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Energy for Sustainable Development Limited
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Improving efficient woody biomass energy production and utilisation
KAR 7422

Final Report

March 2001

ENERGY FOR SUSTAINABLE DEVELOPMENT

Department for International Development KAR Project R7422
Improving efficient woody biomass energy production and utilisation
Final Summary Report March 2001
Contents

Glossary

ARDC	Association of Rural District Councils
CEO	Chief Executive Officer
CPI	Consumer Price Index
EAA	Energy Alternatives Africa
ESD	Energy for Sustainable Development Ltd
FD	Forestry Department, Uganda
GB£	British Pounds
JEEP	Joint Energy and Environment Projects
LC I - V	Local Council One to Five - Uganda local government levels
MOLG	Ministry of Local Government, Uganda
NGO	Non Government Organisation
RDC	Rural District Council
REDC	Renewable Energy Development Centre
SAFIRE	Southern Alliance for Indigenous Resources
SME	Small and medium sized enterprise
ULAA	Ugandan Local Authorities Association
Ush	Ugandan Shillings

Approximate exchange rates:

Uganda: February 2001, approximately Uganda Shillings (Ush) 2330 = GB£1.00.
Zimbabwe: February 2001, approximately Zimbabwe Dollars (ZWD) 56 = GB£1.00.

EXECUTIVE SUMMARY

Energy for Sustainable Development Ltd. (ESD) led a consortium of partners from Uganda and Zimbabwe to demonstrate to key stakeholders at district and national levels the important contributions commercial woody biomass energy makes towards rural poverty alleviation and to the national economy. The objectives were to gain a full understanding of the dynamics of woody biomass production, supply, marketing and use in two districts in rural Zimbabwe and two in Uganda. This knowledge would then allow the local policy makers to plan effective strategies to improve the use of wood resources for energy to the benefit of the local population and the environment. Two districts were chosen in each country: Chimanimani and Nyaki in Zimbabwe, and Masindi and Mukono in Uganda, based upon criteria laid out by the project team and agreed by national stakeholders in both countries at the start of the project.

The project was co-ordinated at a national level by REDC in Uganda, and the Association of Rural District Councils (ARDC) in Zimbabwe.[1] After districts were selected, the team held their first district stakeholder meetings, and working with local authorities, appointed district co-ordinators to lead and co-ordinate all district activities. District advisory committees were set up in each of the four districts, and a series of three to four district level stakeholder workshops were held in each district to involve local stakeholders in all aspects of the work, and to feed back results of that work at key intervals. District stakeholders included local government, representatives at a district level of national government agencies (e.g., ministries of agriculture, environment, planning, etc.), local commercial woody biomass suppliers, local woody biomass consumers, and key NGOs (churches, development and environment NGOs, etc.).

District profiles were prepared by the districts at an early stage in the project, whilst baseline surveys were designed with the district co-ordinators and their teams, and district surveys of commercial wood energy users and commercial wood energy users were undertaken by these co-ordinators and their teams. Further surveys were carried out for other stakeholders (e.g., district officials, NGOs, etc.) and focus group discussions were held with those stakeholders most involved in the wood energy business (suppliers, consumers, officials). Results were analysed and discussed at a district level, and key areas of focus were defined for further work. This included working with charcoal producers, with brick makers, with schools and hospitals, and with a number of other stakeholder groups. From this work, a series of district action plans were drafted and finalised during the course of the project.

[1] . In addition, the Ugandan national team included the Joint Energy and Environment Programme (JEEP an indigenous NGO), the Uganda Local Authorities Association (ULAA), the Ministry of Local Government (MOLG) and the Ministry of Energy and Mineral Development/MEMD's Energy Department. In Zimbabwe, ARDC was assisted by the Ministry of Energy, Department of Energy and SAFIRE, an indigenous Zimbabwean NGO.

It is crucial to note that the project set out to engage and involve the district players from the onset. It was absolutely crucial that the districts "owned" the project and its results, and that the districts "bought into" the process in order to take forward actions and activities identified and prioritised during the process. In all cases, each of the four districts "appropriated" the project, such that, in the end, they owned the project and its results.

Moreover, it is clear that in each of the four districts, both through the importance attributed to the process by the district stakeholders, and through the engagement of national stakeholders in the process, the activities initiated under the project will move forward beyond the life of the project. In the case of Uganda, activities and projects identified during the course of the project will be considered for support by Government under the World Bank-supported Energy for Rural Transformation project. In the case of Zimbabwe, a number of policy and legal steps must be taken before much concrete project action can take place. Therefore, the district stakeholders and Zimbabwe partners have placed actions in the policy and legal fields as the highest priorities in their action plans. These will be the next steps they take in the process.

The project outputs are:

- Engaged and aware stakeholders at National levels and at a local level in two districts in Uganda and two districts in Zimbabwe;
- Engaged and aware local stakeholders in both Uganda and Zimbabwe through the active participation in the project of the Zimbabwean Association of Rural District Councils (ARDC) and the Uganda Local Authorities Association (ULAA) and their constituent members;
- Detailed district study reports of the commercial biomass business (from production to end-use) in the target areas;
- A baseline database on the important poverty alleviation, employment, revenue and other benefits gained from biomass supply and consumption;
- A base line database of current biomass use for industrial and commercial small and medium-sized enterprises (SMEs), and rural institutional users.
- District action plans prepared by the district co-ordinators and their stakeholders that set out policies, actions and activities to improve the benefits of the commercial biomass business.
- National action plans to support and enable the policies and actions called for by the district stakeholders.
- A set of proposed interventions to promote improved commercial biomass business and end-use.

The **key results** from the project can be summarised as follows:

- Commercial wood energy was initially recognised as a priority area of action in all four districts, stemming primarily from the perception that its production causes environmental damage, on the one hand, and that it is often viewed as an "illegal"

activity engaged in by people on the margins of society on the other - i.e. it is viewed in both an environmental and a social sense as a negative factor;

- Initially, there was little realisation on the part of district authorities and local government of the economic importance of the business, and of its substantial contribution to local livelihoods, local revenues and the overall local economy - this changed dramatically in each of the four districts during the course of the project;
- The initial assumptions that commercial wood energy plays a major role in each of the four district's economies was verified at all levels;
- This became apparent to district and local authorities, and increasingly to national authorities, to the extent that the perceptions of the role of commercial wood energy in the districts changed from generally negative (i.e. destructive environmentally) to much more favourable, with the growing recognition of the importance commercial woody biomass plays for rural livelihoods, for generating employment where there are few other off-farm opportunities, and for providing revenues for local authorities to invest in social services and other development activities;
- Commercial wood energy provides important sources of off-farm income, particularly in the commercial fire wood sales area, but increasingly from the production and sale of charcoal, in rural Zimbabwe;
- Commercial wood energy provides the major source of livelihoods for hundreds of full-time suppliers in Uganda, ranging from commercial fire wood producers, charcoal producers, local transporters and local vendors on the supply side, to numerous SMEs (particularly brick makers, fish smokers, tobacco curers, eating establishments, bakeries, etc.) and institutions (schools and hospitals) on the demand side;
- In Uganda, in both Mukono and Masindi Districts, commercial wood fuel is one of the major "cash crops" in the district, and for the poorer, less advantaged residents in the districts, it is the major income earner for both those dedicated full-time to the activity, and is a major source of supplementary income to many other residents;
- In Zimbabwe, commercial wood energy is growing in economic importance, and in the more marginal areas of Chimanimani and Nyaki Districts, it serves as one of the, if not the, most important sources of income available to the poorest rural dwellers;
- However, here is a marked disparity in earnings between the district level producers
  and local retailers and those who market the product into the urban centres.
- In all four districts commercial wood energy supplies brick producers, one of the most important SMEs in the districts, and one of the most important economic activities in the district - and there is considerable scope for improving fuel use efficiencies to reduce environmental impacts and to improve financial returns to brick producers at little cost;
- In all four districts commercial wood fuel provides important sources of energy for a number of other economic activities (tobacco curing, fish smoking, lime production) and for a number of institutional activities (heating and cooking in

hospitals and schools) - intervention that can result in savings of between 25% and 50% can be made at little cost and/or with very short paybacks;
- In all four districts, local and district authorities agree that positive action to improve the production efficiencies of fire wood and charcoal needs to be taken to ensure greater returns to producers, and to assure more sustainable long-term utilisation of wood resources for these activities;
- In all four districts, local and district authorities agree that positive action to improve the utilisation of commercial wood energy needs to be taken to ensure greater returns, lower expenditures, for rural SMEs, for institutions and for households;
- Furthermore, all four districts, in their action plans, agreed to incorporate these issues in their district planning - i.e. all have agreed to focus on means to improve the "business" of commercial wood energy both to tackle environmental issues, but, as importantly, to address key economic, livelihood, and social issues.

The **action plans** developed in each district vary in terms of areas of focus. In Zimbabwe, there is great concern for the need to regularise and legalise the commercial woody biomass business in order to tackle other issues of improving returns to producers and consumers alike. These are priority actions, and were reflected at the highest national levels at national stakeholder meetings. There is great need to revisit existing legislation, taxation, and policy in this field if the wood energy business is to be improved to reduce its negative environmental effects, while at the same time improving rural livelihoods and revenues.

In Uganda, district action plans focused much more at micro-level actions. For example, in Masindi, the district stakeholders set out a detailed action plan for regularising the charcoal business where so many migrants and refugees, people on the margins of society, are engaged. In Mukono, brick production, which accounts for so much commercial wood consumption (and considerable environmental effects) was high on the list of actions in order to reduce the environmental impact, as well as to improve producers' livelihoods. In both districts in Uganda, the districts have identified discrete actions, ranging from training to investments, to improve the business, environmental effects, and raise the incomes of people engaged in the business. Moreover, there is a very strong recognition in Uganda of the need to regularise the business in order to realise longer-term revenues and returns from the business for the district authorities - i.e. for legitimising the business as a commercial activity that can absorb off-farm labour, generate household incomes, and generate local revenues for investing in social sectors.

The primary objectives of the project, namely to raise awareness of district stakeholders, and in so doing, show its positive developmental effects at a district and local level, were achieved beyond the team's expectations, particularly in Zimbabwe. A process of engaging local stakeholders on all sides of the issue began. Judging from the action plans, from the proposed interventions, and from the statements of local government to continue to focus on this in their planning, policy and developmental activities, the team believes the project has helped to initiate a process that will continue and achieve longer-term objectives of improving economic

livelihoods, local revenues and environmental management. Given the high level of participation of national stakeholders in the project, and in the process of defining and developing action plans, there are strong signs that national government bodies and other key stakeholders will continue to build upon the process started by the project.

1. SUMMARY OF PROJECT OBJECTIVES, ACTIVITIES AND OUTPUTS

1.1 Project background

Wood harvested for use in African industries and commercial establishments is “big business” in most parts of Africa, accounting for tens of millions of pounds in business for those engaged in wood energy supply, and providing one of the most important energy sources for industries and commercial establishments. The commercial harvesting, transport and sales of this wood employs tens of thousands of people in Uganda and Zimbabwe. Its sale provides one of the major sources of cash income in rural areas, often in areas where there are few other cash income generating alternatives. It employs thousands permanently and tens of thousands seasonally, and provides local governments with millions of pounds in much-needed revenues each year.

It is important to stress that this project focused on locally-controlled wood resources, almost entirely privately or communally owned, rather than nationally controlled forest reserves where wood reserves are either protected or produced under license or concession by government primarily for timber. Secondly, the project was not a forestry project. It was a project that focused on the commercial exploitation and utilisation of woody biomass energy, one of many rural resources, of which less than 5% comes off the national forest estate in either Zimbabwe or Uganda. Wood energy, in this context, is another rural commodity, and one of the major sources of cash for many rural subsistence households. Indeed, studies carried out under the Norwegians and the European Commission in Uganda showed that wood energy was the single most important cash 'crop' for rural households, and that almost all wood came off private or communally-managed lands.

