MBURUI MICRO-HYDRO PROJECT
KENYA

A SUSTAINABLE LIVELIHOODS CASE STUDY

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TO POVERTY

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Picture on front cover: water carriers from the Mburui community

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Executive Summary

This case study explores the applicability of DfID's Sustainable Livelihoods framework and approach to energy infrastructure projects. Specifically, the case study looks at the proposed installation of a 14 kilowatt micro-hydropower scheme in the village of Mbuiru in the Eastern Province of Kenya. To date, the project has not employed a Sustainable Livelihoods approach. Rather, planning and activities have focused on increasing incomes in the community via the development of diverse small-scale enterprises designed to run the power generated from the hydropower scheme. The community and project partners are not, however, against adopting a Sustainable Livelihoods approach in future and consequently the study makes some suggestions about how this might focus activities to ensure sustainable poverty alleviation.

Though the scheme has not yet been installed, significant project work has taken place in the community in order to plan the intervention and deal with the relevant structures and processes. The community have obtained permission for a power generating scheme, but their ambitions for supplying households with light and for irrigation have been thwarted by inflexible and perhaps inappropriate legislation. This case study, one of a series, aims to inform policy-makers, engineers, economists and those concerned with the energy sector, both in Kenya and the wider context, about the Sustainable Livelihoods approach and its potential application to such infrastructure projects.

In the language of the Sustainable Livelihoods framework, the main impact of project work thus far has been to increase the social capital of the community. The formation of a project management committee, which has been effective in dealing with government structures and other organisations, has boosted community confidence, promoted mobilisation and increased solidarity of purpose. Finance has been raised from the hard pressed residents of Mbuiru to pay for permits. Women are, for the first time, taking a role in formal decision-making processes. Local government structures, meanwhile, are aware of the project and are responding with increased co-operation and support.

The installation of the micro-hydropower scheme will represent a major increase in physical capital - or physical assets - for the community. Utilising this capital to ensure the maximum impact on poverty alleviation is the challenge posed by viewing the project via the Sustainable Livelihoods framework. The question is whether the project's current focus on promoting enterprise is the best way to ensure that the community obtain the Livelihood Outcomes they desire. Community aspirations and people's priorities, are ascertained in this study, along with some assessment of how they might be realised through – or in relation to - the energy intervention.

Without being prescriptive, the case study results suggests that, by using a Sustainable Livelihoods approach, the aims of the project could be diversified in order that increasing financial capital alone, through increased incomes from enterprises, is not the only alternative livelihood strategy. Supporting this strategy, not least with market research to establish commercially viable end-uses for hydropower, is essential. In order to put the expected increase in financial capital to good use, the provision of savings and credit facilities is proposed, along with lobbying and advocacy activities to promote a variety of pro-poor legislative and regulatory changes. Meanwhile, there is a manifest need to increase other forms of capital. The development of human capital, particularly through more accessible educational opportunities and appropriate training, should be given a high priority, as should enhancing other physical assets, such as health centres, roads, irrigation and drinking water supply, which restrict the achievement of the Livelihoods Outcomes that are community priorities.

1 INTRODUCTION TO SUSTAINABLE LIVELIHOODS

1.1 The Sustainable Livelihood Framework and Approach

The sustainable livelihoods (SL) framework is a way of thinking about the livelihoods of poor people. It helps users to reflect on the complexity of livelihoods in a community. In so doing, it stimulates the mind to think more widely and deeply about the problems they face. The SL framework views people as operating within a vulnerability context. The degree of vulnerability is determined by the combined stock of a variety of assets available within the environment of a community. The SL framework maps these assets as human, social, natural, physical and financial.

Communities respond to vulnerability by developing defined livelihood strategies. People develop these strategies motivated by the livelihood outcomes they desire and that they believe are achievable. The extent to which livelihood strategies can be successful depends in part on the organisational and institutional structures that affect the community.

To be able to best achieve meaningful livelihood outcomes, those that alleviate poverty, the SL approach proposes that a community must find sustainable ways and means of building and utilising its stock of assets. Obviously, different assets are accessible in different measures in different communities. Each category of assets is critical, and a community would be hard-pressed to identify viable livelihood strategies without some balance. It would, for example, be unsustainable to be rich in financial capital if natural capital was degraded to the extent that it could not support community livelihoods (deforestation, soil erosion, desertification). Accepting this rider, it is the combined stock of assets that ultimately defines a community's ability to cope with vulnerability.

The SL approach is the way the framework is applied to analyse and address a given situation. Different scenarios pose different challenges and thus may need the framework to be applied in a different way. Being dynamic, as well as participatory and holistic, the SL approach allows for this.

1.2 How the SL Framework and Approach was Applied to the Case Study

The case study team consisted of:

- Stephen Gitonga (Team Leader)
- Lydia Muchiri (Gender and Participatory Rural Appraisal Advisor)
- Patrick Balla (Research Assistant)

In determining the core issue that the study considers, application of the SL framework and approach resulted in the formulation of the following core question:

What is the role of energy services in poverty reduction?

To answer that question, and to be able to justify and apply the SL framework and approach, an attempt to understand the poverty problem was made. The study team agreed at the outset that poverty could not be solely assessed in terms of income, consumption and food availability. Any assessment had to take on board the complexity and changing nature of how an individual or household adapts to their environment. This actually defines a livelihood strategy. A livelihood comprises - the capabilities (skills, resources, knowledge, etc.), assets and other aspects that help individuals or households cope with or recover from stresses, shocks and trends due to the external environment. Shocks include commodity price hikes, lost or poor harvests, war, and natural disasters such as earthquakes, volcanic eruptions and cyclones. Trends are typically somewhat more predictable and include changes of season, shifts in government policy etc. Stress occurs due to factors such as disease, food shortages, expensive or unaffordable school fees. To be sustainable a livelihood needs to maintain or enhance its capabilities and assets, both in the present and in the future.

In this study, a household is taken as *a person or group of persons, generally bound by kinship ties, who live together under a single roof, are answerable to the same household head and share a common source of food.* In the Kenyan context - indeed generally - a household is defined as poor if it cannot meet the basic needs of its members. The question is then *why* people are unable to meet their basic needs? The answer lies in what DFID's SL strategy identifies as a lack of capabilities, assets and opportunities to carry out activities that would help them to cope. If this 'coping deficit' is accepted as the reason people are poor, then development organisations concerned with poverty alleviation adopting the SL approach should seek to:

- Remove barriers to acquiring capabilities. Enhanced capabilities represent new opportunities for meeting basic needs. They can determine the rate of accumulating assets.

- Create, by other means, opportunities for households to accumulate assets.

- Enhance the ability of individuals or households to participate in activities that would help them to cope with or recover from shocks, trends and stresses due to the external environment. The ability to deal with such effects is likely to determine success in exploiting opportunities and accumulating assets.

Actions that are taken in pursuit of the above aims *become* the project intervention. Typically, however, there are various ways of seeking to achieve aims: a choice of actions, which could impact on livelihoods in different ways and to different extents. In arriving at the best course of action for an intervention, a development organisation using the SL approach would address the following issues for communities, individuals or households:

- Interactions with the private sector, the government and its structures, and with institutions;

- The influence of these and other agencies on the ability to satisfy basic needs;

- The impact of legislation, policies, tradition and culture;

- Exposure and access to technology and thence the ability to use and benefit from it;

- Reducing vulnerability to shocks, stress and seasonality, via technology or adaptive measures;

- Enhancing available resources.

The SL approach is participatory. In order for a development organisation to decide which areas are priorities for intervention, it must engage with the individual or household. A thorough understanding of the vulnerability context, livelihood assets and coping strategies is essential, along with an overview of the processes and structures of the household. An appreciation of people's desired livelihood outcomes – what they want to achieve in life – contributes further to establishing the SL agenda or plan of action.

Analysing livelihoods is, then, the basis for making decisions on the interventions that the development organisation undertakes and how to approach them. Results help set priorities and ensure interventions are holistic. The aim then is to assist poor people to accumulate the appropriate assets, those that will best equip them to cope and, thereafter, prosper and increase their well-being.

