there has been a recovery in the economy as a whole. The literature that is available on the economy during this period is still inadequate, but it does provide an important reference for a study of what has been happening in the energy industry during this time.

Throughout both sections of this chapter, more is said about energy consumption than supply. Reasons for this are to do with the nature of Uganda's energy industry itself. As aforementioned (i.e. Chapter Three), (i) all petroleum requirements are imported, (ii) electricity

supply is still limited, and (iii) there is very little inventorying regarding the principal energy type (i.e. woodfuel). In addition, plans for raising energy supply, for instance, are almost always governed by the level of demand for such energy.

## 4.1 General Trends

Compared with the years 1965-70, the period from 1971 to 1979 can be described as one regrettable era in Uganda's industrial and socio-economic development. During that time, the national annual growth rate was -1.6% - far below 4.5% which was the corresponding figure for the low-income developing nations[1]. Declines in per capita Gross Domestic Product (GDP) were translated into reduced energy consumption, especially within the monetary sector of the economy.

Between 1965 and 1970, the monetary economy in Uganda saw a GDP growth rate of 5.3% (Table 4.1 below). GDP in industry and transport and

Table 4.1 Gross Domestic Product growth rates* in Uganda
(% p.a. in 1966 prices)

| | 1965-70 | 1970-5 | 1975-80 | 1980-2 |
|---|---|---|---|---|
| Monetary Economy | 5.3 | -1.5 | -5.0 | 4.7 |
| Agriculture | 6.0 | -0.9 | -5.0 | 6.2 |
| Industry** | 5.7 | -5.4 | -16.3 | 2.6 |
| Transportation & Communication | 7.0 | 2.8 | -16.5 | 6.6 |
| Other | 4.3 | -1.3 | -1.4 | 3.9 |
| Subsistence Economy | 3.9 | 3.6 | -2.4 | 7.4 |

*Growth rates are trends, calculated by the least-squares method.
**Mining, manufacturing and agro-processing.
Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

[1] UGANDA, 1984; Budget Speech: The National Will for Recovery and Development; Kampala.

communications grew by 5.7% and 7.0% respectively. During the same period (i.e. 1965-70), energy consumption in industry rose by 7.7% annually, while, in transport, the corresponding figure was 12.6% (Table 4.2). Thus, the positive growth in these two sectors of the

Table 4.2 Growth rates in energy consumption in Uganda*
(% p.a.)

| | 1965-70 | 1970-5 | 1975-80 | 1980-2 |
|---|---|---|---|---|
| TOTAL | 2.6 | 0.7 | 0.4 | 1.2 |
| By source | | | | |
| Petroleum | 16.3 | -4.4 | -9.6 | -14.1 |
| Electricity | 4.9 | -2.5 | -9.6 | -5.2 |
| Fuelwood | 1.4 | 0.9 | 0.9 | 1.8 |
| Charcoal | 15.0 | 13.1 | 6.4 | 1.7 |
| By end-use | | | | |
| Households | 1.2 | 1.2 | 0.7 | 1.6 |
| Commerce | 5.4 | 5.5 | 4.7 | 4.2 |
| Industry | 7.7 | -4.8 | -5.4 | -1.4 |
| Transport | 12.6 | -5.0 | -8.4 | -16.1 |

*This table is derived from domestic consumption data in TOE, adjusted for transformation and losses. Exports are excluded. Growth rates are trends, calculated by the least-squares method.

Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

Note: Communications, as an energy consumer, is not mentioned specifically in the above table, but one might assume that it is included within transport.

economy created a high energy demand, resulting in increases of 4.9% and 16.3% in the consumption of electricity and petroleum respectively[1].

[1] Apart from households, industry is a major electricity user. As for petroleum products, gasoline and auto diesel are the major items and they are all consumed within the transport sector.

The strong correlation between GDP and energy is also evident for the period after 1970. For instance, GDP in industry declined by 5.4% in 1970-75 and 16.3% from 1975 to 1980 (Table 4.1). On the energy side, total consumption by industry saw similar trends. Between 1970 and 1975, for example, it declined by 4.8% and this figure rose to 5.4% in 1975-80 (Table 4.2). Likewise, negative growth rates in energy consumption by transport were recorded for 1970-75 and 1975-80 owing to a fall in Gross Domestic Product in this (i.e. transport) sector. Therefore, the declines witnessed in both electricity and petroleum consumption during the same periods were due to such negative growth rates.

Another way of analysing the relationship between energy and Gross Domestic Product is to examine the trends in energy composition, say, between 1965 and 1982 (Table 4.3 below). For example, between 1965

Table 4.3 Trends in energy composition in Uganda
(% of total)

| | 1965 | 1970 | 1975 | 1980 | 1982 |
|---|---|---|---|---|---|
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| By source | | | | | |
| Petroleum | 5.5 | 10.3 | 7.8 | 4.8 | 3.4 |
| Electricity | 0.8 | 0.8 | 0.7 | 0.5 | 0.5 |
| Fuelwood | 92.8 | 87.2 | 88.4 | 90.8 | 92.0 |
| Charcoal | 1.0 | 1.7 | 3.1 | 4.0 | 4.0 |
| By end-use | | | | | |
| Households | 82.0 | 76.6 | 78.6 | 79.9 | 80.6 |
| Commerce | 6.5 | 7.4 | 9.4 | 11.6 | 12.3 |
| Industry | 7.3 | 9.3 | 6.8 | 4.9 | 4.6 |
| Transport | 4.2 | 6.7 | 5.2 | 3.6 | 2.5 |

Source: UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

and 1970, there was a 2.0% increase in the proportion of total energy consumed by industry, but, thereafter, the trend was reversed (Table 4.3 above). Similarly, transport increased its share of the total energy consumed from 4.2% in 1965 to 6.7% in 1970. And, as in the case of industry, the years that followed were characterised by reduced proportions (e.g. 5.2% in 1975). These declines were reflected in reductions in energy composition by electricity and petroleum (Figure 4.1 below). For instance, electricity lost a 0.1% share between 1970 and 1975, while the corresponding decrease in petroleum was 2.5%. Therefore, it is true to say that positive growth in the economy between 1965 and 1970 led to more energy consumption, while negative economic performance during most of the 1970s had the contrary effect.

The correlation between Gross Domestic Product and energy during 1980-82 must be understood in terms of what happened prior to 1980. Although the transport and communications sector realised a 6.6% GDP growth rate between 1980 and 1982 (Table 4.1), its energy consumption for the same period declined further (Table 4.2). This was largely due to the -16.5% GDP growth rate recorded in the previous five years (i.e. 1975-80), and, as such, the period after 1980 has been one of rehabilitation within the transport and other sectors of the national economy. Consequently, the decline in the composition of total energy by petroleum continued between 1980 and 1982 (Table 4.3 and Figure 4.1).

Throughout the period under study (i.e. since 1965), GDP growth rates in the subsistence economy in Uganda have generally been higher than in the monetary sector (Table 4.1). For example, between 1970 and 1975, the GDP growth rate in the subsistence economy declined by only 0.3%. This is in sharp contrast to -6.8% recorded for the monetary

economy during the same period. The explanation for this is the predominance of subsistence agriculture which, apart from export crop production, was not affected very seriously by the general economic

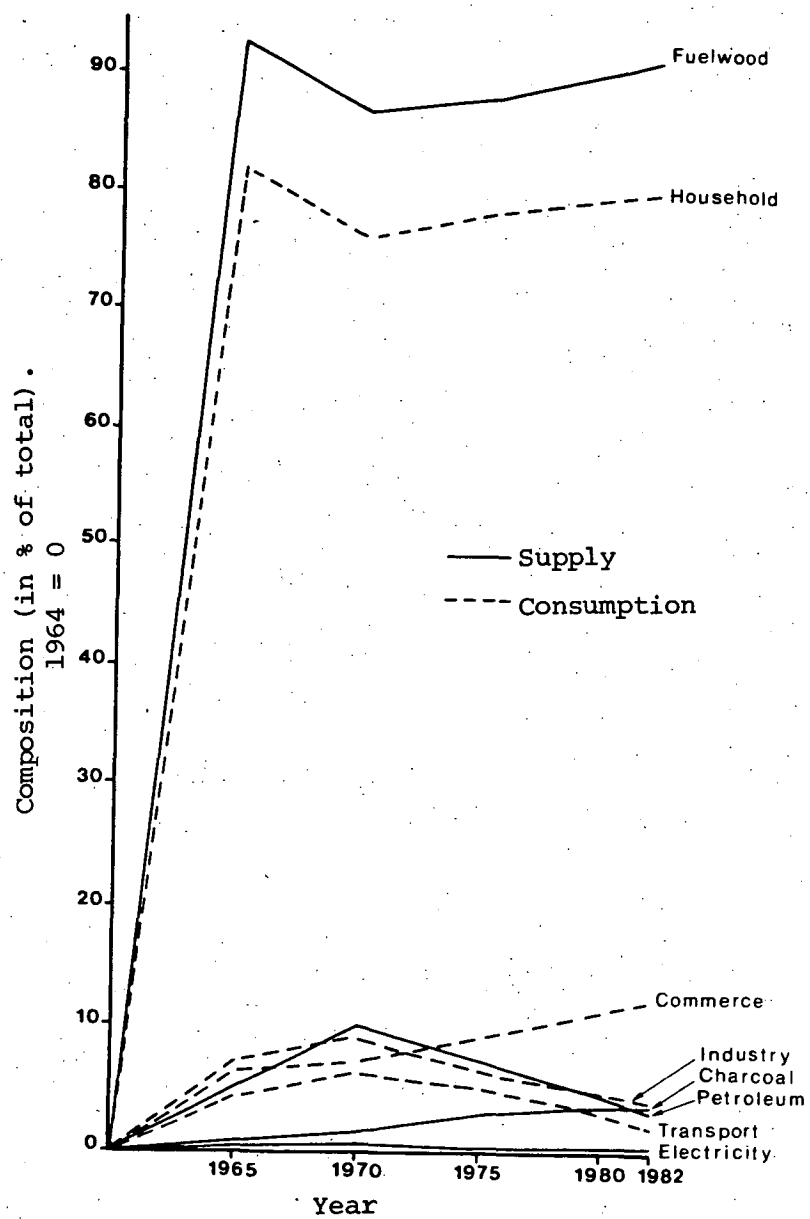


Figure 4.1 Trends in total energy supply and consumption, 1965-1982.

decline witnessed then. It is largely due to this factor that, in overall terms, annual growth rates in the consumption of woodfuel

were higher than corresponding ones in petroleum and electricity. For instance, between 1975 and 1980, woodfuel use nationwide grew by 7.3%

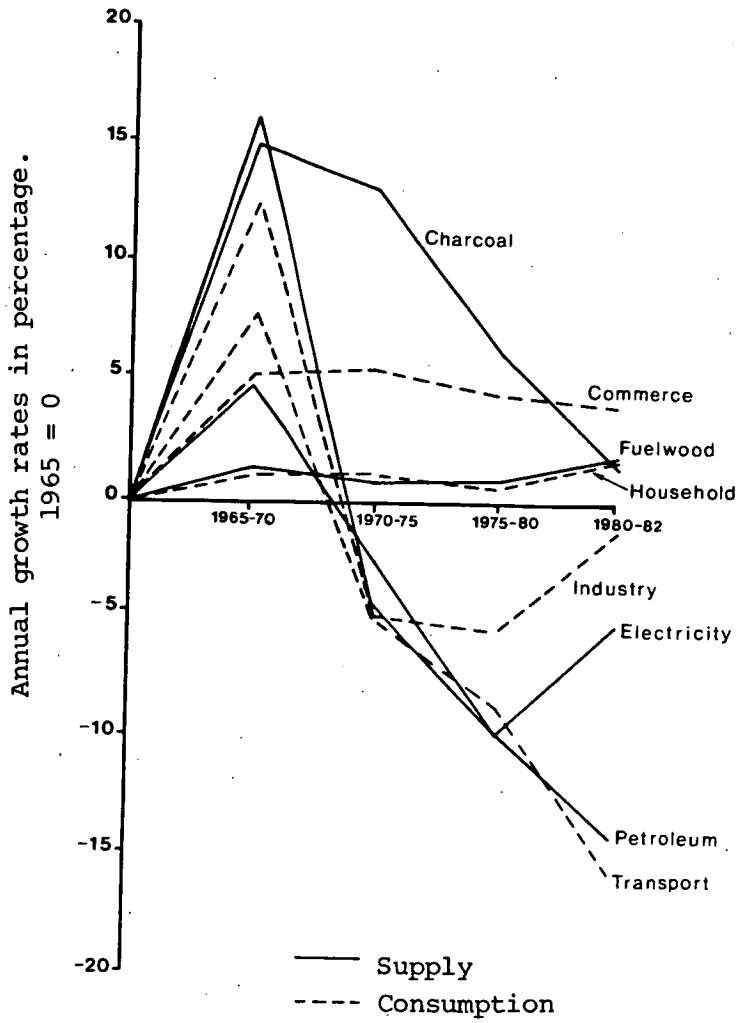


Figure 4.2 Trends in energy supply and consumption, 1965-70 to 1980-82.

annually, while, for the same period, growth rates in petroleum and electricity consumption were -9.6% each (Table 4.2 and Figure 4.2). Furthermore, owing to the high consumption of non-commercial energy in Uganda, the -2.4% GDP growth rate experienced by the subsistence

economy in 1975-80 did not result in a significant reduction in the consumption of non-commercial fuelwood, in particular, during this period. For example, in 1975-80, non-commercial fuelwood use was about 0.2% below the 1.7% growth rate recorded in 1970-75 and compared favourably with trends in the commercial energy sector (Table 4.4 below).

Table 4.4 Growth rates (% p.a.) in commercial and non-commercial energy use in Uganda

| | 1965-70 | 1970-5 | 1975-80 | 1980-2 |
|---|---|---|---|---|
| Commercial Energy | 6.9 | -2.5 | -4.1 | -2.4 |
| By source | | | | |
| Petroleum | 16.3 | -4.4 | -9.6 | -14.1 |
| Electricity | 4.9 | -2.5 | -9.5 | 5.2 |
| Fuelwood | 1.6 | -3.9 | -3.8 | 1.2 |
| Charcoal | 15.0 | 13.1 | 6.4 | 1.7 |
| Non-commercial Energy (All fuelwood) | 1.3 | 1.7 | 1.5 | 1.9 |

Sources: 1. UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.
2. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

Therefore, the five years from 1965 to 1970 were marked by positive growth in both the economy and energy supply and demand. Between 1970 and 1980, however, this trend was reversed, while, since 1980, the economic recovery achieved so far has not yet led to substantial increases in both the supply and consumption of all the energy types. And, as the next section will show, there were other factors which

affected each of the three primary energy sources (i.e. petroleum, electricity and woodfuel).

## 4.2 Trends in Specific Fuels

### 4.2.1 Petroleum Products

Statistics regarding petroleum imports for 1977-82 (Table 4.5 below) do reveal fluctuations within both the total volume and the individual

Table 4.5 Imports of petroleum products, 1977-82

| Item | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|---|---|
| VOLUME (tons) | 303599 | 258194 | 220270 | 259428 | 158052 | 80909 |
| Aviation fuel | 20196 | 10627 | 5021 | 12915 | 14964 | 7695 |
| Motor spirit | 94733 | 90279 | 59297 | 85985 | 46658 | 22552 |
| Kerosene | 51697 | 44185 | 39755 | 47816 | 23086 | 13616 |
| Auto diesel | 59294 | 58815 | 48006 | 72507 | 46699 | 27108 |
| Industrial diesel | 4844 | 3190 | 1589 | 1455 | 1383 | 474 |
| Fuel oil | 60100 | 36115 | 51770 | 23675 | 18820 | 6879 |
| Lubricants | 5682 | 5020 | 8026 | 7252 | 3926 | 2155 |
| Bitumen | 1878 | 2382 | 885 | 1131 | 77 | - |
| L.P. Gas | 1900 | 1492 | 695 | 804 | 649 | 115 |
| Others* | 3275 | 6089 | 5226 | 5888 | 1790 | 315 |

*These include chemicals, shell special spirits, shell motor turpentine, etc.

Source: UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

products. For example, nearly all the petroleum items experienced high negative percentage changes in 1977-78 (Table 4.6), and, during 1978-79,

Table 4.6 Percentage changes in petroleum imports

| Item | 1977-8 | 1978-9 | 1979-80 | 1980-1 | 1981-2 |
|---|---|---|---|---|---|
| TOTAL VOLUME | -15.0 | -14.7 | 17.8 | -39.1 | -48.8 |
| Aviation fuel | -47.4 | -52.8 | 157.2 | 15.9 | -48.6 |
| Motor spirit | -4.7 | -34.3 | 45.0 | -45.7 | -51.7 |
| Kerosene | -14.5 | -10.0 | 20.3 | -51.7 | -41.0 |
| Auto diesel | -0.8 | -18.4 | 51.0 | -35.6 | -42.0 |
| Industrial diesel | -34.1 | -50.2 | -8.4 | -4.9 | -65.7 |
| Fuel oil | -39.9 | 43.3 | -54.3 | -20.5 | -63.4 |
| Lubricants | -11.7 | 59.9 | -9.6 | -45.9 | -45.1 |
| Bitumen | 26.8 | -62.8 | 27.8 | -93.2 | .. |
| L.P. Gas | -21.5 | -53.4 | 15.7 | -19.3 | -82.3 |
| Others | 85.9 | -14.2 | 12.7 | -69.6 | -82.4 |

Note: These percentage changes are based on data shown in Table 4.5.

this pattern persisted except for fuel oil (43.3%) and lubricants (59.9%).

Singly or jointly, the aforementioned post-1973 oil price rise and unfavourable political relations between Uganda and Kenya (e.g. in 1977) underlie some of the declines in petroleum imports. In addition, from about mid-1978, Uganda was engaged in a war that eventuated in the overthrow of the military regime in April 1979. The war did interfere with petroleum supplies - both in terms of imports and pattern of internal distribution and use. Consequently, 1978-79 was characterised by sharp reductions in nearly all fuel supplies, e.g. -50.2% for industrial diesel (Table 4.6 above).

Since 1979, there have been two distinct features in the petroleum industry. Apart from industrial diesel, fuel oil and lubricants, petroleum imports in 1979-80 saw high increases. Not only was there a lot of economic aid extended to Uganda by outside countries immediately after the 1978-79 war, but, internally, the transport sector, in particular,

had a reasonable recovery (Section 4.1 above). Secondly, since 1981 especially, the government in Uganda has taken steps to curtail petroleum imports as one way towards saving on foreign exchange. It was with this in mind, for instance, that, after 1980, the government lifted subsidies on prices of petroleum products. One corollary of this was a sharp rise in retail prices of all petroleum fuels (Table 4.7 below). For example, between 1980 and 1981, the price of

Table 4.7 Percentage changes in retail prices of petroleum products in Uganda, 1972-1983

| Item | 1972-5 | 1975-9 | 1979-80 | 1980-1 | 1981-2 | 1982 to June 1983 |
|---|---|---|---|---|---|---|
| Aviation fuel | .. | 108.3 | 72.0 | 465.1 | 188.1 | .. |
| Gasoline | | | | | | |
| Premium | 83.1 | 183.8 | 0.8 | 1042.5 | 76.5 | 13.3 |
| Regular | 89.4 | 185.6 | 1.0 | 1009.6 | 75.0 | 14.3 |
| Auto diesel | 80.2 | 103.8 | 0.9 | 1062.8 | 80.0 | 22.2 |
| Industrial diesel | .. | 120.0 | 81.8 | 515.0 | .. | .. |
| Fuel oil | .. | 112.5 | 100.0 | 535.3 | 131.5 | 40.0 |
| Kerosene | 79.7 | 138.0 | 11.8 | 709.5 | 161.4 | 25.0 |
| L.P. Gas | .. | 211.1 | 26.2 | 500.9 | .. | .. |

Note: These percentage changes have been computed using data in Table 3.8

auto diesel rose by over 1000%.

What is still uncertain, however, is the extent to which domestically price-induced consumption of petroleum products has been achieved. For example, some measures[1] have been taken to regulate petroleum use by

[1]These have been in the form of greater accountability by officers (e.g. heads of departments) who authorise use of government vehicles in their care. However, some of these officers are known to use such vehicles for purely private concerns (e.g. transporting their wives to the food markets for shopping).

vehicles belonging to government departments. But the number of vehicles in the private sector far exceeds that of the government ones and, thus far, the government has not adopted non-price-related strategies to ensure proper use of petroleum products by private vehicles. One such measure is a public information exercise to make all the people aware of the need for proper management of available petroleum supplies. In addition, vehicle maintenance - which is comparatively inadequate now - is a necessary requirement for such management of petroleum products. Apart from garages having the right paraphenalia and executing their duties responsibly, it is essential that cooperation is sought from the Uganda Police to ensure realisation of some of these strategies. Through thorough inspection of vehicles by the Vehicle Inspection Section, as well as selfless duty performance by the Traffic Police Section, government measures for scaling down petroleum consumption, and therefore imports, should bear more tangible results. Also, improvements in and more distribution of the services rendered by Uganda Transport Corporation could cut down upon the number of petrol-using public service vehicles (PSVs), thereby reducing the demand for petrol countrywide. Thirdly, the government, in particular, must utilise every opportunity to restore political stability in the country so that consumption of petroleum by vehicles used in military and similar operations is kept low indeed.

It is worth noting that ill-planned reduction of petroleum supplies can have serious ramifications on the economy as a whole unless it is tailored to other types of energy, as well as various aspects of national development planning and management. For instance, over 50% of the national foreign earnings currently go to pay for petroleum imports. Domestically, transport is a very important infrastructural base for different forms of socio-economic and industrial development, and, at present, petroleum remains the only fuel input in the transport sector. What is required, therefore, is more of an energy-cum-development policy

which will evaluate the role of public versus private transport in national development. On the premise that, under the present circumstances, fossil fuels are still an indispensable economic requirement, development planning and management in Uganda need to review the apparently undue emphasis hitherto given to urban growth. Unless there is a kind of national and regional development planning commensurate with Uganda's present realities (e.g. a predominantly rural population and rapidly growing 'white collar' unemployment rate), it is difficult to envisage how, for example, further urbanisation will avoid resulting in an exacerbation of the skewed development that already exists countrywide.