Supply of wood fuel most often comes from disadvantaged low-income groups within rural communities who sell wood on to intermediaries ranging from transporters to urban merchants. This may be their sole income earning activity or a source of additional or supplementary income when times are hard or when

additional income is needed. By organising themselves, wood energy producers can improve production methods and raise their incomes, and thereby increase their earnings. Wood energy consumers can improve their efficiencies of utilisation, thereby reducing wood energy consumption and expenditures, and increasing their incomes.

Acceptance by local and national government stakeholders that wood is a real and important part of the local economy and an important part of the national energy balance is crucial.

This should lead to local authorities helping rural wood producers to become more organised, with improved production methods, and hence improve the quality and price of their production. Defining interventions that can reduce wood energy consumption can raise the incomes, reduce expenditures, of numerous rural SMEs, small industries, commercial establishments and institutions, thereby increasing employment opportunities and raising rural incomes.

This was one of the key premises that underlay the development of this project. It was tested out in four districts, two in Zimbabwe and two in Uganda. The project indeed illustrated that local authorities are generally unaware of the substantial contributions the business of commercial wood energy to their local economies, both in terms of livelihoods and incomes, as well as to local revenues.

Rather, they often view "the business" as a negative activity that leads to deforestation, that is often practised marginally, extra-legally or illegally, that requires considerable resources from a local level to enforce and control. The project demonstrated to local authorities and other key stakeholders that there are numerous benefits from "the business", and that they have many of the instruments to improve those benefits and thereby reduce negative environmental impacts of commercial wood energy production, while also improving the economic benefits to many local constituents.

The project, by involving all key stakeholders, from government to producers, from consumers to national policy makers, clearly demonstrated "win-win" options in the commercial woody biomass business. It demonstrated that for this to occur, local authorities must work with producers and others engaged in the business, to develop a clearer understanding of the business, and to understand the options at their disposal to help regularise and rationalise the business, and help local producers (and local economies) extract the most from the business, while ensuring its long-term environmental sustainability.

Locally-owned, managed and controlled wood resources in Uganda and Zimbabwe are the main source of sustainable fuel supply to local markets and industries and for transport to urban centres. In the case of Zimbabwe, the Forestry Commission is a parastatal commercial body, charged with managing the national forest reserve estate, and with exploiting its commercial timber resources. It has little contact with, little interest in, and no legal control over local wood production outside national forest reserves. In Uganda, the Forest Department (Ministry of Environment and Natural Resources) is *only* responsible for woody biomass within designated forest reserves, which account for less than 10% of the timber produced in the country and less than 5% of the wood energy. District level 'forest officers' in Uganda report to local authorities, although their remit is entirely within the context of forest reserves, not communal or private forest land.

It is for these reasons that the project focuses at the local, district level, where the bulk of the forest estate is either private or communal, and where all key decisions are made regarding production, conversion and transport of wood energy. Local environmental and development officers are much more crucial to the 'business' of

woody biomass in both Zimbabwe and Uganda than 'forest officers' (the concept does not exist in Zimbabwe). While national government does have some control, particularly in Zimbabwe, it is more important to engage and involve local administration (district environmental, development and agricultural officers) as stakeholders in the project than any national agencies.

1.2 Project Description

The purpose of the project was to demonstrate to key stakeholders at national and district levels the important contributions that commercial woody biomass energy (including charcoal) makes towards rural poverty alleviation and to the national economy.

The objectives were to gain a full understanding of the dynamics of woody biomass production, supply, marketing and use in two districts in rural Zimbabwe and two in Uganda. The project was designed to involve all key district stakeholders in developing an understanding of the contribution of commercial woody biomass to development (employment, revenues, fuel supply, etc.) in their district, to define the issues surrounding commercial woody biomass (environmental, economic, legal, participatory, etc.), and to develop a set of actions and interventions that would rationalise the commercial woody biomass sector by ensuring participation of all key stakeholders.

Local government officers were fully involved with the process. In each of the four districts, local government personnel were appointed by local stakeholders to co-ordinate all project activities in their districts. These co-ordinators were the focal points of the project. They initiated contacts with all key stakeholders, They helped design survey instruments, and oversaw all surveys in the district. They interpreted and analysed data from the surveys. They organised and facilitated numerous workshops and working group activities in each district. Finally, they were key in bringing together the recommendations and the action plans for each district.

The initial perceptions and views of key local government officials and administrators were obtained in the early stages of the project through the national and regional workshops.

The method of work was primarily through stakeholder identification, survey interviews with the key target groups and some focus group discussions. Workshops were held at District and National level to enable broad discussion between different interest groups to take place, and as a method for developing the district action plans.

The impacts that the production[3] and use of woody biomass has on poverty and the economy were examined. The main objective was to work with district officials to

[3] The project focused on all aspects of commercial woody biomass short of planting and managing forestry/tree growth. That is, when the term "production" is used, it refers to the harvesting, conversion (e.g., wood to charcoal), transport and marketing of woody biomass (fuel wood and charcoal).

develop action plans for the optimal development of the woody biomass sector within their districts. These plans, and the information gathered by the project, were then disseminated nationally.

1.3 The Project Team

The overall project managers and contact point with DFID were Energy for Sustainable Development Ltd of the UK. Their partner organisation Energy Alternatives Africa (EAA) based in Nairobi Kenya acted as the Africa based co-ordinators of the project and handled day to day management for the first year of the project. After the EAA field manager left in October 2000, ESD managed the project directly through the country partners in Uganda and Zimbabwe.

Country teams in Zimbabwe and Uganda carried out the required survey work in collaboration with the government energy departments, local government associations and district authorities. The Ugandan team was managed by the local consultant company the Renewable Energy Development Centre (REDC). Key partners were the Ministry of Energy, Joint Energy and Environment Projects (JEEP) and the Ugandan Local Authorities Association (ULAA). In Zimbabwe, the main partners were the government of Zimbabwe through the Department of Energy, the Association of Rural District Councils (ARDC) and a local NGO, the Southern Alliance for Indigenous Resources (SAFIRE).

1.4 Project workshops and meetings

Three types of meeting were held periodically during the project.

i) **Regional partner meetings.** These were attended by the core project team members from Uganda and Zimbabwe and the ESD consultant team. Two meetings were held, the first in Harare in September 1999, and the second in Kampala in June 2000. The purpose was to co-ordinate the activities, share experience between countries and hold working groups on specific tasks.

ii) **National stakeholder meetings.** To inform national level stakeholders of the project progress, consult them on national level issues and put them in contact with the key District level officials working with the project.

iii) **District stakeholder meetings.** To bring together in each District the key government and private sector actors either regulating or exploiting biomass energy resources in the District. The meetings presented the project, organised the survey work and developed the action plans under guidance of the team.

A full list and description of the workshops held during the project is included in Appendix 1 of this report.

1.5 Outputs

The specific outputs of the project are:

- Engaged and aware stakeholders at National levels and at local levels in two districts in Uganda and two districts in Zimbabwe;
- Engaged and aware local stakeholders in both Uganda and Zimbabwe through the active participation in the project of the Zimbabwean Association of Rural District Councils (ARDC) and the Uganda Local Authorities Association (ULAA) and their constituent members;
- Detailed district study reports of the commercial biomass business (from production to end-use) in the target areas;
- A baseline database on the important poverty alleviation, employment, revenue and other benefits gained from biomass supply and consumption;
- A base line database of current biomass use for industrial and commercial small and medium-sized enterprises (SMEs), and rural institutional users.
- District action plans prepared by the district co-ordinators and their stakeholders that set out policies, actions and activities to improve the benefits of the commercial biomass business.
- National action plans to present the consensus of the national workshops to the proposals in the district action plans and to stimulate national level discussion on what policy and other actions should be taken to support the policies and actions called for by the district stakeholders.
- A set of proposed interventions to promote improved commercial biomass business and end-use.

1.6 Project reports and workshop proceedings

Submitted with First Progress report

1. Project Kick-off meeting Workshop proceedings, Zimbabwe September 1999
2. First Stakeholders meeting Uganda September 1999

Submitted with Second Progress report

1. Minutes of the first national stakeholder meeting Zimbabwe 19th October 1999

2. Minutes of the first District stakeholder meetings in Uganda and Zimbabwe

2.1 Uganda Masindi District 28th October 1999
2.2 Uganda Mukono District 5th November 1999
2.3 Zimbabwe Nkayi District 16th November 1999
2.4 Zimbabwe Chimanimani District 23rd November 1999

3. District baseline profiles Uganda Districts

3.1 Masindi February 2000
3.2 Mukono February 2000

4. Survey questionnaires
4.1 Woodfuel Producer Survey
4.2 Woodfuel Transporter Survey
4.3 Woodfuel Consumer Survey
4.4 Woodfuel Vendor Survey
4 5 Local Authority and District Officer survey

5. Minutes of Zimbabwe training workshops - Nkayi District - February 2000
- Chimanimani District - November 2000

Submitted with Final Report

1. Proceedings of the second partner meeting, Equatoria Hotel, Kampala Uganda 19-20 June 2000

2. Uganda woody biomass energy industry case study reports, REDC, September 2000

3. Second National Stakeholder Meeting, Equatoria Hotel, Kampala, 1st November 2000

4. Improving efficient woody biomass energy production and utilisation in Mukono District, REDC, January 2001

5. Improving efficient woody biomass energy production and utilisation in Masindi District, REDC, November 2000

6. Report on the Pilot Project conducted in Chimanimani and Nkayi Districts on Improving Efficient Woody Biomass Energy Production and Utilisation. ARDC, Zimbabwe, February 2001

7. Uganda biomass energy industry report, ESD, March 2001

2. PROJECT METHODOLOGY

The project was organised into three phases:

- **Phase I: Gathering baseline information on the wood energy business**
- **Phase II: Stakeholder action plan development**
- **Phase III: District, national awareness & final Report**

Phase I: Gathering baseline information on the wood energy business

The national level government and non government stakeholders were informed of the project and involved in the selection of the target districts in which the project would be piloted. Two districts in Zimbabwe and two in Uganda were selected using a set of criteria defined by the project partners, and approved in each country by the national stakeholders. District level stakeholder meetings were then held. District co-ordinators were selected by the district stakeholders. These local co-ordinators selected district teams representing local government and national government agencies at a district level, private businesses, local NGOs, producers and other key stakeholders. They co-ordinated all project activities in each of the four districts through the remainder of the project. District profiles of the local wood fuel supply and demand sectors were prepared by the district co-ordinators and their teams. These profiles were reviewed and vetted by district stakeholders prior to being submitted to the national co-ordinators, partners and stakeholders.. These were to be a guide for the development of the survey instruments.

National stakeholder workshops developed the survey approach and the instruments to be used in co-ordination with the district co-ordinators and district local government representatives (LCVs - elected local district heads - in Uganda, and district commissioners in Zimbabwe). These were designed to capture disaggregated data concerning income and wealth. These survey instruments were then presented and further developed at district levels with training being given to local stakeholders and the district survey staff.

At the same time further work, in addition to the district profiles was carried out to ensure that the project identified all key stakeholders to target in the survey work. Surveys were developed for wood fuel producers, wood fuel vendors, wood fuel transporters, wood energy industry and commercial users, wood energy institutional users, district officers and district leaders. The surveys were piloted before the final versions were developed. The surveys led to the development of the district survey reports which contained detailed district wood energy profiles. These reports were presented at national and district level.