2 KENYA, MBUIRU VILLAGE, AND MICRO-HYDRO POWER

2.1 Background to Kenya

Set in Eastern Africa, the Republic of Kenya gained independence from Britain on 12 December 1963. Administratively, it is composed of 7 provinces and the Nairobi Area. Occupying around 580,000 square kilometres, Kenya is bordered by Tanzania, Uganda, Ethiopia, Sudan and Somalia. The 1999 census estimated the population of Kenya at just over 27.3 million, with a density of 50.3 people per square kilometre. Estimates of population growth rate vary between 1.27% and 2.30 %. Average life expectancy is around 48 years (2000), with women living slightly longer than men.

With a GDP of US$ 10.6 billion, GNP per capita of US$ 360 and an average annual growth rate of only 0.1%, Kenya remains one of the poorer countries**,** ranked 170th in the world (World Development Indicators Database, 2000). Inflation in 2001 was estimated at 7%. The proportion of the population below the poverty line is around 46.4%. Meanwhile, 47% are without access to safe water supplies, and the infant mortality rate (IMR) stands at 124 per 1000 live births (cf. 115 per 1000 live births in 1980). Overall, Kenya exhibits high levels of poverty and poor health. Slow economic development is often blamed on poor management by government and public sector corruption.

Agriculture contributes around 25% to GDP, while employing 75 to 80% of the workforce. Industry contributes 13% to GDP and services 62%. National unemployment is high at around 50% of the workforce. Literacy is good, with around 78% of the population over 15 able to read and write.

The Kenyan Highlands are one of the most productive agricultural regions in Africa. Environmental problems in rural areas include deforestation, soil erosion and desertification. Northern and eastern regions of Kenya are prone to flooding and drought. In 1999 and 2000 drought led to water and energy rationing along with reduced agricultural productivity.

Around 80% of people in rural sub-Saharan Africa depend on biomass - wood, dung, and crop residues - for domestic energy, and this holds true for Kenya. The rural population - 68% of the total - is particularly dependent on biomass, only 2% having access to grid electricity. The trend in Kenya's modern energy use is towards increasing reliance on imported petroleum fuels. Hydropower, meanwhile, makes a significant contribution to meeting the electricity requirements of the commercial and industrial sectors. It accounts for 67% of electricity production, fossil fuels contributing 31%.

2.2 The Community of Mbuiru

Mbuiru village is located in Mariani Sub-location, Karingani Location, Chuka Division. All these are in Meru South District, Eastern province of Kenya (Figure 1). The village lies about 200 km from Nairobi, and is 12km from the nearest town, Chuka. It is not electrified. The project area considered is 3 km^2, though it draws people from the whole of Marianai Sub-location.

Figure 1: Map of Kenya showing Meru District

Population

The Meru people, one of the minor tribes of Kenya, constitute the majority of the population. Several other tribes live in the area, including the Chukas, Tharakas, Mwimbi and Chogorias, Kikuyus and Embu. This ethnic mix is a result of people buying land and moving into the area as well as intermarriage. Different ethnic groups have coexisted for a long time and form an integrated society.

There are about 300 households in Mbuiru village, each having an average of 6 members. The total population actually exceeds 1,800 people. Of these, females account for 56.3% and males 43.7 %. Around 90 % of the population are aged 40 and below. About 23 % are aged 10 and under. This is shown in Figure 2

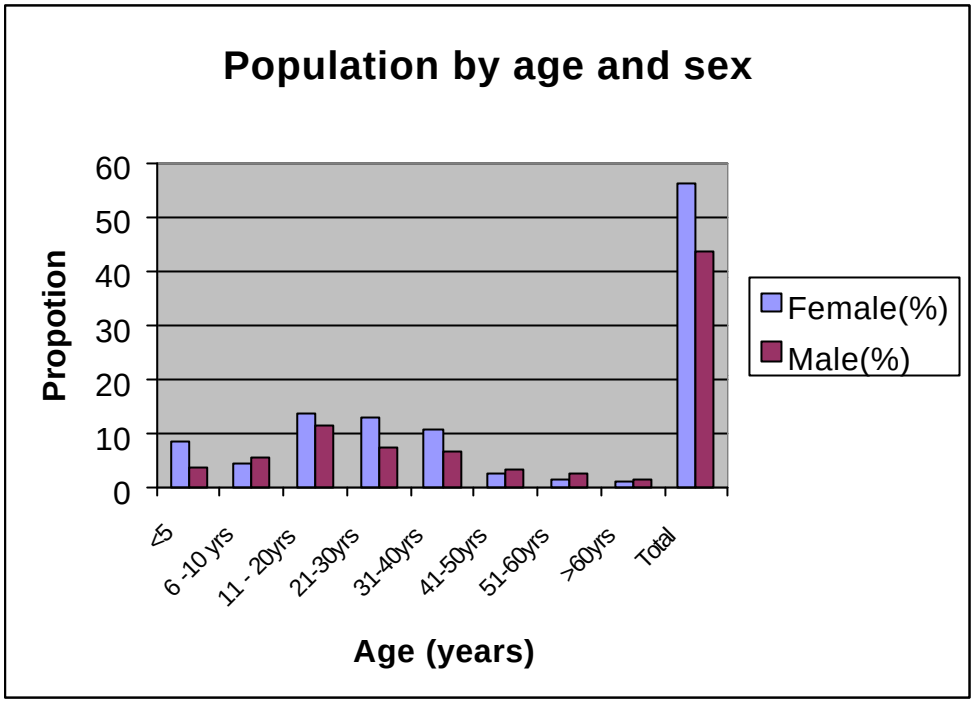

Figure 2: Population by age and sex

Mariani Sub–location covers an area of 43.1 km^2 with a population density of 98 people per km^2. There are over 900 households - an estimated 5,400 people.

Climate, soils and vegetation

The project area is located on the leeward side of Mount Kenya and this influences its climate pattern. It receives an average annual rainfall of 600 to 900mm, with 'long rains' from September to December and a shorter rainy season between March and May. The area is hot for most of the year, experiencing temperatures up to 33^0C. The soil is usually red soil with poor water retention. The area is hilly and suffers severe erosion due to inadequate soil conservation. Vegetation is low bushes and scattered indigenous trees, although there have been some efforts by the community to plant exotic trees, such as gravillea species. These exotics were initially introduced by the local tobacco companies as a source of fuel for curing.

2.3 Background to the Micro-Hydro Project

The national project was launched in 1998 with a view, in the first instance, to assessing the potential of local micro-hydro schemes. Various approaches were used to come up with the requisite information for the project. These included a review of existing literature and the legal status of potential projects, site surveys, assessments of demand and possible uses for power. Criteria for the selection of a community micro-hydropower site were developed. These helped in comparing potential sites and led to the eventual selection of Mbuiru for development as a demonstration project.

The national project was initiated with funding from the UNDP-GEF Small Grants Programme. Implementation will be a joint undertaking by the Ministry of Energy's

Department of Renewable Energy and the Intermediate Technology Development Group (ITDG- Eastern Africa). The objective of the project is to distribute micro-hydropower for improving livelihoods, specifically providing communities with a viable source of energy for commercial activities. This will be achieved by transmitting the electricity generated to a conveniently located commercial and social centre. At the moment, due to legal restrictions, the power cannot be distributed to households.

Micro-hydro technology was chosen because Kenya has many small rivers that can be exploited to provide power for community development. The Mbuiru project should, therefore, serve as a model and provide lessons for future initiatives. Micro-hydro technology is not well known in Kenya, particularly at a community level. Only a few tea estates and some missionaries have used the technology. After commissioning, however, the operation and maintenance of micro-hydro schemes is relatively straightforward: it is a manageable technology, well suited to local energy supply projects.

Micro-hydro technology has the potential for increasing incomes and improving livelihoods in remote communities like Mbuiru, where sufficient flow and head – the height water falls to the turbine – are available. The Mbuiru project was instigated following a pre-feasibility study of more than twenty potential sites in Kenya. The Tungu-Kabiri Community Micro Hydropower Project is the community group behind the project. Registered with the Social Services Department, it is a commercial entity formed for the dedicated purpose of running the community micro-hydro scheme.

The micro-hydro scheme was not set up using a Sustainable Livelihoods approach. However, as this case study shows, there is still opportunity to influence and make modifications to the design and implementation of the scheme.