### 4.2.2 Electricity

Apart from what has already been said under section 4.1, prices of electricity have had both a positive and negative effect on its use. For instance, in 1981, Uganda Electricity Board (UEB) sold approximately 129.5 million KWh to household consumers, but, in 1982, there was a decrease of 8.3% (Table 4.8). This reduction was recorded in spite of an increase of nearly 10% in the number of electricity-using households, and, even after 1982, this trend persisted. One major cause for a decrease in electricity sales appears to be the rise in electricity tariffs[1], and it is expected that, following a further tariff increase by 50% from 1 March 1984[2], such declines were recorded for 1984 as well. In particular, these price-induced

[1] In their joint report, entitled Uganda: Issues and Options in the Energy Sector, UNDP and the World Bank were of the view that, for all practical purposes, the then low electricity tariff in Uganda was inappropriate to the economic climate in the country.

[2] Uganda Times, 2 April 1984.

Table 4.8 Electricity sold by Uganda Electricity Board (UEB) by category of consumer, 1977-1983.

| Category of consumer | Number of consumers | | | | | | | Units sold (mil. KWh) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 |
| Domestic tariff | 62594 | 67258 | 43793 | 63484 | 65721 | 72058 | 73977 | 97.8 | 97.8 | 80.6 | 80.8 | 129.5 | 118.8 | 102.0 |
| Hotels, clubs, etc. | 1246 | 1288 | 806 | 1150 | 1076 | 1149 | 1161 | 19.2 | 18.6 | 11.1 | 8.7 | 14.2 | 14.2 | 12.7 |
| Flat rate commercial power and heating | 7221 | 7511 | 3416 | 6191 | 6050 | 6550 | 6706 | 18.7 | 22.1 | 14.2 | 16.1 | 22.6 | 21.3 | 17.3 |
| Commercial and security lighting | 20886 | 21897 | 12278 | 20463 | 19901 | 21437 | 22088 | 24.5 | 26.5 | 23.9 | 26.5 | 37.2 | 25.6 | 26.5 |
| Street lighting | 108 | 108 | 108 | 107 | 107 | 107 | 107 | 6.8 | 6.8 | 6.1 | 7.6 | 6.8 | 6.8 | 7.1 |
| Industrial tariff | | | | | | | | | | | | | | |
| Standard | 369 | 328 | 326 | 295 | 301 | 299 | 291 | 84.9 | 82.2 | 46.1 | 84.7 | 73.8 | 99.2 | 85.7 |
| Special | 10 | 10 | 10 | 9 | - | - | - | 90.0 | 78.5 | 53.4 | 15.2 | - | - | - |
| Kenya bulk supply | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 217.8 | 217.0 | 158.3 | 288.7 | 178.7 | 213.3 | 217.5 |
| TOTAL | 92435 | 98401 | 60738 | 92600 | 93157 | 101601 | 104331 | 603.6 | 549.5 | 393.7 | 528.3 | 466.7 | 499.2 | 468.8 |

Sources: 1. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.
2. UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1984; Background to the Budget 1984-1985; Government Printer, Entebbe.

growth patterns in household electricity use are invariably linked to operations in the woodfuel industry.

### 4.2.3 Woodfuel

#### a) Urban sector

Between 1965 and 1982, consumption of commercial urban charcoal remained on the upward move (Figure 4.3 below), but its growth rate declined from 1970 onwards. For instance, the growth rate of 47.1% in 1975-80 represented a decrease of nearly 70% from that of 1970-1975 (Table 4.9). In part, and as was shown in both Chapter Three

Table 4.9 Percentage changes in urban commercial charcoal and fuelwood consumption in Uganda

| | 1965-70 | 1970-5 | 1975-80 | 1980-2 |
|---|---|---|---|---|
| Charcoal | 182.4 | 116.7 | 47.1 | 3.3 |
| Households | 181.8 | 112.9 | 47.0 | 3.1 |
| Commerce | 183.3 | 123.5 | 47.4 | 3.6 |
| Industry | - | - | - | - |
| Fuelwood | 7.5 | -17.5 | -35.6 | 3.9 |
| Households | 12.8 | -14.2 | -30.8 | 3.2 |
| Commerce | -5.1 | -27.0 | -51.9 | 7.7 |
| Industry | - | - | - | - |

Note: These percentage changes are based on charcoal and fuelwood consumption data (in TOE) shown in Tables 3.9 and 3.10 respectively.

and section 4.1 above, this owed to (i) a negative growth in industry and commerce, (ii) increasing distances between urban charcoal markets

and the rural sources (and therefore higher charcoal prices), and (iii) a deteriorating security situation which, among other things,

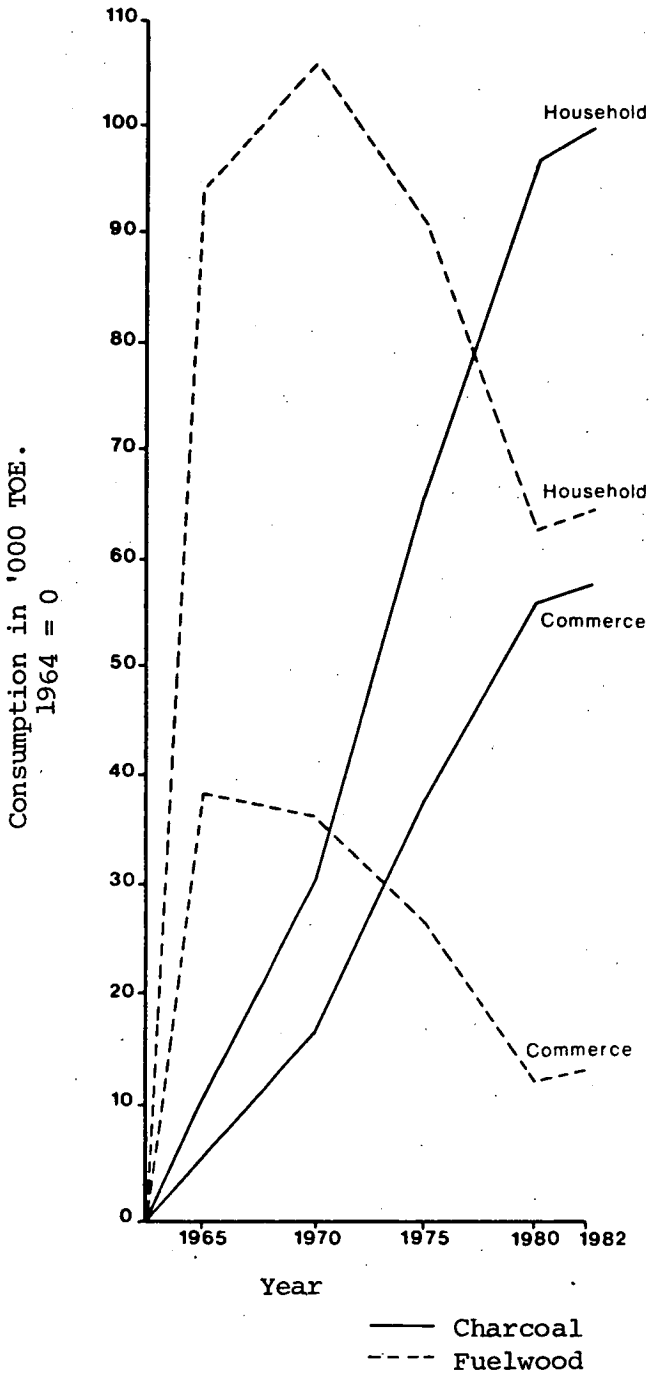


Figure 4.3 Trends in estimated urban commercial charcoal and fuelwood consumption, 1965-1982.

often resulted in irregularities in charcoal supplies. Furthermore, although rising prices of kerosene engendered a switch-over to charcoal use by a number of low- and middle-income urban households, their impact on overall charcoal consumption appears to have been minimised by the effect of low electricity tariffs. (The latter induced many households to take to electricity use.)

On the other hand, growth in urban commercial fuelwood[1] consumption from 1965 to 1980 was characterised by sharp declines (Figure 4.3 and Table 4.9 above). Reasons for this have already been cited, e.g.

(i) high charcoal use;

(ii) rising fuelwood prices due to receding margins of fuelwood resources ruralwards; and

(iii) presence of black marketeering and other illegal activities - referred to in Uganda as magendo - which saw many people in the lower income bracket gain relative affluence and, as a consequence, afford more consumption of non-fuelwood household energy types.

And, as for the post-1980 reversal in the downward growth trend, there are two principal causes. Firstly, the general economic recovery, among other things, has led to positive performance by commerce and, subsequently, more demand for fuelwood. Secondly, the economic measures introduced by the government after 1980 have had a serious impact on urban household fuelwood use. A good many people on the periphery of the magendo economy appear to have been edged out of the system, and, given the current high urban living cost in Uganda, they are likely to

[1] Sometimes, a few people procure non-commercial fuelwood, say, by gathering dry branches falling off urban trees. (The majority of these trees are eucalyptus.) However, it is difficult to assign a monetary value to such fuelwood unless one first studies its actual supply and procurement. For instance, this feature seems to have become increasingly noticeable after 1980.

have switched back to fuelwood use.

b) Rural sector

Growth in rural commercial charcoal use from 1965 to 1982 was lower than that experienced in the urban sector. For example, between 1970 and 1975, households increased their consumption by 80%, but, thereafter, growth declined (Table 4.10 below). In part, this rural-urban

Table 4.10 Percentage changes in rural commercial charcoal and fuelwood use in Uganda

| | 1965-70 | 1970-5 | 1975-80 | 1980-2 |
|---|---|---|---|---|
| Charcoal | 26.3 | 20.8 | -17.2 | 4.2 |
| Households | 66.7 | 80.0 | 66.7 | Nil |
| Commerce | 20.0 | 33.3 | 12.5 | 11.1 |
| Industry | 18.2 | -7.7 | - | - |
| Fuelwood | 8.7 | -17.9 | -11.8 | 2.0 |
| Households | 0.7 | -22.6 | -26.5 | 2.4 |
| Commerce | 10.3 | 12.5 | 15.3 | 4.8 |
| Industry | 14.4 | -23.8 | -13.5 | Nil |

Notes: a) These changes (in %) are based on data in Tables 3.9 and 3.10.
b) Owing to unavailability of statistics for charcoal use in industry for 1980 and 1982, the dashes appearing against industry for 1975-80 and 1980-2 do not necessarily imply that there was no growth change.

disparity is largely explained in terms of the predominance of fuelwood use in the rural areas. Thus, despite the comparatively higher decreases in fuelwood consumption by industry and commerce after 1965 (Figure 4.4 below), overall rural commercial fuelwood use remained high.

The reduction in fuelwood consumption by the rural commercial sector appears to have been a result of four possible factors. Between 1965

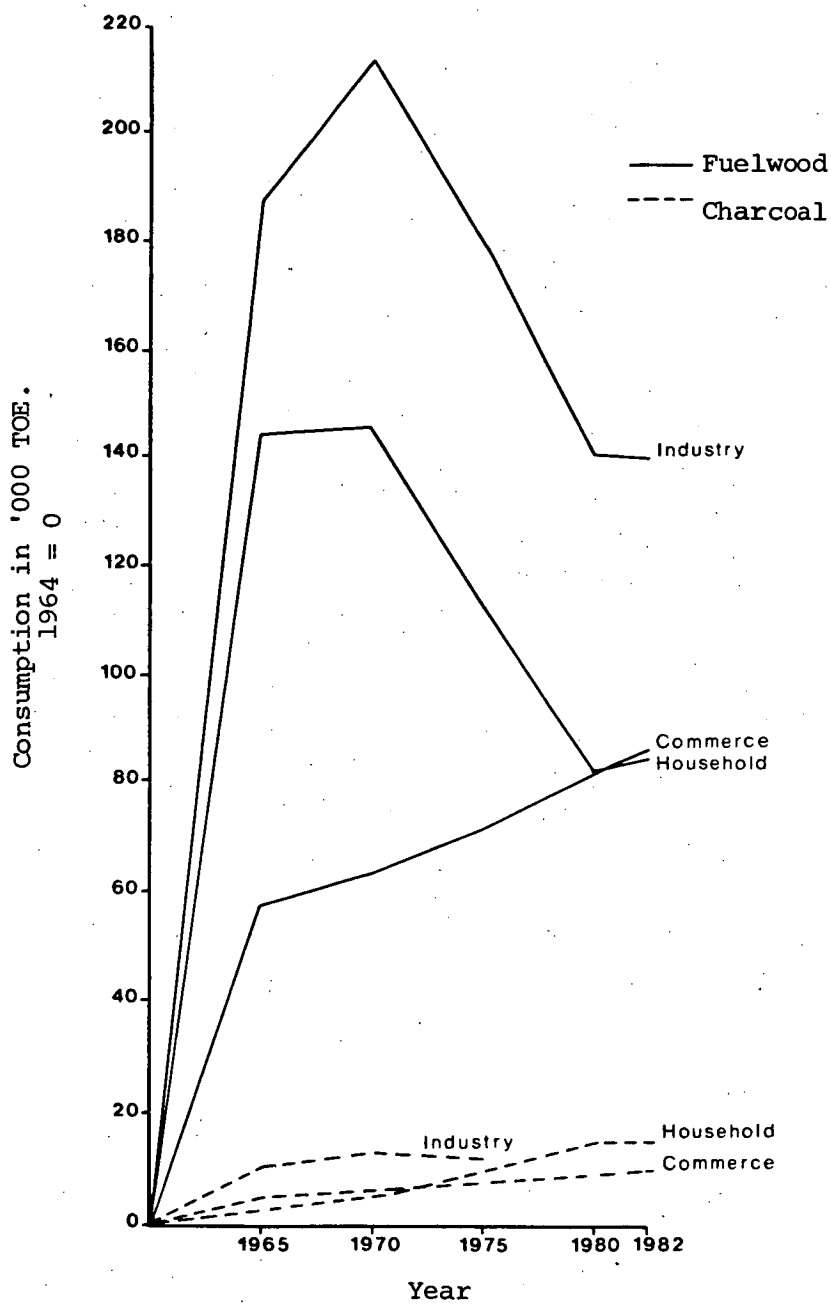


Figure 4.4 Trends in estimated rural commercial charcoal and fuelwood consumption, 1965-1982.

and 1975 especially, some households might have converted to charcoal use. Secondly, a few former fuelwood consumers switched over to electricity use. Thirdly, a proportion of those dependent upon fuelwood purchases could have gained access to non-commercial fuelwood supplies. Lastly, the decline in socio-economic development led to a relative decrease in staffing levels in a number of rural infrastructural establishments, thereby contributing to further reduction in fuelwood consumption.

However, the use of non-commercial fuelwood in the rural sector is one feature which, apart from possible increases in urban charcoal demand, needs to be addressed urgently at both national and subnational levels. Throughout the period in question (i.e. from 1965 onwards), growth in non-commercial fuelwood consumption remained high (Table 4.11 below), and, despite a substantial fall recorded for 1980-82, continued

Table 4.11 Changes (in %) in rural non-commercial fuelwood consumption in Uganda

| | 1965-70 | 1970-5 | 1975-80 | 1980-2 |
|---|---|---|---|---|
| Overall | 6.8 | 8.7 | 7.7 | 3.9 |
| Households | 5.0 | 6.7 | 5.3 | 3.2 |
| Commerce | 42.6 | 40.8 | 35.5 | 10.0 |
| Industry | 13.3 | 11.8 | 15.8 | 4.5 |

Note: These percentage changes are based on data in Table 3.10.

recovery of the economy nationwide should, other things being equal, provide a stimulus for more consumption. (It is also noteworthy that, since no reliable studies have been undertaken to determine the actual

rural fuelwood consumption in Uganda, the data, say, for 1980-82 could be an understatement of the true picture.)

## 4.3 The Significance of these Trends

The foregoing historical look at the trends in Uganda's energy industry provides a useful background to Parts Two and Three of this thesis, as well as future studies on either energy or socio-economic development nationwide. For example, an analysis of past fluctuations in energy demand and supply assists in energy policy formulation, planning and development. Through appropriate strategies (e.g. efficient energy use and more investment in small-scale energy projects), it is possible to ensure that a start is made on achieving a high degree of self-sufficiency in energy supply in future.

Additionally, the discussion in both Chapter Three and sections 4.1 and 4.2 above indicates that a very close link exists between energy consumption and the welfare of the people in Uganda. A healthy energy industry, for instance, contributes very significantly towards more employment (e.g. in the manufacturing sector), thus improving the purchasing power of those concerned. When energy is in short supply, particularly in the transport sector, one consequence is in the form of high prices for various producer goods and consumables. What this means is that, contrary to what has been happening in the past, energy must figure significantly in nearly all socio-economic planning and development in Uganda.

The importance of various kinds of data lies partly in the extent to which facts are gathered and presented in a language understandable to a given audience. Notwithstanding their usefulness, estimates, such as are used in Tables 3.2, 3.5, 3.6, and 3.9 have shortcomings. For

example, they do not mirror the true picture of what they are about. Consequently, and particularly for planning purposes, effort must be made to gather as much factual information about different issues as is possible. This will help, say, in determining the magnitude of a problem (e.g. fuelwood shortages) and devising appropriate remedies. Thus, Part Two of this thesis, especially, can be regarded as a first step in this direction.

From what has been said in Chapter Three and the first two sections of this chapter, five key features may be identified regarding the energy industry in Uganda. These are:

a) the known energy resource base is limited;
b) both commercial and non-commercial energy consumption will rise in line with the economic recovery in the country;
c) agriculture, Uganda's economic mainstay, is inextricably linked to woodfuel, in particular, while improper management of the land resource implies less crop yields, reduced foreign earnings, and, most likely, cutbacks in expenditure on petroleum imports;
d) household electricity use nationwide will remain low; and
e) fuelwood, especially, will continue to be Uganda's leading energy source for the foreseeable future, even though its present demand is higher than supply.

Each of these factors has merits and demerits. For instance, owing to the high costs involved in the exploration for fossil fuels, Uganda cannot afford to raise sufficient domestic resources for both this undertaking and maintenance (and further development) of the existing energy supply sources. On the other hand, the negative effects of this and other constraints can be minimised through efficient use of the energy types available. In addition, the current fiscal mechanisms of influencing commercial energy consumption need to be supplemented with action, by

the national government, regarding the level of priority that each of the two energy sectors (i.e. commercial and non-commercial) is to receive in the short-, medium-, and long-term.

Energy policy formulation and planning offer a very useful means through which Uganda's energy needs can be met in a sustainable manner. One observation about the aforementioned general and specific trends in the country's energy industry is that, comparatively speaking, more data already exists about the commercial than non-commercial energy sector. Also, and especially at the national level, the impact of shortfalls, say, in the supply of petroleum products is felt much more readily than is the case with fuelwood. Furthermore, heavy reliance upon electricity use in industry and for urban domestic consumption is one reason why plans are already underway for a second major power-generating station in the country. Thus, in terms of tackling Uganda's real energy needs in the 1980s, what the government has done thus far is inadequate since the fuelwood sector is still relegated to a position inferior to that of petroleum products and electricity.

One factor to explain the low-key attention hitherto given to fuelwood demand-supply operations is that not many people in Uganda, at both national and subnational levels, think, let alone believe, the country has a fuelwood problem. Ipso facto, the latter appears to be very localised, while those peasants already affected by it lack an effective medium through which to air their views to the politicians especially. It is also noteworthy that, similar to what happened during the 1970s, the majority of the population in Uganda are increasingly focusing their attention and energies on individual survival, especially now and in the immediate future. In pursuit of this, however, both the "haves" and "have-nots" hardly consider the importance of resource sustainability, especially where there is no direct monetary value attached. Lastly, both the causes and effects of fuelwood shortages are not always easily defined in temporal terms. Thus, it is uncertain that,

particularly at the national level, rising fuelwood shortages can be perceived as a problem and redressed in time. Accordingly, by looking at the fuelwood situation at a subnational level, Part Two of the thesis adopts a "bottom-up" approach towards identifying this problem and its impact (both actual and potential).

# PART TWO

# FUELWOOD DEMAND AND SUPPLY IN BUSHENYI AND MBARARA DISTRICTS

# CHAPTER FIVE

## AN INTRODUCTION TO THE ASSESSMENT OF THE FUELWOOD SITUATION IN BUSHENYI AND MBARARA DISTRICTS

Fuelwood demand and supply in both Bushenyi and Mbarara Districts are closely linked to physical and human geographical aspects like climate and population distribution. These factors play a twofold role. Firstly, they provide an important explanation for current differences, say, regarding the supply of fuelwood within any one given area. Secondly, they are central to almost all suggestions that may be advanced for solving fuelwood scarcities. Thus, by citing and discussing these influences, this chapter forms a very useful background to what follows hereafter.

The chapter is divided into two sections. Those aspects of physical geography which interact with fuelwood in the districts of Bushenyi and Mbarara are dealt with in the first section. This is followed by section two which looks at human factors that do have a bearing on the demand for and availability of fuelwood.

