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Rural Development and Environmental Degradation:
A Case Study of Swedish Free Mission (SFM) Household Food Security
Activities in Terekeka, Southern Sudan.

By
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Abstract

The aim of the research was to investigate Swedish Free Mission, a non-governmental organization that in response to famine and displacement of the people affected by war in the area, it initiated a multi-sectoral approach for development. The major component of the project deals with self-sufficiency in food production. This requires the participation of the local people and their inherent local knowledge for a sound environmental use of their resources. The initiative arose interest in farming activities that auger well with the objective to close the food gap. But this was not without negative effects on the environment as large tracts of land have become cleared of forest. Without initial environmental impact assessment, measures required to safe-guard against such effects were not enshrined. With the sense of ownership introduced by the agency through the village development committees, the citizen participation in the areas of co-operatives and health centres was good as shown by their financial contributions and labour. But there remain more to be done in order to empower the VDCs structures educationally for proper financial and administrative organization. The farmers depend much on their traditional ways of farming, like use of local seeds thus the Groundnut seeds suffer from disease infestation. As such, certified seeds are recommended beside the introduced off-season Sorghum. Environmental degradation like land degradation was indicated by
disappearance of forest, decline and failure of crop yield and loss of soil fertility through erosion and nutrient depletion.

Proper crop rotation and diversification of crop types should be encouraged. With animal wealth being common, establishment of live hedge in homesteads and crop fields to serve the purpose of shelterbelts is advised. To sustain the vegetation of the area, the government and the NGOs in the area should design policies for establishing community forests, SFM have the potentials for the lead way. SFM objectives on providing clean water and on education should equally be implemented.
الخلاصة

الكشفيات ممكنة وعملها مهم في التأكد من أن الأشخاص الذين يعانون من الأمراض المزمنة، يمكن أن يتلقوا المساعدة من خلال حكومة غير م geliت، وهي السوية على التنمية في القطاعات المتعددة. مشروع إنشاء خليصية في المنطقة في المجتمع، ومثلت مواقعة جزء كشف لهدف للمشروع الأساسي لكونه في حالة من التدريب والتشجيع على الاستخدام في مجالات أخرى مثل الزراعة في التقليدية الموسومة، والخدمات المحسنة. рабطة III. لدعم تفعيل العمل كثيف هناك، الرحلات المادية المشاركة في الصحة والمتلازمة قادرة على إحظاء بخلق، وتسجيل قدرتها على تشكيل التربة، وفقدان، ومع الفحص والانبعاث مناسبة زراعة دور، تشجيع إدخال KA مع حماية وقاية كأحزمة المنازل حول الأشجار، و-ons أن يكون أيضا في KA.
Dedication

To the memory of my loving mother, Late Deaconess Debora Modong, who died the very day I started this course and to my beloved wife, Late Leila Juwa Kalisto, who was with me in Malakal, my work place where death left me alone.
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Mr. Michael Luguri, the coordinator of Swedish Free Mission-Juba Office who provided transport and accommodation in Terekeka beside valuable information required. Joseph Abuk Lodiyo, ACCOMPLISH provided valuable information. The team in Terekeka was amicable, thus I was not lonely and Mr. Edward Leju, the Extension Officer, whose love for his work and the people made the long motorbike journeys tireless.

Being in Juba gave me a fresh experience of home; I remain longing for the love and care accorded to me.

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The help of Mr. Michael Abe Kenyi with the scanning and printing is noted and that of Mr. Andrew Taban and Physician Patrick Sokiri with typing of this work.

To my brother, sister and my daughters who, although far away in a refugee life, remains an encouragement for the endeavour.

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<td>ACORD</td>
<td>African Committee for Research and Development</td>
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<tr>
<td>CBO</td>
<td>Community Based organization.</td>
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<td>CPP</td>
<td>Contagious Pleuro-Pneumonia</td>
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<td>CSO</td>
<td>Civil Society Organization</td>
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<td>Female Headed Household.</td>
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Chapter One

Introduction

Majority of people in what we now call the developing countries experience relatively slowly changing lives, producing food in the same way as their ancestors. Their methods of production were usually well adapted to the local environment, involving minimum risk and ensuring enough food for the family in all but exceptional years. This had changed by time due to population pressure that tilted the traditional systems of land use and conservation of the fertility of the land to break down. Thus, a great strain is put on soil and pasture resources which are being rapidly used. Resources occur scattered in different parts of our country. These resources are shaped by the inhabitants wherever they occur. Indigenous inhabitants' compatibility with their resources being land, animal wealth, forestry, and above all, agricultural products by time become affected by many factors.