Specifications of Tungu-Kabiri Community Micro Hydropower Project

An 18kW micro hydropower scheme was designed. It will give 18kW of mechanical power but 14kW of electrical power. The canal is 250m long and the penstock and the head are 20m and 13.5m respectively. The flow of the water in the canal is 200l/seconds with an effective 180l/seconds running the T12 cross-flow turbine.

3 CASE STUDY METHODOLOGY

3.1 Data Gathering and Fieldwork

The case study was carried out using the SL framework and approach as a basis. As befits the SL approach, a variety of research methods were employed – as appropriate - in order to obtain the most detailed possible view of community livelihoods. Hence, both formal and informal methods of data collection were employed.

In April 2001, a detailed socio-economic survey reviewed the energy needs of the community. The relationship between energy and livelihoods was investigated, including an assessment of the community's purchasing power for energy services. In addition, thirty questionnaires were administered to households. Interviews were conducted to collect information from local opinion leaders and key informants. Interviewees included the local Chief and Assistant Chief, technical and extension staff from government departments working in the area. This helped the study team to understand social, political and development aspects of the region and the community. Discussions with selected stakeholders helped to enrich the information collected. Those participating included the Department of Social Services, the pastor, health officials, the Water Department and community elders.

Other study methods included self and participant observation, unstructured interviews and focus group discussions. Community forums were used to collect views and impressions from residents. Wealth ranking was undertaken to help understand the distinct needs of different sections of the community. Throughout the study, participants included men and women of all ages and from diverse income groups.

4 CASE STUDY RESULTS: LIFE BEFORE THE PROJECT INTERVENTION

This section looks at what life was like in the village before the micro-hydro project intervention. This is done using the SL framework and approach. Hence, the village situation is analysed with regard to it stocks of capital: human, physical, social, natural and financial. The vulnerability context is investigated in terms of shocks, trends and seasonality and their impact on livelihoods. Thereafter the effects of policies, institutions and processes (PIPs) on livelihood strategies and outcomes are examined.

4.1 Capital Assets

Human assets

It takes an average of Ksh 2,500 (Kenyan Shillings) per year to send a child to primary school. Able to bear this cost, most people in Mbuiru have attained primary education. Those without formal education are mostly women over fifty. Despite the fact that adult education services are provided in the community, they are apparently not used. The study revealed that 7.8% of people have no formal education. Focus Group Discussions indicate that over 90% of people are literate, i.e. they can read and write English. A significant number are not, however, able to speak the language fluently. Only a small number of people pursue secondary education. Of those who do, at least 5% drop out. Typically, this is because families find school fees of around Ksh 30,000 per student per year unaffordable. This is shown in Figure 3.

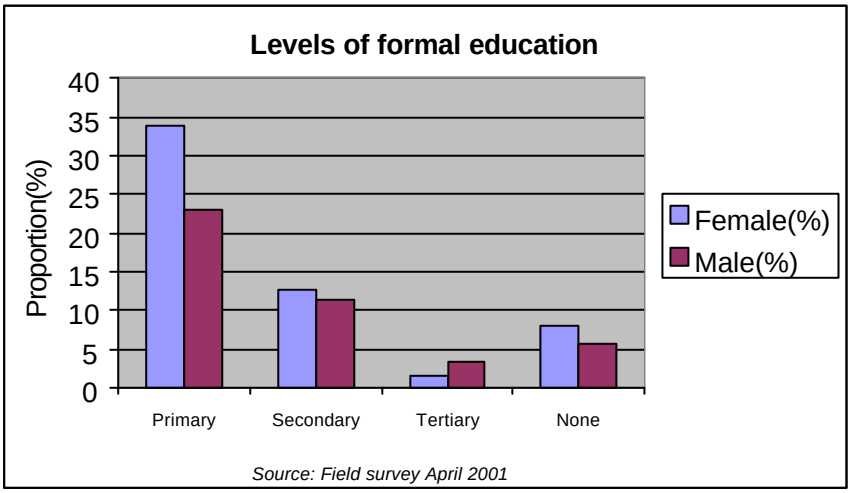

Figure 3: Levels of formal education

The average age that people leave secondary school is 16. They then tend to work as labourers, either in agriculture or for companies. Many girls take up employment in households outside the village. Less than 5% of the population goes on to attain a tertiary education. The majority of these people then leave the area to find jobs in urban centres.

Very few individuals possess formal vocational skills. Carpentry, masonry and tailoring are examples of skills available in the community. Vocational training institutes, like secondary schools, cost around Ksh 30,000 per student per year, deterring potential trainees. The results of the field survey revealed that even people with formal skills are often not using them. The reason given is the lack of start-up capital to launch productive enterprises. Traditional skills, such as rope making, weaving and basketry, are mainly practised by the older generation. In general, young people are not interested in learning traditional skills. Their perception appears to be that traditional skills are associated with low status and poor financial reward.

Financial assets

Most residents of Mbuiru, 82.5%, have an annual income of less than Ksh 150, 000. The main occupation in the area is small-scale farming. Women are more involved in farming than men, the proportion of the community represented being 76.3 % and 23.7% respectively. Farming provides people with subsistence food and some income, around 28% of the total annual income per household. The major cash crop grown is tobacco, cultivated by 83% of households. It contributes on average Ksh 24,060 per year to each household involved. Food crops include maize, beans, sorghum millet, potatoes and bananas. While most food crops are consumed locally, a proportion is also sold to generate income. Although tobacco is grown as a cash crop, the community can be considered as predominantly a subsistence economy. Financial security is limited and income unpredictable, depending mainly on the weather.

There is no limited access to micro credit, as most families do not have collateral to secure against a loan. The surveys showed that over 95% of the community members do not have any savings. Only members formally employed or in stable business (usually based outside the community) have some savings. That notwithstanding, the community members save assets in the form of goats, chicken and trees which they sell when there is a situation that needs finances e.g. school fees, hospital fees etc. However, savings in the form of money are quite limited.

Physical assets

Apart from the primary and secondary schools, churches and a polytechnic serving Mbuiru, there are two health-centres in the area. Both are located approximately 2 kilometres from the proposed micro-hydro site. These clinics lack basic facilities such as water, refrigeration equipment, essential drugs to treat minor ailments, and laboratories. According to the Nurse-in-Charge of Kaanwa Dispensary, they have to rely on untreated water from the river because storage tanks are not functional. Neither health-centre is equipped for childbirth or surgery.

The nearest referral health-centre, which provides maternity services for the village, is located in Chuka town, 12 kilometres away. Transport is expensive and not readily available. Survey participants cited the example of snakebites to illustrate the inadequacy of facilities. To receive anti-serum, the patient has to travel to Chuka – sometimes further if stocks there are depleted. More often than not, it is reported, people die before they can get treatment.

There are two earth **roads** linking the community to other parts of the District and the rest of the country. Chuka-Kaanwa-Tharaka road lies about 12 km from the village, while Chuka-Mitheru-Kaanwa road is approximately 17km away. Apart from the Chuka-Mitheru section, which is tarmac, both roads are extremely dusty in the dry season and become impassable when it rains. Poorly maintained, they quickly

develop gullies and potholes. The local County Council and Ministry of Public Works are said to be responsible for maintenance.

Kaanwa trading centre is the nearest market for Mbuiru (Annex 4). It is approximately 2km from the site of the proposed micro-hydro installation and has a 'catchment area' of 8km^2. Unfortunately, the market lacks water and adequate sanitation facilities. Community members must, nevertheless, meet at Kaanwa to buy and sell goods and services. Basic commodities, such as food, farm produce and livestock are sold at the open market. The market does not, however, supply all the equipment and inputs households require. Farmers, for example, report constraints to productivity due to a lack of inputs ranging from tools to fertilisers, pesticides and animal medicines. Kaanwa market acts as an administrative centre for Chuka Division. Various government agencies and officials are located there, including the Divisional Officer, Police Post, Lands Office, the Chief and Assistant Chief.

There is scarcity of **clean water** in Mbuiru, forcing residents to use untreated water from Tungu River. It was reported that people often 'forget' to boil water for drinking. Firewood is scarce and boiling water is an extra drain on resources. Households use around 6 gallons of water per day and women reportedly spend on average 45 minutes collecting one gallon from the river, a steep climb. Water scarcity has a negative effect on hygiene standards as households limit their use. There is also high demand for water to irrigate horticultural crops.