### 5.1 Physical Geography

#### 5.1.1 Location

Bushenyi and Mbarara Districts are located in south-west Uganda (Figure 5.1 below), i.e. over 200 kms from Kampala, the national capital city. Apart from having borders with neighbouring districts (e.g. Kasese to the north of Bushenyi and Rakai east of Mbarara), Bushenyi and Mbarara

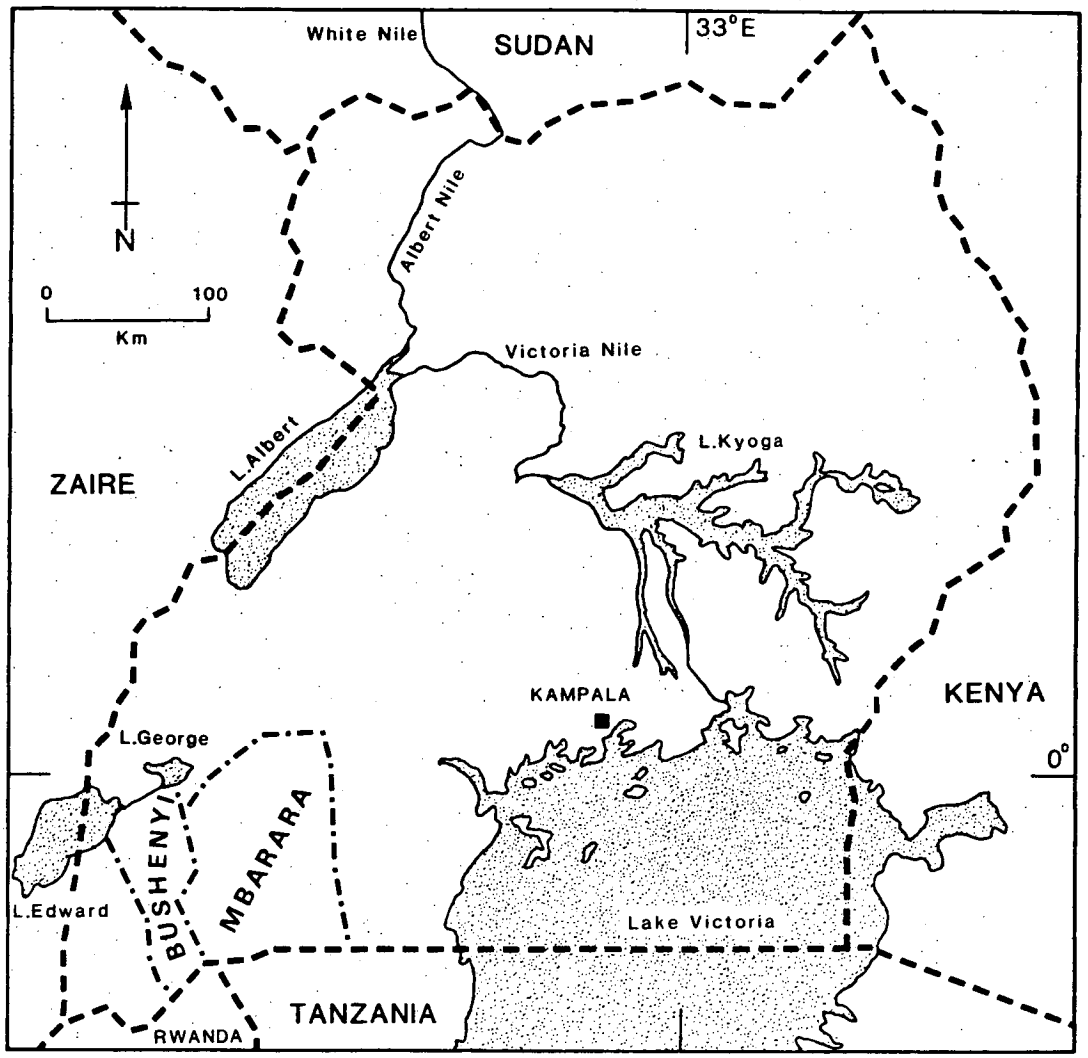


Figure 5.1 Map of Uganda showing the location of Bushenyi and Mbarara Districts.

also share international boundaries with Zaire and Tanzania respectively (Figure 5.1 above).

5.1.2 Size

In 1980, the area of Bushenyi District was given as 5079 $km^2$ and that of

Mbarara District as 10 121 km$^2$, with Mbarara being nearly twice the size of Bushenyi[1]. As is the case with other districts in Uganda[2],

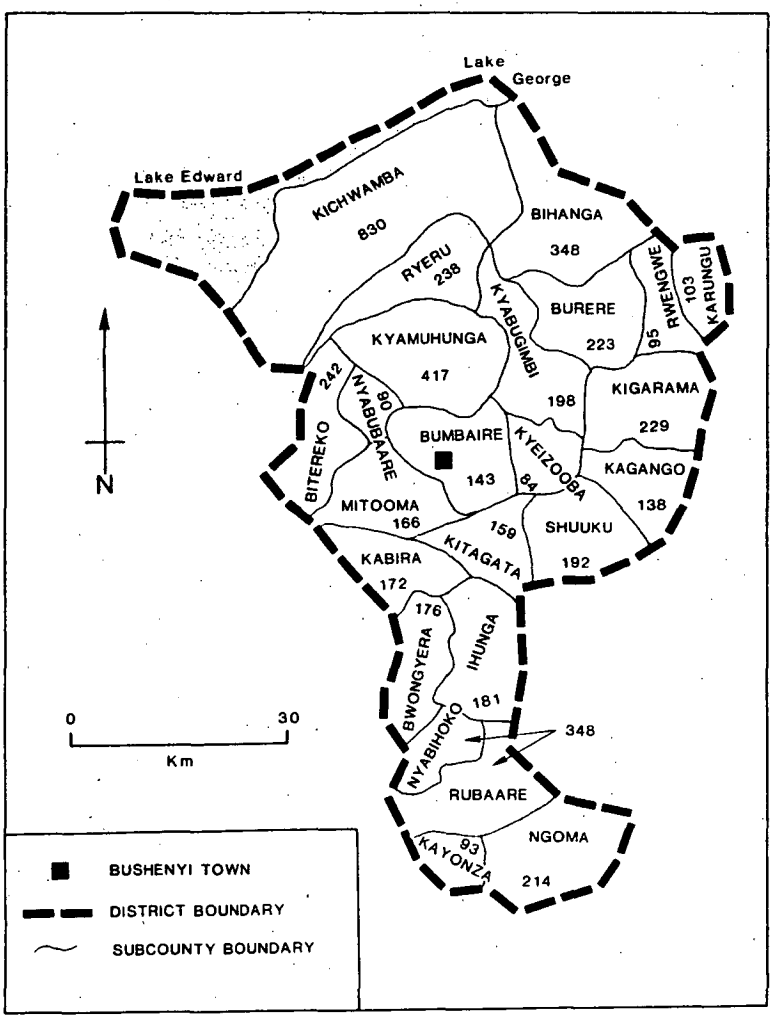


Figure 5.2 Map of Bushenyi District showing subcounties. Figures refer to area (in square kilometres).

Bushenyi and Mbarara are each subdivided into subcounties of varying sizes. For example, within Bushenyi District (Figure 5.2 above), the

[1] UGANDA ELECTORAL COMMISSION, 1980; Report of the Electoral Commission 1980; Government Printer, Entebbe.

[2] Kampala District, which includes Entebbe Township, consists of about 84 divisions. For purposes of the 1980 general elections, these were equated with subcounties.

smallest subcounty is Kyeizooba (84 $km^2$), while Kichwamba, with 830 $km^2$, is the largest. And, as for Mbarara District (Figure 5.3 below), Kakiika

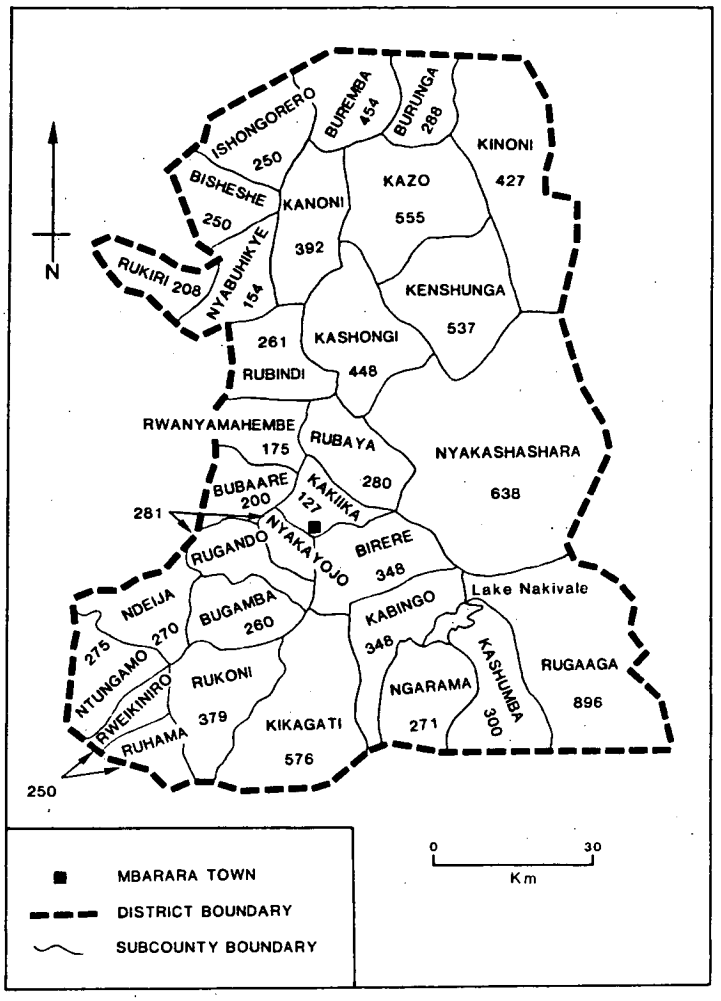


Figure 5.3 Map of Mbarara District showing subcounties. Figures refer to area (in square kilometres).

Subcounty (127 $km^2$) is the smallest, with Rugaaga, in the south-east, being the largest with 896 $km^2$.

These differences in area are of prime significance to fuelwood supply especially. On the one hand, a small physical area sets spatial limits

to human settlement and size of per capita land ownership and/or use. As a consequence, fuelwood supplies within such areas are bound to be constrained. On the other hand, a physically large area offers more room for human settlement and economic activity, and, depending on soil quality, land tenure system and population density, may facilitate more production (and supply) of fuelwood.

### 5.1.3 Climate

Generally, Bushenyi and Mbarara Districts have an equatorial-cum-continental type of climate that is found throughout most of Uganda. However, apart from what was mentioned in Chapter Two (e.g. a double rainy season and three-month dry spell), there are local influences which, singly or jointly, create climatic differences within both districts. For example, the northern and north-western parts of Bushenyi District receive moisture-bearing winds blowing across Lakes Edward and George (Figure 5.2) and, as such, tend to be wetter than most other parts in the district. But, unlike Bushenyi, Mbarara District is far removed from such water surfaces[1], with the result that its dry season, especially, is both harsh and longer than the average three months, while rainfall totals tend to be lower than those received in Bushenyi District.

These climatic characteristics have a lot of implication for the production and supply of fuelwood (and other land-based items). For

[1] There is Lake Nakivale in south-east Mbarara District, but its influence is greatly minimised by its comparatively small size and the mountainous nature of the surrounding area.

instance, areas with more rainfall generally have more soil moisture, thereby facilitating more woody plant growth and survival. This is true, for example, in most of Bushenyi District. On the other hand, many places in North, Central and South-east Mbarara District are disadvantaged by water shortages - more so during the dry season - and, consequently, chances of fuelwood plant growth and survival therein are greatly reduced.

The factor of water availability influences fuelwood supply in other ways too. Throughout most of Mbarara District, for example, there is heavy reliance upon temporary water sources - usually in shallow wells which, more often than not, are unhygienic. Availability of such water is almost entirely dependent upon the onset, reliability and duration of the rainy season. In many areas (e.g. Kabingo Subcounty), water scarcities mean long distances being walked in search of water for both man and domestic animals. This implies that, in areas where fuelwood sources are already in decline, not all the families can afford sufficient labour throughout the year for procuring domestic fuelwood requirements and fulfilling other daily chores.

### 5.1.4 Soils

Edaphically, most of Bushenyi District is endowed with fertile soils which support a variety of crops (e.g. bananas, millet, coffee and tea). South Bushenyi, however, is dominated by poor, often sandy soils which are also to be found in many parts of Mbarara District (e.g. Nyakayojo Subcounty). In part, these soil differences are due to the nature of the parent rock. For instance, most soils in North Bushenyi

District tend to be of a volcanic nature. Secondly, poor soils in many areas of Mbarara District are one result of overcultivation and/or overstocking and overgrazing, while, in South Bushenyi, soil erosion - mainly by rainwater - explains the poor edaphic conditions, say, in Ngoma Subcounty. Therefore, while fuelwood plant growth in edaphically rich areas is often possible throughout the year, this is usually not so for other places. For example, soils in Central Mbarara District have a loose texture and, as a result, tend to dry up quickly even in the early part of the dry season.

## 5.2 Human Geography

### 5.2.1 Population

#### a) Total population

In 1969 and 1980, Bushenyi District had a total population of 410 170 and 523 170 respectively, and the corresponding figures for Mbarara District were 450 462 and 687 803[1]. (It is estimated that, as of 1984, the population of Bushenyi was 585 900 and that of Mbarara 798 300[2].) During the 1969-80 intercensal period, the population of Bushenyi rose by nearly 2.4% and that of Mbarara by 4.2% annually (Table 2.3). Since the supply of land area in each district is inelastic, these high population growth rates are bound to exacerbate the existing fuelwood supply-demand disequilibrium in many subcounties of both districts.

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

[2] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1984; Background to the Budget 1984-1985; Government Printer, Entebbe.

b) Population distribution

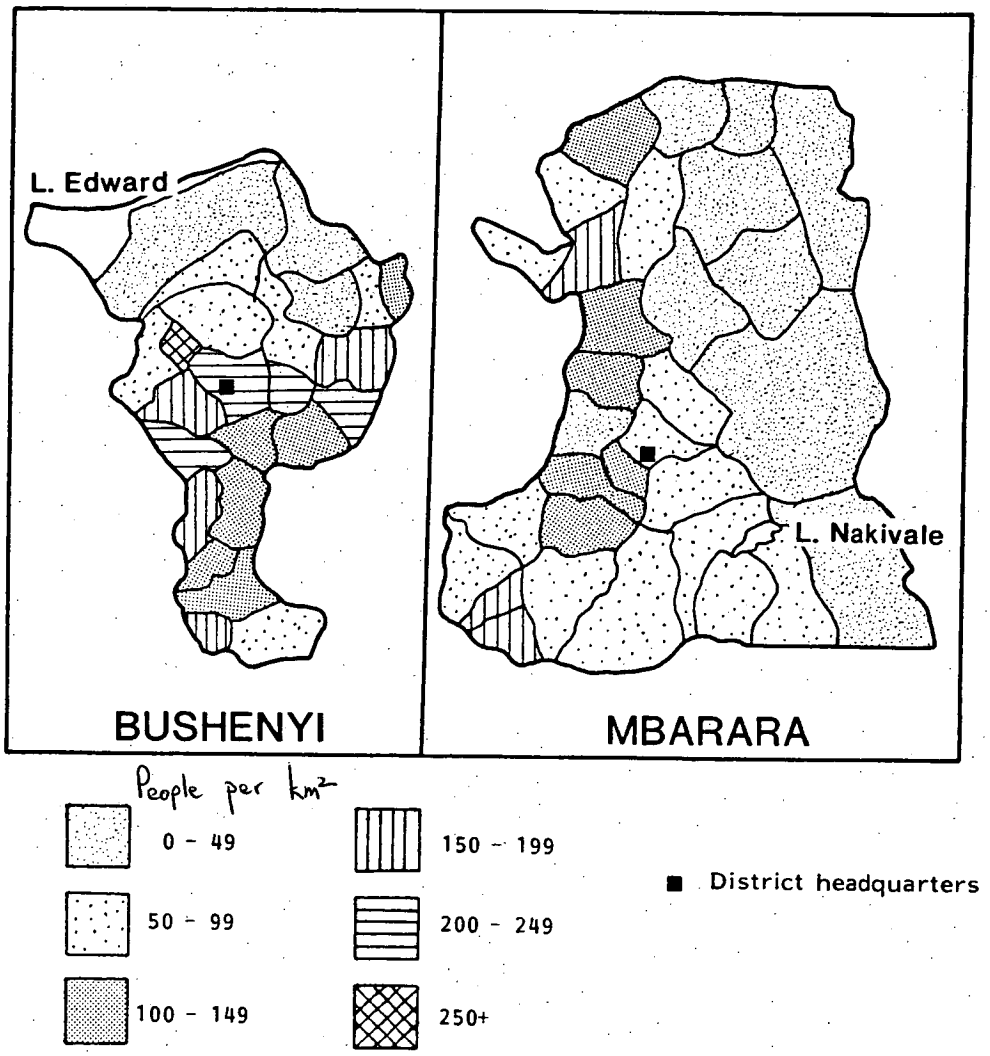


Figure 5.4 Population density by subcounty in Bushenyi and Mbarara Districts, 1980.

Uneven population distribution is characteristic of both Bushenyi and Mbarara Districts (Figure 5.4 above). For example, Nyabubaare Subcounty (Central Bushenyi District) has a population density of 275, making it the most densely populated subcounty in the whole district (Table 5.1

below). On the other hand, Bihanga/Rukiru Subcounty, with 26 p/km$^2$,

Table 5.1 Bushenyi District: subcounties, population, area, and population densities, 1980.

| Subcounty | Population | Area (km$^2$) | Population density |
|---|---|---|---|
| North | | | |
| Kichwamba | 30 925 | 830 | 37 |
| Ryeru | 21 236 | 238 | 89 |
| Kyamuhunga | 26 849 | 417 | 64 |
| Bitereko | 22 371 | 242 | 92 |
| West | | | |
| Mitooma | 29 520 | 166 | 178 |
| Kabira | 35 888 | 172 | 209 |
| Kitagata | 22 625 | 159 | 142 |
| Shuuku | 23 188 | 192 | 121 |
| Central | | | |
| Burere | 8396 | 223 | 38 |
| Kyabugimbi | 19 168 | 198 | 97 |
| Kyeizooba | 18 000 | 84 | 214 |
| Bumbaire | 29 635 | 143 | 207 |
| Nyabubaare | 24 746 | 90 | 275 |
| East | | | |
| Bihanga/Rukiru | 9076 | 348 | 26 |
| Rwengwe | 6544 | 95 | 69 |
| Karungu | 10 913 | 103 | 106 |
| Kigarama | 37 645 | 229 | 164 |
| Kagango | 29 764 | 138 | 216 |
| South | | | |
| Bwongyera | 28 977 | 176 | 165 |
| Ihunga | 23 619 | 181 | 131 |
| Nyabihoko / Rubaare | 17 035) / 17 945) | 348 | 101 |
| Kayonza | 14 322 | 93 | 154 |
| Ngoma | 14 108 | 214 | 66 |

Notes: a) Data on population and area is derived from Report of the Electoral Commission 1980, and population density has been calculated using that data.
b) The divisions North, West, etc. refer to constituencies demarcated by the Uganda Electoral Commission for the 1980 general elections.

is the least densely populated subcounty. This dichotomy is also evident in Mbarara District where, with Mbarara Town excluded, Nyabuhikye Subcounty, with 150 p/km$^2$, has the highest population density for any single subcounty in the district (Table 5.2 below). Kinoni Subcounty, with 19 p/km$^2$, has the lowest population

Table 5.2 Mbarara District: subcounties, population, area, and population densities, 1980.

| Subcounty | Population | Area ($km^2$) | Population density |
|---|---|---|---|
| North | | | |
| Ishongorero | 26 310 | 250 | 105 |
| Kanoni | 29 965 | 392 | 76 |
| Buremba | 10 759 | 454 | 24 |
| Burunga | 6640 | 288 | 23 |
| Kazo | 14 343 | 555 | 26 |
| Kinoni | 8017 | 427 | 19 |
| Kenshunga | 14 970 | 537 | 28 |
| North-west | | | |
| Rubindi | 37 063 | 261 | 142 |
| Rukiri | 16 590 | 208 | 80 |
| Nyabuhikye | 23 142 | 154 | 150 |
| Bisheshe | 20 826 | 250 | 83 |
| West | | | |
| Mbarara Town | 23 155 | 23 | 1007 |
| Nyakayojo | 21 270) | 281 | 131 |
| Rugando | 15 467) | | |
| Bugamba | 27 465 | 260 | 106 |
| Ndeija | 26 808 | 270 | 99 |
| South-west | | | |
| Ntungamo | 25 295 | 275 | 92 |
| Rweikiniro | 16 876) | 250 | 154 |
| Ruhaama | 21 621) | | |
| Rukoni | 23 363 | 379 | 62 |
| South | | | |
| Birere | 34 563 | 348 | 99 |
| Kikagati | 57 089 | 576 | 99 |
| South-east | | | |
| Kabingo | 20 778 | 348 | 60 |
| Ngarama | 16 604 | 271 | 61 |
| Kashumba | 21 705 | 300 | 72 |
| Rugaaga | 25 552 | 896 | 29 |
| Central | | | |
| Kashongi | 18 259 | 448 | 41 |
| Nyakashashara | 15 609 | 638 | 25 |
| Rubaya | 19 398 | 280 | 69 |
| Rwanyamahembe | 20 648 | 175 | 118 |
| Bubaare | 9284 | 200 | 46 |
| Kakiika | 7829 | 127 | 62 |

Notes: a) Data on population and area is derived from Report of the Electoral Commission 1980, and population density has been calculated using that data.
b) The divisions North, North-west, etc. refer to constituencies demarcated by the Uganda Electoral Commission for the 1980 general elections.

density. To a great extent, the aforementioned differences in the edaphic and climatic characteristics within each district underscore these demographic features.

Population distribution is of great significance to both fuelwood supply and consumption. Areas with high population densities (e.g. Kagango and Kyeizooba Subcounties in Bushenyi District and Rubindi and Rwanyamahembe Subcounties of Mbarara District) have considerable pressure upon land for the production of (i) food and cash crops, and (ii) building and construction materials, as well as provision of pasture for livestock. One effect of this is that the existing fuelwood resource base in the area(s) so affected can easily be degraded through more land clearance for both settlement and agriculture, as well as by peasant grazing practices. Also, assuming that such densely populated subcounties have high annual population growth rates, land shortages are almost unavoidable. For instance, this has already eventuated in Nyabubaare Subcounty of Bushenyi District. Since fuelwood production also requires land, it is more than likely that, in land-scarcity areas, land-use decisions will continue to place fuelwood farming, if any, after human settlement and agriculture. Therefore, a high population density can easily disallow adequate fuelwood production and supply, while, at the same time, increasing demand for it.

### 5.2.2 Urbanisation

In 1980, nearly 0.8% of the population in the district of Bushenyi was urban, while, for Mbarara District, the corresponding proportion was 3.5% (Table 2.3). As is the case throughout Uganda, the district administrative headquarters in both districts are, at the same time, the leading urban centres (i.e. Bushenyi Town for Bushenyi District and Mbarara Town for Mbarara District). The higher urban population in Mbarara District derives from the historical past. Prior to 1967,

present-day Bushenyi and Mbarara Districts were one administrative area known as Ankole Kingdom. The birth of the Republic of Uganda in 1967 marked a constitutional end to Ankole and other kingdoms (and also chiefdoms). Thereafter, the name changed to Ankole District, but the administrative headquarters remained at Mbarara[1]. During the 1970s, however, the district was officially subdivided into East and West Ankole Districts, but, partly owing to the nationwide politico-economic situation then, no significant steps were taken to develop Bushenyi, then a trading centre, into the district headquarters of West Ankole. Thus, Mbarara Town, in effect, continued to serve both districts. One impact of this was that, throughout both East and West Ankole Districts, urban growth remained centred around Mbarara Town.