1.1 Research Problems:

There were instances where developmental agencies approached rural development through their experiences in rural areas. Over population and initial urbanization processes in many such rural areas do not much favor development but are a cause of environmental degradation in some places.

In the past, projects were drawn without consulting the beneficiaries who were expected to understand and carry them out. Based on many project failures, the earlier notion has given way to the realization that projects should be based on peoples' analysis of the problems they face and their situation if they are to succeed (Norman, 1977).

Swedish Free Mission (SFM), a Non Governmental Organization (NGO) is engaged in household food security activities in Terekeka area. Its activities are channeled through the village committees in the twenty-five villages, which run the household food security activities. As the household food security activities involved shifting cultivation, the tree cover had been removed thus losing the binding effect of the trees to soil; such tracts of land are exposed to water erosion leading to siltation of streams and especially basins in the area. The vegetation cover of the area is at a tremendous pressure from construction activities, fuel wood and charcoal production.

The aim of this study was to know the SFM food security activities in the area and their environmental impacts as well the community altitude and participation in introduced innovations and the agency environmental impacts and concern towards environmental protection in the area.

1.2 Objectives:

- To assess the role of the project towards environmental protection.
• To identify environmental degradation problems.
• To assess the impact of the project in poverty alleviation in the area.
• To suggest a better solution for poverty and land degradation.

1.3 Hypothesis:
• Rural development is effective through the mobilization of the grassroots in the community.
• The village committees are a good link for the success of the project.
• There is an influence of environmental degradation due to plant cover removal in the area.

1.4 Methodology:
The approach to the study involved a field study of the villages where the Swedish Free Mission (SFM) household food security activities are taking place.

1.4.1 Observation:
Presence of the researcher in the field is important to correlate observations on the field. The participation and cooperation between the recipient and the providers of the project and the farmers' enthusiasm towards the project can be observed.

1.4.2 Participatory Rural Appraisal (PRA) Method:
Transect walks were taken whereby activities taking place on a piece of land are noted.

1.4.3 Documents:
Records on the Swedish Free Mission (SFM) work plan and reports were consulted for secondary data collection.

1.4.4 Interviews:
This is covered by the household questionnaire besides interviewing persons executing the project, persons in the community and others in the local administrative area.

1.5 Sampling Procedure:
Many villages were selected for the study based on the activities of the project in the area. The sample size contains one hundred and twenty households, which were selected randomly. The sample size represents 2% of the total beneficiaries and the respondents were chosen based on the same proportion of the population size of the beneficiaries in each village. Names of the villages sampled are in the (4), while those villages where Swedish Free Mission activities were at hold, were not sampled and are marked in asterisk.

1.6 Field work:
The work which was intended for November to December 2003, practically started off from mid-December 2003 up until January 2004.

1.7 Problems Encountered.
The site of the research is a long way south of the country. Going requires a ticket, which is not a privilege for a coursework student as is the case here, and thus the process became taxing financially. Leaving Juba for Terekeka requires a permit, despite the looming cloud for peace, although the permit is forthcoming, sending an official for one is not a jolly thing due to war trauma. It was not easy for respondents to come by after mid-day in their homesteads as they go to particular shade trees for their evening chat. Some will not like to respond without the prior consent of their chief, while others wanted to participate with the hope that there is immediate benefit at the end of the process. Although holidays are good, the public holidays in between that period made me nervous and lonely.

1.8 Structure of the Thesis:
The set up consists of six chapters, beginning with chapter one that includes the research topic and the information about the methodology used. Problems encountered during the fieldwork and the structure of the thesis. While chapter two, encompasses the literature review of the problem. Chapter three, deals with the background of the study area. It's location, climate, vegetation, demographic characteristics, and economic activities. Chapter four is all about the Swedish Free Mission (SFM) food security project, objectives, activities, the environmental impacts and chapter five deals with data analysis. Chapter six is about the summary, conclusions and the bibliography.