Mbuiru residents have used a variety of materials in the construction of their housing. Forty percent have used exclusively mud for walls. Thirty percent used wood and the remainder used stone. Everyone used iron sheets for the roofs of their houses. All respondents were concerned about the high cost of erecting stone or wooden houses, which are regarded as superior to traditional mud. Two third of houses have less than 5 rooms.

With respect to **energy**, residents of Mbuiru have no mains **electricity**. The nearest grid is in Chuka. Rechargeable wet-cell batteries are used for powering television sets and some radios and radio-cassettes players. These batteries are re-charged in Chuka at a cost. Dry-cell batteries are used in other radios and torches. A few households possess a Solar Home System (SHS), which they use to charge batteries and power electrical appliances.

Around 80% of households in the village own some form of electrical equipment. Radios are quite common, while a smaller number have spotlights and/or black and white televisions. Of those with electrical equipment, 75% spend an average of Ksh 500 on battery charging and/or dry cells each month. This figure, though, ignores the additional cost of transport from the village to Chuka. This effectively increases expenditure to over Ksh 700. People complain that sometimes wet-cell batteries are spoilt during transportation.

Woodfuel is used by 100% of the population in the area, predominantly for cooking and curing tobacco. Sixty-five percent of households spend a monthly average of Ksh 500 on woodfuel. Those who spend more than Ksh 2,000 are typically involved in tobacco curing on a larger scale or are running kiosks that supply hot food.

Most households use **kerosene** for lighting. It is bought at market centres, usually Chuka. Sixty percent of the population uses between 1 and 3 litres of kerosene per month, seventy five percent of them spending a monthly average of at least Ksh500. Diesel is only used to run the grain mill in the village.

Social assets

The typical household consists of a wife, husband and 4 children. They also interact with extended family members. It was reported that the trend was towards having fewer children due to the financial hardship of raising large families. Before the project intervention, social networks in the village were mainly family related. Some other forms of social groupings existed, including women and youth groups. These groups are mainly concerned with religious work, exchanging gifts, and informal communal agricultural work.

Natural assets

The main natural asset is land for farming. Sixty percent of households own less than ½ an acre of land. These are considered the poor (Annex 1). Apart from the land, the other natural asset is Tungu River, a crucial resource. Not only does the river provide drinking and irrigation water, Tungu Kabiri waterfall presents the opportunity for developing micro-hydro power.

4.2 Vulnerability Context

4.2.1 Seasonality and Trends

Climatic patterns create seasonality. Obviously, an economy dependent on agriculture for most of its food and a significant proportion of its cash income is affected by the change in seasons. Livelihood activities also vary between planting and harvest time, between the dry and the rainy seasons. The busiest times for farm work corresponds with the rainy seasons leaving people with little time for other livelihood activities. Food production and income from cash crops are not evenly distributed over the year. The sale of produce is greatest during and just after harvests. After food crops such as maize and beans are harvested, people typically sell a proportion to meet their financial needs. A surplus is dried and stored to meet on-going household food needs.

The incidence of human disease is also dependent on seasonality, reflected in higher medical bills at certain times of year. At the onset of both rainy seasons, the incidences of malaria, typhoid and diarrhoea increase. At such times, the river is dirty with floodwater and less safe to drink; water-diseases are common. Meanwhile, school fees, an example of a trend, are due at certain points in the year rather than being distributed evenly or matching times of maximum disposable income.

Agricultural production, income and expenditure patterns, then, vary over the year and are generally ill matched. The need to conserve stocks of food and save money in order to be able to meet needs and expenses the year round is apparent. For many residents of Mbuiru this is a difficult feat as they are living near the margins. Barely coping with seasonality and trends, they are then particularly vulnerable to shocks.

4.2.2 Shocks

The community experience shocks due to drought, famine and disease, particularly malaria, typhoid, cholera and HIV/AIDS. According to focus group discussions, people are increasingly aware of AIDS/HIV and are taking precautions. To date, not many people have died of the disease. Other health risks include respiratory problems due to air pollution inside dwellings when biomass is burned for cooking. Accidents with kerosene lamps sometimes cause – usually minor – burns.

Illness, and of course death, obviously alter the livelihood pattern of affected households. In such circumstances, households may be forced to sell food stocks or other assets in order to cope. As a result, their vulnerability to seasonal impacts, trends and further shocks is increased.

As an example of a 'positive shock', there are occasionally bumper harvests. This means, of course, additional food and income. In this case people can accumulate assets, stored food or cash savings. This provides an enhanced cushion, reducing vulnerability. Unfortunately, drought and famine are more common occurrences than bumper harvests.

4.2.3 Vulnerable Groups

Certain groups in society are more vulnerable to shocks, trends and seasonality. According to the area Lands Adjudication Officer there are at least 10 households in Mbuiru community that have no land. These households are squatting and cannot develop the lands they occupy so, they cannot grow food. All their food requirements, therefore, have to be purchased with cash, typically earned from casual work. These people are evidently vulnerable.

Typically, those with large families, particularly single-parent households, generally widows, have fewer resources and are more vulnerable. The elderly, infirm and ailing too, are at increased risk. Meanwhile, young adults with no paid work can also find it difficult to cope, especially if they come from households already vulnerable on other grounds.

Seeking out the causes of vulnerability

During focus group meetings, in order to find out more about their livelihoods and coping strategies people were asked the following question:

Why is it difficult to prepare for the shocks?

Their responses included:

1. Many households' plots of land were too small to produce enough food to sustain members throughout the year.
2. Those with sufficient land nevertheless experience problems obtaining necessary inputs, such as fertiliser and weed-killers, so their surpluses too proved inadequate.
3 Generally, people do not have enough monetary assets to shield them from even minor shocks. They tend to sell their food stocks in order to cope, increasing vulnerability.
4. People felt strongly that they had no access to capital for starting small businesses that would allow them to diversify their income base and accumulate assets.

4.3 Policies, Institutions and Processes

Various policies, institutions and processes obviously impact on the livelihoods of people in Mbuiru. The study looks at how these affected the community before the project intervention. Of interest is considering changes in PIPs that might ensure maximum livelihood benefit results from the operation of the micro-hydro project.

Government institutions

Government institutions are custodians of legislation and regulations on the use of various public resources found in the area. For example, the water department provides the community with the licenses to use river water for domestic, irrigation

and energy purposes. The Ministry of Lands furnishes people with title deeds and carries out land adjudication activities. The Local Authority, apart from facilitating business and micro-enterprise development, administers taxation of the same. The administrative units provide law and order, and administer all social and development activities in the area.

Administrative units: Mbuiru is in Karingani location and is administered by the local Chief, who heads the location's development committee. It falls under the Chuka Division, Meru District. Policies 'trickle down' from higher authorities to the Location.

Government ministries: The most important in the area include the Water Department, the Land Adjudication Department, the Ministry of Public Works, and the Ministry of Health.

Local authorities: Mbuiru community falls under Meru South County Council, which administers all services and controls activities at Kaanwa Market

Educational and training institutions: There are 7 primary schools in the area, serving Mbuiru and neighbouring communities: Mbuiru, Miraja, Kiegumo, Ndumbeni, Kiganju, Mwanjati and Kaanwa. Ekangaria is the only secondary school, while Kiriribo Youth Polytechnic offers apprenticeships in carpentry, tailoring and masonry.

Village Development Committee: There is a Village Development Committee (VDC) which has a mandate to articulate local development needs and priorities to the Location Development Committee to District Development Committee. However it has not been very successful due to a lack of capacity, and its perception as part of a Government instrument rather than the true voice of the community

Non-Governmental and private organisations

Several church groups in the area administer to people's spiritual needs and are active in community development activities. For instance, two church groups, The Presbyterian Church Of East Africa (Chogoria Mission) and the Anglican Church Of Kenya, run the two dispensaries in the area. The Catholic Church and the Christian Mission sponsor some schools and give bursaries to needy students. There are more than eight churches in the area.

Farm Africa, an International NGO supports livestock production projects in the area through women's groups.