It was the 1979 administrative exercise by the national government which, apart from changing the name West Ankole to Bushenyi District, marked a watershed as far as urban growth in Bushenyi District goes. Since then, efforts have been made to develop Bushenyi Town as the district administrative and commercial headquarters. However, urbanisation throughout Bushenyi District might take time before it reaches the level currently obtaining in Mbarara District. While both districts still rank low with regard to industrialisation, geographical inertia[2]

[1]The actual site of the district administrative head offices is known as Kamukuzi, but it lies within the Greater Mbarara Town area.

[2]Mbarara Town lies along the main road from Kampala City to Kabale Town and on to Rwanda (Figure 2.1). Economically, this is an important route that carries Rwanda's transit trade which passes through Kenya's Indian Ocean port of Mombasa. In addition, Mbarara Town already has a more established socio-economic infrastructure (e.g. schools, health facilities and services, commercial buildings, restaurants and lodges, street lighting, etc.) upon which further development will be based. Regionally, Mbarara Town has also long been acknowledged as the headquarters of the four districts (i.e. Bushenyi, Kabale, Mbarara and Rukungiri) which make up what can be called Southern Uganda. All these factors combine to give Mbarara Town a geographical 'pull' or inertia.

favours Mbarara Town and a few other trading centres (e.g. Ntungamo) in Mbarara District. Thus, growth in urban demand for both fuelwood and charcoal will remain highest within Mbarara District. Unfortunately, the fuelwood resource base in many places in this district now is of poor quality, owing largely to less favourable edaphic and climatic conditions than are obtaining in Bushenyi District.

### 5.2.3 Land Use and Management

#### a) Land use

Apart from human settlement, crop cultivation is a principal user of land and both cash and food crops are grown. For example, coffee and tea are cultivated in Bushenyi District, while Mbarara, though not a tea producer, has coffee, onions and others alike. Throughout both districts, finger millet, bananas, and sweet potatoes are the leading food crops, while pulses (e.g. beans and peas) and groundnuts are found almost everywhere. With such crops as bananas, potatoes, millet, groundnuts, and pulses becoming highly cashable during the 1970s, the tendency has been one of more land clearance so as to increase acreage per crop. This has already contributed to a diminution of fuelwood sources in many areas (Chapter Six).

Peasant farmers also practise livestock-keeping. Cows and goats are the most widespread domestic animals, with sheep having a limited distribution. (Pig-keeping is still minimal in both Bushenyi and Mbarara Districts.) These animals are owned mostly on a household basis, and, over a wide area, grazing is done commonly (i.e. animals are allowed to graze wherever there is pasture). Although most of the

land is privately owned, it is only with the recent introduction of fencing land with barbed wire that movement of grazing animals is becoming very restricted.

Owing to generally low numbers of livestock (e.g. cattle) versus vast stretches of unused land in some subcounties (e.g. Kabingo Subcounty in South-east Mbarara District), common grazing has survived until now. However, with the increase in both human and livestock population, landlessness and more barbed-wire fences cannot be ruled out. Given that not all households with domestic animals are financially sound, a decrease in pasture will most likely lead to overgrazing, especially in sandy areas where the dry season is often long and harsh. This will not only lead to destruction of various woody species, but plant regeneration will be greatly reduced.

Many households in the districts of Bushenyi and Mbarara have eucalyptus woodlots which are principal sources of building and construction materials. These woodlots are usually small - about 0·5-1·0 hectares per household. Owing to lack of sustained tree-planting activities country-wide[1], such woodlots occupy only a small proportion of an individual's land area. If these woodlots are to become major sources of household fuelwood in future, (i) their size will have to be increased, and (ii) some form of modern woodlot management will need to be practised.

[1]Tree-planting programmes in Uganda were sharply scaled down during the 1970s owing to lack of the necessary resource inputs. Since the start of the 1980s, there have been measures taken to revive them, but the progress made thus far is not impressive. As in the 1970s, scarcities in finance and other requirements are still a major impediment.

b) Land management

Within any one subcounty in Bushenyi and Mbarara Districts, land husbandry varies according to such factors as

(i) type and level of peasant agriculture;
(ii) size of the land;
(iii) educational standard of the land user;
(iv) spatial location of a given piece of land;
(v) type of available labour force;
(vi) population density and settlement patterns;
(vii) degree of accessibility to extension services provided by trained agricultural and other relevant personnel; and
(viii) soil and climatic conditions.

An example may help to illustrate some of these points. Where termites are non-existent at any given time, mulching[1] is widely practised (e.g. Kabingo Subcounty in South-east Mbarara District). Generally, this process promotes low-cost soil fertilisation, thus minimising the urge for further land clearance. Therefore, mulching can be regarded as contributing, albeit indirectly, to the presence and survival of such fuelwood sources as woodlands. On the other hand, places wherein mulching is virtually impossible are often characterised by high rates of annual land clearance, thereby leading to a diminution of the fuelwood resource base. This is especially so if land is in short supply and the population density high (e.g. Bumbaire Subcounty in Central Bushenyi District), or where, owing to grazing activities, there is no grass

[1] This is a process which involves covering the soil with crop residue (e.g. bean and maize stalks), fresh banana leaves or grass. While the main aim is to prevent soil erosion, the mulch allows soil organisms to act upon it, thereby contributing to soil fertility. During the dry season especially, mulching reduces loss of moisture from the soil and, as a result, the crops affected (e.g. bananas and coffee) hardly experience water-related seasonality in their growth.

available for mulching (e.g. Kazo Subcounty in North Mbarara District).

Another factor worth considering concerns bush fires. As already noted, these are used mostly during the dry season to open up land for the cropping season that commences around November annually. In 1974, the then military government passed a decree which prohibited unauthorised burning of grass[1] throughout Uganda. The objectives of this legislation were sound. For example, it aimed at (i) reduction of edaphic degradation and (ii) minimisation of bush fire-related property losses. Unfortunately, the decree was hardly effected for two major reasons. Firstly, growing civilian disenchantment with military rule disallowed broad-based implementation of such a measure. Secondly, the legislators did not spell out to the lay people the manner in which the decree was to be carried out. In a society where literacy rates are low, income and wealth are distributed unequally, and the seat (i.e. Kampala) of the national government is far removed from most parts of Uganda, public understanding of such legal provisions is an invaluable requirement for their successful execution.

One direct demerit of bush fires is the indiscriminate destruction of woody and other vegetation. In places with low population densities vis-a-vis large stretches of unused land (e.g. Kinoni Subcounty of North Mbarara District), the bush fire effect on fuelwood supplies is often not felt immediately. However, bush fire-related fuelwood diminution exists mainly in densely populated areas which, in addition, have serious land shortages (e.g. Nyabubaare Subcounty in Central Bushenyi District). Although, nowadays, bush fires are less widespread than, say,

[1] Grass was used to refer to all vegetation other than trees. For example, grass tends to dominate the undergrowth in many woodlands in Uganda.

twenty years ago[1], their role as a major threat to the survival of many fuelwood supply sources must be reckoned with.

Therefore, various factors within both the physical and human environment anywhere (e.g. Bushenyi and Mbarara Districts) are decisive in almost all land-based activities. For instance, the interaction between soils and population density underscores the production of fuelwood in any rural area. Since such factors are unequally distributed in space, it is expected that fuelwood supply and demand are uneven throughout Bushenyi and Mbarara Districts. It is this feature that is dealt with in the next chapter.

[1]Four reasons explain the decline in the use of bush fires. Firstly, there has been a decrease in the number of virgin lands which previously necessitated use of bush fires to open them up for cultivation. Secondly, most people who still have such land areas are now financially capable of employing hired labour for their clearance. Thirdly, growth of the brick- and charcoal-making activities has resulted in some form of 'planned' management of such areas. Lastly, changes in socio-economic relations have, albeit inadvertently, led to many cases of bush fire-related property losses being settled in a court of law. The huge sums of money imposed by the courts as fine are a deterrent to many would-be users of these fires.

# CHAPTER SIX

## BUSHENYI AND MBARARA DISTRICTS: FUELWOOD CONSUMPTION AND SUPPLY, AND EFFECTS OF FUELWOOD SHORTAGES

As is the case with most other parts of Uganda, the fuelwood used in the districts of Bushenyi and Mbarara has been and remains largely non-commercial. Its consumption, which is on the rise, is determined by factors which include type of end-use, household size and available wood supplies. Its supply is mainly dependent upon such influences as levels of demand, and this holds true for both commercial and non-commercial fuelwood. Unfortunately, some areas in Bushenyi and Mbarara Districts are already experiencing an imbalance between the demand for and availability of this predominantly domestic energy item. These issues are considered in the three sections that constitute this chapter.

### 6.1 Fuelwood Consumption

#### 6.1.1 End-uses

The household sector remains the dominant consumer of fuelwood in both Bushenyi and Mbarara Districts. Cooking of different kinds of food (e.g. bananas and meat) is the main end-use. Boiling of milk, tea/coffee, drinking water and the like is uneven in the two districts. For instance, drinking of raw milk is still practised among a good many cattle-owning families, while finger-millet porridge (locally known as obushera) is a major non-alcoholic drink consumed throughout the districts of Bushenyi and Mbarara. Fuelwood is also used for roasting maize and meat, as well as food flavouring and preservation. At the

same time, it is still an important source of household lighting in the rural areas, particularly among families which are too poor to afford kerosene at all times.

Other uses of fuelwood in both districts include heating of water for a bath, roof-thatch maintenance, and medication by traditional medicine-men. Generally, space-heating is low-key, while, nowadays, iron-smithing and pottery are less important and, as such, their consumption of fuel-wood is low. On the other hand, wood plays a major role in sorghum-roasting[1] and distillation of a native alcohol known as waragi. In Kyamuhunga Subcounty of North Bushenyi District, tea-curing is practised and involves use of fuelwood, while expansion of fish-smoking activities in Kichwamba Subcounty - also in North Bushenyi - and elsewhere has been accompanied by increased consumption of this energy item. Brick- and charcoal-making activities, such as are undertaken in Bumbaire and Bitereko Subcounties of Bushenyi District, also use wood. And, despite the impact of the electronic age, a wood fire still remains a focus for certain forms of socio-cultural intercourse (e.g. riddling and story-telling), while, during bereavement, a fire is normally kept burning at the home of the deceased for at least three nights[2].

[1] Within both Bushenyi and Mbarara Districts, sorghum is mostly used for brewing tonto, the oldest and most popular native alcohol in the two districts. Before it is ground into a semi-powder form, the sorghum is first roasted over a wood fire. (It is this tonto that becomes the raw material for waragi.)

[2] The number of such nights is traditionally determined by the age and/or status of the deceased. For a child, it is usually three nights, while, in the case of a male head of the family, it is about five. It is around these fires that friends and relatives of the deceased gather mainly for informal talk, especially in the evenings.

## 6.1.2 Cooking 'Stoves' and Utensils

### a) 'Stoves'

In almost each and every home where wood is the principal energy type, open fires are the only 'stoves' used for most cooking and heating activities. Each open fire usually consists of three pieces of termite mounds, but it is also common to find two open fires made up of only four such pieces (Figure 6.1 below). In most kitchens, these fires are

Figure 6.1 Part of the inside of a kitchen in Mbarara District. Here, four pieces of termite mounds have been so arranged as to make two open fires.

located as is shown in Figure 6.2 below. Every kitchen has 2-3 open fires at any given time, with one usually bigger than the rest. For

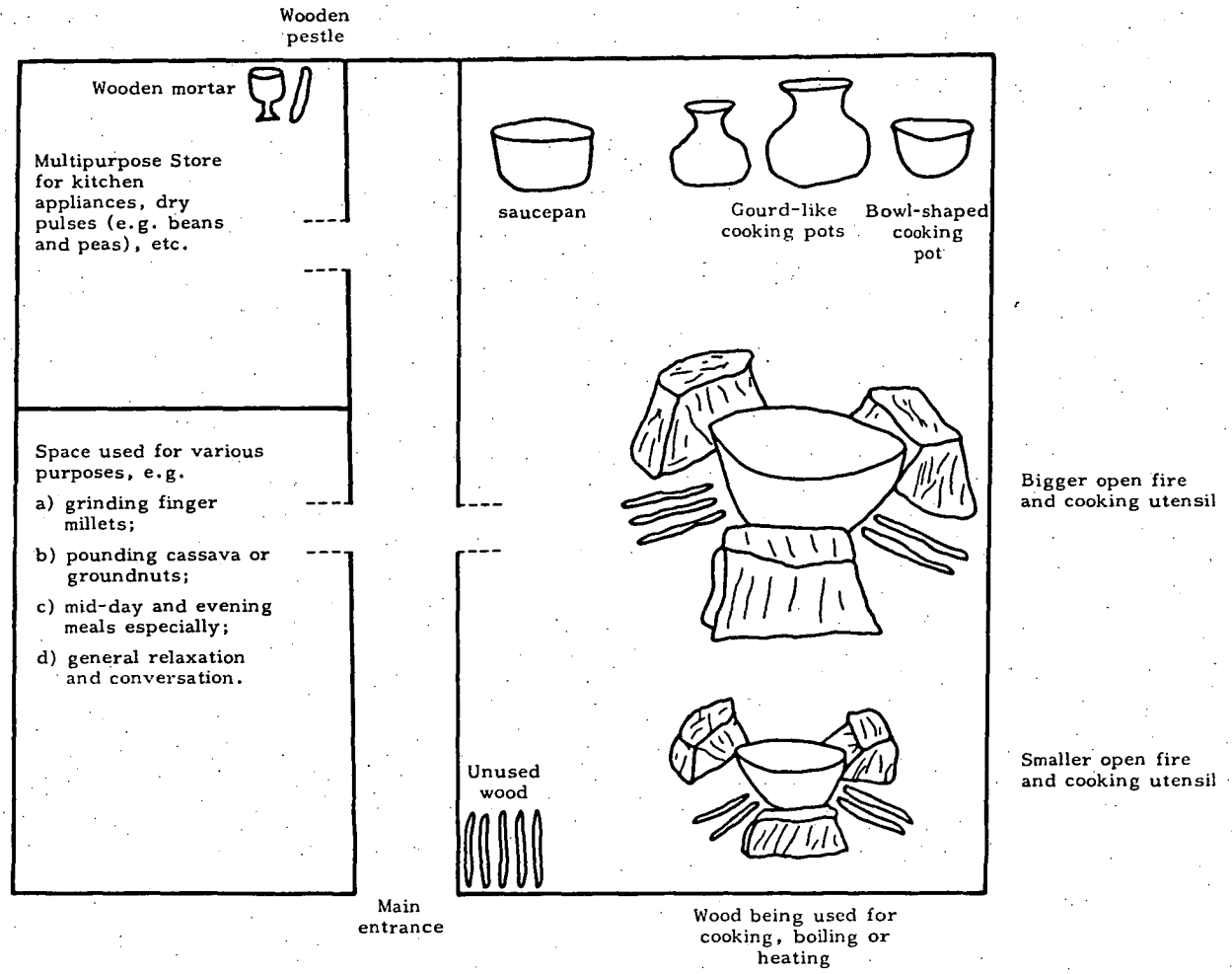


Figure 6.2 Top view of the inside of a typical kitchen in Bushenyi and Mbarara Districts, Uganda.

the evening cooking especially, the big open fire is used for cooking the main food (e.g. bananas or sweet potatoes), while one of the smaller

ones is used for preparing sauce. Should need arise, the third open fire, where it exists, can be used for heating water, say, for an evening bath, or boiling milk or tea/coffee for a visitor. (The size of the mounds making up these open fires is largely determined by the size of the cooking utensil in use. Also, these mound pieces can be moved inwards or outwards to fit the size of a given utensil.) Pieces of wood are fed into the fire from any of the three open spaces, but it is usually the space directly in front of the cook that is used most (Figure 6.1 above).

One important merit of these open fires is their multipurpose nature. This comprises rapid boiling, light provision, radiant space-heating, insect control, and the like. Furthermore, they are easy to set up and quite ideal for situations involving only temporary cooking[1]. But, owing to their open nature, these fires have disadvantages too. For example, maximum target cooking, boiling and/or heating are impossible since heat escapes through the spaces between the three pieces of termite mounds. Secondly, they can easily engender accidents to both their attendants (especially small children) and grass-thatched or uninsulated kitchens. (The majority of the kitchens in both Bushenyi and Mbarara Districts are thatched with grass.) Thirdly, and especially when there is incomplete combustion as a result of using wood with a high moisture content, the smoke given off can have serious consequences. These include (i) blindness due to trachoma, (ii) chronic bronchitis and emphysema caused by sulphur dioxide, nitrogen dioxide and formaldehyde, and

[1] A good example is provided by millet harvesting when food for the harvesters is usually cooked on the spot.

(iii) malignant cancers by carcinogenic Benzophyrene[1].

b) Utensils

Within the districts of Bushenyi and Mbarara, handless-cum-lidless saucepans are predominantly in use nowadays (Figure 6.1 above)[2]. They serve for cooking and also water-heating, although the latter sometimes involves use of metal basins as well. Disused saucepans and/or metal basins are commonly used by brewers of tonto (i.e. a native alcohol) during sorghum-roasting. Metal drums and tins, originally containing petroleum products (e.g. auto diesel and kerosene), are used for distilling waragi.

Until about the beginning of this century, the most widespread cooking utensil was a clay pot. This consists of two kinds (Figure 6.2 above). The gourd-like clay pot is largely used for sauce and/or simple food-cooking and preparation of porridge from finger millet flour, while the open, bowl-shaped type serves for making finger millet dough. Both types, usually made by skilled craftspeople, are used less nowadays. While the introduction of saucepans offers a major explanation for this, it appears that, with changes in people's socio-economic lifestyles, pot use is increasingly relegated to 'unmodernised' society. However, two features of pot use are noteworthy. Firstly, the open clay pot is still widespread and coincident with the cultivation and/or consumption of finger millet. Secondly, the gourd-like pot, apart from its traditional

[1] WEERAKOON, W.T., 1982; Fuelwood Conservation Efforts in Zambia through Improved Cookstoves; paper presented to the seminar on Afforestation in Rural Development in Eastern Africa, Nairobi, Kenya.

[2] During the cooking process, the main food is usually covered with banana leaves (see Figure 6.1 above). On the other hand, plastic plates and the like are used to cover sauce once the latter is off the fire.

use in porridge preparation, tends to be closely associated with the older womenfolk. Its appeal is twofold. It flavours sauce, in particular, and, unlike most metal saucepans, also retains heat for a longer period of time. The latter aspect is especially significant where food has to be preserved overnight or when a family member is to have his/her meal later.

### 6.1.3 Types of Fuelwood Used

Various kinds of fuelwood are in use throughout Bushenyi and Mbarara Districts. They include eucalytpus, acacia, coffee and tea stems, and the like.

A number of factors underlie the use of any given kind of wood. For example, soft types (e.g. coffee branches) are commonly used for making a quick meal, particularly the mid-day one or when there is an unexpected visitor. Here, the criterion of the wood choice is the latter's temporal efficiency (i.e. ability to burn quickly), and this tends to have a strong hold on those households without adequate labour force for various domestic and other chores. In most homes, however, evening cooking involves use of hard fuelwood types. In this case, the concern of the womenfolk (and, sometimes, the children) is more to do with time-cum-labour saving in fire attendance than directly relating to fuel efficiency.

For homes wherein a wood fire is a significant source of lighting and/or space-heating, long-burning species are usually preferred - provided they are adequately air-dry. Eucalyptus is one such example whose desirability is strengthened further by its provision of coals which are used in

ironing clothes. And, as already mentioned under section 6.1.1, these types of wood are also commonly used during social occasions.

Families in the high social and economic class tend to use eucalyptus and similar kinds of wood more often than their poorer counterparts. This feature is especially so for those areas close to the towns and/or trading centres (e.g. in Kakiika Subcounty near Mbarara Town). While, in terms of fuel efficiency, this may be beneficial, the main reason is that these families are largely reliant upon commercial fuelwood which, in many parts of both Bushenyi and Mbarara Districts, is dominated by eucalytpus. In addition, most of the cooking in such homes is always done by domestic servants (i.e. paid housegirls or houseboys) to whom fuel efficiency might be as ill-defined as its wide-ranging effects are unappreciated by the family head(s). At the same time, the attitude of these servants regarding the manner of wood use is heavily underlain by the kind of relationship that exists between them and their employer(s), as well as their age, work experience, and wage scale.

The linkage between the person in-charge of cooking and the wood types used is also evident among low- and middle-income households. For instance, where small children (i.e. about 5-6 years old) are entrusted with simple daytime cooking, they tend to use soft, easy-to-get species, except if they have been provided with alternative kinds. On the other hand, when, as is always the case during millet harvesting, the mid-day meal has to be cooked on the spot, it is what is physically available that determines which fuelwood kinds will be used. In a way, therefore, it can be said that the economic activity one is engaged in at a given time will also influence, though indirectly, the wood that is consumed.

Urban areas provide two other factors that determine what type of wood one is to use. In the first instance, recent, low-income, self-dependent urban arrivals tend to use the same hard or soft fuelwood types (and, sometimes, foodstuffs and cooking methods) that they are already familiar with. This is particularly so among those persons with little or no formal education and/or who rent poor accommodation. For example, the suburbs of Mbarara Town, especially, have a substantial number of these people. But what is noteworthy is that, in the majority of cases, this is only a transitional feature. As one gradually adjusts to town life, as well as becoming less dependent on occasional supplies of wood and other items from the countryside, changes take place. In Kizungu Suburb of Mbarara Town, for example, two interviewees cited rising monetary expenditure on household wood requirements as one important influence.

Secondly, owing to availability of energy substitutes in the urban areas, some fuelwood users therein tend to buy those types of wood required for a particular end use. For instance, food flavouring is still popular among many households (e.g. in Mbarara Town), and eucalyptus is usually preferred for this purpose. Also, such type of wood is required for the preparation of finger-millet dough (or oburo) since the utensil commonly used (i.e. the bowl-shaped clay pot or enyungu) is unsuitable for electric cookers. (There are also people who use saucepans for this kind of food preparation.) On the other hand, and especially in Bushenyi Town, electricity is used mainly for lighting purposes, while, in the absence of charcoal, all the cooking is done using wood. Here, the main explanation is that many houses in this town have no wall sockets wherein electrical appliances can be plugged.