Phase II: Stakeholder Action Plan Development

This phase was to investigate the costs and benefits of the current wood energy business and identify specific interventions which could improve the poverty

alleviation potential of the biomass trade while protecting the environment. The initial activity was the development of draft district and national action plans at the partner regional stakeholder meeting in Uganda June 2000. These plans were then presented at district and national feedback workshops. District workshop participants were tasked to identify the interventions most suited for development. The district level feedback meetings brought together relevant partners and institutions at district level. These meetings served various purposes, including raising awareness of the importance of commercial woody biomass on the supply and demand side, presenting results from the district level activities, discussing preliminary courses of action, and identifying information gaps. Focus group interviews were held as follow-ups to the surveys to provide more insights particularly into key stakeholder perceptions and recommendations. Focus groups included wood harvesters and transporters, charcoal producers, key end users, local government and district officials and NGOs involved in local development.

Focus group interviews served the purpose of discussing and collecting more in-depth information on the needs and aspirations of the stakeholders. They were held by ward (level above a village) and the audience included producers, consumers, vendors and local institutions. These discussions were held with small groups of people who were involved in production, selling and consumption of charcoal and firewood. Check lists of open-ended questions were prepared by the team and were similar for both districts in each country. Information collected during the focus group interviews complemented the information that had been collected through the surveys.

These activities led to the identification of interventions which were then incorporated into District level action plans.

Phase III: District, National Awareness & Final Report

The next step was to take the developed action plans and disseminate them at National and District levels. The aim of this phase was to consult widely on the proposed interventions and ensure that they were agreed upon for inclusion as suitable interventions in the final plans. These plans are presented in final country reports which include:

- recommendations and next steps;
- a set of proposed projects to promote improved commercial biomass business and end-use;
- district action plans and national action plans.

3. DESCRIPTION OF THE PILOT DISTRICTS

3.1 The Ugandan Districts

The districts selected for the project in Uganda were Masindi and Mukono Districts (see map in Figure 1 for their locations). A criteria-based selection process was used which focussed on five key criteria:

1. District that has a broad range of woody biomass production activities.
2. District that has a broad range of woody biomass end uses.
3. District that has a thriving commercial/industrial base that depends primarily on woody biomass as an energy source.
4. District which manifests the negative environmental impacts of woody biomass supplies and use.
5. District that has existing local government interest in woody biomass related activities, etc.

Mukono and Masindi Districts were chosen because both have extensive woody biomass consumers/end uses. Furthermore, both have been subject to severe environmental degradation due to unsustainable and inefficient wood energy supply and consumption. Additionally, and perhaps most importantly, they were selected because the local governments in these districts were known to have interest in this type of project and had the capacity to implement it.

The districts have some distinct similarities and differences. Mukono is much closer to Kampala than Masindi and more urbanised. The habitable land area in Masindi is about twice that in Mukono with only about 40% of the people. This is reflected in the population densities; around 179 persons per square km in Mukono compared to around 42 in Masindi. Mukono has the unusual feature that 67% of the District's area is under water or swamps. Not surprisingly fishing is a major industry here. Fishing is less important in Masindi but still a major source of employment as Masindi borders Lake Albert to the west. Agriculture in Mukono tends to be dominated by commercial agriculture with large private firms growing sugar cane, tea, cocoa , flowers and vanilla. In Masindi commercial agricultural activity tends to be low. Subsistence agriculture dominates rural Masindi, with production primarily consisting of finger millet cultivation, supplemented by cotton, tobacco and sugar production, with subsistence cattle keeping and some ranching. In both districts, charcoal and commercial wood fuel production are important rural "cash crop" activities, and account for a major source of cash revenue for a large number of rural households.

3.2 The Zimbabwean Districts

As in Uganda, a criteria based system was used to select the Districts. The two districts selected were the Rural District Councils (RDCs) of Chimanimani and Nkayi (see the map in Figure 2 for their location).

Fig 1 Map of Uganda showing pilot districts Masindi and Mukono

Fig 2 Map of Zimbabwe showing pilot district locations of Chimanimani and Nkayi

The two districts were chosen on the basis of:

- considerable woody biomass resources
- many agro-ecological zones
- a District Environmental Officer
- ease of access
- conservation committees in existence
- presence of active non governmental organisations
- willingness to participate with the project
- income generation from wood fuels is important rural revenue source
- being two of the poorest districts in Zimbabwe
- extensive wood energy demand
- presence of an interested and committed CEO with Project Officer and strong district team
- natural resource NGO presence
- good capacity to implement project

Chimanimani District is situated in the south east of Manicaland Province and shares its borders with Chipinge, Buhera, Mutare and Mozambique in the south, west, north and east respectively. The district has an estimated area of 3 353km^2 of which 1207 km^2 are designated communal areas. There is a total population of 142 980 thus giving a population density of 42.64 people per square kilometre.

The district has a mixed economy with agriculture being the main economic activity. Agriculture in the communal areas is primarily for subsistence but now there is an increased impetus to produce a bigger surplus for the market. The crops grown include maize, beans, tomatoes, vegetables, fruit, tea and coffee. Forestry is also a major economic activity in the highlands of Chimanimani. Border Timbers, Forestry Commission, Wattle Company and Rathmore Forest own plantations and a number of saw mill factories in the district.

Nkayi District is situated in the south east of Matabeleland Province. The district comprises 4362 square km of communal lands, 520 square km of resettlement area and 470 square km of state land e.g., the Gwampa Forest. Agriculture is the major economic activity in the district. Livestock production accounts for 70% of agricultural production in the district. Cotton, maize and sunflower are now among the major cash crops produced by the district.

More detailed descriptions of the Districts are given in Annex 6 Final District Reports of the Final Zimbabwe Report on the Pilot Project February 2001.

4. BIOMASS FUEL PRODUCTION AND MARKETING

Rural wood biomass production is a complex economic activity. There are a number of uses to which the timber is put, including construction, furniture making, fencing as well as for energy purposes. The land used for wood production may be privately owned, part of state forest reserves, common land, or natural reserves. The laws and regulations regarding the use of the wood from these different sources may well be different for each source and also depend on the use to which the wood is put. The object of the surveys carried out in the Districts was to gain an understanding of the present structure and control of wood biomass production for energy in the target districts.

It will be apparent from the descriptions below that the wood energy industries in Uganda and Zimbabwe are very different. In Uganda wood energy is a regulated industry both for firewood and charcoal while in Zimbabwe the small scale production of both these commodities is generally illegal and only large producers are given licenses. These facts reflect themselves in the data that have been gathered.

For Uganda there will be some illegal activity but this is taking place in an environment where many producers and marketers are operating within a regulated structure. These people have been willing to discuss their livelihoods, needs and aspirations with the project teams and to speak fairly openly about their businesses.

In Zimbabwe this has not been the case. Wood fuel is generally only used for own use in rural areas rather than for production and resale. Where it is being sold it is generally carried out illicitly as permits and licenses are not forthcoming from the government. Fuel is moved at night and hidden on lorries. It was therefore more difficult for the Zimbabwe teams to obtain good survey information in their Districts. This difference is reflected in the information laid out below and in the supporting documentation.

However, this does not effect the validity of the work it just reflects the reality of the present situations in the two countries. The difference in the present regulatory structures is later reflected in some difference in the recommendations for change in each country. Zimbabwe is keen to focus on legislative change while Uganda is focusing on how existing, market arrangements can be modified in favour of the poorer local producers and suppliers.

4.1 Ugandan biomass fuel production

Detailed information on the commercial wood fuel production in the two Districts surveyed is given in the **Uganda biomass energy industry report** and the two reports produced by REDC for Mukono and Masindi, all in The Final Report Annex 1.

Fuel wood has always been used to provide energy for domestic, institutional, industrial, and commercial establishments in rural areas in both Mukono and Masindi. Besides, rural fuel producers have depended on it has a source of income for their livelihoods. However, inefficient production and utilisation methods have not only accelerated the loss of the resource but have also led to high cost of fuel to the consumers and loss of income to the producers. The problems associated with this include perpetuation of poverty in rural areas and extensive localised deforestation. Previous attempts to intervene in this system have been constrained by the limited information and understanding of the dynamics of the production-to-final-sale chain.

The two main fuels produced are charcoal and firewood.

4.2 Charcoal Production

Four distinct groups of charcoal producers were identified in the two districts:

- ***Transient charcoal burners:*** These people have income from other sources (e.g. agricultural farming) and travel during the slack season to areas where charcoal can be produced. They are present in both Districts.
- ***Resident Farmers:*** These produce charcoal as and when their agricultural labour inputs requirements are low. They are also present in both Districts.
- ***Encroachers***: This group comprises labourers on large tracts of farmland that belong to non-resident landlords. This group is present in Mukono District.
- ***Refugees and Displaced Ugandans:*** This group is limited to certain areas in Masindi District only.

The **Uganda biomass energy industry report** highlights some key factors connected with charcoal production and compares the findings in Mukono and Masindi. Charcoal making is a more dedicated activity in Masindi than Mukono, primarily because there are few opportunities for other work.

4.2.1 Livelihood factors for charcoal producers

The charcoal producers tended to work individually, not through associations, though they thought that charcoal-producing associations could be beneficial. The producers admit that they are not familiar with the process for forming associations. Additionally, others say that associations tend to lose focus fast and quickly disintegrate. The older producers had bad experiences with the state cooperative structures and were sceptical of the sustainability of associations of producers. This scepticism prevails in all areas of rural agricultural and livestock activity in Uganda, and is not unique to charcoal producers.

Many of the charcoal producers depended on water from bore holes, Masindi tends to be drier than Mukono and some producers there had to travel 3 km for water. A significant proportion in both districts of the producers also reported experiencing regular shortages in food supply. However, producers in Masindi (54%) and

Mukono (72%) reported that they owned land and the average land size reported was 9.5 acres and 6.5 acres respectively. In most cases in Mukono, the production of charcoal was an activity that was embarked on in the afternoons and evenings, leaving the mornings to farm production.

In both districts producers complain about the occupational hazards like the need to sleep outdoors for days tending the fires, where they were subject to toxic smoke, rains, the risks of losing the whole charge to the fire outbreak and wild animals. The prevalence of chest pains and eye diseases is high among charcoal producers. Charcoal theft is a common feature of the trade. The production cycle takes 2 weeks, in contrast, modern charcoal kilns are known to have a production cycle of almost 70 hours (Max. 3 days).

Uniform prices apply at the market or final point of sale. The Consumer Price Index (CPI) shows that price of charcoal has been relatively fixed/stagnant over the last 5 years. At the same time, the costs of transportation have risen with the changes in the foreign exchange rate and with the escalating world petroleum producer prices. This has, during the life of the present project, lowered the purchase prices paid to the producers. In fact, even without escalating petroleum prices over the past year, charcoal producers in Uganda have faced steadily declining prices in real (purchasing power) terms, and their terms of trade with urban consumers have deteriorated marketed over the past decade. Nonetheless, it is a major source of income for both subsistence farmers, and for those marginalised through civil unrest, war and economic stress, most notably drought and landlessness

4.3 Firewood production

Like charcoal, firewood production (in this case firewood production implies the acquisition, processing and marketing of standing stock into firewood) is a male dominated activity. Female participation in the industry in Mukono was higher than in Masindi. In Mukono commercial firewood production tends to be a primary means of obtaining household income. It is not seasonal. In Masindi firewood production was less dedicated than charcoal making.