British American Tobacco (BAT) and ***Mastermind Tobacco Company (MTC***) operate in the area. They provide commodity-based extension to small-scale farmers to promote tobacco production. Extension services are specific with demand-driven objectives and targets that must be achieved in a specified timeframe. The companies make contracts with farmers and provide complete technical packages. ***Several small firms*** also have an impact on the livelihoods of the community. These include kiosks, shops and private clinics.

The community view of institutions

Analysis shows that the community considers some institutions more crucial than others. Health Centres, churches and schools proved dear to the residents. Private enterprises are also important. Despite the importance of the roles government

institutions should play in the area, people were very unhappy with them. Their inability to provide important services to the area was irksome. Meanwhile, they are considered to be slow and 'high-handed' in dealing with people and their cases.

Policies and Processes

Policies with a definite influence on people's livelihood strategies include the Land, Water and Power Acts.

Land Act
The Land act has certainly affected the development of the area, with a lack of title deeds and the process of land adjudication directly impacting on people's livelihoods.

Land adjudication involves surveying and registration of land for the purpose of establishing individual ownership through the issuing of Land Title deeds. Land in Mbuiru area had not been adjudicated and so people have no legal ownership. They own it as a communal land but do not have individual ownership. However, land adjudication is taking place and soon the community will be issued with land title deeds.

Water Act
The Water Act controls the extraction of water from Tungu River for irrigation purposes.

Power Act
The Power Act is particularly relevant to schemes proposing exploiting rivers for micro-hydro power. *The Electric Power Act, 1997*, relates to the generation, transmission and distribution of all electrical power in Kenya. In relation to community hydropower, the Act does not allow power to be distributed (except by the official Kenya Power and Lighting Company) although power can be generated up to 100 kW. There are also no set standards for micro hydropower- only for larger hydropower schemes.

The only market for farm produce in the area, as discussed, is Kaanwa trading centre, administered by the County Council. British American and Mastermind, meanwhile, largely control the process of selling tobacco.

4.4 Livelihood strategies

Off-farm employment plays an important role in supplementing income from farming activities. It contributes 72% of the total household income per year. There is a range of forms of employment, from salaried employment to self-employment and casual work. At least 53.7% of people are self-employed. That is, they engage in small enterprises and farming for a living. Only 39% of people have formal employment. This is shown in Figure 4

Some households receive remittances from family members and friends who have migrated to work in towns or cities. Overall, though they are important to the households concerned, such remittances make only a marginal contribution to the economy of the village.

Homegrown maize, beans and vegetables are the staple foods of the community. Income from selling surpluses of these crops permits people to buy other requirements, such as salt and fat, at the market. Cattle, goats, sheep, pigs and chickens are kept, usually on a very small scale. Typically, a household might have two larger animals. Livestock are kept for milk and meat, which is mainly consumed by household members rather than sold. Animals do, however, represent a means for savings. They are sold during lean times when staple foods must be purchased.

In times of drought and famine, most of the community depend on relief food channelled by government. Relief supplies frequently arrive late or not at all, however. Furthermore, there is seldom sufficient for the whole community. A resident reported that:

"One kilogram of maize will not feed the whole family… The government has introduced a lottery food distribution scheme so that if your identity card is picked, you are lucky"

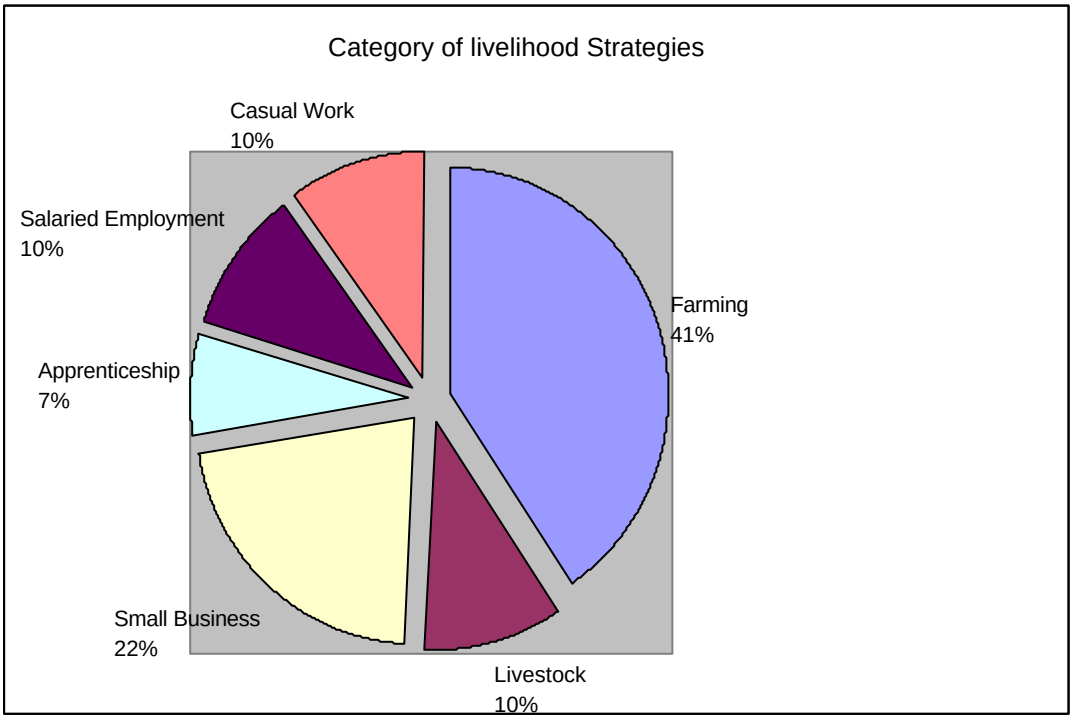

Figure 4: Categories of Livelihood Strategies

Energy Strategies

- Many forms of energy are not readily available to the community of Mbuiru. Over 90 % of residents purchase their energy needs. On average, households spend 12.8% of their total monthly income on energy. Wood and kerosene are the main sources involved.

- Fuelwood, which is used by all households, is purchased on the market, cut from trees on people's own farms or gathered (legally and illegally) from nearby areas.

- Some people resort to burning charcoal. There are legislative implications attached, however, as permits must be obtained to fell a tree for any reason, and there is also a complete ban on charcoal burning.

Coping Strategies

The community has formulated some ways of ameliorating the shocks that impact on their livelihood outcomes. These coping strategies include:

- Those near rivers irrigate vegetable plots, the produce of which they sell.

- As discussed, people sell assets – especially livestock – in times of dire need. Unfortunately, it is often hard to find buyers, as the whole community tends to be in the same situation at the same time.

- Similarly, attempting to sell one's labour to cope with periods of hardship is likely to coincide with potential employers also facing financial hardship.

- Those who are unable to make a living by other means either beg or rely on charity from other members of the community.

- Others resort to socially demeaning activities during times of shock. Such activities include illegal charcoal burning, theft, selling the local brew and prostitution. It is illegal to fell trees without a permit, even if they grow on one's own land. Alcohol brewing and consumption is illegal and officials often arrest and prosecute offenders.

> *'Government is not really helping… Charcoal burning is banned, and the advice not to sell everything is often impracticable. If a child falls ill, or in order to keep a child in education, we are often forced to sell our belongings.'*

- Some people migrate to cities in search of work, sending as much as possible of what they earn back to support their families.

- Ferrying water to better-off families and market kiosks provides some people with income.

4.5 Summary of Constraints to Achieving Community Livelihood Priorities

Livelihood Priorities

Consultations revealed that one shared aspiration of the community is to have access to **electrical power** that will contribute to their socio-economic well-being and at the same time conserve the environment. Specifically, they would like **piped water** and **good lighting**, both of which were said to bring particular benefit to women. At the time this study was made, the community had carried out its own water supply survey, indicating their commitment. Better transport facilities were also seen as a priority for improving livelihoods.

What people say they want and how they expect to get it

- Higher income: through opportunities to engage in enterprises.
- Increased well being: via better access to water for domestic and farming uses.
- Enhanced food security: via increased production and more affordable milling services.
- More sustainable natural resources: via using electric power instead of fuelwood for productive activities such as drying and curing crops and blacksmithing. Community use of kerosene can be reduced through the provision of forms of electric light.
- Increased social participation: already the community has set up a committee consisting of men *and* women to examine potential commercial developments. Furthermore, a community initiative led to maintenance work on roads being carried out. People see the advantage in organising and working together and wish to develop this capacity.