### 6.1.4 Amount of Fuelwood Used

Variations exist regarding the quantity of wood used in a given situation. Reasons for this include:

a) type of end use;
b) manner and frequency of wood use;
c) number of persons, say, in a family, and whether or not all of them reside at home full-time;
d) quantity and/or kind of wood available;
e) method of procurement;
f) changes in commercial fuelwood prices;
g) time of the day or week versus weather conditions; and
h) level of interfuel substitution.

By way of illustration, three examples are given below. For purposes of this discussion, it is assumed that (i) the wood in use is eucalyptus[1] and air-dry, and (ii) the number of people in a family is six, i.e. two parents and four children.

Example 1: A family in a remote rural area with fuelwood self-sufficiency.

- Type of end use : cooking food for domestic consumption.
- Method of wood procurement : free (i.e. no money paid).

[1] Most harvesting of eucalyptus trees for fuelwood purposes takes one or two forms. The tree is first felled and, very often, allowed reasonable time to dry. The branches and top parts are then cut off and used as fuelwood, while the trunk is chopped up. In the urban areas especially, eucalyptus wood is usually sold in bulk (i.e. bundles). Each bundle contains 10-12 pieces. On average, each piece measures 75 cm long and 5 cm thick.

- Frequency of wood use : three times a day (i.e. morning, afternoon and evening).
- Manner of use : a) Morning: only one open fire is used for making finger-millet porridge for breakfast.

  b) Afternoon: one open fire is used to cook lunch (e.g. bananas mixed with pounded groundnuts).

  c) Evening: three open fires are used for cooking the main food (e.g. bananas) and sauce (e.g. meat), and also heating water for a bath.
- Available energy substitutes : kerosene, but used for household lighting only.
- Estimated amount of wood consumed in a day :

| | | |
|---|---|---|
| a) | Morning | : 1½ pieces |
| b) | Afternoon | : 3½ " " |
| c) | Evening | : 7 " " |
| | TOTAL | 12 pieces |

Example 2: A family in a rural area, but close to a trading centre, and with fuelwood self-sufficiency.

- End-use types : a) cooking food for domestic consumption;
  b) preparation of sweetened finger-millet

porridge[1] for sale in 'kiosks' in the trading centre, open-air markets, along roads in the countryside, etc.

- Wood procurement : free (i.e. not bought).
- Frequency of wood use : thrice a day (i.e. morning, afternoon and evening).
- Manner of use : a) Morning: one open fire is used to make breakfast (e.g. maize-meal porridge).

  b) Afternoon: only one open fire is used for preparing lunch (e.g. bananas mixed with sliced onions and tomatoes).

  c) Evening: three open fires are used for the evening meal (i.e. food and sauce prepared separately) and heating of water for a bath. In addition, once food-cooking is over, one of the open fires - usually the big one - is used to prepare finger-millet porridge for sale the following day.
- Available energy substitutes : kerosene, but used for lighting only.

[1] Fuelwood is used to bring water to boiling point. Thereafter, the water is poured into a big, gourd-like clay pot containing finger-millet flour. This is followed by stirring with a pestle, usually of a papyrus type. About 15 minutes later, a finger-millet flour sweetener (locally known as amamya) is added, and, after more stirring, a cover (e.g. a small, bowl-shaped basket, or endiiro, made from banana midribs) is placed on the mouth of the pot and left there until the following morning when the porridge is ready for use.

- Estimated amount of wood used in a day : a) Morning : 1½ pieces
  b) Afternoon : 3½ " "
  c) Evening : 8 " "
  TOTAL 13 pieces

Example 3: A family in an urban area.

- End-use type : cooking food for domestic consumption;
- Wood procurement : purchased at an average of Uganda Shillings 10.00 (or US$ 0.03) a piece.
- Frequency of wood use : once a day, i.e. in the evening.
- Manner of use : one open fire is used to cook the main food (e.g. bananas), while, for sauce, as is the case with breakfast and lunch, electricity is used.
- Available energy substitutes : electricity and kerosene, but kerosene is used only in emergency cases, e.g. when there is a power failure.
- Estimated amount of wood used in a day : 3 pieces.

One conclusion that can be drawn from the foregoing three examples is that most energy is consumed in the evening. The impact of this temporal wood use requires further research as part of fuelwood planning and management. Among other things, the socio-economic environment of a wood user interacts very closely with the use of this energy type. It was observed, for example, that, as the financial status of a peasant family

improves, there tends to be less manual labour expended on farm work. In part, this leads to more time-saving and, as such, family members tend to be at home during lunch time more often than previously. Two implications of this are that (i) cooking is not done hurriedly, and (ii) the main food and sauce are cooked separately. This results in more wood being consumed.

In the absence of data on actual fuelwood use in Bushenyi and Mbarara Districts - as is the case with the rest of Uganda - one can only make estimates on the basis of total population and the aforementioned 2 $m^3$ annual per capita fuelwood consumption. Naturally, this implies that areas with the highest population (e.g. Kabira and Kikagati Subcounties of West Bushenyi and South Mbarara Districts respectively) will have a very high level of wood use (Figure 6.3 below). But, at the same time, since the amount of wood consumed is partly dependent upon the physical availability of this fuel item, it is possible that, in some wood-deficient areas, the aforementioned per capita average is not realised by every person. One such area is Ngoma Subcounty of South Bushenyi District (Figure 5.2). Here, cowdung was reported to be in use already, and the actual amount of it consumed tends to decrease further during the dry season (i.e. June-August/September) when cowdung production is less owing to inadequate supplies of both pasture and drinking water for cattle.

Mbarara District also provides examples of areas where the 2 $m^3$ may not be met by all. Edaphically and climatically, Rugaaga Subcounty, in South-east Mbarara, and most of North Mbarara (Figure 5.3) are particularly vulnerable during the dry season. The problems obtaining in Ngoma Subcounty (South Bushenyi District) at this time (e.g. water shortages) are also found here. Secondly, bush-firing - especially from about July until the end of the dry season - engenders random

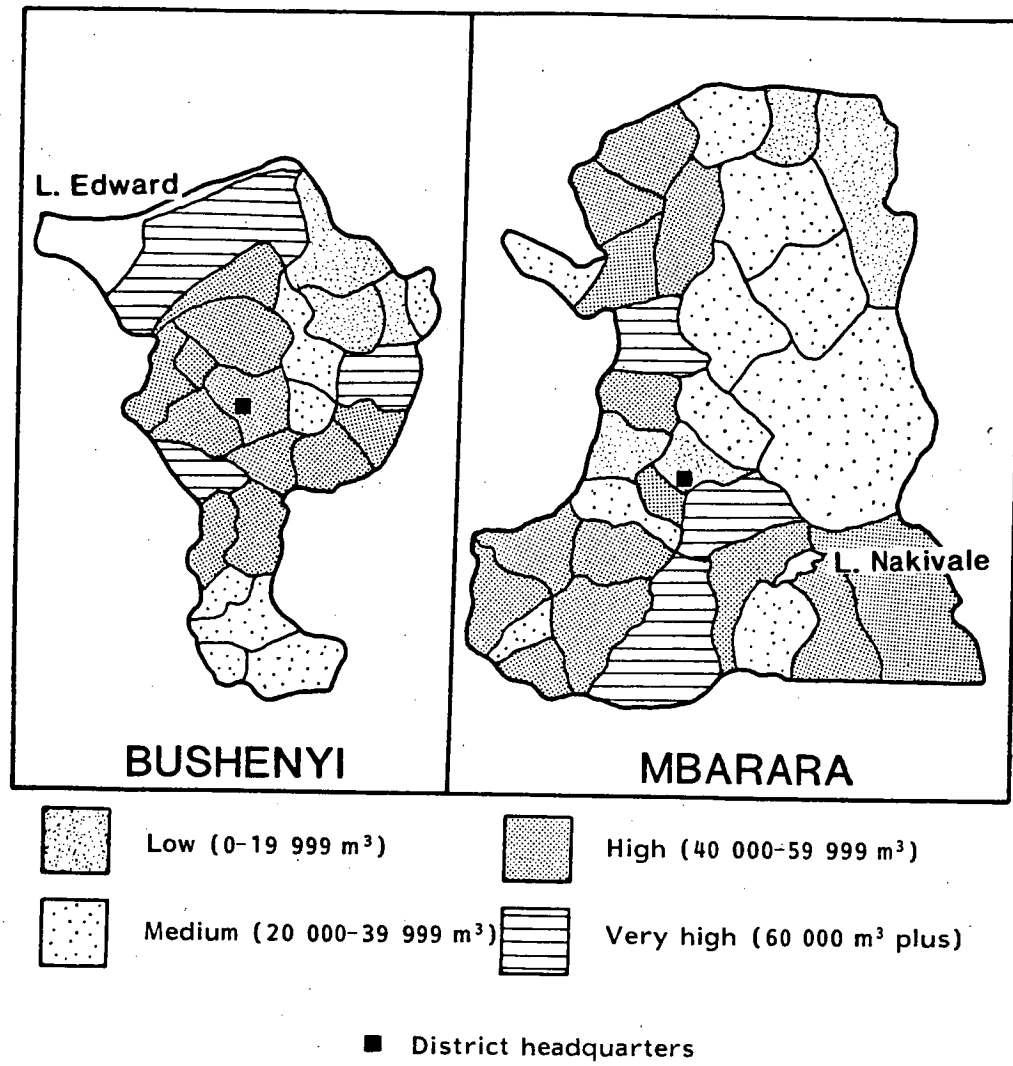


Figure 6.3 Distribution of estimated fuelwood consumption in Bushenyi and Mbarara Districts.

destruction of woody stocks, thereby reducing further the amount of fuelwood that is readily available for consumption.

There appear to be seasonal fluctuations regarding food preparation and consumption. For instance, food shortages are known to recur annually in many areas (e.g. Kabingo and Kashumba Subcounties in South-east Mbarara District). In part, drought-like conditions offer an explanation for this, and this was the case, say, from 1978 until about the start of 1983. With the number of meals in a day reduced from three to about one, there is a corresponding decrease in wood consumption. Less food intake often results in ill-health which, particularly during the dry season, is sometimes exacerbated by a high incidence of malaria. One corollary of this is a further decrease in food consumption and, subsequently, more reduction in wood use.

Thus, understanding actual fuelwood consumption, say, in Bushenyi and Mbarara Districts necessitates an in-depth study of virtually all that interacts with it. It is this condition that, if not reasonably satisfied, might easily frustrate policies and programmes targeted at raising wood supply.

## 6.2 Fuelwood Supply

As is the case with consumption, the supply of fuelwood can be considered in terms of the type available and its source, as well as the methods by which it is obtained and stored.

### 6.2.1 Sources and Types

Lack of relevant data (e.g. land-use maps) makes it difficult, at this point in time, for one to show clearly how the supply of fuelwood is

distributed in the districts of Bushenyi and Mbarara[1]. However, and as was noted under consumption, there are different fuelwood types (e.g. eucalyptus and acacia). In terms of sources, there are four main kinds, i.e. forests (both natural and plantation), woodlots, woodlands and crop gardens. Unfortunately, data relating to their distribution and acreage is hardly available.

For purposes of this discussion, four broad areas of fuelwood supply have been identified (Figure 6.4 below). These have been based on a combination of factors which include agriculture, population density, soils, climate, vegetation, proximity to transport routes and/or major fuelwood-using centres, level of fuelwood commercialisation, and interfuel substitution. The four are to be known as areas of high, medium, low and very low fuelwood supply, and each of them is discussed herebelow.

a) High-fuelwood supply areas

These are mainly found in those places where the natural vegetation has not been greatly affected by man. Kichwamba and Ryeru Subcounties (North Bushenyi District) can be cited as examples (Figure 6.4). Generally, annual land clearance in these areas is low, especially in Kichwamba Subcounty which has a very low population density (i.e. 37 p/km$^2$). Secondly, the negative impact of some peasant grazing activities (e.g. overgrazing) tends to be minimized by low numbers of domestic animals vis-a-vis extensive areas with pasturable vegetation.

[1]For instance, land-use statistics which, today, are regarded as reliable are those of 1972 (Table 2.1). Since land clearance has remained unchecked, it is expected that the acreage of wooded land has decreased, say, between 1972 and 1984.

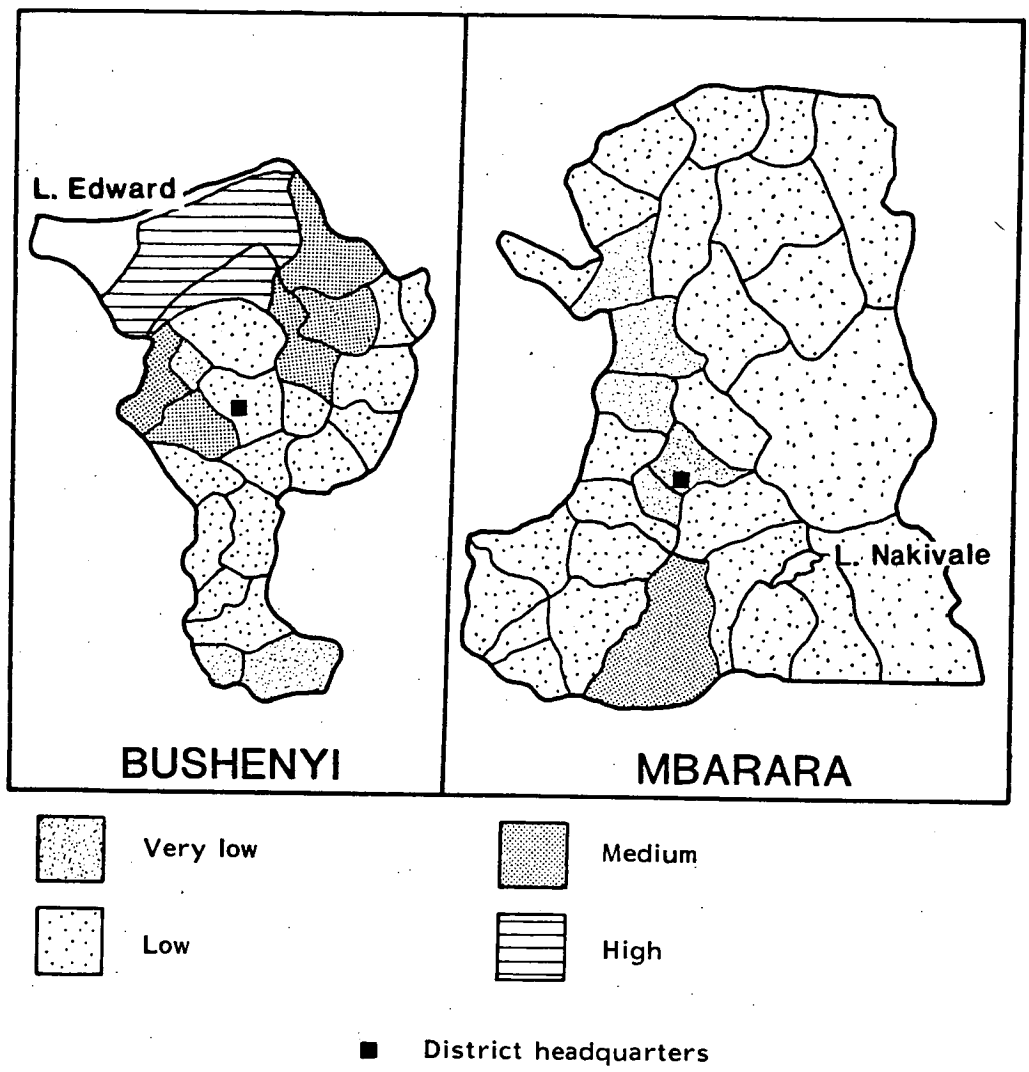


Figure 6.4 Distribution of estimated fuelwood supply in Bushenyi and Mbarara Districts.

Thirdly, urbanisation in these and nearby areas is extremely low[1] and, as such, fuelwood demand is predominantly disaggregated. This ensures

[1]There is a tea factory at Mashonga in Kyamuhunga Subcounty, but the nearby Kalinzu Forest meets nearly all the fuelwood requirements of both the factory and the small trading area centred on it. In its 1980/81 Annual Report, the Uganda Forest Department gave the production area of Kalinzu Forest as 12 895 ha. This forest is a natural, rather than planted, one.

maximum regeneration of various woody plants over a wide area. Lastly, the edaphic and climatic conditions here are suitable for woody and other plant growth and survival, while remoteness of many of these places from motorised transport routes accounts for the existing insignificant levels of fuelwood purchases. (These purchases are usually made by teachers and similar employees posted to places of work far removed from their home areas.)

b) Medium-fuelwood supply areas

These tend to be more widely distributed than the foregoing, and examples include the subcounties of Kyabugimbi (Central Bushenyi District) and Kikagati (South Mbarara District). Here, rates of annual land clearance are higher, but there are still reasonable stretches of woodlands which account for most of the fuelwood supply. Eucalyptus woodlots are also another fuelwood source, even though, traditionally, they are principally intended to service building and construction needs. (Crop gardens, too, provide fuelwood, say, in the form of coffee/tea stems and branches.)

There is some fuelwood commercialisation (e.g. in Kyabugimbi Subcounty), but it is still on a low scale. Nearly all of these areas are distant from major wood consumers. For example, Kikagati Subcounty is approximately 70 kms from Mbarara Town whose fuelwood supplies are mostly met by some of the areas in the immediate hinterland (e.g. Birere and Kabingo Subcounties). Furthermore, the majority of such areas are not close to principal transport routes. Bihanga Subcounty, for instance, is far removed from Mbarara-Ishaka-Katunguru Road, the busiest transport route in the whole of Bushenyi District.

However, one growing worry in these areas concerns the presence and expected expansion of brick- and charcoal-making activities. Demand for both bricks and charcoal is strongest in the urban areas (e.g. Ishaka, Kabwohe and Itendero Trading Centres in Bushenyi District). Without timely and appropriate husbandry of the various wood resource areas, the net impact of these otherwise beneficial operations is likely to get worse.

c) Low-fuelwood supply areas

On the basis of Figure 6.4 above, these have the widest geographical distribution in both Bushenyi and Mbarara Districts. The majority of them have soils which are generally low in nutrients, while extensive woodstocks have been destroyed through repeated land clearance for agricultural purposes. A good example of these areas is South-east Mbarara District (i.e. Kabingo, Kashumba, Ngarama and Rugaaga Subcounties). Here, livestock numbers are also high, while, very often, the dry season lasts beyond three months. In addition, most parts are hilly and covered with thin soils which, partly owing to devegetation over a long time, are increasingly being washed away and deposited in lower areas. This is the case, for example, in Kyabinunga and Kaharo Parishes of Kabingo Subcounty. Thus, a combination of human and physical factors has already resulted in landscapes such as is shown in Figure 6.5 below.

With the exception of subcounties like Bumbaire (Central Bushenyi District) and Birere (South Mbarara District), most low-fuelwood supply areas are removed from major consumers of wood. Furthermore, they are not close to important transport routes, while, at the same

Figure 6.5 A gentle slope in Kyabinunga Parish of Kabingo Subcounty, Mbarara District. About twenty years ago, the density of these acacia trees was higher than it is today.

time, their interfuel substitution is low. Therefore, the already emerging fuelwood shortages therein can be attributed largely to a high local demand for both domestic wood needs and agricultural land-use. This is exacerbated by the aforementioned factors (e.g. unfavourable soils and climate). Shortage of land, for instance, has already caused replacement of eucalyptus woodlots with food crops (e.g. bananas) in parts of Bumbaire Subcounty in Central Bushenyi District (Figure 6.6 below). To a great extent, this only serves to aggravate the physical fuelwood scarcities found in such areas.

Figure 6.6 An area between Bushenyi Town and Ishaka Trading Centre in Bumbaire Subcounty of Bushenyi District. Here, some of the eucalyptus trees have already been felled to provide land for crop cultivation.

d) Very low-fuelwood supply areas

In both the districts of Bushenyi and Mbarara, these areas are not easy to delimit. This is so partly owing to the interpretation of fuelwood by the local community. To most people, fuelwood is synonymous with woody biomass, and, consequently, almost all crop residues are considered a type of fuelwood. However, one can regard most crop residue and all cowdung use as indicative of an area having very low supplies of fuelwood. In this sense, therefore, examples of such areas are provided by Ngoma Subcounty (South Bushenyi District) and Nyakayojo Subcounty (West Mbarara District).

Three main explanations can be offered for inadequate fuelwood availability in these areas. Firstly, population densities, say, in the subcounties of Nyabubaare (Central Bushenyi District) and Nyabuhikye (North-west Mbarara District) are quite high - i.e. 275 and 150 p/km$^2$ respectively. Consequently, high levels of peasant crop cultivation over the last ten years or so have eventuated in clearance of almost all wooded areas. Secondly, the soils and climatic conditions in Ngoma Subcounty (South Bushenyi District) and Kakiika Subcounty (Central Mbarara District), for example, do not favour plant growth throughout the year. One outcome of this is reduced replenishment of the wood resource base vis-a-vis ever-rising demand and exploitation. Thirdly, high numbers of cattle versus inadequate grazing land are one reason why, for instance, woody shrubs often do not reach maturity. This feature is found, for example, in Nyabuhikye Subcounty. In addition, these domestic animals cause soil compaction, thus disadvantaging plant regeneration. And, during the dry season, their hooves assist in loosening the soil texture, thereby rendering the soil particles erodible by wind during the dry season and/or rainwater in subsequent rainy periods.

It should be noted that each of the foregoing four fuelwood supply areas is constantly acted upon by a wide range of factors (e.g. population density, crop cultivation, overstocking and overgrazing, and climate). Accordingly, the character of each area is ever-changing.

### 6.2.2 Procurement

This depends largely on the type of fuelwood used and its source, location of the user, nature of end-use, labour force involved, and, to a less extent, time of the day and/or week.

a) Urbanites

Three methods of fuelwood procurement are in use in the urban areas. Firstly, the majority of wood-using families buy this energy item from retailers. The latter consist mostly of young men and children (Figure 6.7 below). The principal wood involved here is eucalyptus and is mainly sold in bundles.