In Mukono there are many new entrants to the industry making the trade more competitive than in Masindi. A common feature among the firewood producers is that they play a double role of both producing and marketing their fire wood. Producers complain of harassment from the Forestry officials who often confiscate their products on the premise that they illegally exploit the forestry reserves. In reality, for the vast majority of firewood producers, trees are purchased from farm owners who sell “by the tree” depending on it size. The producers admit that there was an increasing scarcity of trees and this has resulted in higher prices for the trees. However, as with charcoal producers, their lack of organisation and control of the marketplace leaves them with no economic bargaining power to pass on higher prices to intermediaries, whilst growing competition from other wood fuel producers puts further downward pressure on the prices they receive.

As with charcoal producers, commercial wood fuel producers in both Mukono and Masindi receive less today, in real terms, than they received a decade ago. Nonetheless, with few alternatives for cash cropping, increasing numbers of new entrants come into the market every year. With no organisation and no market clout,

commercial woody biomass energy production generates fewer returns for input than ever before. Furthermore, in Mukono, in particular, producers feel that if the trend in standing stock depletion is to continue for a few more years, the business shall cease to be sustainable.

4.3.1 Livelihood factors for firewood producers

Like charcoal makers, firewood producers note that their water supply was from protected wells and they often experience food supply shortages.

4.4 Other stakeholders in the Uganda wood energy supply chain

In Uganda, in addition to producers, the other main stakeholders in the wood and charcoal supply chain are wholesalers, retailers, brokers and transporters. Their function is to supply the wood energy to the consumer and make a profit for those engaged in the process. Each group has a key part to play. There are two main markets, local District markets and the Kampala market. A summary of the wood fuel energy supply chain in Uganda is given in the Uganda biomass energy industry report. Further details and case study examples are in the REDC reports for Mukono and Masindi. Case studies of the participants in the Uganda wood fuel supply chain are given in the **Uganda woody biomass energy industry case study reports**. All these reports are in Annex 1 accompanying this report.

4.5 Summary of the Ugandan woodfuel production and supply market

The Ugandan wood fuel supply market is a highly complex system with an operating structure that has developed over many years. There are many entry points for producers and marketers of different means and expectations. Table 1 indicates the different earnings noted during the survey for participants in the market place.

Table 1 Ugandan wood fuel market participants monthly earnings (£1 - Ush 2330)

	Monthly income			
	Masindi		**Mukono**	
District level participants	Ush	GB £	Ush	GB £
Charcoal producer	40,000	17.17	30,000	12.88
Firewood producer	78,778	33.81	58,977	25.31
Bicycle charcoal transporter/retailer	38,000	16.31	70,000	30.04
District market charcoal wholesaler	50,000	21.46	105,000	45.06
Village charcoal retailers	9,000	3.86	9,000	3.86
Firewood retailer			10,000	4.29
Kampala level participants	Ush		GB £	
Charcoal retailer Kampala	158,000		67.81	
Kampala based truck transporter	1,225,000		525.75	
Kampala based wholesaler	624,000		267.81	

As Table 1 shows, people engaged at a district level in commercial woody biomass energy production/supply earn little from their activities, both in real terms and relative to their counterparts in Kampala, and those engaged in rural to urban transport. The incomes for the women dominated professions of village charcoal retailer and firewood retailer are very low indeed.

4.6 Legislation and administration of the woodfuel industry in the Ugandan Districts

The production and movement of wood fuel is subject to taxes and fees which can be levied by the Forestry Department representing Central Government or the Local Authorities. For example, Local Councils are allowed to issue licenses on local forestry reserves while the Central Government, through District Forestry Offices, issues licenses on private and central government reserves.

PART III of the Forestry Act [CAP 246], "Licenses for forestry produce" under Section 12(2) permits Local Authorities to issue licenses upon the payment of a prescribed fee. Under Section 9 Local Governments can create village forests in consultation with the Ministry concerned for purposes of raising revenue. There is a great need to make the district authorities aware of this unexplored opportunity.

According to the latest circular from the Ministry of Natural Resources and Water Management, dated 9/8/00, permits and licenses to operate in forest reserves are as follows on a monthly basis: -

1) Casual Trade licensing (Petty Trade) e.g. making of beds and chairs Ush 45,000

2) Forest Minerals licenses per person
(i.e.) bricks, stones and sand Ush 300,000/=

3) Charcoal marketer license Ush 10,500= (old rate)
Ush 36,000/= (new rate)

4) Firewood: This falls under two categories:

i) Petty trade was previously Ush 6,000, The new rate is Ush 22,000 per person.

- ii) Large-scale woodcutting e.g. people supplying institutions doing bulk deliveries, in lorries. The new rate is Ush 225,000 per month. The old rate was Ush 60,000 per month per person.

4.7 Zimbabwean biomass fuel production

4.7.1 Background

As mentioned above the situation in Zimbabwe differs greatly from Uganda in that small scale production of charcoal and firewood for sale is generally illegal. This led to difficulties with the survey but these are not nearly as great as the difficulties the legal position presents for the rational exploitation and sustainable production of wood for energy. Zimbabwe's forestry policies developed very differently from Uganda's. As a settler colony, former-Rhodesia's best land and richest forest estate was expropriated by the colonial authorities and settlers.

The Forestry Commission was established as a commercial body solely for developing commercial plantations of exotic trees and the commercial exploitation for domestic consumption and export of forest products. Unlike Uganda, no true 'forest service' evolved to assist farmers, certainly not the vast majority of indigenous Zimbabweans who were largely moved to over-crowded, poor 'communal areas'.

Good indigenous forest land was excised as national parks and reserves where native Zimbabweans were prohibited from exploiting. Indeed, the legal system put in place for forestry prohibited commercial exploitation for all but those licensed by the Forestry Commission - all other forest production, including wood fuel, was deemed 'non-commercial', and for 'own use'.

Hence, as Zimbabwe rapidly urbanised, and demand for commercial wood energy escalated, those who stepped into the supply chain acted 'illegally'. Despite over 20 years post-colonial independence, these laws have not changed. Rural people who produce fire wood and charcoal for sale, and those who transport it and sell it to final consumer, act illegally. This has sent the bulk of Zimbabwe's commercial wood energy business 'underground'. However, given the fact that the poorest urban dwellers, and many relatively prosperous rural dwellers, commercial establishments and institutions rely on fire wood, and increasingly charcoal, for their needs, most of the wood energy business is conducted openly, yet illegally.

Both charcoal and firewood activities are largely discouraged by law and for one to engage in such activities, they have to obtain a permit through the RDC (Rural Development Council). The process of obtaining such permits is largely unknown by local communities. The utilisation of biomass, together with other forest products is largely restricted to 'own use'. In reality however, people continue making charcoal and selling firewood. Since most people are aware of the legal environment, they were elusive when it came to answering some questions, despite the fact that assurances were made that no arrests would be effected.

Transporters of both firewood and charcoal operate clandestinely. In Chimanimani, for example, charcoal sacks are placed beneath other products like bananas and

other fruits and they mostly travel by night. This made the survey work very difficult, as most transporters were reluctant to discuss the issues. Most transporters in both district use vehicles intended to collect or deliver goods from various companies and they operate without permission from the vehicle owners.

The project findings have shown that because the small scale trading of biomass for energy is illegal the labour input into the production of these products is not rewarded in economic terms. The local authorities would benefit a lot if they legitimised the activity of biomass energy production through licences and other fees as their Ugandan counterparts do. Charcoal making is done poorly using primitive methods which use considerable wood for little output. Production efficiencies are very low, even by developing country standards - 10% conversion efficiency (i.e. 10 tonnes of wood to produce1 tonne of charcoal) is not unusual. Black-smithing (especially making of hoes and axes) using charcoal has a potential to become a thriving industry in Nkayi if the technology is improved.

Overexploitation of woody biomass has resulted in deforestation resulting in land degradation during the rain season, as there is no soil cover. If biomass was utilised well in Zimbabwe, this could result in job creation resulting in poverty alleviation with proper business management.

4.7.2 Land tenure

The land holding rights in the Chimanimani and Nkayi districts are in the communal land tenure system, which shape the property rights and natural resources access. The communal land tenure system is governed by the Communal Land Act and is applicable to 42% of the Zimbabwe land area where some 66% of the population reside. Ownership of communal land is vested in the state president who has powers to permit its occupation in accordance with the Act. Communal area inhabitants have usufructory rights over communal land and its resources. Most resources, including woodlands remain under the common property regime, with weak rules and regulations.

4.7.3 Gender characteristics

The survey findings on fuel wood production reveals that people who carry out the activity are mostly males both in Chimanimani and Nkayi although wood fuel collection sometimes involves their wives and daughters. Charcoal production in Nkayi is done by men while in Chimanimani females and males are engaged in charcoal production.
Table 2 shows the ages and genders of producers broken down.

Table 2 Sex and age of respondents

Sex of respondents	Firewood production	Charcoal production	Production of charcoal and firewood
Males	20	3	1
Females	7	4	7

As rural people depend on their livelihood on agricultural activities during the rainy season they will be busy in their fields so firewood and charcoal production are done from May to September when they are not working on their fields. Brick moulding is also done during the same period.

4.7.4 Other stakeholders in the Zimbabwe wood energy supply chain

4.7.4.1 Transporters

As selling of fuel wood is an illegal activity, transporters were not willing to state that they transport fuel. In Chimanimani charcoal is at times transported at night hidden in sacks containing fruits. Some transporters charge per kilometre while others charge on tonnage e.g. Z$24/km or $450/tonne or see table 9 in the Chimanimani report.

Vehicles used to transport fuel are not fixed and known, but producers use any available mode of transport. In most cases, these are vehicles on return trips after off-loading other goods.

4.7.4.2 Vendors

In Chimanimani only three vendors were interviewed. All vendors sell their fuel wood to their community members in their wards either on a weekly or monthly basis. The fuel wood is transported as head load or by wheelbarrow or donkey load.
In Nkayi vendors who sell fuel wood were not interested in coming forward as the council regarded their activity as illegal although some of them have been in the business of selling fuel wood for 11 years. The peak business is during winter season, that is May to August of each year.

4.7.5 Legislation and administration of the woodfuel industry in Zimbabwe

As the legal position for biomass energy use in Zimbabwe is such a critical factor in the development of the sector the project commissioned a specific legal study to look at the situation. The report for this study is attached as Annex 7 to the accompanying Report on the Pilot Project in the Zimbabwe districts produced by ARDC (February 2001). Below is a brief summary of the key points and conclusions.

Laws that have some application to biomass energy use to a greater or lesser degree are:

1.Natural Resources Act
2.Communal Land Forest Produce Act
3.Forest Act
4.Parks and Wildlife Act
5.Rural District Councils Act
6.Communal Land Act
7.Mines and Minerals Act
8.Regional, Town and Country Planning Act
9.Traditional Leaders Act
10.Atmospheric Pollution Prevention Act
11.National Museums and Monuments Act;
12. Land Acquisition Act (for expropriation of private land to establish woodlots, etc; and
13. All Regulations and By-Laws Related to the Acts above.

One of the key acts in granting permissions to those wishing to exploit wood resources is the Communal Land Forest Produce Act. This Act puts virtually all control on how these resources are exploited in the hands of the Environment Minister. The Act is discussed further in Annex 7, The Legal Report, which reports on a discussion between the legal representative and the District level participants.