Constraints to Energy Supply

Overall, people feel that their access to energy is inadequate. They are frequently short of fuel of one type or another. The cost of transporting any form of energy into the community is felt as a definite constraint.

Finding firewood for domestic purposes is increasingly difficult. Nearby supplies are exhausted and people have to walk a long way to gather enough wood. Even then it is difficult to find anything apart from small, green wood, which is too wet to be ideal for cooking.

Tobacco curing, meanwhile, consumes a substantial amount of firewood during firing sessions and is required in large quantities during curing seasons. Other activities, such as oil processing, place an additional demand on scarce firewood resources.

People spend a lot of money and time procuring kerosene and dry-cell batteries, as well as charging wet-cell batteries. Apart from battery charging, any activity requiring

electricity – such as welding or using power tools - means travelling at least 12 kilometres for the service.

Constraints to Water Supply

Every day, women spend an average of 4.5 hours fetching water from the river, either in hand-held containers or wheelbarrows. There is not even a hand pump for water in Mbuiru. There have been some community initiatives to start a water scheme, drawing water from the river 4km upstream and supplying it by gravity to the residents. According to the local chief, in 1997 the community began to organise an irrigation scheme that would facilitate cultivation of cotton and tobacco. Due to financial and organisational problems the project did not proceed, however. As discussed, river water is generally unfit for drinking and is the cause of disease unless it is boiled. When the river is engorged with floodwater, the red soil suspended in the water makes it unsuitable even for washing clothes.

Land Constraints

Land adjudication is not yet complete in the area and so some people do not have title deeds. This means they do not feel secure in investing to develop the land to its potential. Some people in the community, moreover, remain landless. In addition, there can be conflict between land for development schemes and farming. Even the micro-hydro scheme, for example, will infringe on land otherwise used for farming. Issues such priority uses of land and water, rights of access and rights of way have to be considered.

Constraints to Income

Low and fluctuating prices for farm produce constrain people from attaining the livelihood outcomes they desire. Farmers have no facilities to store fresh produce. Thus, when there is a glut at harvest times, they have no choice but to sell quickly before produce spoils. Middlemen, who come to the village and buy produce, often at low prices, are felt to be exploiting the community. One problem is that farmers do not have access to transport to take produce to alternative markets. This problem is compounded because the community lack information on market prices and the availability of commodities. Overall, the community feels the odds are against them. Ultimately, they have no choice but to accept the harsh trading conditions offered by middlemen.

It is difficult for farmers to consider becoming traders in their own right. The county council charges an annual Ksh 1,600 for a trading license, putting it beyond the financial reach of the majority of Mbuiru farmers. Council officials will act against anyone who tries to trade without a proper license, confiscating their goods. Confiscation means people ‘lose out twice over’ – no money from sales and no produce left to sell. This deters most people and closes an avenue for trade.

Household expenditure often exceeds income, obviously limiting the ability to save and invest. Even when households do manage to save, there are few opportunities for investment that would lead to income generation. There is severely limited access to credit to support micro-enterprise initiatives. Typically, people cannot borrow money from banks or micro-finance institutions as most have no collateral. This is one reason why people are concerned that the process of adjudication and issuing land title deeds is proceeding so slowly.

Miscellaneous Constraints

Some sectors of the community are excluded from the governance process. This applies specifically to women, the poorest, the illiterate and the youth. In focus group discussions, it was widely conceded that older men dominate the decision-making processes. This is especially true with respect to the Chief's administration meetings. Marginalized groups are considered – by older men – not to possess the necessary information or knowledge for participation and thus are denied a voice.

Other constraints, which have already been raised, include the poor state of health care provision, which adversely affects physical well being. Then, there are inadequate and badly maintained roads and generally poor physical infrastructure. Underpinning these constraints is the absence of consultation between government institutions and the community. There do not appear to be forums in which the community could participate and systems such as 'complaints procedures' do not result in any action. Thus, the community have lost respect for and confidence in government institutions and their capabilities.

5 ANALYSIS OF CASE STUDY RESULTS: LOOKING AHEAD

5.1 Achieving Livelihood Priorities

The section examines the potential of the energy intervention for removing constraints on the achievement of people's livelihood priorities. The community will not be in a position to use electricity from the scheme for lighting their homes via a direct distribution system due to legislative restrictions on the sale of power. As stated earlier, Kenya Power and Lighting Company is the only body authorised to transmit and distribute power. Any other party that generates power can see it to Kenya Power and Lighting Company, unless the generated power is for the exclusive use of the generating body. They will, however, be able to use electricity for charging batteries to provide light and powering, for example, TVs and radios. Electricity from the hydropower scheme will be transmitted to the commercial and social centre. The intention is that the community will run several micro-enterprises. Provided markets are thoroughly researched and business plans made, these enterprises could help provide people with new capabilities, including technological capabilities, and generate income, reducing community vulnerability. The availability of power is expected to trigger demand for training, especially in technical areas such as welding and machine operation, as well as business management and bookkeeping. Recalling the projected 14 kW limit to power as a guide to possible combinations of activities, enterprises earmarked as possibilities include:

- *Hand weaving, tailoring and basket making.* The provision of electric light would increase the hours that could be spent on theses activities or the flexibility of operating times. The estimated power demand is only around 200 Watts.

- *Oil processing*. Pressing sunflower seeds to produce oil and 'cake' (for livestock feed) is potentially a very lucrative business. Estimated power demand from 3 to 10kW, depending on scale of production.

- *Flour grinding/ milling*. A mill powered by micro-hydro generated electricity is expected to provide a better, cheaper service than the current diesel-powered mill. Power demand of possible mills ranges from 3 to 10kW

- *Battery charging*. There is a growing market for charging batteries as more and more people come to own TVs, hi-fi, radios and cassette players. Customers for this service may come from as far afield as Marimanti, 20 km away. Power demand is 1kW or less.

- *Refrigeration for Health Centres***.** A potential commercial option for the community scheme. There are two health centres within 2 km of the proposed site from where power will be transmitted. The power requirement of each clinic ranges from 3 to 12kW

- *Tobacco curing.* This is an option for using excess energy generated when the load factor is low, especially at night. It is technically more efficient to locate the curing facility near the powerhouse. Power available will depend on the plant load factor.

- *Irrigation***.** This is a service that can only be carried out if there is sufficient surplus water. Irrigation schemes require licensing by the Government (for river water

extraction). Water could be pumped to irrigate adjacent farms and kitchen gardens and thus increase food production for consumption or sale. The estimated power required is 1kW or less.

- *Micro-enterprises*. Welding, woodwork shops, barbers shops and telephone booths have all been suggested as possibilities. Power required is up to 5kW.

- *Water pumping for drinking water supply*. Planning ahead, Mbuiru community are installing pipes in anticipation of the micro-hydro scheme. Water pumping requires less than 5kW

Apart from the enterprises themselves, secondary – or spin-off - employment is likely in the processing, packaging and distribution of goods, as well as in supply and support services. For new enterprises to be successful, Mbuiru community will be obliged to interact with government institutions, organisations and the private sector in order to meet legislative demands, produce goods of the appropriate quality to suit markets, and for diverse other reasons. Such interaction, provided it is supported in the initial stages, is expected to develop and empower community institutions and organisations themselves.

5.2 Impact of Project Intervention on Livelihoods To Date

Although the micro-hydro scheme has yet to be commissioned the process of community mobilisation and interaction with various institutions and organisations has already had effects on people's livelihoods. Confidence has increased and people are prepared to be more involved in making decisions about issues affecting their lives. Furthermore, they have been proactive in instigating activities related to the scheme for the benefit of the community. The activities and outcomes to date are listed below:

- Women have taken an active role in formal processes of decision-making for the first time, and are working alongside men. This development may have the wider effect of improving the gender balance in the community.

- The community has organised itself to form a commercial development group, the Tungu Kabiri Micro Hydropower Project Management Committee, including women members.

Tungu Kabiri Micro Hydropower Project Management Committee

The Committee has provided a forum for dealing with the institutions that affect people's livelihoods, such as the Ministry of Water, the District Commissioner, and the Minister in charge of Energy. The Committee acts as a channel for development assistance to the community, interacting with ITDG and the Ministry of Energy on technical assistance, and administering funds from UNDP via the creation of a project account. The Committee have also liased with government departments concerning the provision of land for the project.