Figure 6.7 Two boys, near Bushenyi Town, with a bundle of eucalyptus wood each. There are approximately 10 pieces of wood in each bundle, and the total cost is Uganda Shillings 100.00 (or US$ 0.29). (March 1984)

Secondly, a good many urban dwellers in both Bushenyi and Mbarara Districts also receive 'free' fuelwood supplies from the countryside and/or other places. This is usually on Mondays when some semi-urbanites return

from a weekend recess in the countryside. The extent to which this method of fuelwood procurement is used depends, for instance, upon the urban status of an area. This is clearly illustrated by the recently created Bushenyi Town where distances between the town centre and the immediate countryside hardly exceed 2 kms. Consequently, many low- and middle-income residents of Bushenyi Town obtain fuelwood at virtually no direct monetary cost.

The third major procurement method involves children - rarely above the age of 15 - who either climb multi-branching trees in search of dry branches or debark some of the trees. This practice was observed in Mbarara Town which, unlike Bushenyi Town, has many urban trees. Informed sources characterised tree-debarking, in particular, as a very recent development and caused by failure, on the part of the procurers, to gather enough dry branches that naturally fall off these urban and primarily ornamental trees.

b) Rural population

Fuelwood used in the countryside is obtained almost entirely at no monetary cost. It is gathered from wherever it happens to be, but, over a wide area, woodlands predominate. Hardly any harvesting implements are employed, say, in gathering dry, fallen branches and/or deadwood within woodlots or forests. However, pangas are commonly used to harvest thorny woody species (e.g. acacia). Axes, especially, are also employed when an eucalypt is to be felled for fuelwood purposes. In many areas of both Bushenyi and Mbarara Districts, however, the peasant wood procurement methods in use rarely cause complete removal of the ground cover. This, in a way, ensures

some form of soil protection, particularly against agents of edaphic degradation (including surface erosion).

Traditionally, women and children have borne the onus of fuelwood procurement - as is undoubtedly the case in many other Less Developed Nations (e.g. Zambia). Male participation in fuelwood harvesting, though not entirely new, is mostly applicable to childless families and those families where children are in school for most of the day hours. Nowadays, though, economic conditions are forcing some men to get involved in fuelwood procurement for sale (e.g. in Bumbaire Sub-county of Central Bushenyi District). Also, men are increasingly taking part in harvesting of hardy fuelwood species (especially eucalyptus) used on special occasions, e.g. social and religious feastdays. Well-to-do families, which are still a minority group, use hired labour to obtain their domestic wood requirements.

### 6.2.3 Storage

Spatial location and end-use purpose are key factors that explain the differences which exist between urban and rural fuelwood storage methods. In the urban areas, fuelwood, where it is used, is stored either in a separate store or kitchen, and, for most low-income earners, in the same multipurpose room which also serves for accommodation. Fear of theft is one main reason for this kind of storage. The same factor also explains why operators of open-market kiosks, say, in Ishaka Trading Centre (Central Bushenyi District) store their unused wood in iron-roofed rooms at a monthly rental of Uganda Shillings 1000.00 or US$ 2.90 each. (This was the rate at the end of February 1984.)

within the urban areas, wood for sale is usually stacked as is shown in Figure 6.8 below. At night or during rains, the wood is often cover-

Figure 6.8 Stacked (and unstacked) eucalyptus wood for sale.

ed with canvas or other protective material readily available. Generally speaking, there are no stores provided for such wood, but the respective Town Council authorities employ night watchmen to guard town markets. (Apart from fuelwood, some foodstuffs and other items are usually left in these markets for as long as is necessary.)

As regards the rural areas, the tradition in most homes is for small amounts of fuelwood to be placed on the rack above a fireplace. (Where no rack exists, such wood is stored near the fireplace as is already shown in Figure 6.2.) Other than this, fuelwood - stacked or not - is left out in the open (Figure 6.9 below). This is especially

Figure 6.9 Dry eucalyptus wood leaning against a barkcloth tree.

so during the dry season, but, when it rains, the wood is stored either

in the kitchen or a detached, multipurpose store[1]. And, apart from those rural areas very close to Mbarara Town especially, stealing of fuelwood from other people's compounds is generally unheard-of. But, with increasing fuelwood shortages in the countryside, this is bound to change.

## 6.3 Effects of Fuelwood Shortages

Where they do occur, present-day fuelwood shortages and their demerits in the districts of Bushenyi and Mbarara might be seen as one inevitable consequence of government failure, both in the past and at present, to integrate fuelwood supply-demand and population growth in all social, economic, political and other kinds of planning and management. In addition, the current low public awareness of such scarcities and their far-reaching implications demonstrates that the general public is not fully informed about these and similar issues.

Broadly speaking, the various effects of fuelwood scarcities can be regarded as being either physical or non-physical.

### 6.3.1 Physical Effects

One ill-consequence of fuelwood shortages that is easily noticeable

[1] Very often, this will depend upon the financial position of the family. At crop harvest time especially, crops, wood, etc. are also stored on verandahs of the living houses. (In Uganda, many living houses have hedges which are made of either grass or reeds, and the space between the hedge and the outer wall of the house, also referred to as a verandah, is often used for storage purposes.)

is a continuing recession of sources of both hard and soft wood species. In turn, this is promoting the spread of generally treeless and unhealthy landscapes that are either bare or dominated by coarse and scrubby vegetation. This is the case, for instance, in Rwanyama-hembe Subcounty of Central Mbarara District. In addition, windbreaks are increasingly on the decline, thereby exposing land, crops and buildings to the full might of the winds. Already, this is engendering destruction of property in Rubaare Subcounty of South Bushenyi District.

Decreases in the supply of fuelwood are indirectly contributing to edaphic deterioration and impoverishment, and, subsequently, reduced productivity per hectare of cultivated land. This is so owing to the less retentive ability of the soil which results in cutbacks in soil moisture, particularly in those subcounties with unusually long dry seasons (e.g. Ngoma in South Bushenyi and Birere in South Mbarara). At the same time, surface erosion and floods are on the increase, especially during the first tropical thunderstorms after a prolonged dry spell. Nowadays, these disamenities are recurrent in Ngoma Sub-county (South Bushenyi) and Rubaya Subcounty (Central Mbarara).

Within Bushenyi District (e.g. Rubaare Subcounty), destruction of vegetation by pests is reported to be growing[1]. Acacia, which are regarded to be resistant to termites, have been reduced greatly through human settlement, agriculture and unsustainable level of fuelwood procurement. While most of the secondary vegetation in such areas tends to be non-wood-yielding, its survival is greatly imperilled by such pests to which it has no resistance. Elsewhere, predation on crops by birds, monkeys and

[1]This was cited by a member of staff of the Forest Department, Bushenyi District.

baboons (e.g. in Kabingo Subcounty of South-east Mbarara District) is on the increase, and, according to interviewees, say, in Kyabinunga Parish, crop harvests are already affected.

As regards the aforementioned tree-debarking in Mbarara Town, it appears to be on the rise. This poses a threat to the aesthetic and recreational value of the trees so affected, as well as having a negative impact on the urbanscape at large. In the countryside, there is an unchecked disappearance of medicinal flora, wild fruits, valuable game, and, particularly for scientific purposes, uninventoried genetic potentialities.

### 6.3.2 Non-physical Effects

In almost all societies with private land tenure, relations among members of the community are inextricably influenced by factors relating to land. For example, with the increase in land privatisation and landlessness in both Bushenyi and Mbarara Districts, the gap between the "haves" and "have-nots" is widening. The "haves", who are mainly rich farmers, have sizeable woodlands and/or woodlots and are, therefore, in a position of comparative advantage. On the other hand, the emerging fuelwood thefts (e.g. from eucalyptus woodlots) might be viewed as one form of expression of the dis-ease felt by the "have-nots".

The impact of fuelwood scarcities on community relations is felt in other ways too. In both Bushenyi and Mbarara Districts, the practice of families sending some of the young children to live with and help their grandparents is still present. While this might not always suit the children in question, its other ramifications are being exacerbat-

ed by rising physical fuelwood shortages. For instance, as longer distances have to be walked to the remaining fuelwood sources, the children, as well as their parents (and, sometimes, the grandparents too), are feeling the stress associated therewith. This includes physical exhaustion and also less time left for the children to attend to play and other activities. Furthermore, the social fuelwood problems of such grandparents are made worse by two unrelated factors. On the one hand, an increasing number of young couples are opting for small families and openly disapproving of sending their children to go and help the grandparents with various chores. Secondly, the rise in primary school enrolment means that more and more children have to be away at school for most of the daytime. This implies that, where fuelwood cannot be procured from nearby sources, the grandparents may have to do with little cooking, boiling of water, and, more especially, space-heating.

Apart from the increasing physical distances, more time is also being spent and fuelwood procurement is becoming more labour-demanding on a daily basis. This rising temporal expenditure is particularly worrying at crop harvest time and for small families. In situations like these, available family or household labour tends to be overstretched, and social fuelwood shortages are a common feature. Also, there is a growing tendency to rely on eucalyptus as a daily wood source for domestic fuel, thereby threatening the production and provision of building and construction raw materials.

The emergence and likely spread of rural commercial fuelwood supply are other features characterising fuelwood shortages in the districts of Bushenyi and Mbarara. Most especially, the gross monetary proceeds from wood sales are attracting more people to engage in the fuelwood trade. In addition to causing reductions in the number of man-days spent on agriculture, it is quite possible that such financial remunerations will

lead to the harvest and sale of almost anything that can burn. Moreover, high wood prices have already given rise to increased food prices in restaurants and similar places. While, at present, the rural population is generally unaffected by the latter eventuality, low-income urbanites (e.g. in Mbarara Town) are confronted with an ever-falling purchasing power. In addition, the current nationwide drive for more urbanisation means more reduction in temporal distances between the urban centres and the countryside. Consequently, urban-type fuelwood ill-effects can be expected to cover a wider geographical area in the near future.

The receding margins of fuelwood sources ruralwards also contribute to increased vulnerability of the wood-using urban population. With rising prices of petroleum products (Chapters Three and Four), wood, too, has to cost more. Secondly, during an emergency, it may be impossible to deliver wood to the urban consumers. The aforesaid 1978-9 war in Uganda, for example, caused disruption in the supply of fuelwood (and other rural products) to Mbarara Town. As expected, the subsequent supply-demand imbalance led to higher prices for all the items so affected.

What one might refer to as economic fuelwood scarcity is found in the urban areas especially. This occurs when the purchasing power of a fuelwood user is so low that wood, even though it is physically available, cannot be purchased. Rises in fuelwood prices, for instance, are clearly illustrated by Ishaka Trading Centre in Central Bushenyi District. Here, a bundle of 10-12 pieces of eucalyptus wood retailed for Uganda Shillings 20.00 (or US$ 0.06) in 1979. But, as of March 1984, the price had gone up to Uganda Shillings 100.00 (or US$ 0.30), and, according to many end-use wood buyers, the length and thickness of each wood piece had been reduced gradually. Unfortunately, all this has been happening at a time when, countrywide, the cost of living has been rising.

While the traditional role played by a wood fire as a social focus is increasingly diminished by reduced fuelwood availability, one other disturbing social outcome of these wood decreases is to be found among both the rural and urban young generation especially. This concerns parental ability to adequately provide for the family. The root cause of this is that personal incomes are not rising fast enough to compensate for increases in the cost of living. At a time when traditional community supportiveness is under stress from different corners, it is conceivable that such social disamenity will continue to grow.

Inadequacies in fuelwood supply also have a bearing on the health of individuals. Particularly in Bushenyi and Mbarara Towns, it was noted that some low-income males[1] are already opting for food types which require less fuelwood to prepare. Good examples of such foodstuffs are maize meal and green vegetables. This shift in food preferences generally fluctuates with the ups and downs in net personal incomes. Its effect, however, is twofold. Firstly, it can easily lead to consumption of food that is not readily digestible. Secondly, given the aforesaid mismatch between incomes and expenditure nationwide, continued intake of food types lacking in proteins and carbohydrates, in particular, implies less nutrition to the body. This might result in a low level of resistance against malaria and other ailments.

Furthermore, fuelwood shortages mean that boiling water for drinking is not always possible. While the latter has hitherto not been widely

[1] There was no mention of females being affected in this way by fuelwood shortages. One main explanation for this is a socio-economic one. Many low-income women in the urban areas supplement their income by going out with men. Others operate small drinking places where different types of alcohol, as well as roasted meat or muchomo, are sold. (Traditionally, most men in Uganda regard the latter occupation as menial work suitable for women.)

practised in the countryside especially, it must receive emphasis as one part of programmes aimed at improving living conditions. In most of Mbarara District, this requirement is very important owing to the shortage of potable water. Furthermore, the use of cowdung for cooking purposes can also contribute to serious ill-health, more so among the young and old-age groups.

Two other effects of scarce fuelwood supply are noteworthy. Firstly, increasing wood unavailability means that, for poor families, in particular, school-going children have to stay away from school - about once a week per child - to procure this energy item. For example, this is already happening in Nyarusiza Subcounty of Kabale District. Also, while traditional wood-based fires must be criticised for their adverse health effects, they nevertheless remain the only source of light for study at night by some pupils. Secondly, the close link between fuelwood production and agriculture is of great significance at household, district and national levels. With mounting land-use competition between agriculture (i.e. crops and animals) and provision of wood, it is apparent that there will be further reduction in the carrying capacity of the land. Densely populated areas (e.g. Nyabubaare Subcounty in Bushenyi District) will be affected most. In addition, continued destruction of woodlands has already led to decreases in non-eucalyptus building and construction materials. What is of immediate significance, however, is that self-sustenance of the peasant communities is also being eroded through the disappearance of raw materials for the cottage industry. Hitherto, sales of wicker baskets, mats and similar products have generated revenue with which to pay school fees for the children and also satisfy various family needs.

## 6.4 Conclusion

The previous discussion provides evidence of the existence of a fuelwood problem in Uganda. It also shows that, at the district level, many people are already aware of fuelwood shortages and some of the factors causing them. On the other hand, there is, as yet, not much being done by way of counter measures. Nor are all the people well informed about the wide-ranging implications of such shortages. Largely owing to lack of both energy planning and a tradition of fuelwood farming in the country, the fuelwood scarcities and their effects mentioned in section 6.3 above are likely to get worse. As of now, there can be no denying that the primary cause of inadequate fuelwood availability lies in (i) a high population growth and (ii) failure, on the part of the national government especially, to formulate and implement policies commensurate with both actual and expected human needs and wants.

While it is true that the impact of the politico-economic traumas Uganda underwent in the 1970s will not be redressed easily, it is also worth noting that, particularly at the political level, ground is yet to be laid for broad-based, non-partisan community involvement in nearly all matters pertaining to people's daily lives. For instance, cultivation of fuelwood trees is one way through which the supply of this energy type can be raised. However, success with such tree-farming is heavily dependent upon individual peasants who own most of the land in the country. Thus, while Uganda has the opportunity to learn from and, where necessary, adopt what other countries are already engaged in (e.g. community forestry in South Korea, social forestry in India, and the use of improved cookstoves in Guatemala), a conducive environment must prevail at home. It is such an atmosphere that can facilitate identification of other fuelwood-deficit areas in the country, as well as enable both the government leaders and the peasantry to devise cost-

effective measures towards redressing and/or preventing such problems. Due to a number of factors in the country (e.g. structure of government administration and project funding), discussion on such issues has to be more at national than local level. This is the approach adopted in the next two chapters which make up Part Three of the thesis.

# PART THREE

# SUGGESTIONS FOR INCREASING FUELWOOD SUPPLY

# CHAPTER SEVEN

## FUELWOOD FARMING AND IMPROVED END-USE EFFICIENCY

In tackling the fuelwood problem, Uganda will undoubtedly have to apply some of the methods in currency elsewhere. One of these is fuelwood farming which, under different names, is being practised in the Philippines, Nepal, India, Malawi, the Sahelian countries, and the like. Another approach to dealing with the imbalance in fuelwood demand and supply is through the use of improved cooking stoves. Stove designing, construction, experimentation and use are already in progress in such countries as Guatemala, Senegal, Sri Lanka, and Papua New Guinea.

Choice of a given means towards realisation of self-reliance in energy supply for every wood user is governed by a number of factors. Throughout Uganda, for instance, inequalities in income and wealth distribution mean that wood will remain a leading fuel in most rural homes especially. Also, some industrial works will continue to depend upon fuelwood (and/or charcoal). Furthermore, fuelwood shortages (and the fuelwood problem) have an uneven distribution in space.

Thus, analysis of the strengths and limitations of any one suggested course of action is very important. Partly on the basis of the results obtained therefrom, for example, fuelwood farming or improved stove use might be recommended. Alternatively, a combination of two or more such strategies might be a better option for a given area. These issues are the focus of the three sections that make up this chapter.

### 7.1 Fuelwood Farming

Three systems of growing trees for energy provision have been identified. These are agroforestry, woodlots, and energy farms. Each of these is

dealt with below.

### 7.1.1 Agroforestry

A number of attempts have been made with regard to defining agroforestry. Ramshaw[1], for example, defines it as 'the practice of combining commercial forestry with agriculture in the same piece of ground at the same time'. On the other hand, the Nairobi-based International Council for Research in Agroforestry (ICRAF) views agroforestry in a broader sense. To ICRAF, agroforestry might be seen as a

> sustainable land management system which increases the overall yield of the land, combines the production of crops (including tree crops) and forest plants and/or animals simultaneously or sequentially on the same unit of land, and (which) applies management practices that are compatible with the cultural practices of the local population[2].

What is common to the foregoing definitions (and others alike) is the idea of an integrated land-use form (i.e. agroforestry) that combines either agricultural and tree (including woody) crops, or tree crops with animals. Some of the processes involved in all this have been documented already[3] and, as such, this thesis does not engage in a discussion about them. However, it is noteworthy that, when choosing agroforestry as one way towards raising fuelwood supply for a given

[1] RAMSHAW, D.G., 1980; Agro-Forestry Demonstration, Journal of Agriculture, Tasmania 51(2), 29-31.

[2] This definition is quoted in SPURGEON, DAVID, 1979; Agroforestry: New Hope for Subsistence Farmers, Nature 280, 533-4.

[3] See, for instance, FILIUS, A.M., 1982; Economic Aspects of Agroforestry, Agroforestry Systems 1, 29-39; also FOLEY, GERALD and BARNARD, GEOFFREY, 1984; Farm and Community Forestry; International Institute for Environment and Development, London.

user community, various issues are involved. Singly or jointly, these will influence the kind of establishment and, more especially, management practices to be employed. For instance, unlike the traditionally eucalyptus-dominated woodlots in different parts of Uganda (section 7.1.2 below), there are two major concerns when practising agroforestry. These are the productivity and sustainability of land. Basically, productivity of a given piece of land can be thought of as being both immediate and long-term, while sustainability is a long-term factor. Achieving these two goals may involve more than a trade-off between them. More especially, it depends on the various roles fulfilled by agroforestry.

a) Advantages of agroforestry

Apart from the production of crops and fuel, agroforestry can lead to creation and/or diversification of employment, and this means income to those engaged in it (and others beyond). If properly managed, it can contribute to more productivity per hectare of land in use. This is possible, for example, through leaf fall which facilitates humus formation. Trees do also provide shade for man, his animals and crops, as well as props (e.g. for banana trees in Mbarara District). In areas faced with soil erosion (e.g. South Bushenyi District), agroforestry can assist in checking such edaphically deleterious action, while, elsewhere, it has the potential to forestall the spread of desertified landscapes. (These disamenities are already in the making, for instance, in parts of South-east Mbarara District and North-eastern Uganda.) Furthermore, provision of wood energy *in situ* minimises the costs - of production and supply - which might otherwise disallow adequate per capita fuelwood use by an economically disadvantaged people.

Increased production of fuelwood from on-the-farm sources should also be seen as leading to ease of pressure on woodlands especially. This

is beneficial in terms of both ecological diversity and availability of sufficient pasture for livestock owned by the peasants. While it is desirable that the number of cattle in a given area should be based on the carrying capacity of the land, it is likely that peasant methods of cattle-keeping will remain widespread for many years to come. Thus, in planning and effecting agroforestry schemes, their merits should be clearly identified and made known to all the people in question.

b) Requirements for agroforestry

As is no doubt true of any other programme, success or failure with agroforestry will depend on the extent to which the necessary conditions are met. These include use of appropriate species, selection of ideal sites and situations, and timely solution to any establishment and/or operational constraints.

(i) Preferred species

Outside Uganda, a lot of work has already been done regarding suitable growth conditions for various wood species[1]. One of the overriding factors is that there has to be a harmonious coexistence between the trees and food/cash crops. The rural population in Bushenyi and Mbarara Districts, for example, showed preference for those trees that have

- a fuel, socio-cultural and temporal efficiency;
- ease of establishment and rearing, harvesting and transportation;

[1] See, for example, PANEL ON FIREWOOD CROPS, 1980; Firewood Crops: Shrub and Tree Species for Energy Production; National Academy of Sciences, Washington, D.C.; and also O'KEEFE, PHIL, RASKIN, PAUL and BERNOW, STEVE (eds), 1984; Energy and Development in Kenya: Opportunities and Constraints; The Beijer Institute, Stockholm, and the Scandinavian Institute of African Studies, Uppsala.

- capability for quick maturity and drying;
- a high coppicing ability and resistance to pest attacks and adverse climates;
- unpalatability to grazing animals; and
- an economic value.

Largely owing to climatic and edaphic factors, different agroforestry trees will be grown in given areas. Generally, Leucaena leucocephala survives in a wide range of climates and soils, and, as such, can have a wide geographical distribution. Its high nitrogen seeds and foliage give it an added attraction to those areas (e.g. South Bushenyi District) where there is seasonality in pasture availability and soil fertility. Alnus nepalensis is also suitable for such areas, while, due to their fast-growing nature, Acacia mangium and Sesbania grandiflora[1] are ideal for land-scarcity areas (e.g. Central Bushenyi District). The shea-butter tree, long established in parts of northern Uganda, is also preferred - particularly for its multipurpose nature (i.e. it yields fruit, oil, and woodfuel).