The summary points from the legal study in Zimbabwe are:
"

(a) There exists a plethora of legislation governing the utilisation of forest resources for wood fuel (firewood and charcoal) although the supply and distribution side was too enmeshed in regulatory rules to engender confidence in producing and marketing the products on a commercial basis. The law was found to favour existing monopolies and private entrepreneurs, the ordinary public being left legally encumbered;

(b) contradictions, loopholes and redundancies (admitted even by the responsible Ministry), were found to exist in the laws, rendering them an incomprehensible maze for ordinary villagers, hence inspiring fears and inhibitions that stifle the latent entrepreneurial spirit in them, rendering them barely able to use wood fuel and charcoal to their own commercial advantage;

(c) it is possible to harmonise existing legislation on the point through promulgating legislative provisions that make the local authority (the RDC) and related traditional leadership structures the focus of local woody biomass development and management on a sustainable basis, allowing them to facilitate local engagement in its commercial utilisation, while seeking Parliamentary delegation of specific natural resources management functions as the Minister's direct role diminishes under decentralisation yet without removing the latter from the national overseership responsibility on environmental matters;

(d) existing regulations, by-laws and statutory instruments on the sustainable utilisation of woody biomass need to be revamped at the local authority level, taking into account the specific requirements of each of the districts; and that a general model by-law could be developed to guide the local authorities endeavours;

(e) it is imperative to lobby the makers of legislation to maintain a dialogue on how best to keep reviewing the legislation on such an important resource as wood; and

(f) The laws on the environment need to be made user-friendly, with emphasis on more local participation in managing and benefiting from local and indigenous wood resources."

5. BIOMASS FUEL CONSUMPTION

The report so far has examined the production and supply of the biomass energy resources charcoal and firewood. The report now turns to the use of these commodities and the sectors in which they are consumed. The issues to examine are how important a source of energy wood fuel is to these end use sectors, whether the fuel is being used efficiently, and whether it is readily available at a reasonable price.

The District Profile reports and the Final District Survey reports provide more detailed information on the consumers of purchased charcoal and firewood in the Districts, below is a summary of key information. The Uganda biomass energy industry report in Annex 1 contains a summary description of the Ugandan situation.

As part of the surveys, a detailed study was made of the various consumers of woody biomass energy products. Samples were drawn from among the institutions, small and medium scale industries, and the commercial establishments.

The main users of charcoal and biomass include those in Table 3 below, they were found to be very similar in Uganda and Zimbabwe

Table 3 Users of purchased charcoal and firewood in the Uganda and Zimbabwe Districts

Institutions	**Schools**	**Country**
	Educational Institutes, Training centres	Uganda and Zimbabwe
	Hospitals	Uganda and Zimbabwe
	Prisons, Police and Army Barracks	Uganda and Zimbabwe
Commercial	Eating houses	Uganda and Zimbabwe
	Hotels	Uganda and Zimbabwe
	Bakeries	Uganda
Industry and agroprocessing	Tobacco curing	Uganda
	Beer brewing Fish smoking	Uganda and Zimbabwe Uganda
	Brick production	Uganda and Zimbabwe
	Black smithing	Zimbabwe

5.1 Ugandan district consumption

As part of the surveys, a detailed study was made of the various consumers of woody biomass energy products. Samples were drawn from among the institutions, small and medium scale industries, and the commercial establishments.

5.1.1 Charcoal Consumption

Charcoal was being used in most of the categories in Table 3 above, exceptions being primary schools, army and police, and brick burning. The largest users were eating houses and hotels. The next largest users were secondary schools with some schools in Masindi and Mukono using over 30 sacks per month. The other users consume much smaller amounts so it would appear that eating houses, hotels and secondary schools are the ones to target to reduce charcoal consumption.

5.1.2 Firewood Consumption

Firewood was the most popular form of woody biomass used across all the consumer categories. Among the institutions schools again featured as the largest consumers . The largest wood consumers among the small-scale industrialists are brick burners in both districts. Producers buy their trees from farmers and transport them to their kilns.
Fish smokers are also large consumers of firewood in both districts. The wood is obtained from retailers and casual firewood dealers.

In the commercial sector the highest consumers of fuel wood are bakeries. Baking efficiencies in both districts, on average, could easily be doubled using better techniques and improved ovens. Highly efficient wood ovens are built in Uganda. There is great scope for such intervention in both districts.

Brick making, fish smoking, baking, beer brewing, lime production and tobacco curing are among Uganda's largest rural industries in terms of wood fuel consumption. Essentially, there are numerous opportunities available for intervening on the demand side, such as those indicated below:

- training in better designs,
- construction of improved devices,
- instruction in better use and maintenance of the new technologies,
- instruction in the relationship between fire management and product quality control,
- seeking ways to reduce the labour intensity of the work and,
- energy advice with respect to the most appropriate technology relative to an entrepreneurs scale of activity.

5.2 Zimbabwe district consumption

In Zimbabwe there is a closer link between consumers and suppliers than in Uganda as there is not supposed to be a trade going on in charcoal or firewood. Therefore the official position is that those wishing to use charcoal or firewood make or gather it themselves. This seems to be the case for the blacksmiths who make their own

charcoal. The situation for other consumers is less clear and there does seem to be a reasonable amount of wood fuel being sold. What does seem to be permitted is the hiring of carts to collect firewood and presumably the labour to go with them. This seems to have become a proxy for paying for the firewood itself but the concern expressed by the Zimbabwe team is that this does not properly value the wood fuel being removed.

In Zimbabwe the beer brewing business was dominated by females whilst the brick makers had equal numbers of both sexes. The black smiths were all-male but are sometimes assisted by their wives especially in the making of charcoal.

6. DISCUSSION AND ANALYSIS OF FINDINGS

6.1 Producers (firewood and charcoal)

- Commercial firewood and charcoal producers are generally at the bottom end of the socio-economic ladder - many are migrants, immigrants or refugees who have few, if any, political or social rights;
- Producers, in almost all cases, in both Zimbabwe and Uganda, operate as individuals, rarely collectively. Hence, their bargaining positions vis-à-vis other market players and authorities are very weak;
- Most commercial wood energy producers who are not migrants, immigrants or refugees engage in the practice on a part-time basis; they too are generally at the bottom of the socio-economic ladder - hence, revenues from wood energy sales account for a major, if not the major, source of their incomes;
- In virtually all cases, the returns to labour and investment to producers (those who engage in the primary production of firewood and charcoal) is lower than other groups in the supply chain (exceptions are Ugandan female charcoal retailers at village and district level who have very low incomes);
- Considerable scope exists to improve the returns on labour for those who produce firewood and charcoal in both Zimbabwe and Uganda. These improvements are generally organisational, managerial, and to a certain extent, technical (mainly in charcoal production). Their success depends upon local government's approach to them;
- In Zimbabwe national government policy changes could have a positive effect upon reducing poverty amongst producers;
- Lack of organisation and management skills means that producers cannot improve their negotiating positions vis-à-vis transport and marketing intermediaries, thereby raising their returns on labour;
- Lack of organisation and management skills also reduces their bargaining power for assistance and legitimacy vis-à-vis local and national authorities;
- Lack of organisation reduces their ability to shift from non-sustainable harvesting of common or private land to more sustainable production, particularly in charcoal.

In all cases, clear examples for improvements in technical production and technological transformation, particularly in charcoal, exist. In the case of charcoal production in Uganda, most producers know of improved methods and technologies. However, shifting to more efficient production relies overwhelmingly on mobilisation and organisation, rather than technical or technological "fixes".

Until producers are organised, they will not be eligible for loans or grants to invest in improved production technologies. Moreover, improving production technologies is not the answer to increasing their returns. Rather, improving their bargaining position vis-à-vis the marketplace, which rests almost entirely upon organisation, legitimacy and marketing skills, is of far more importance than improving efficiencies of production.

Indeed, evidence is abundant in both Uganda and Zimbabwe that those who are organised also improve their production efficiencies because they are better able to employ new techniques and technologies through organisation. Hence, the most important recommendation that can be made concerning wood energy producers is that local authorities, national governments, interested NGOs, and others involved with poverty alleviation and environmental improvement in rural areas should focus the bulk of their efforts upon helping producers organise, as is the case in other commodities, such as coffee, tea, cotton and tobacco. There are numerous lessons to be learned from the agricultural cash crop sector that are relevant to wood energy producers.

The Zimbabwean situation is more complicated. All commercial wood energy production is illegal unless licensed at a national level. Licenses are rarely given to all but the largest producers (primarily plantation operators). Therefore, it is very difficult for local authorities, NGOs and donors to assist producers in this area. The Zimbabwean national authorities should take a leaf from their successful community natural resource (primarily wildlife) programme - CAMPFIRE - and invest local producers with the powers and responsibilities to manage and control their production.

Without such divestiture of power and responsibility, commercial wood energy production in Zimbabwe will continue to be a very marginal activity, with few possibilities for raising producers above the shadowy extra-legal world they operate in today, with virtually no possibility to raise themselves up the ladder. Without such recognition, it should go without saying, that there will be no incentive on producers to improve the efficiencies of their production, hence to reduce their effects on the environment and to engage in more sustainable practices leading to more sustainable livelihoods.

6.2 Local supply intermediaries

In both Zimbabwe and Uganda there are generally two groups of local intermediaries. By local intermediaries is meant those who engage in the procurement, transport and marketing of commercial wood energy for sale to local vendors and customers. The two groups are those who are engaged in local transport, and those who are engaged in local sales. In some instances these are the same people e.g. district bicycle transporter/retailers in Uganda, but generally they are separate.

In many cases, particularly in Uganda, many people who purchase commercial wood energy from producers sell it to consumers, whether those be directly to establishments (e.g., schools, restaurants, brick producers, tobacco curers, etc.) or to households (e.g., door-to-door sales of charcoal and wood). In some instances, particularly amongst wood producing farmers, producers sell directly to the end consumer. This is rare, and when it occurs, it enables the producer to realise the greatest return on her/his labour relative to other individual vendors.

Then there are those who strictly sell wood and charcoal locally - e.g., vendors in the marketplace or those who purchase commercial wood energy from transporters to sell directly to customers.

- In most cases, local intermediaries are next up the socio-economic ladder from those who produce the wood energy;
- Local intermediaries are rarely organised, hence, their bargaining power, particularly vis-à-vis consumers, is limited as there is much competition;
- Their bargaining power is further limited when the wood energy sales activity is extra-legal or illegal, as is the case in most instances in Zimbabwe;
- Lacking organisation, they engage in direct competition with many other producers, and are therefore unable to set prices;
- Those with the weakest bargaining and sales position are those who sell wood and charcoal in rural marketplaces. These (generally women) realise the least economic benefit as they are price takers from suppliers and are in a weak economic position vis-à-vis consumers given their lack of organisation and the stiff competition with their fellow market vendors - they are often heads of household, and have no other source of livelihood;

As with primary producers, local intermediaries suffer from lack of organisation. Only when they short circuit the supply chain by purchasing from producers and selling to local consumers do they realise a relatively good return to their labour. However, all would benefit substantially were they to organise. In particular, market vendors could benefit as much as primary producers if they were organised in the market place, particularly to purchase wood energy from local suppliers.

Their lack of organisation vis-à-vis suppliers means they have to purchase their wood energy supplies at relatively high prices. That, when coupled with considerable local competition, limits their economic options, and, in some cases, these vendors actually lose money on transactions. This is not atypical of unorganised petty traders in market places all over the developing world. However, given the importance of the activity in terms of providing poor small urban dwellers, particularly women, with income earning livelihoods, it is in the interest of local governments and NGOs to work with them to help them obtain better options.

Moreover, any improvements in the market place will work their way back up the supply chain. If local vendors can improve their economic position, there will be lessons learnt by local producers. Any improvements they make in the extraction of woody biomass for commercial energy can only have positive effects on the environment, which is a major, if not the major, concern of local authorities and policy makers. Getting the economics of commercial woody biomass "right" at a local level is crucial to improving the livelihoods of all key actors at a local level as well as to improving the environmental sustainability of the activity itself.