The Committee has proposed that the micro-hydro scheme will be operated on a commercial basis through shareholding in a company. They have promoted community support for the project and begun to mobilise people to become actively involved. An acre of land has been acquired for a site to build the social centre, from where enterprises will operate.

- The community have identified and mobilised local artisans to contribute to the project.

- Labour has been mobilised for, among other things, construction, moving building materials, blocking the river during construction and off-loading lorries. (Every Tuesday is a community working day and people's contributions are recorded in project accounts.)

- Funds have been raised from within the community to pay for the necessary Government licenses for the project.

- The capacity of the community, represented by the Project Management Committee has developed, with the acquisition of planning and management skills.

- The community has acquired knowledge about the workings of the micro-hydropower sector. Meanwhile, the project has contributed to official recognition of the need to prioritise the training of turbine manufacturers and producers of associated equipment. A donor has sponsored an ITDG-EA training course for turbine manufacturers in Kenya.

- Successful policy, advocacy and influence activities have resulted from the project, with the community of Mbuiru heavily involved. The way in which decentralised energy schemes are regarded, the role of Government and energy stakeholders, has been extended and taken new directions. The process has promoted an enhanced understanding of the practical problems associated with energy policy in relation to renewable energy. For example, the Ministry is currently reviewing the Power Act with regard to distribution of power, as a direct result of the community hydro scheme.

- Project experience has paved the way for the community to negotiate new development terms with local Government institutions in the area.

5.3 How Energy Intervention might be Modified with an SL Approach

The opportunity exists to employ the Sustainable Livelihoods framework and approach to the project in advance of the completion of the micro-hydro scheme. The results of this case study and the process of participation with the community that has been initiated presents the chance to make the project more poverty focused, ensuring enhanced livelihood outcomes that are sustainable. But how might that be brought about? Some of the possibilities that have been discussed with the community include:

- Focusing micro-enterprises on community livelihood priorities. Investigating the process by which health centres could be provided with power on a basis that is commercially viable for the hydropower scheme is one example.

- The formation of enterprises will require finance and start-up capital. Discussions between community representatives, project facilitators and credit organisations have already taken place. These links should be consolidated.

- The process of social organisation and knowledge enhancement must continue to ensure that potential enterprises make best use of finance to generate income.

- Detailed market research will help avoid enterprise failure due to making unfounded assumptions about supply and demand.

- Training in organisation for production and business management will assist marginalized, less privileged groups to form enterprises. This is particularly apposite with respect to the 'youth', who otherwise see few livelihood opportunities in the community and tend to migrate to cities in search of work.

- Enterprises should be designed to maximise the increase of assets within the community, rather than seeing benefits accruing mainly to outside agencies.

- With the projected increase in income resulting from the productive use of hydropower, the community will need to consider the opportunities for savings, credit and investment. This may result in the formation of community administered institutions to deal with micro-finance.

- Investment opportunities should be assessed in terms of sustainable livelihoods: the extent to which they increase the assets of the community and its ability to cope with shocks, thereby reducing vulnerability.

- The hydropower scheme itself is a physical asset, which the community can consider as collateral when seeking to access funds for future development projects

- The SL framework can also be used as a monitoring and evaluation tool for the project

5.4 Impact of Intervention AND POTENTIAL of AN SL Approach

The table summarises the main findings of the case study using an SL framework. It looks at the situation before the intervention, looks at the impact to date, and looks at possible modifications that could be made by using the SL framework.

SL COMPONENT	SITUATION BEFORE INTERVENTION	IMPACT TO DATE	POSSIBLE MODIFICATIONS
VULNERABILITY			
Shocks	Drought, famine, diseases.	Plans for irrigation, water supply & electrification of health centres.	Advocacy on agricultural practice in Tungu River catchment area.
Trends and seasonality	Mismatch in timing between periods of income and demand on community assets.	Plan for water supply scheme to reduce incidence of diseases. Discussions on savings schemes and credit finance.	Processing and storage options for farm produce. Micro-finance schemes. Lobby for incremental payment of school fees & medical bills.
ASSETS			
Human capital	High basic literacy, most people have primary school education. Poor uptake of secondary & tertiary education, including vocational training.	Recognition of the need for vocational and business skills due to anticipated development of productive, commercial enterprises.	Lobby for affordable training and/or phased payment of fees. Develop participatory training opportunities in the village.
Financial capital	Subsistence economy. Limited off-farm employment opportunities. Low/variable prices for agricultural produce. Limited access to credit and credit institutions, due to no land deeds and thus no collateral against which to secure a loan.	Plans to diversify sources of income via small-scale enterprises.	Market research on behalf of proposed enterprises. Pro-poor market regulation for sales of farm produce. Promote micro-finance/saving. Lobby for efficient land title adjudication process.
Physical capital	Earth roads badly maintained. Poorly functioning health centres. Exploitative local market. Expensive vocational training centre & secondary schools. No electricity. Unsafe drinking water. Basic shelter for majority.	Micro-hydro scheme, including electrification and development of commercial centre, irrigation and drinking water schemes.	Prioritisation of infrastructure needs & development of appropriate infrastructures.
Social capital	Mainly family/household alliances. Church groups. Informal co-operation.	Project Management Committee. Increased involvement of women in decision-making. Community mobilisation. Improved political capital/institutional capacity.	Support groups and forums. Monitor effectiveness.
Natural resources	Eroded agricultural land. Water from Tungu River. Deforestation & fuelwood scarcity.	Plans to better exploit water.	Sustainable agriculture, nursery & reforestation schemes

PIPS			
Policies	Unsatisfactory government structures, including market. Inadequate health centres. Exploitative private enterprises.	Productive relationships developed with relevant local and national structures governing land, water and energy policy. Market officials aware of & supportive to project.	Promote pro-poor attitudes & reform within structures. Empowerment of local action, management and lobby groups.
Processes	Cumbersome and inappropriate Land, Water and Power Acts. Government institutions – the way things are done – are bureaucratic obstacles to holistic, dynamic development.	Limited success with processes & institutions: permission for hydro-scheme, but no dispensation for selling electricity to households or an abstraction licence for irrigation.	Advocacy for pro-poor policies on decentralised renewable energy schemes, power distribution standards, water abstraction & land use.
LIVELIHOOD STRATEGIES	Subsistence farming plus some sales. Off –farm employment. Migration. Shock- response strategies (criminal activities and begging). Fuelwood & kerosene dependence.	Plan for development of enterprises using hydropower, increased agricultural production via irrigation & enhanced well being via provision of safe water.	Increase opportunities for diversified strategies. Diversify energy sources.
LIVELIHOOD OUTCOME	Subsistence plus some income in good years. Too much time and money spent securing sufficient supplies of energy.	Aspirations of increased incomes, well being, food security and social capital, plus conservation of natural resources & reduced vulnerability.	Prioritisation of livelihood outcomes. Pursuit of livelihood outcomes.

5.5 Looking at other Entry Points for Community Development

The on-set of the energy intervention has seen the entry of more players into community development activities. They include ITDG, UNDP and the Ministry of Energy. In the process of designing the energy intervention, with the principal aim of utilising alternative energy for commercial end uses, other potential entry points for development have been identified. For example, the Community Development Trust Fund, an EU initiative, will be considering a water scheme proposed by the community. The Catholic Church in the area is approaching some of its partners in America to co-finance the water scheme. The community proposal is a direct result of project work on the energy infrastructure intervention.

Evidence of the empowerment and improved status of the community, resulting from their social mobilisation in the cause of the energy intervention, is strong. The local administration was on the verge of transferring its Divisional Headquarters from the Mbuiru to another village. This plan has been shelved in the light of the evident progress the community has made and a radically altered perception of the potential of the community. Meanwhile, K-Repp one of Kenya's biggest micro-enterprise institutions has approached the project partners to assess whether they could be of assistance in financing enterprises in the village.