(ii) Selection of site and situation

It is envisaged that agroforestry will involve use of selected species (i.e. types of tree plants which have been tested and recommended for a given physical and, sometimes, social environment). This means establishment of agroforestry centres in accordance with given local conditions (e.g. soils and land tenure). In due course, these centres will take on a dual role of educating and rendering other needed service to agroforesters. Therefore, and especially when transportation is likely to be a problem, the site of an agroforestry centre should be such

[1] O'KEEFE; PHIL, RASKIN, PAUL and BERNOW, STEVE (eds), 1984; Energy and Development in Kenya: Opportunities and Constraints; The Beijer Institute, Stockholm, and the Scandinavian Institute of African Studies, Uppsala.

that there is easy accessibility for the population it is to serve. The physical area (i.e. situation) occupied by the latter is decisive with regard to the size of the agroforestry centre.

(iii) Manpower and other resources

Establishment and maintenance of agroforestry require availability of qualified personnel very close to the tree-growers. Also, the working conditions of such people need to be conducive to good performance of duty. For example, under the present high cost of living in Uganda, many government employees and others alike find it almost impossible to survive on their salaries alone (see also Chapter Two). If they should seek supplementary sources of income, this might not leave them with enough time and/or commitment to attend to agroforestry activities. Furthermore, provision of sufficient funds for these schemes will facilitate realisation of the set goals (e.g. adequate fuelwood supply). Lastly, availability of transport and other facilities (e.g. watering cans) is necessary if, say, the haphazard nature of tree-planting activities in Uganda during the 1970s is not to recur.

c) Management practices

Good management of a given land area is one factor contributing to the latter's productivity and sustainability. As one form of land use, agroforestry is complex. In part, this arises out of a range of purposes it is to serve. Not only do different geographical areas (and, therefore, human communities) have needs and wants that are not always easily defined, but, as individual owners of land, many agroforesters are key decision-makers regarding which parts of their land are to serve what goals and for what period of time. In addition, lack of adequate inventories, if any at all, exacerbates the task of

choosing specific crops in accordance with given climatic and edaphic conditions. Another complication arises, for instance, in areas where, apparently, fuelwood demand and supply are still in equilibrium. Partly due to the difficulties involved in quantifying fuelwood shortages, it is not always easy to tell when disequilibrium will set in. As such, and particularly in those areas where transactions involving cash (as a medium of exchange) are comparatively few, would-be beneficiaries of an agroforestry programme may not be convinced of the need for it at the time.

In view of these and other influences, it is fair to suggest that a management practice in use in one area might not suit other places. In many parts of Uganda, for example, intercropping is a long-established land-use form. Since agroforestry has some advantages that are already met through such intercropping (e.g. improved soil fertility where beans are intercropped with young banana trees), it pays to seek and utilise any knowledge and/or expertise that peasant farmers in a given area have. In cases like these, the local community members can facilitate inventorying, say, of those crop combinations that have already been cultivated successfully by them. The role played by this group of people in what one writer[1] has referred to as 'land diagnosis' is an indispensable one. This is the more so since many agroforestry schemes in most of the Less Developed Nations are and will continue to be characterised by low amounts of material inputs.

In a way, therefore, the task of working out and recommending management practices for agroforestry programmes is arduous, lengthy, and, perhaps, non-conclusive. It involves a considerable period of time during which each form of management can be evaluated. This is complicated further by a wide range of both known and unknown factors that, at

[1] See, HUXLEY, PETER A., 1982; Agroforestry - A Range of New Opportunities? Biologist 29(3), 141-3.

any one time, can influence each management kind. By identifying and inventorying the different purposes agroforestry is to serve for each area, ground will have been laid whereupon various management practices can evolve.

### 7.1.2 Woodlots

#### a) Description and current management forms

Woodlots differ from agroforestry farms, for example, in that, here, there are no agricultural crops or animals. Instead, these consist of trees which serve building, construction, fencing, fuelwood, and other purposes. In Uganda, individual woodlots are widespread and, as aforesaid, dominated by eucalyptus trees. On average, most woodlots are 0.50 ha or less in size.

Spontaneous tree-planting is very common,and, in terms of management, the majority of the people prune the trees when need arises (e.g. when there are branches that are to be removed). Due to the danger posed by bush fires during the summer time (i.e. June-August/September), a clearing of approximately 5-10 m wide is made around each woodlot and, as much as is possible, the woodlot floor is kept free from dry branches, twigs, and too much dry leaf fall. At other times, it is not uncommon to find woodlots which have an undergrowth with grass and many shrubs. This arises, in part, owing to the traditional major roles played by these woodlots. As aforementioned, heavy reliance upon such woodlots as a fuelwood source in Uganda is, generally speaking, a recent development. Instead, building and construction (by the woodlot owners themselves and/or relatives and friends) are the two main purposes for which people have been keeping woodlots. But, since such activities are not undertaken, say, every month, it is unsurprising that such a deficiency in woodlot management does exist.

b) Requirements for woodlots as major fuelwood sources

Owing to unsustainable levels of harvesting of the traditional fuelwood sources (i.e. woodlands) in Uganda, woodlots are likely to figure prominently as fuelwood sources in future (see also Chapter Six). In view of this, some of the factors mentioned under agroforestry apply here as well. For instance, where the traditional spontaneous tree-planting is considered or proved less beneficial, seedlings should be planted according to the local conditions. Also, the primary and secondary objectives of these schemes need to be spelt out clearly, as well as being reflected within the establishment and management methods of the woodlots in question. Availability of transport and related facilities and services will help in ensuring that any saleable products are marketed easily and with minimal cost to the producers.

What must be noted here is that land tenure is very decisive in woodlot establishment and/or management. It is because of private land ownership that almost all existing woodlots in Uganda belong to individuals. Whenever these become the main fuelwood sources, it is unavoidable that the owners will remain the principal beneficiaries, while the position of some of the "have-nots" might get worse. Under such circumstances, every effort should be made to enable each family or household to have its own woodlot.

On the other hand, community woodlots, which are almost non-existent in Uganda now, might be envisaged for those areas which are both densely populated and facing land shortages already. Where public land exists, it can be considered for this purpose. Alternatively, people in a given area could be talked into starting such a scheme. One way of doing this is to identify an agriculturally marginal area that is about equidistant to many people and then have a woodlot established there. Unlike individual woodlots, all such community schemes will be large in size (e.g. over 5 ha). However, social factors, in particular, might be such that

the establishment of community forests in Uganda will not materialise. Among other things, there is unequal distribution of wood demand owing to variations in family sizes. Secondly, differences of opinion between Catholics and Protestants at the local community level, especially, often create mutual suspicion and, sometimes, bitter exchange of words. This situation is aggravated by the country's party politics whereby members of different parties (e.g. Uganda People's Congress and the Democratic Party) are, almost always, not prepared to shelve their differences in political ideologies and aspirations and, without coercion, pool their resources for the good of all. Thirdly, as one component of management, organisation of work on these community woodlots may not be smooth since people will always tend to give priority to their individual agricultural and other pursuits. In view of these and similar reasons, individual, rather than community, woodlots should be emphasised nationwide.

### 7.1.3 Energy Farms

These refer to large stretches of trees (e.g. eucalyptus) which are grown with provision of adequate woodfuel as their primary goal. Unlike in the case of agroforestry and woodlots above, these energy farms are likely to involve substantial material inputs. Also, their establishment and management may have to be more systematic than what is obtaining, say, in individual woodlots.

Two types of these farms can be identified and these are shown herebelow.

a) Rural energy farms

Ideal locations for these include agriculturally marginal lands and also

sparsely populated places[1]. For instance, leguminous trees could be planted in semi-arid areas, e.g. parts of South-east Mbarara District. These trees have a twofold advantage. They help to raise the productivity of the soils therein, while, simultaneously, yielding different tree products. Furthermore, energy farms can create employment, both skilled and unskilled, thereby contributing to individual incomes and the national economy at large.

Among the major consumers of the wood energy forthcoming from these farms will be institutional activities (e.g. tea-processing, tobacco-curing, fish-smoking, etc.). In addition, any secondary objectives, such as the production of industrial raw materials, need to be identified right from the beginning so that the whole establishment and management of such farms reflect all the end-use types. Lastly, since the population densities in these areas (i.e. around such energy farms) are likely to be low or medium, it should be feasible, when need arises, for the local community to secure some or all of their fuelwood requirements from these sources.

b) Green belts

Preferably, green (or tree) belts should be established around towns, trading and/or community centres, along road sections, and the like. They can also take the form of shelter belts. Either way, these could have, as their primary role, charcoal production with use of high-efficiency kilns and conversion processes. (This goal will be determined mainly by the energy characteristics of the immediate user population.)

[1] The reason for suggesting such areas relates to the need to minimise, if not prevent altogether, competition (for land use) between agricultural crops (and human settlement) and trees grown on such farms. Other things remaining the same, for instance, the huge inputs of fertilisers required to upgrade such marginal land for agricultural purposes cannot be afforded by most peasants. Thus, establishment of energy farms thereon might be a reasonable option.

Since conflicts are likely (e.g. involving illegal and indiscriminate fuelwood harvesting), there ought to be a properly constituted administrative and operational machinery. For instance, forest guards may have to be employed. In addition, and perhaps more important, there should be a well-organised public information exercise to enable the wider community understand and appreciate the multipurpose nature of such belts, such as their windbreak effect and provision of habitats for birdlife. Finally, these belts should not be allowed to become a haven for social misfits or enemies (e.g. thieves).

Two other points are noteworthy about green belts especially. In different parts of Uganda, some government eucalyptus tree belts, also referred to as tree plantations, have been sold to individuals and institutions (Table 7.1 below). Here, private ownership of such belts serves to strengthen further the economic status of the owner(s), while, at the same time, removing a potential woodfuel supplier, say, for industrial consumers likely to locate in the area(s) in future. Also, some of the owners often fell the trees in preference for other land-use activities, e.g. livestock farming (Figure 7.1 below).

Figure 7.1 Eucalyptus trees being cleared away in preparation for a cattle ranch. (Location: Kayanja Village of Kyeizooba Subcounty, Central Bushenyi District.)

Table 7.1 Official tree plantations in Bushenyi District sold out since 1965

| County | Subcounty | Place/parish | Taken/bought by | Year |
|---|---|---|---|---|
| KAJARA | Nyabihoko | Rukanga | Taken by Forest Department | - |
| | Nyabihoko | Rwashamaire | Taken by Haji Abdul Kakwara | - |
| | Nyabihoko | Ruyanja | Taken by Mr Tibenderana | - |
| | Ihunga | Rutunguru | Taken by Haji Salim Jumba | - |
| | Ihunga | Butanda | Taken by Swaliki Mukasa | - |
| | Kiyaga | Nyabihoko | Taken by Mr S. Kwesiga | - |
| | Kiyaga | Nkongoro | Taken by Mr Muranga | - |
| | Kiyaga | Karengye | Taken by Mr Tibenderana | - |
| | Kiyaga | Nkongoro | Taken by Mr Rwankurukumbi | - |
| SHEEMA | Bugongi | Kyamurari | Taken by Mr R. Sempa | - |
| | Bugongi | Karera | Taken by Mr Nyehangane | - |
| | Shuuku | Shuuku | Taken by Mr S. Biniania | - |
| BUHWEJU | Karungu | Karungu | Reported to have been taken by Forest Department, but no records are available. | 1960 |
| | Karungu | Rugongi | Taken by Forest Department | - |
| RUHINDA | Mitooma | Omukabira | Taken by Mr Kyombo | - |
| | Mitooma | Mushunga | Taken by Mr A. Kinengyere | - |
| BUNYARUGURU | Ryeru | Magambo | Taken by Mr E. Besigaki | - |
| | Ryeru | Magambo | Taken by Mr P. Katuramunda | - |
| | Ryeru | Nyabuhere | Taken by Mr Rukasingurwa | - |
| | Ryeru | Butoha | Taken by Mr Rwabutiiti | - |
| | Ryeru | Nkombe | Taken by Forest Department | - |
| | Ndekye | Katampanga | Taken by Forest Department | - |
| IGARA | Bumbaire | Bushenyi | Taken by West Ankole Diocese | 1980 |
| | Bumbaire | Bushenyi | Taken by Mr Mukaira | 1972 |
| | Bumbaire | Ruhandagazi | Taken by Rushinya Parish | 1973 |
| | Bumbaire | Butuuro | Taken by late Katukura | 1965 |
| | Kyeizooba | Kyeizooba | Taken by late Rwabusyagara | 1969 |
| | Kyeizooba | Kararo | Taken by Mr Bangabaabo | 1976 |
| | Kyeizooba | Buyanja | Taken by Dr Tiberondwa | 1969 |
| | Nyabubaare | Omurugara | Taken by Mr Besiima | 1972 |
| | Nyabubaare | Nyabubaare | Taken by Mr Barya | 1972 |
| | Nyabubaare | Nyabitote | Taken by late Bitahwa | 1972 |
| | Kyabugimbi | Kyabugimbi | Taken by Church of Uganda, Kyabugimbi | 1968 |

Source: This information was obtained from item two (2) of the list compiled by the Administrative Secretary, Bushenyi District, and dated 31 August 1983.

Note: There are some discrepancies in the subcounty names appearing above and those shown in Table 5.1. It is possible that either some names have been changed or there are names which are used interchangeably.

Secondly, the survival of some wood belts will, now and then, be affected by other man-made factors. For example, the eucalyptus tree belt shown in

Figure 7.2 below has, for a long time, had an effective windbreak impact upon part of Bushenyi Town. Continued fulfilment of this role, however,

Figure 7.2 Part of an eucalyptus tree belt close to Bushenyi Town. The younger trees represent a section of the belt where tree-felling has already taken place.

now hangs in the balance owing to frequent cutting of parts of it. Unofficial sources indicated that the aim of such action is to guard against this belt offering a haven to 'bandits' (i.e. armed opponents of the government).

## 7.2 Improved End-use Efficiency

Essentially, this can be considered in terms of household use, charcoal-

making, and fish-smoking. The central theme here is to do with achieving a higher efficiency, say, in fuel use than has been the case hitherto. Of the three users mentioned above, households provide a good illustration of how complex this objective is.

### 7.2.1 Households

Many countries, such as Nepal, Indonesia, Somalia, Burkina Faso (i.e. former Upper Volta), and Guatemala, are already engaged in programmes dealing with improved cookstoves. (To date, Uganda has not joined in the exercise.) Literature on the various stoves that have been developed, experimented upon, and/or used is available in different forms[1]. Examples of these stoves are the "Lorena" in Guatemala, "Ban ak Suuf" and "Louga" of Senegal, "Nouna" and "Kaya" found in Burkina Faso, and the "HERL Chula" in India[2]. (In 1983, the author, along with two other colleagues, constructed the New Nepali Chulo II, i.e. an enclosed cooking stove designed in Nepal. Clay, sand, and cowdung were the raw materials used. Although the stove's efficiency was not tested at the time, it is likely not to differ significantly from that of similar ones that have been constructed elsewhere.)

When it started, the stove programme aimed at reducing the amount of fuelwood used during a cooking process. One way of doing this would be through more target heating (e.g. by having the fire directly below the bottom of a cooking utensil, as well as shielding the fire against the wind). It was hoped that this would overcome one of the main weaknesses

[1] For example, see FOLEY, GERALD and MOSS, PATRICIA, 1983; Improved Cooking Stoves in Developing Countries; International Institute for Environment and Development, London; also MANIBOG, FERNANDO R., 1984; Improved Cooking Stoves in Developing Countries: Problems and Opportunities, Annual Review of Energy 9, 199-227.

[2] As above.

of the traditional open fire (see also Chapter Six). Since then, various shielded and closed stoves have been constructed[1]. But, as is the case with open fires, the efficiency of these stoves is one area where a lot of debate is still going on.

In the real world, substituting an improved cookstove for an open fire is influenced by a number of factors. Chief among these is the extent to which such a stove is multipurpose. While emphasizing fuel efficiency of these stoves, their early developers often overlooked the significance - to the rural users especially - of a stove's non-fuel efficiency. For instance, closure of a stove's door improves the stove's fuel efficiency, but, simultaneously, fails to provide lighting. Secondly, traditional food flavouring and preservation, such as are common in the districts of Bushenyi and Mbarara, are almost impossible when using such stoves.

But what is a cookstove's efficiency, and how can it be measured? Different people and organisations engaged in the stove programmes are trying to come to grips with these and other issues alike[2]. Basically, the efficiency of a stove can be low, medium, or high. The range of purposes a given stove serves constitutes one criterion for determining how efficient the stove is. Thus, if the fuel and socio-cultural needs of a local community are met (Chapter Six), the stove in use might be described as having a high level of efficiency.

Measuring the different types of a stove's efficiency appears to be more complicated than defining efficiency itself. Here, for example, one major discrepancy relates to the results of stove performance under and away from laboratory conditions. While it is possible to control the many

[1] MANIBOG, FERNANDO R., 1984; Improved Cooking Stoves in Developing Countries: Problems and Opportunities, Annual Review of Energy 9, 199-227.

[2] As above.

variables on performance within the laboratory, testing a stove for its efficiency, say, in a rural kitchen is difficult. As already mentioned in Chapter Six, for example, the type of wood one uses depends upon where one gets it from or the food that is to be cooked. Also, the person in-charge of the cooking has considerable influence on how the stove in use functions.

Yet another issue to be resolved is how inefficient the traditional open fire is. Shielding of these fires against wind is long-established in different parts of Uganda, more especially when cooking is being done in the open or where the walls of the mud-and-wattle kitchen being used are not properly plastered. This kind of improving the open fire's efficiency at no monetary cost is one area which, it is hoped, research in the stove programme will investigate further.

Therefore, the merits of these stoves, where they have been identified, still have to be improved upon. For example, most stove technical design and construction, at least so far, dictate use of wood of a certain length and diameter, as well as putting these stoves beyond the reach of many economically disadvantaged wood users. To appeal to the average rural dweller, these stoves have to be multipurpose, and neither energy-source specific nor technically demanding. Lastly, while the local community members (especially women) are increasingly becoming involved in stove designing and construction, substantial attention and effort should also be given to ways of improving the efficiency of the traditional open fire without necessarily replacing it with the stove. Inevitably, this will depend a lot on how accurately the efficiency of the open fire, as opposed to the stove, can be measured.

### 7.2.2 Charcoal-making Activities

Improvement in end use is possible here. For example, adoption of portable and efficient kilns should be promoted so as to cut down on

the amount of wood used by charcoal makers. Owing to the likely high initial costs for such kilns, it might be preferable to have Charcoal Producers' Cooperative Societies. These would also ease the task of achieving rationalisation of such activities in different parts of Uganda.

### 7.2.3 Fish-smoking

Traditionally, most fish in Uganda is smoked using wooden racks below which the fire is lit. End-use efficiency here is low since there is considerably less target smoking. This can be remedied through construction of barns with partially enclosed chambers[1]. However, due attention should be given to the cost and social benefit analyses of these new methods before they are introduced. Also, the fish smokers themselves must be accorded an active role in all this, while, at the same time, fish-smoking operations ought to be rationalised and monitored accordingly.

## 7.3 Which Strategy is Better?

Brief though it has been, the foregoing discussion points to one thing: individually, none of the strategies mentioned above should be expected to provide a panacea, say, to fuelwood scarcities. Instead, fuelwood farming and improved end-use efficiency ought to be regarded as complementary. Thus, a better strategy should consist of a combination of both.

For Uganda and other countries which are late starters in the different programmes dealing with fuelwood shortages, there are plenty of opportunities to learn from the experiments already done by others, as well as

[1] UNDP and THE WORLD BANK, 1983; Uganda: Issues and Options in the Energy Sector; The World Bank, Washington, D.C.

any mistakes that the latter might have committed. For instance, it is becoming increasingly realised that a participatory local community is one medium through which some of these schemes can be made cost-effective for and meet with a greater measure of acceptance by the rural beneficiaries especially. This is clearly exemplified by female involvement in stove construction, say, in Senegal[1]. Furthermore, the limitations imposed by lack of inventories about many local factors (e.g. soils and climate) are an important influence with regard to various development programmes. In this connection, Uganda stands to benefit a lot from making a start on this undertaking as early as is possible. Lastly, an integrated, as opposed to piecemeal, approach to people's energy and other requirements holds promise for more success with these endeavours and others which will be launched in future.

Other factors, too, are important regarding the realisation of the primary (and secondary) goals of the aforementioned strategies. For example, the presence of an energy awareness among the people might ease their (i.e. strategies) implementation. Creation of such awareness can be achieved when, at government level, for instance, there is action and commitment towards solving such problems as fuelwood shortages. It is some of these influences that the following and last chapter of the thesis discusses.

[1] FOLEY, GERALD and MOSS, PATRICIA, 1983; Improved Cooking Stoves in Developing Countries; International Institute for Environment and Development, London.

# CHAPTER EIGHT

## FUELWOOD POLICY, PLANNING AND DISSEMINATION OF INFORMATION

Increasing the supply of fuelwood in any district of Uganda involves policy issues, particularly those relating to the social and economic development of the country at large. Within Uganda, it is the national government that (i) formulates such policies and (ii) provides most of the capital and manpower required for different purposes. In addition, the effectiveness of any policy is largely underscored by the politics of the day. Thus, a number of favourable conditions must exist if, for instance, the suggestions raised in Chapter Seven are to materialise. It is this that the first four sections of this chapter are about, while the last section provides a conclusion to the thesis as a whole.

### 8.1 Introduction

With the President's and Prime Minister's Offices aside, there are 27 government ministries in Uganda. These are:

Agriculture & Forestry
Animal Industry & Fisheries
Commerce
Cooperatives & Marketing
Culture & Community Development
Defence
Education
Finance
Foreign Affairs
Health
Housing & Urban Development
Information & Broadcasting
Industry
Internal Affairs
Justice
Labour
Lands, Mineral & Water Resources
Local Government
Planning & Economic Development
Power, Posts & Telecommunications
Public Service & Cabinet Affairs
Regional Cooperation
Rehabilitation
Supplies
Tourism & Wildlife
Transport
Works

Under the present arrangement, fuelwood production falls under the Forest Department, and, therefore, the Ministry of Agriculture and Forestry. On the other hand, major issues regarding national planning and development policies are handled by the Ministry of Planning and Economic Development. This implies that, if fuelwood production has to be stepped up, all issues relating to and interacting with it (e.g. finance and agriculture) need to be carefully planned for. This is only possible if there is proper coordination between the ministries so affected.