6.3 Other supply Intermediaries

Those best able to benefit from the wood energy business in Uganda and Zimbabwe are those who are engaged in the transport of wood energy supplies from rural areas to urban areas or large consumers (e.g., schools and hospitals). Whilst these are generally owners or operators of mechanised transport, they also include itinerant transporters using bicycles. The latter is particularly the case in Uganda, where some engage in the transport of charcoal and firewood over distances up to 50 km from rural areas to large urban centres.

When plotting the value-added along the supply chain from point of production of wood energy to point of final purchase in urban areas or large consumers, these transporters (and those engaged in financing them or supplying them with transport), generally earn up to 50% of the final consumer price. They can earn, as in the case of charcoal in Uganda, up to five times as much per unit of wood or charcoal as those who produce the wood or charcoal.

The role of these intermediaries is essential to the commercial woody biomass energy business. The returns on transport are not simply "gouging". Rather, there are considerable risks in transporting fuels from rural areas to urban areas. There are commercial risks associated with lack of guaranteed supply sources (e.g., a producer can sell to anyone, and because of lack of production organisation, they do). There are risks associated with obtaining sufficient supplies from numerous scattered, unorganised producers which can involve extensive trips into rural areas without roads, with the inherent risks of vehicle breakdowns and insecurity that such entails.

Carrying large quantities of money to pay producers, and operating vehicles that can be stolen or vandalised, poses further risks to these intermediaries and their backers. Hence, the premiums they extract and command for their services from point of purchase from producers to point of sales to consumers are economically justified. However, those premiums, or some of them, could be aggrandised by producers were they (producers) better organised.

This is not a prescription for producers to get organised to transport, but organising production, centralising it at points of storage and collection, would not only allow producers to realise better bargaining power vis-à-vis intermediaries, but, it would fundamentally reduce much of the risk currently associated with obtaining highly dispersed supplies from unorganised, decentralised producers. Thus, there are certainly "win-win" options for both producers and intermediaries that depend upon producers being better organised and commercially better managed.

6.4 Urban supply intermediaries

As with rural intermediaries, there are two types of urban intermediaries in both Zimbabwe and Uganda. There are those who organise and finance transport from producing areas to urban areas and big consumers, and there are those engaged in direct sales of wood energy supplies to consumers in urban areas.

The degree of organisation of the former is markedly different from Zimbabwe to Uganda. In Zimbabwe, most transport of wood energy from rural areas to urban areas is ad hoc and illegal or carried out by very large producers for large industries under a government licensed scheme. In Uganda, large-scale transport from rural areas (e.g., with lorries and medium sized vehicles) is highly organised, with vehicles either hired or dedicated solely to the business. It is a major transport activity in Uganda, and revenues to those who own transport (whether they lease the vehicles to transporters or transport the commercial woody biomass themselves), are substantial.

As noted previously, the risks of transport are great in both Uganda and Zimbabwe. Therefore, a certain portion of the revenues those earned by those who finance transport from producers to consumers must be considered as risk premiums - risks ranging from vehicle breakdowns in rough rural areas, to risks of confiscation of goods by authorities to risks of theft and security in scattered far-off rural areas. In Uganda, transport risk could be considerably mitigated by organising producers; this would eliminate much of the risk to tranporters of having to move around from one individual small producer to another. This would reduce the risk of breakdown, and would reduce costs of collection. It would also reduce security risks.

In Zimbabwe, the primary means for reducing risk to transporters, and thereby enabling producers and consumers to realise better benefits, would be the regularisation and legalisation of the small-scale commercial woody biomass energy business. So long as the bulk of all transport of wood energy for urban low-income consumers and large consumers is illegal, this will make it riskier for transporters, and therefore keep the price of transport inflated. So long as the "business" remains illegal, the less the opportunity to promote producer organisation, thereby reducing the risks of having to move around the rural countryside shopping for wood and charcoal to transport.

In Uganda, a number of individual transporters, namely bicycle owners and operators, transport a significant amount (up to 25%) of the charcoal that is consumed in urban areas. They tend to purchase it directly from producers, and sell directly to consumers, thereby gaining virtually all of the value-added between production and consumption. Whilst the business is arduous, it is good in rural income terms. There is little to be recommended to improve the business of transport for these itinerant business people.

In Uganda, urban charcoal vendors, in particular, realise high returns on their labour. Like their counterparts in rural markets, they are primarily women heads of household. However, they tend to earn as much as ten times what their rural counterparts earn. The larger vendors have fixed places of sale, and they invariably sell much higher quantities than rural market vendors. The wood selling business in urban areas tends to be delivered directly to consumers, whether households, who use little fire wood compared to charcoal, or urban establishments (restaurants, bakeries, schools, hospitals, prisons, etc.), thereby involving fewer intermediaries

than the charcoal business.

In Zimbabwe, most charcoal is sold for specialised purposes, rather than directly to households. These purposes range from black smithing to roasting foods. Compared to Uganda, it is not a big business, although for rural producers it is an extremely important, and growing, source of revenue. Wood, on the other hand, is very important and is indeed a big business in urban Zimbabwe. While not more than half urban households utilise wood for heating and cooking purposes, this is significant. However, given the illegality of the business, points of sale are dispersed and not as established as in Uganda. This imposes burdens on both suppliers and consumers, increasing the price of wood energy unnecessarily. Zimbabwean urban wood vendors, consequently, do not realise the returns on their sales that their Ugandan counterparts realise.

Were the Zimbabwean wood energy business legalised and regularised, the benefits would be spread both to consumers (lower prices) and to all people engaged in supply. Producing and transporting products clandestinely only benefits a few, while raising prices to consumers and lowering prices to producers. It is crucial that the Zimbabwean national authorities realise this. Only when national policies change to legitimise what is a very important rural and urban economic activity will economic benefits be spread more evenly, and, as importantly, will there be any real opportunity to produce the wood on a sustainable basis.

6.5 Consumers (end-users)

The district and country teams focused on district level consumption during the course of the project. As has been noted, above, survey work was undertaken to follow the supply chain to urban and large consumers outside the districts. However, consumer surveys focused on the district, and extensive consumer surveys were undertaken.

The two countries differ in many ways, although they show far more similarities in rural commercial wood energy consumption than in urban wood energy consumption. Rural brick production, beer brewing, tobacco curing, lime production are the most important rural commercial consumers that are very important to rural economies in both Zimbabwe and Uganda. Boarding schools, mission and other hospitals, prisons, and other institutions share many of the same characteristics in Zimbabwe and Uganda, and are of major importance for the commercial woody biomass economy in both countries.

Indeed, there is great scope for improvement in end use efficiencies in these enterprises in both countries. Brick production was recognised by all four districts as a major economic activity and one in which considerable commercial wood energy is consumed. Moreover, very little energy efficiency improvements have been made in this sector in either country. The bulk of the efficiency improvements can be made in this sector through better organisation of brick producers and better energy

management, rather than any major technical or technological investments. Getting the incentives right in this industry requires a better familiarity of producers of the options for improvements and the importance of organisation and management to increase production outputs.

The lack of organisation closely mirrors charcoal production in Uganda. It is not so much the extra-legal nature of the activity (although that is definitely the case in Zimbabwe) so much as the fact that traditionally it has been a very independent, household rather than artisanal or industrial activity. With increased economic development, and the rapid growth in permanent housing in both countries, the demand for bricks has grown substantially without a concomitant improvement in the industrial organisation and management.

With such improvements, economies of scale will certainly arise, which will, without any other energy efficiency interventions, result in improved energy efficiency (i.e. more bricks per unit of wood used). However, with improved organisation, new, simple but cost effective, techniques (such as wood drying before firing), could be introduced. Without organisation of producers, introduction of techniques and technologies will have little effect.

Brick production is highlighted here because it is not only a major commercial wood energy user, but because it is of near-equal importance in both countries. Other activities share similarities. Wood consumption in eating establishments, schools, hospitals, prisons could be reduced easily by 25%, and up to 50% through the installation and proper use of improved institutional stoves. These have been very successful in Kenya, and a previous DFID KAR project carried out by ESD in Kenya, Uganda, Tanzania and Ethiopia demonstrated the commercial and environmental benefits of such. It also demonstrated the need to involve key stakeholders such as ministries of education, the prisons authorities, ministries of health and local authorities to help finance improved stoves in institutions.

Commercial establishments and households who use commercially purchased fuels are more difficult in the first instance to achieve energy efficiency in so far as they are dispersed and numerous. However, the success of improved stoves in households and commercial establishments in Ethiopia and Kenya shows that this can be accomplished with the right promotion, and support for commercial stove producers.

This is taking place in Uganda, although it requires more support, but has a long way to go in Zimbabwe, where officially the bulk of commercial wood energy consumption is not "legal". It is for this reason that the recommendations of the Zimbabwean team differ so much from the Ugandan team. In the case of Zimbabwe, the team believes that no concrete action can be made on demand side improvements, or on the supply side for that matter, until local ordinances and regulations, local licensing and taxation, and, above all, national laws pertaining to commercial woodfuel production and use are drastically altered. In the case of Uganda, the issues are more to do with organising consumers, such as brick producers, sensitising other consumers, such as schools and hospitals, to the

opportunities for wood energy efficiency improvements.

The Zimbabwean and Ugandan district stakeholders and national teams all agreed that both supply side and demand side actions need to be taken and co-ordinated. While it is imperative that producers realise higher value for their wood energy production, this will inevitably raise the price of wood energy to rural consumers. Therefore, the teams also believe it is imperative to tackle the issue of demand side efficiency improvement in order to achieve a "win-win" situation.

That is, consumers' net expenditures can remain the same, or even decrease, in the face of rising wood fuel prices only if they are able to achieve energy efficiency improvements (e.g., improved brick production, improved tobacco curing, improved stoves for cooking and baking) to offset those increases. As has been shown in Kenya, Ethiopia and other parts of the developing world, this indeed can happen at both a commercial, institutional and residential level. These form the backdrop for the major demand side recommendations from this project. Table 4 shows the scope for taking action for specific suppliers and consumers in each country. For instance, legal changes are unimportant for firewood producers in Uganda but a top priority in Zimbabwe.

Table 4 Scope for actions for suppliers and consumers - Uganda and Zimbabwe

Uganda			
Category	**Scope for improving livelihoods (1-5, 5 highest)**	**Costs of improving livelihood (1=low, 5=high)**	**Change in laws/policy required (1=few, 5=,many)**
Suppliers			
Wood producer	3	1	1
Charcoal producer	5	2	3
Local wood transporter	3	2	1
Local charcoal transporter	3	2	1
Local wood transporter-vendor	2	4	1
Local charcoal transporter-vendor	2	4	1
Local market wood vendor	5	1	1
Local market charcoal vendor	5	1	1
Consumers			
Brick producers	5	2	0
Bakers	3	3	0
Tobacco curers	3	2	0
Fish smokers	4	2	0
Lime producers	4	1	0
Restaurants/hotels	5	2	0
Boarding schools	3	3	0
Other schools	3	3	0
Hospitals	3	3	0
Households	3	2	0
Zimbabwe			

Category	Scope for improving livelihoods (1-5, 5 highest)	Costs of improving livelihood (1=low, 5=high)	Change in laws/policy required (1=few, 5=,many)
Suppliers			
Wood producer	3	1	5
Charcoal producer	5	3	5
Local wood transporter	4	2	5
Local charcoal transporter	4	2	5
Local wood transporter-vendor	4	3	5
Local charcoal transporter-vendor	4	2	5
Local market wood vendor	5	2	5
Local market charcoal vendor	5	2	5
Consumers			
Brick producers	5	2	5
Tobacco curers	3	2	5
Beer brewers	4	2	5
Black Smiths	3	2	5
Lime producers	4	2	5
Restaurants/hotels	5	2	5
Boarding schools	3	3	5
Other schools	3	3	5
Hospitals	3	3	5
Households	3	2	5

7. CONCLUSIONS

The project has illustrated that local authorities are generally unaware of the substantial contributions the business of commercial wood energy to their local economies, both in terms of livelihoods and incomes, as well as to local revenues.