5.6 Issues Arising For Design of the Micro-Hydro Project

There are potentially competing uses for water in Mbuiru community; the hydropower scheme, irrigation for agriculture and kitchen gardens, and drinking water supply. In some senses, the community is defined by the resources it shares: Mbuiru could not exist without, for example, the river Tungu. Waterfalls provide the opportunity to

redefine the community via the introduction of electrical power. Hydrological surveys of the region indicate that, in most years, there will be enough water all year round to satisfy all demands. In times of drought, however, which are not infrequent, water use becomes a resource allocation issue that the community will have to plan for. At present, drought leads to an erosion of community participation in development schemes. At such times of shock, people are preoccupied with obtaining enough food for their households: they have no surplus assets to contribute to other activities. The design of the micro-hydro project will have to consider how commercial enterprises will be affected in times of drought, when there will be insufficient water to provide them with power or competition from farming for limited water resources.

In the longer term, there are fears that unsustainable agricultural practices and massive deforestation in the Mount Kenya region might affect the hydrology of Tungu River, severely reducing the flow of water. Obviously, This would have dire consequences for the hydropower scheme and community development plans. The need for the community, its partners and supporters, to engage in lobbying and advocacy activities in order to influence government and others on development policies affecting the whole catchment area of Tungu River is apparent at this early stage of the project.

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6 ANNEX 1: POVERTY AND WEALTH DETERMINANTS

Tungu Kabiri Community - Mbuiri Village

8 June 2001

In order to conduct a wealth ranking exercise, community members were first asked to list their own determinants of poverty and wealth.

Rich:
- own a car
- own at least two graded cows
- own at least one stone house
- are employed by the government
- own a big farm (10 acres and above)
- own a shop
- can afford to send children to high school
- own a bicycle
- own a TV
- use car batteries to power the TV, radio, etc
- can afford medical treatment in hospital

Poor:
- do not own any land or only very small plots (up to ¼ acre)
- rent land
- do not own cows
- are employed on other people's land
- own 1 goat or 1 chicken (sold in times of hardship)
- cannot afford school fees (some have sold land to pay for school fees)
- may learn a trade (such as tailoring) but cannot afford tools (e.g. sewing machine)
- do not own a bicycle
- do not own agricultural tools such as panga or jembe (machete or hoe)
- live in mud huts, roofed with iron sheets or grass
- may own a radio
- use home-made kerosene lamps and dry cell batteries
- cannot afford medical treatment

60% of all households in Tungu Kabiri community own less than ½ acre of land. In addition, they may own poor quality agricultural tools, 1 cow or 1 goat, and 3 or 4 chickens. However, 30% of the 60% do not own any of the above.

Health care is an important issue in the community. A deposit of Ksh 2,000 per person is required just for hospital admission (both private and general). In addition, the patient must pay for all drugs. Residents could not afford adequate medical care and are even forced to take low doses of drugs prescribed.

7 ANNEX 2: "WHAT IF" EXERCISE

Tungu Kabiri Community - Mbuiri Village

8 June 2001

In order to plan for Phase II of the project, the community was asked to imagine life in Mbuiri Village in two years' time. In particular, they were asked to focus on how they would like to see hydropower used. Thence, people were asked to consider the livelihood outcomes they would like to see as a result of the project. Participants were aware that the results of this exercise would be used to help design the social and commercial centre.

Desired energy uses:

- Water pumping
- Welding
- Milling
- Tobacco curing
- Carpentry
- Blacksmithing
- Sewing
- Barber shop/hairdressing saloon
- Irrigation of kitchen gardens
- Battery charging
- Improved lighting, especially for schools
- Basket making
- Electric cooker
- Communal laundry facility
- TV/video viewing room

Desired outcomes of the project

- Increased income from existing livelihood activities such as carpentry and welding
- New sources of income from activities previously rendered difficult or impossible due to lack of electricity (basket making, barbering/hairdressing, etc.)
- Improved well-being, principally through better access to water
- Increased food variety
- Improved food security, especially via better milling facilities
- More sustainable use of the natural resource base, particularly firewood and water
- Better social relations
- Enhanced community status

8 ANNEX 3: INTERVIEWS WITH MARKET OFFICIALS AND TRADERS

Tungu Kabiri Community – Kaanwa Market

The following questionnaire was used to conduct semi-structured interviews with market officials at Kaanwa market. The purpose was to gain an understanding of the nature of the market and its relationship to Mbuiru. In addition, the questionnaire explores awareness of the hydropower scheme and the market's demand for water. The results of the survey, incorporating observations from informal interviews with traders and customers at the market, are synthesised and presented after the questionnaire.

Date:	**Interviewer:**	**Questionnaire No.**
Name of Respondent:		
Position:		

What are the rates charged to traders?
Does everybody pay the same?
Where does the market get water from, if any?
What kinds of products are sold on the market?
What services do you provide to the market?
When is business brisk/slow?
Are you aware of the hydropower scheme?

RESULTS

What kinds of products are sold at the market?

According to this survey, goods, products and services can be classified as:

- *Agricultural produce*: maize, beans, cabbages, tobacco, arrowroots, potatoes, sorghum, cow peas, green grains, millet.
- *Livestock*: goats, cattle, sheep, chickens.
- *Commercially manufactured/processed products* - mostly household goods.
- *Others:* ropes, bows and arrows, grinding stones, scrubbing stones, kerosene, building stones and sand.
- *Services* available include bicycle repair and small-scale building contractors.

Most products come from outside the area. This is especially so with the livestock, manufactured household goods and some foodstuffs, particularly processed foods. Livestock such as goats and cattle come mainly from Marimati and Tharaka.

There are two markets for tobacco. The local market deals in small quantities of tobacco for sniffing, chewing and smoking. On the other hand, the private tobacco companies, BAT and Mastermind, buy in large quantities. Depending on grade (quality), 1kg of tobacco normally sells for between Ksh 30 and 40. The highest grade can fetch up to Ksh 90 per kg.

What are the rates charged to traders? Does everybody pay the same?

Rates vary according to the products sold, size and type of stall. A stall to sell cereals in the open-air market, for example, ranges from Ksh 10 to 20. Where people are selling very small quantities, council officials use their discretion, charging less than Ksh 10 or even permitting free access to the market. Products such as tobacco and maize are subject to a 'double tax'. Tobacco sellers pay fees on entering the market and buyers transporting it for resale elsewhere are charged on leaving the market. Retailers who operate kiosks or shops are charged a licence fee of Ksh 1,600, wholesale traders are charged Ksh 2,000.

Traders and buyers come to the market by various means, by motor vehicle, bicycle and on foot. How much it costs people to get to the market obviously depends on how far away they come from. Transport from Chuka, for example, on the back of a lorry or van costs Ksh 40 each way. Commercial Vehicles entering the market are charged. Distributor's lorries are pay as much as Ksh 520 per visit. Passenger service vehicles, commonly known as Matatus, are not charged at the market because they pay an operating fee to Chuka council. Market officials don't charge ITDG and visitors accredited to the Mbuiru scheme because of the benefits thought likely to accrue from it.

Where does the market get water from, if any?

Tungu River is the main source of water. When it rains, water is also collected from the roofs of business premises. The council doesn't provide any water. Hotels and other businesses have to pay someone to fetch water from the river. One of the women who fetch water was interviewed. She collects 12 gallons of water per day at the rate of Ksh 10 per gallon. Such arduous work does not, however, obviate her domestic responsibilities. She still has to cook, clean and do the other household chores, invariably the responsibility of women.

What services does the Council provide to the market?

According to one council official, Caroline, the good old days when the Council could provide help to the poor, including education for their children, are long gone. The Council, doubtless hard-pressed within its own budgetary constraints, does, however, continue to license businesses and their premises as well as providing toilets for the market. Asked about road maintenance, market officials agreed that the local Member of Parliament and the Roads Engineer 'could have an influence'.

When is business brisk/slow?

The amount of produce in the market, along with the number of traders and customers, is seasonal. The market thrives during harvest seasons and is very quiet during times of drought. Officials revealed that, overall, the number people doing business in the market is rising. This is evident from the number of new kiosks and shops. Mondays and Thursdays are the open-air market days, with Mondays being particularly busy. Most traders are not from the area. Many come from as far away as Nairobi to buy in bulk for resale in the capital.

Are the Council aware of the hydropower scheme?

Council officials are aware of the hydropower scheme. According to Caroline and her colleague Njagi, the belief is that the scheme will supply the market with water, create businesses and jobs. This is expected to increase Council revenues from the market.