With the exception of four ministries[1], all the others have their headquarters in Kampala City. Each ministry is divided into departments (e.g. Department of Agriculture), and, in addition to the head offices, most ministries have offices located in the district administrative centres. In terms of the civil service, each ministry is headed by a Permanent Secretary to whom all ministry employees are immediately answerable. The financial year in Uganda lasts from July until June, and each ministry submits estimates of its budget to the Treasury around April annually. Very often, not all ministries are allocated all the funds asked for, and, apart from submitting supplementary estimates at a later date, must endeavour to operate within the available resources. These resource constraints are among the main problems facing various programmes (e.g. tree-planting) countrywide.

Administratively, each district is headed by a District Commissioner, with two or more assistants. Districts are divided into counties, subcounties and, lastly, parishes, and administration in these units is

[1] Head offices of the Ministries of Agriculture and Forestry, Health, Public Service and Cabinet Affairs, and Works are in Entebbe Township, approximately 34 kms from Kampala City.

handled by county, subcounty and parish chiefs respectively. Unlike the District Commissioners who, since the start of the 1980s, are directly answerable to the President's Office, these chiefs fall under the Ministry of Local Government. (Prior to the 1980s, District Commissioners were also under this ministry.) This unfortunate arrangement can easily lead to some administrative complications since the two (i.e. the President's Office and the Ministry of Local Government) might not always concur on a number of issues. In particular, this applies to the appointment of different cadres of administrators where there is an increasing influence of party politics. Thus, successful implementation of any scheme can only be guaranteed if there are good relations, say, between the Office of the District Commissioner, staff of the Ministry of Agriculture and Forestry, subdistrict administrators, and, more especially, the general public.

## 8.2 A Fuelwood Policy

Since fuelwood plays a crucial role in the welfare of the majority population in Uganda, its operations (i.e. demand and supply) have to form part and parcel of all the socio-economic programmes aimed at developing the country. Also, its link with agriculture and agro-processing industries has a direct bearing on Uganda's "FERIDI" (i.e. Foreign Exchange Requirements for the Importation of Different Items). Thus, a fuelwood plan of action is necessary.

In formulating a fuelwood policy, there are two main issues to consider. One of these relates to the aim(s) of such a policy, while the other concerns the strategies that are to be adopted for achieving the set goal(s). Each of these factors is dealt with herebelow.

### 8.2.1 Aims

Declines in the availability of fuelwood are eroding one of the most fundamental bases of Uganda's development and well-being. Therefore, the main goal of a fuelwood policy is to facilitate realisation of per capita fuelwood self-sufficiency for as long as is necessary. In addition, this objective is not to be achieved at the expense of other equally important ones (e.g. crop cultivation). Thus, such a policy should also aim at promoting proper land husbandry, and, as such, improving the carrying capacity of a given piece of land.

### 8.2.2 Strategies

Owing to the rural-urban dichotomy regarding wood consumption, there are bound to be some variations in the strategies for achieving adequate fuelwood supplies. But what is common to both rural and urban contexts is the high growth rate in population. Accordingly, the first cornerstone of a fuelwood plan of action lies in this human factor.

#### a) Population growth control

It is futile to strive to raise the supply of fuelwood if population growth - i.e. the primary cause of its current diminution - cannot be brought in line with the national resources and aspirations. As aforementioned, land clearance for agricultural purposes is mainly responsible for the continuing disappearance of woody stocks countrywide. For instance, more people call for increased production of food for them, as well as cash crops to earn revenue that must go towards availing

them of other life necessities (e.g. clothing, shelter, health facilities, education, transport, etc.).

Currently, there appears to be no policy regarding population growth in Uganda. For instance, it is unclear as to what population size the country is capable of sustaining at any given time. The implication of this vacuum is especially critical in the countryside where, as is the case with fuelwood use, population growth is fastest. Reversal of this trend involves improved living conditions for the rural people. This includes, for example,

(i) more availability of potable water throughout the year;
(ii) better socio-economic infrastructure;
(iii) reasonably high prices for agricultural produce;
(iv) ready access to various manufactured items and at fair prices; and
(v) easing of the manual labour required for farm work.

Three points deserve special consideration here. Firstly, while improved health facilities, for instance, will ipso facto contribute to a high survivorship rate, political stability is equally important to ensure that no family, particularly among the peasant community, is disadvantaged through politically motivated losses of its members. Secondly, any measures for controlling population growth ought to emphasize voluntary means. Hitherto, the geographical distribution of family planning programmes across Uganda is still very limited. To be more effective, it might be necessary for the Uganda Family Planning Association (i.e. the body handling family planning activities in the country) to have branches at the lowest administrative level (i.e. parish). The success of this strategy is inextricably linked to the third point. That is, the status of rural women, especially, has to be raised. For instance, there needs to be redress to the onerous family, garden and other tasks which they

continue to shoulder. Furthermore, female school enrolment ratios ought to be raised so that, to a great extent, these (i) equip the women with more employable skills in a money economy, and (ii) lead to a decrease in their marriage at a very early age. (Obviously, the last factor applies equally to men too.)

b) Other strategies

Improved wood end-use efficiency and growing of trees purposely for fuel provision offer other means through which self-reliance in wood supply can be attained (Chapter Seven). Equally important, the current wood resource base must be evaluated to determine the level of the supply-demand imbalance. This is particularly significant given that, almost always, Uganda will be confronted with limited investment resources. Thus, the aim here is that the level of investment in a fuelwood programme should reflect the magnitude of the scarcity it is intended to remedy. In a way, this implies some form of classification of wood shortages, say, into high, medium and/or low (Chapter Six). Inevitably, such categories set the priorities that ought to govern resource allocation and utilisation.

In addition to the foregoing, assessment of both actual and potential wood consumption is an important requirement, and this must include analyses of trends within fuelwood use. Also, there needs to be research into alternative fuel kinds on the basis of their cost-effectiveness, technical feasibility, social desirability, and local and national impact. The main purpose of the latter strategy is to facilitate sufficient wood supplies through a high level of interfuel substitution. This is particularly relevant to those areas (e.g. densely populated and/or land-scarcity subcounties or districts) wherein fuelwood production is severely constrained.

It is expected that a fuelwood policy with the above goals and strategies would provide effective representation of the non-commercial energy industry, and, hopefully, enable it to be accorded more attention at both national and subnational levels than has been the case thus far. Improving the supply of fuelwood to a level commensurate with end-use demand requires on-going resource investment which is possible only when such a goal can compete strongly for the allocation of various investment resources. And, as is shown below, the involvement of different agencies in programmes of this kind is indispensable.

## 8.3 Intersectoral Planning, Coordination and Cooperation

The significance of these may be considered under three sub-headings (i.e. land use, manpower, and administration).

### 8.3.1 Land Use

Both public and private agencies or sectors have a role to play with regard to fuelwood supply. Consequently, their activities have to be coordinated. On the government side, for example, the Ministry of Agriculture and Forestry must liaise with that of Animal Industry and Fisheries since cattle-keeping, which falls under the latter ministry, is also an important land user. In addition, there have to be coordination and cooperation with the Ministry of Power, Posts and Telecommunications. While installation of facilities for posts and telecommunications in Uganda might not require a lot of land, Power, under the present arrangement, includes petroleum products. Owing to the link between fossil fuels and woodfuel, trends within the petroleum sector,

too, must be monitored by fuelwood planners and managers.

Furthermore, the Ministry of Housing and Urban Development uses land, and, therefore, its development plans and projects should be made known to and discussed with relevant persons in the energy sector. This also applies to the Ministry of Lands, Mineral and Water Resources. Here, for example, establishment of fuelwood nurseries in different areas requires, among other things, reliable supplies of water. Thus, the data that this ministry has on the geographical distribution of water resources countrywide is crucial to such programmes. Also, preparation and updating of land-use maps by this same ministry are fundamental to the planning, implementation and success of any land-based activity (e.g. tree farming).

That poor planning, coordination and/or cooperation between two or more agencies can have negative effects is clearly illustrated by two cases from Bushenyi District. Firstly, some of the interviewees here indicated that there is often inconsistency regarding the extension services rendered by agricultural, forest and veterinary field staff. On the one hand, agricultural personnel tend to restrict themselves to matters relating to crops only. Many foresters, on the other hand, talk about trees from an industrial viewpoint. That is, trees are considered mainly in terms of their potential as industrial raw materials. What is perhaps not very clear to such foresters is that this approach to trees tends to distance the majority of the peasants for whom that goal has been, is and will continue to be of secondary importance. And, to aggravate the situation, some veterinary officers view a number of shrubby plants as providing a haven for vectors that are harmful to domestic (and sometimes wild) animals[1]. Accordingly, they advise that such vegetation be cleared away.

[1]This opinion was presented during a meeting attended by representatives from the Office of the District Commissioner and the Departments of Agriculture, Education and Forestry, Bushenyi District.

The second illustration concerns trees and urban growth or expansion. In Bushenyi District, Ishaka Trading Centre is growing in terms of commercial and residential buildings. However, this seems to be at the expense of other equally important needs. For instance, eucalyptus trees in a nearby wood belt are being felled to provide room for commercial buildings (Figure 8.1 below). Not only does this constitute a reduction

Figure 8.1 An area in Central Bushenyi District. The building shown here is part of the expansion of Ishaka Trading Centre for which the eucalyptus trees are being destroyed.

in the fuelwood potential of this tree belt, but the windbreak effect of the trees on the trading centre itself is being minimised. So far, it appears that none of the ministries concerned - especially Agriculture and Forestry, Housing and Urban Development, and Local Government - is aware of and/or attempting to prevent the demerits of such uncoordinated actions.

### 8.3.2 Manpower

Effective implementation of energy, population, and similar policies also depends on the number and quality of the personnel in question. Quite often, many highly qualified persons tend to be in the major urban centres (e.g. Kampala City), particularly at or near the headquarters of various ministries. In most cases, this is due to the highly centralised nature of a given ministry (e.g. Housing and Urban Development). At other times, though, it stems from the existing imbalance between rural and urban socio-economic facilities and services.

Both the number and quality of manpower are central to fuelwood production. For example, all fuelwood producers should have easy access to the relevant personnel. In a way, this means that, say, foresters ought to be available at the parish level (i.e. the lowest administrative level in Uganda). This creates both physical and temporal proximity that can ease, say, attendance to tree diseases. In addition, such proximity helps to eliminate communication gaps that are so common between urban-based professionals and rural recipients of a given service.

The issue of the quality of manpower for fuelwood purposes touches directly on the Ministry of Education. While low- and middle-cadre foresters, for example, can be trained locally (e.g. at Nyabyeya Forest College and Makerere University, Kampala), a number of the more qualified staff still have to undertake their training overseas. This is particularly so with regard to manpower needed for research activities. The extent to which as many foresters as are needed can receive such training depends a lot upon the priority this sector alone receives within the Ministry of Education. In addition, it also raises the question of manpower planning at the national level. Presently, the latter task is handled by the Ministry of Planning and Economic Development. To many people, however, the impression is that Uganda's manpower needs are still ill-defined. Furthermore, there appear to be undue tribal and/or political party influences on the nomination of candidates to undertake

overseas training.

### 8.3.3 Administration

Of the non-technical and non-financial constraints, local and national political instability and maladministration are major obstacles to raising fuelwood supply in Uganda. At all levels, the quality of administration is an important factor. What one notes about the Ugandan situation, both now and in the past, is that party politics and appointments of various administrators seem to go hand in hand. Unfortunately, many political appointees rarely have the qualifications and/or experience required for this kind of job.

Because fuelwood production, like many other activities, is characteristically intersectoral, there need to be mutually desirable and beneficial relations between the leaders and the rest of the population. For example, a subcounty chief should know and accept that, apart from matters of a purely administrative nature, his day-to-day involvement, say, in agriculture, forestry, and so forth must not override the role and position of the immediate and proper personnel (e.g. agricultural and forest officers). Many interviewees in Mbarara District, especially, cited political maladministration and persecution - at both subnational and national levels - as the most unfortunate impediments to various development activities currently facing Uganda. It is also largely due to these factors that, in spite of the inadequate supply of well-qualified manpower at home, Uganda has a substantial number of its university-trained professionals and others alike exiled to and working in many countries outside.

Given that full community participation is also essential for sustained wood production, the hitherto predominantly "top-down" type of administration needs to be substituted with a "bottom-up" one. Unlike the

former kind, the latter emphasises active participation by the public. If well implemented, "bottom-up" administration can ensure respect for the local community views and their full integration into the policies, plans and management of various development schemes. This would go a long way towards enabling the public to benefit from such projects, as well as identifying themselves with them. In the final analysis, the public would be elevated from the status of near-passive recipients to one where they actively engage in the day-to-day running of matters affecting them and the rest of the world.

## 8.4 Dissemination of Information

Identification of fuelwood problems and the ways through which they are to be remedied is also influenced by the manner in which given types of information reach those people concerned. Since wood production interacts with many other activities (e.g. crop cultivation and harvesting of trees for building and/or construction purposes), it is necessary that the content of any kind of information be broad in outlook. Furthermore, the choice of the media to employ ought to be governed by such local factors as literacy rates and distribution of income and wealth.

Three main ways through which information can be disseminated are schools, radio (and television) programmes, and publications. As is shown below, the effectiveness of each medium is influenced by various factors.

### 8.4.1 Schools

Across Uganda, the number of primary schools, especially, has been growing rapidly. To an extent, this can be deduced from the percentage increase in

primary school enrolment over the last few years (e.g. 8.88% for 1980/81 and 11.4% in 1981/82)[1]. Since only about half of the pupils enrolled in primary schools manage to carry on with their education (e.g. in secondary schools and technical colleges)[2], the school curriculum should be organised in such a way that even these early drop-outs do acquire knowledge that can be of long-lasting benefit to them outside the school situation. For instance, the syllabus for Primary School Science used in Uganda in 1984 included topics on plants and environment. But, very often, the actual teaching and learning of these themes tend to be oriented largely to passing school examinations. As late as the end of 1983, moves were under way to introduce environmental education as a school subject in Uganda. It is hoped that its objectives and content would be such as to offer remedy to the shortcomings of the other subjects.

### 8.4.2 Radio and Television Programmes

Radio broadcasts are another useful medium that many areas in Uganda have access to. Hitherto, agriculture has received considerable coverage, say, through farmers' talks and the like. On the other hand, fuelwood has hardly figured in these radio programmes. Given what has already been said on non-commercial energy in Uganda (e.g. lack of a fuelwood policy and/or experience with serious wood scarcities), this is perhaps unsurprising. However, changes are called for to ensure that all the

[1] UGANDA MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT, 1983; Background to the Budget 1983-1984; Government Printer, Entebbe.

[2] The majority of the pupils drop out of school due to financial problems. Among the girls, though, some are forced out of school by unwanted pregnancies, while, at times, parents also put pressure on their daughters to leave school and get married. The latter is especially so in areas (e.g. Mbarara District) where, largely owing to economic reasons, brideprice has been rising. For example, it is not rare for a prospective husband to pay five cows, plus other items, for his wife-to-be.

people are adequately informed of what the fuelwood situation is like, both in Uganda and elsewhere. This, it is hoped, would go a long way towards encouraging many peasant farmers, especially, to start fuelwood farming on their own.

Television viewing in Uganda is limited mainly to Kampala City and a few other urban areas. One major advantage with T.V lies in its ability to have an immediate and effective visual impact upon a given audience. But, while T.V services countrywide will remain unfeasible for sometime[1], the Ministry of Information and Broadcasting can do a lot of service to the rural dwellers through use of mobile film units. This requires that this ministry gets funding commensurate with its obligations. Furthermore, programme compilers and producers can only do a worthwhile job if left free from political and similar harassment. Also, the ministry would have to liaise with relevant public and private agencies so that the programmes acquire an intersectoral outlook. Among government ministries to be involved in this are Agriculture and Forestry, Animal Industry and Fisheries, Culture and Community Development, Education, Health, and Housing and Urban Development.

### 8.4.3 Publications

A variety of local and international journals, newspapers and the like are to be found in Uganda, particularly in Kampala City. Of these, local newspapers can be singled out as having the potential to be an important disseminator of information on fuelwood and other issues.

[1] Apart from the technical and financial constraints facing Uganda, there are several subnational influences that disallow T.V viewing in many areas. In the countryside, for instance, electricity supply is minimal, while the people's purchasing power is low. Also, English, the official language, is not used by the majority of the population. To be effective, T.V programmes must overcome the language multiplicity existing in Uganda. While radio broadcasts have achieved this, it is uncertain that this could also apply to T.V.

At the national level, the government-owned Uganda Times[1] is published in English. Of necessity, this means that it is not accessible to the majority of the Ugandan population. In addition, there tends to be unnecessary coverage of news - especially about party politics - which the radio and T.V have already carried. It is for this reason, for example, that, apart from those pages containing advertisements and sports news, some readers of Uganda Times find it boring.

Newspapers at the subnational level vary a lot. In Kampala City alone, nearly all the dailies are in Luganda (i.e. the dominant language in use in and around the national capital). These include Taifa Empya and the Catholic-owned Munno which have been in publication for a long time. However, their coverage is generally narrow. For instance, Munno is liked by many readers for its accurate reporting, but its news does not cover most parts of Uganda. This shortcoming also characterises Ageeteeraine, a bi-monthly publication in Runyankore/Rukiga and the only regular newspaper in the vernacular for the districts of Bushenyi, Mbarara, and a few others. Another Luganda daily, known as Ngabo, gives a serious reader of such papers an impression of being more sensational than informative. Perhaps the only publication which, as of March 1984, appeared to be attempting to steer a middle course was the Munnansi Bulletin, published once a week. This is the official mouthpiece of the opposition Democratic Party, and, since its early publication in English[2], has widened its readership. However, the political climate nationwide still has a lot of influence on its operations. On at least one occasion in the past, some of its staff were arrested and materials seized by

[1] The Uganda Times, like the daily publications in the vernacular, has six issues a week, i.e. from Monday to Saturday. The dailies in Luganda, in particular, are almost always out by 7.30 a.m. But it is not uncommon for Uganda Times to appear after 10.00 a.m. This temporal factor constitutes an additional advantage for the former over Uganda Times.

[2] Munnansi Bulletin was first published in English, but, as of now, it is available in two other languages (i.e. Luganda and Luo).

government authorities.

Countrywide, the role of newspapers as informers needs to be improved. For example, there should be coverage also of those other issues that relate to land (e.g. proper land husbandry). The effects of a high population growth rate, too, ought to be made clear to as many people as is necessary. Newspapers should also inform the public, particularly in the countryside, about what fuelwood scarcities have already resulted in (e.g. increased temporal expenditure) among many wood-using societies, both near and far.

Two major constraints have to be overcome. In the first place, freedom of the press has to be guaranteed. Many social and economic disamenities found in Uganda today (e.g. poor rural development) have, among their causes, past and/or present political mistakes. Those affected must learn to accept constructive criticism if meaningful progress is to be made. Secondly, recognition must be made of the problems posed by Uganda's language multiplicity. Language, as a significant cultural component in many societies, influences people's attitudes to various issues. Directly or otherwise, the government in Uganda should promote publication of newspapers in the vernacular so that nearly everyone is served. Newspapers, for instance, must be regarded as a medium through which both the government and the general public can exchange ideas. Furthermore, various suggestions for raising fuelwood supply (Chapter Seven) can also be communicated to those in question. Of necessity, raising of literacy rates nationwide is fundamental to the effectiveness of newspapers and similar publications.

## 8.5 Conclusion

On the basis of the discussion given so far, it is fair to suggest that this thesis has achieved two major objectives. Firstly, the fuelwood

problem in Uganda has been identified, thus lending support to the views held by various organisations (e.g. the United Nations Development Programme and the World Bank) regarding the fuelwood situation in the country. Secondly, the relationship between fuelwood and the people's welfare and national economy has been analysed. It is in this connection, for example, that the effects, as well as causes, of fuelwood shortages must be seen as being immediate and far-reaching in space and time. This is exemplified by South-east Mbarara District where many interviewees agreed that the aforementioned increased predation on their crops by birds, monkeys and the like was directly linked to a net destruction - through bush clearance for crop cultivation - of the natural habitats of these predators.

More knowledge of the magnitude of this fuelwood problem in different parts of Uganda is needed, particularly for national planning and resource-allocation purposes. This will assist in ensuring that, within the limits set by available investment resources, appropriate measures are taken to remedy the disequilibrium in the fuelwood industry in a given area. Furthermore, any such measure should be of a multi-pronged nature. For instance, fuelwood farming outside the urban areas ought to be seen and promoted as one of the ways aimed at better land husbandry. For this to succeed, members of the local community have to be active participants in the whole programme. Equally significant, all the departments involved in such land-based activities must have cooperation and coordination among themselves.

On the understanding that fuelwood will continue to be the leading energy type consumed in Uganda, programmes aimed at increasing its supply are closely related to population and overall energy planning. For as long as the national population growth rate remains high, considerable pressure will continue to be generated on land use for crop cultivation especially. Due to the status of agriculture in Uganda, it is highly unlikely that individual peasants can grow enough trees (for fuel) when their crop-related requirements are not

yet met. Consequently, formulation and implementation of a population policy must be seen as fundamental to ensuring adequate fuelwood supplies in Uganda.

With regard to energy planning, it has been shown that fuelwood interacts, albeit indirectly, with other energy types (e.g. petroleum fuels). What is required is an energy policy which, partly on the basis of what is known (e.g. the relationship between energy and the national economy during the 1970s), spells out which kind of energy is to be developed and at what rate. This is necessary if the emphasis hitherto given to petroleum products and electricity, in particular, is to be lessened in favour of fuelwood. For both the present and future, rural electrification in Uganda, desirable though it be, will not have a significant impact on rural patterns of fuelwood use. Among other things, rural houses would have to be designed such that this energy type can be used therein. In the majority of cases, this would be too expensive and, therefore, unattainable. Given that one overriding objective of all socio-economic planning and development is a better quality of life for everyone, perception of the important contribution fuelwood makes to this is fundamental to solving any imbalance in the demand for and supply of this energy type.

Lastly, political stability must be seen as having a significant influence on programmes targeted at increasing the supply of fuelwood, as well as other energy types. Furthermore, as long as Uganda's politicians continue to favour, propose, sponsor and/or undertake only those socio-economic development schemes that can easily win them votes (from the electorate) and, hopefully, a further term of office, it is doubtful that much will be achieved. This is more so in the case of fuelwood whose scarcities may not have effects that are readily tangible in the short-term especially. Also, the fight against this (i.e. fuelwood problem) and other environmental disamenities in Uganda involves everybody. For the latter to participate meaningfully, a conducive environment is a basic requirement.

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