Rather, they often view "the business" as a negative activity that leads to deforestation, that is often practised marginally, extra-legally or illegally, that requires considerable resources from a local level to enforce and control. The project demonstrated to local authorities and other key stakeholders that there are numerous benefits from "the business", and that they have many of the instruments to improve those benefits and thereby reduce negative environmental impacts of commercial wood energy production, while also improving the economic benefits to many local constituents.

The project, by involving all key stakeholders, from government to producers, from consumers to national policy makers, clearly demonstrated "win-win" options in the commercial woody biomass business. It demonstrated that for this to occur, local authorities must work with producers and others engaged in the business, to develop a clearer understanding of the business, and to understand the options at their disposal to help regularise and rationalise the business, and help local producers (and local economies) extract the most from the business, while ensuring its long-term environmental sustainability.

The situations in Uganda and Zimbabwe are very different despite the fact that the users of wood fuel particularly at District level are very similar. Uganda has a well regulated woodfuel industry with a recognised structure of taxes and market fees for those producing and marketing charcoal and firewood. There is also a recognised system of payments for those who own the wood be they owners of small woodlots or absentee landowners. The system can be improved; there is non payment of taxes and other illicit activity, the small producers, wholesalers and retailers usually lose out and receive low return for their labours. Wood fuel is used inefficiently by institutional, commercial and industrial users. The good point is that because the regulation of the industry is clear it is fairly straight forward to organise these improvement initiatives or interventions and involve the private sector stakeholders, local government and, where necessary, central government representatives.

The situation is not nearly so promising in Zimbabwe. The form of legislation at present on the statutes is highly complicated with many overlapping laws, it is centrally controlled from the Environment Ministry. The implementation of the law seems to favour a colonial approach where permits for firewood and charcoal are granted to large companies. The local population, while they have access to the sizeable communal lands, are only granted "own-use" rights in a semi feudal manner. This results in the alarming situation that wood fuel and charcoal are only valued in terms of the time, labour and equipment is takes to go and collect it. Without a monetary value there is no incentive for local people to plant or protect their tress. At

the same time wood fuel is still the main fuel used in the districts both domestically and in institutions, commercial and industrial establishments. The bulk of the supply therefore comes from illegally produced and traded timber for which the Local District Councils (LDCs) receive no benefit.

In Uganda it has been possible to come up with a large number of suggested local interventions of a practical nature that could be implemented very soon. This is much harder to do in Zimbabwe as until the legal framework is overhauled it is difficult to work with those who do not feel they are on a clear legal footing. However, it is as much how that law is enforced that is the problem, there are laws there that could be used to divulge authority down to the local level. It requires the Environment Ministry to be imaginative and then in turn the LDCs to grant licences for firewood and charcoal production to small producers and marketers at District level. Only then can the work really begin to ensure these producers use efficient methods and help them access the market in a strong position. Fortunately demand side energy efficiency improvement work with the users of wood fuel in the district can begin immediately.

Table 5 below summarises the current situation and key recommendations in each country.

Table 5 Current situation and recommendations

Uganda	**Zimbabwe**
Current situation	**Current situation**
Regulated industry Plenty of scope for district level supply and demand interventions Problem is organising displaced, marginalised people Wood fuel is seriously under-valued, with substantial decline in returns to production and sales in rural areas over past ten years, and relative to urban activities Big disparity in earnings among members of the supply chain	Overly regulated, so virtually illegal Rationalisation required Fundamental problem in working with charcoal and firewood producers while the business is illegal Wood fuel is under-valued, value is what it takes/costs to cut down and collect. Government can either change the law or the way the law is implemented - second would be quicker. Make the Rural District Councils and Traditional leadership the focal point of WBM development and management
Recommendations	**Recommendations**
Biomass industry organisation Marketing assistance Improved forest resource use Supply side efficiency improvement Demand side interventions Capacity building for local authorities	Wood energy business needs to be legitimised for small local producers/suppliers People in wood energy business should be provided with skills, training, management and marketing assistance Local authorities should become actively involved with participating in the wood energy business both in terms of rationalising the business as well as to promote sustainable development Demand side interventions Capacity building for local authorities

8. RECOMMENDATIONS AND ACTION PLANS

The partner, national and district stakeholder meetings were used to develop and consult on the recommendations for actions at national and district level to maximise the poverty alleviation benefits from the woody biomass energy resource.

8.1 Ugandan National and District Action Plans

Recommendations for the national action plan were first developed at the partner meeting in Kampala in June 2000. The framework is given in the Table 6 below.

Table 6 Uganda National Action Plan

Intervention	Responsible	Resources/Inputs
1. Legitimisation of woody biomass production, utilisation and marketing (law is not very clear)	MEMD, Parliament, ULAA, Urban Authorities Association of Uganda (UAAU)	Survey reports
2. Carry out resource assessment at district level (each district in the country)	MEMD, ESD, REDC	District Environment Action Plans, Sub-County Action Plans
3. Full implementation or functionalisation of District Environment Management Councils	ULAA, UAAU, DEO, MOLG	Reports from ULAA, MOLG, etc. showing where the councils are not functioning
4. Advocate for decentralisation of forest resource management (currently with Central Forest Department)	MOLG, FD	FD to co-operate
5. Thorough Research and Development on Energy Saving Technologies (disseminate results of work)	Forestry Research Institute, NARO	Media, promotion, dissemination, prototypes

The recommendations for the District Action plans also began to be developed at the June 2000 regional partner meeting. They were subsequently followed up by the team at the district level and then presented at the National Stakeholder meeting in November 2000. This meeting discussed the proposed district level actions and finalised the list to that in Table 7.

Table 7 Proposed actions at district level in Uganda

	Subject area	Description
1	Biomass industry organisation	Pilot the creation and support for an Association of Charcoal Makers for training, organisation and marketing.
2	Supply side efficiency improvement	Investigate improved viability of individually owned kilns using the new Mab Kase design. Pilot individual ownership
3	Improved forest resource use	District Environment Officers assist a group (Association?) of charcoal producers to take a forest lease in collaboration with district forestry officer (FD)
4	Improved forest resource use	Pilot the involvement of a charcoal producers association where saw millers are clearing land and prior to "enrichment" for the Forestry Department.
5	Marketing assistance	Assist a charcoal producer association to improve their sales price by moving up the supply chain, this may involve Kampala marketing. Alternatively the market study may recommend marketing at some intermediate point up the chain.
6	Demand side pilot - Institutions	In each district contact the schools and identify those interested in installing improved stoves. Develop a mechanism for financing the supply of stoves to the schools and pilot in 2/3 schools (or more if possible).
7	Demand side pilot - Industry	Investigate the increased use of charcoal in the industrial sector. Use the cement industry as a pilot example.
8	Capacity building	Provision of training and capacity building at District level to officers to enable them to tackle biomass energy related issues more effectively. Provision of a local information resource. The Ministry of Energy to assist with this.

8.2 Zimbabwean National and District Action Plans

8.2.1 Introduction

The proposed interventions and plans for the districts are listed and discussed below. It was not possible to come up with concrete proposals and plans. The main interventions were however identified and it is hoped that projects could be defined from these. The team was hesitant to produce shopping lists of projects that may not be followed-up, or that do not contain enough detail.

8.2.2 District Action Plans

1. Formulate district by-laws
   To address:
   - commercial exploitation of woody biomass
   - management and control of woody biomass
   - marketing strategy of natural resources
   - co-ordination of natural resources utilisation and conservation with existing non-governmental organisations
2. Training in Natural Resources Management for communities

Training should be in areas like woodland management, tree growing, charcoal production, beer brewing and black smithing technologies. Co-ordination to be done by Rural District Councils.

3. Identify new markets

4. Establish institutional mechanisms for marketing and production

5. Resource assessment (enumeration of resources)

6. Land use planning to include issues of woodland management

7. Review the incentives for enforcement agencies who monitor natural resources

8.2.3 National Action Plans

1. Rationalisation of legislation

2. Decentralisation of the administration of legislation

3. Review and refine local institutional arrangements

4. Need to consider the use of biomass domestic level e.g. stoves

5. Review issuing of title deeds

8.2.4 Brief discussion of Action Plans/Key interventions

a) Policy and Legislation

Comprehensive policies supported by intensive awareness programs, adequate incentives for biomass production, protection and management through strengthening, co-ordination and the empowerment of operational local institutions have to be developed. Development of comprehensive legislation and legal instruments that incorporate local level traditional control mechanism to ensure that benefits accrue to local communities should be intensified. This has to be done at both district and at national level including the introduction of permits, licenses and stampede fee for each tree felled. A good starting point could be the harmonisation of current legislation, which is mostly contradictory.

b) Institutional Arrangements

The Ministry of Environment and Tourism will play a leading role in the formulating overall policy and legislation on environment and biomass utilisation through the recent Environmental Management Bill to be presented in parliament this year. The ministry has to delegate some of its responsibilities to the Rural District Councils. Broad

recommendations from the Bill include the following. The Ministry of Mines and Energy shall provide the broad energy policy guidelines as they relate to biomass utilisation. Ministry of Local Government and National Housing shall provide co-ordination of local inputs into the reviews and formulation of policy and legislation and shall co-ordinate the implementation of the legislation through the RDCs. The Ministry of Lands, Agriculture and Rural Resettlement should provide appropriate land use plans in consultation with relevant institutions to provide land for afforestation.

c) Biomass Production, Management and Use

The suggestion here is for the Forestry Commission to develop cost effective methods which will generate reliable and useful information, both at local and national levels, to be used in forest resource planning, exploitation, management and monitoring in order to achieve sustainable development. The Forestry Commission will build and strengthen the institutional capabilities of the RDCs.

d) Biomass Management at Local Level

RDCs should establish and strengthen sustainable management capabilities particularly in the area under their jurisdiction through community involvement, retention of benefits, training and education. RDCs should develop and evolve regulations and controls of woodland utilisation.

e) Marketing and Distribution of Biomass

The Department of Energy and other interested parties should facilitate the development of marketing mechanism of biomass and related products.

9. PROPOSED BIOMASS SUPPLY AND DEMAND INTERVENTIONS

9.1 Proposed Uganda Supply and Demand Interventions

The tables below are included to illustrate the type of interventions that can be planned by district authorities. All these actions were prepared by the district level officers in the pilot districts.

9.1.1 Mukono District Interventions

The following interventions in Table 8 were identified at the Mukono District stakeholder meeting.

Table 8 Proposed Mukono District Interventions

	Supply side interventions
1. Intervention	Increase and legitimise the wood fuel supply base by: i) encouraging non-charcoal burners to plant wood for sale to charcoal burners; ii) encouraging charcoal burners to plant their own raw materials
Rationale	Charcoal burners are generally not long term investors; also charcoal production is a demanding occupation that not every tree owner can engage in. Charcoal burners will not want to invest themselves if they have no rights over the land
Target Group	The Individual residents of the area organised by/thru' *District Env. Committee (LCV Sec Pdn & 5* Local Environment Committees (LEC's)*Councillors(Sub-county level - Sec Prodn LC 3 - 1)*
Method of implementation	Form a Resource management committee to serve as a conduit for support including representatives from the Local government structures at the parish level, Local community interested in Forest Development, Local Forestry Personnel, and the Village Environment Office (LEC's)
Location	These areas have been suggested by the participants at the final district stakeholder meeting in order of priority: i) Kifu forest (Savannah) ii) Bajo Forest (Savannah) iii) Wanyonyi For. iv) Nandagi For.
Remit	The residents expressed willingness to be organised
	Demand side interventions
2. Intervention	Mechanisms for popularising fuel efficient equipment
Rationale	To help lower the costs of fuel to the schools, to reduce the pressure of fees on parents, to save the environment from pressure for firewood
Target group	Government Schools, Private schools
Method of implementation	Demonstrations among the institutions Easy Financing - project support in form of a revolving fund system may be necessary to actualise the effort. Guarantees , Sensitisations, Stove design and acceptability studies, TA
Location	Schools selected by the Mukono head teachers association
Remit	

3. Intervention Rationale	Energy efficiency among fish smokers Reduce the amount of wood consumed
Target group	Fish smokers
Method of implementation	Through local fishery connected bodies: Fisheries Office, Local Ggabunga Fisheries Task forces (Local), Demo. & training on modern smoking kilns
Location	Kiyindi, Ssenyi, Katosi and Kawango landing sites
3. Intervention	Energy efficiency among bakeries
Rationale	Reduce the amount of wood needed, Increase the profitability of the trade, Introduce new methods of baking, Modernise the trade
Target group	Bakeries within Mukono TC and Mbiko TC area
Method of implementation	Through the smallscale Bakers Assocn., demonstrations, developing a financing mechanism, adapting the oven designs to suit market
Location	See target group

9.1.2 Masindi District Interventions

Masindi has a well developed environmental action plan that identifies the environmental problems in each parish and develops action plans to deal with these problems. Two parishes Waibango and Kaduka have identified charcoal burning as an environmental problem. They have developed solutions for the alleviation of the problem. These are laid out in Table 9.

Table 9 Planned interventions for charcoal production in Masindi District

1. Parish	**Waibango** Villages: Kitakuza, Kinyoka, Rwenkunyi, Waibango, Namilyango
Problem	Charcoal burning Causes: Unemployment, Lack of by laws, Lack of food, Lack of awareness
Situation analysis	Area :8 sq miles, population 2800, No. immigrants 112; No. emmigrants 70 Charcoal Burning: Waibango has approx. 790 persons engaged in the activity, a quarter are immigrants. Over 450 bags of charcoal produced per month. 3/4 of public lands are affected.
Proposed solution	Institute by laws to regulate the production of charcoal. Encourage reafforestation, establish tree nurseries, licensing charcoal burners at S/C level, seek other IGA's. Introduce energy saving equipment. Plant a tree nursery at parish level.
2. Parish	**Kaduka** Areas: Wakisanyi Village, KatugoVillage, Kitaleba Village, Kaduku 1, Kaduku 11, Kinyonga Village
Problem	Charcoal burning Causes: Unemployment, Lack of by laws, Lack of food, Lack of awareness
Situation analysis	There are 200 immigrant charcoal burners

Proposed solution	By laws needed to guide the community on env. Issues; est. tree nurseries; Parish wood lots; demonstr. Agro forestry. Registration of all burners and orientate burners. Lack of Env. Awareness: increased seminars & meetings to build sense of ownership of env. Functionalise the LECs. Produce publications to inform public. Temporary ban on tree cutting.

9.2 Proposed Zimbabwe Supply and Demand Interventions

9.2.1 Identified Proposed Biomass Supply Interventions

(a) Enhancement of conservation committees
(b) Enhancement of management of indigenous forest
(c) Awareness campaigns and training
(d) Enhancement of research into growing of indigenous trees
(e) Harmonisation of by-laws governing woody biomass
(f) Encouragement of use of economies of scale in transportation
(g) Introduction of efficient technologies in production of wood biomass, e.g.

- Use of fertilisers
- Biotechnology for gene modification for rapid growth of indigenous trees
- Charcoal to be produced in kilns

(h) design marketing strategy for wood biomass and its products

9.2.2 Identified proposed biomass demand interventions

(a) use of efficient technologies in burning wood biomass e.g. efficient wood stoves thus institutional and household
(b) better methods for arranging brick kilns before firing them
(c) introduction of wind breaks for brick kiln firing
(d) popularisation of energy saving technologies
(e) introduction of alternative sources of energy
(f) establish linkages with research units at institutions of higher learning
(g) enhancement of natural resources conservation committees
(h) raising awareness on environmental law and wood biomass

5.3 Brief Discussion of proposed interventions

a) Enhancement of Management of Indigenous Forests

RDCs could use the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE). Under this approach, local communities derive direct benefits from the resources around them. The programme has been successful to date, mainly with large game. It could be widened to include resources like woodlands. The opportunity is already there, but it has not been exploited by the RDCs. Training in proper methods of utilising woodlands could be part of this programme, e.g. on harvesting techniques.

b) Resource Assessments

The empowerment of RDCs to carry out a resource inventory before issuing permits for logging to reduce over exploitation of the resource should be promoted. Resource assessments at district level will enable the RDC to make informed decisions on quantities and quality of the resources they have and what levels of exploitation could be sustained.

c) Agro-Forestry

Research institutions e.g. Forest Commission, Universities, Scientific, Industrial Research and Documentation Centre (SIRDIC) etc should intensify efforts in screening species for appropriate agro-forestry systems, with attention being given to cost benefit analysis, genetic modification of indigenous tree species to stimulate their rapid growth.

d) Research and Information Development

It is necessary to establish a database of biomass research development projects and on important biomass related statistics. The understanding of decision making on macro-economic influences on biomass use, research on the relationship between macro-economic environment and use business strategies so as to identify policy interventions which impact on biomass production and utilisation and use efficiently in the use of biomass for energy in both household and rural industries such as bread making, soap making, beer brewing, brick burning, catering etc. There should also be introduction of new technologies after their local adaptation and modification to meet local requirements.

e) Review and Harmonisation of Biomass Policy and Policy Instruments Which Impede on the Control and Monitoring of Biomass Resources.

Issues to be addressed include the following.

- The overlap of mandates among various ministries and departments and scattered nature of pieces of legislation.
- The lack of specific permit or licensing system to be used to authorise and monitor timber harvest.
- Lack of strategic plan to curtail biomass demand in rural industries.
- Lack of adequate and effective mechanism to monitor biomass harvesting as well as insignificant fines demanded from culprits.
- Lack of effective use of local infrastructure and authorities in monitoring biomass harvesting e.g. WADCO and VIDCO, institutions that are already in existence.
- Inadequate legislative back up and resources as well as low level participation by locals in the decision making process including relegation of traditional leadership roles in the conservation and management of biomass resources.

f) Fuel Switching

This includes introduction of alternative sources of energy for in the rural industries, institutions etc so that there is regeneration of forests.

APPENDIX 1 PROJECT WORKSHOPS AND MEETINGS

i) National Zimbabwe team kick off meeting Harare, Zimbabwe 8th September 1999

This first meeting was dedicated to introducing the project to the Zimbabwe team and developing the Zimbabwe team's strategy, priorities, district selection criteria and selection framework, and project management and communications framework.

ii) Regional partners kick off meeting Harare, Zimbabwe 9th -10th September 1999

This meeting was attended by the core teams from Zimbabwe and Uganda and the ESD Team. The first session introduced the project to the Uganda team and, with assistance from the Zimbabwe team, the Ugandan team set out their strategy, priorities, district selection criteria and selection framework.

The second day brought the two country teams together to review one another's plans and approaches, and to set out a collective project approach for involving district and national stakeholders, for district, national and project level co-ordination, for developing survey and interview approaches and initial instruments, and for defining the framework for each district and country 'action plan'. Minutes of the meetings supplied to DFID with the first progress report.

iii) 1st National Uganda Stakeholders meeting Kampala, Uganda 23rd September 1999

The workshop was attended by District level representatives, National government representatives, Local government associations, NGOs, Forestry officials and the project team. The purpose was to present the project to National stakeholders and outline and discuss the Uganda country strategy for the project. Project roles were defined and a clear strategy for participation at district, national and project levels. Discussion of the qualitative and quantitative survey approaches and draft instruments to be used in each district in each country took place with definition of the responsibilities for these activities. Minutes of the meeting supplied to DFID with the first progress report.

iv) 1st National Zimbabwe stakeholders meeting, Harare, Zimbabwe 19th October 1999

The workshop objectives were to: outline and discuss the Zimbabwe country strategy for the project; finalise selection of the target Districts for the project; define the role of the Core Team, the district authorities, and other stakeholders, and their responsibilities, and their primary areas of activity; develop a clear strategy for participation at district, national and project levels; define means for engaging all stakeholders and developing commercial woody biomass action plans and intervention strategies in each; outline stakeholder participation methods (e.g.,

surveys, interviews, workshops, seminars, training, capacity building, technical assistance, etc.) to develop the participatory and information base to develop district action plans and proposed interventions; set out project management, co-ordination and reporting formats; define the framework and work programme. Minutes of the meeting supplied to DFID with the second progress report.

v) 1st District stakeholder meetings in Uganda and Zimbabwe

Uganda	Masindi District 28th October 1999 Mukono District 5th November 1999
Zimbabwe	Nkayi District 16th November 1999 Chimanimani District 23rd November 1999

The purpose of the district meetings was to introduce the project to the district level officials responsible for all aspects of local environmental protection and resource management. Non government district stakeholders were also involved. The meetings went on to discuss and develop the methodology and make plans for implementation. The following outputs were achieved:

- 35 to 50 participant stakeholders in each District consulted
- Introduced the project background, purpose, goal, focus, outputs and methods
- Developed consensus on the Projects methods among the key district stakeholders
- Developed the project workplan and activities to be carried out in each District
- Designed follow up plans/activities for the next three months
- The Districts bought into and accepted the project as a viable development activity

Minutes of the meetings supplied to DFID with the second progress report.

vi) 2nd Chimanimani District Stakeholders Meeting, Zimbabwe 22nd February, 2000

Aims:

- Review Project background, goal, purpose, outputs, and methods and update on the Project's progress
- Discuss survey methods
- Review and identify woody biomass producers and consumers in Chimanimani (District Profiling)
- Review survey instruments and agree on contents

Minutes of the meeting supplied to DFID with the second progress report.

vii) 2nd Nkayi District Stakeholders Meeting and Training, Zimbabwe 28th

February - 1st March 2000

As for Chimanimani meeting above but also included more extended training on survey methods. Minutes of the meeting supplied to DFID with the second progress report.

viii) 2nd Masindi and Mukono District Stakeholder meetings, Uganda, June 2000

Review of the district profiles and initial discussion of the survey process.

ix) 2nd Regional Partner Meeting Kampala, Uganda 19th, 20th June 2000

Reports on District profiles and surveys. First development of district and national action plans and proposed interventions. Report of meeting included in the final report Annex.

x) 2nd National Uganda Stakeholders meeting Kampala, Uganda 1st November 2000

Reports from the Districts on activities. Main findings from the surveys. Presentation of draft action plans and interventions. Report of meeting included in the final report Annex

xi) 2nd National Stakeholders workshop Zimbabwe 18th January 2001

Presentation of findings and conclusions by the two Districts (surveys and focus group interviews). Presentation of the legal and institutional situation for energy from biomass in Zimbabwe. Presentation of the regional and District action plans for biomass development. Report of meeting included in the final report Annex.

xii) 3rd Mukono District Stakeholder meeting, Uganda 21st February 2001

Report of meeting included in the final report Annex 1