Chapter Two

Literature Review

2. Introduction:
Human condition in the rural areas of the less developed countries leaves much to be desired. There are two basic factors behind the rural problems in the less developed countries. The first relates to the capacity of the rural environment to bear increased pressures of an intensified agriculture while the second concerns with the human capacity to increase agricultural output within environmental limitations (Hewes, 1974). Many African and Asian farmers are constant victims of drought. Where the total amount of rainfall varies greatly from one year to another and the late arrival of the rains means that the preparation of the soil has to be carried out very rapidly, at the time of the year when the food supplies from the last harvest are at low ebb and many of the
farmers are undernourished. Plant nutrients move in a closed nutrient cycle, from the soil to trees and as the trees die, back to the soil. Once the forest has been cleared permanently and the soil is exposed to high temperature and heavy rainfall, not only are many of the bases leach away but also the risk of soil erosion is greater. This in the past was overcome by bush fallowing where small patches of land are cleared for crops but after two or three years, the land is left and natural vegetation allowed to regenerate. But as population has grown, the fallow periods have become shorter and shorter and it has been difficult to maintain soil fertility (Crigg, 1974).

If people are to be encouraged to remain in rural areas, then they must have farms of their own. With the increase in population, these are bound to be small farms. As Johnson (1972) points out, there is nothing intrinsically bad about this. The history of the Green Revolution to date bears out that some of the highest yields per acre have been achieved on the smallest farms. Mixed cropping has been and remains a widespread technique in small farming in tropical Africa and elsewhere. Yet for many years it was regarded as backward. Soils and land types are usually distinguished by colour and texture. Some farmers in Nigeria use colour to identify degree of soil fertility (Netting, 1968). Soil is used by Somalis in Northern Kenya to distinguish soil-vegetation association (Chambers, 1969), the strongest distinction there, as in other parts of Africa, being between red or dark brown and black soils. Stephen Kraft at Cornell University was reported to have found farmers in Upstate New York to have eighteen operational categories for land types including such aspects as drainage, rockiness, slope and duration of frost, and to find these more useful than the USDA soil classification (Chambers, 1983). Climate is another sphere in which local knowledge can be strong and local weather lore soundly based. W. Reed (1970) found that farmers generally sowed according to the phases in rainfall. The Metrological Office in Nairobi was skeptical, but Reed analyzed five and a half years of rainfall data which supported the belief. The Metrological Office was not at first convinced, but subsequent analysis of the rainfall at two hundred sites near Nairobi, confirmed an association between rainfall and lunar phases. The scientific explanation is that lunar phases influence the amount of dust entering the earth's atmosphere, which seeds rainfall. In Reed's words, "the experts claims that such effects could not affect the rainfall in the tropics, but the local farmers knew better" (Chambers, 1983).

However, donor government's and their organizations' relationship to indigenous people and their traditional knowledge have been and are contradictory. They have always rejected traditional knowledge because it is said to be primitive knowledge from a primitive culture. But some scientists are beginning to realize that this knowledge can be rational because they know that these communities have helped preserve the earth, not only the natural resources but humanity as a whole.
2.1 Concept and Definition:
In following the underlying endeavour, definition of some of the terminologies to be encountered in this study is worth considering.

2.2 Development:
From the 1980s onward, development was pursued by following and promoting a strategy of export oriented economic growth based on trade liberalization and currency devaluation, as is reflected in the World Bank and IMF's structural adjustments programs. This approach failed to recognize local circumstances, the potential for internally generated growth and combinations of traditional institutions and knowledge. It was not inherently geared towards sustainability, as it relied on external circumstances over which developing countries have no control and neglected agro-ecological systems that were adapted to the local environments. True development is the development of people. It is concerned with all their needs, material, social and spiritual aspects. This can only be affected by the people provided that they articulate their needs, how these needs can be met and if they have the freedom to make their own decisions and carry them into effect (Nyerere, 1973). Development means liberation from dependence and deprivation to self-reliance, cultural identity and socio-economic development (Marta and Rudi, 1987). The process of development is continuous as the people liberate themselves. This process however is very much connected with peace and justice. Development can be a reality if:

- Firstly, local institutions and organizations are strengthened.
- Secondly, life sustaining necessities should be produced locally and are fairly distributed among the members of the community.
- Thirdly, meaningful work opportunities are created for the broadest possible range of people in the community.
- Fourthly, tools and techniques are owned and managed by those who use them.
- Fifthly, the natural environment is maintained and resources are carefully conserved, recycled and renewed.
- Sixthly, the productions of necessities allow time for creativity, play and celebration (Marta and Rudi, 1987).

The purpose of development is to create an environment, in which all people can expand their capabilities and opportunities to be enlarged for both present and future generation. Development is both physical reality and a state of mind in which society has…secured the means of obtaining a better life (Todaro, 1977).

2.3 Rural Development:
Rural development has been identified variously with economic growth, with increased agricultural production, with socialist forms of organizations, and with services for basic needs such as health, education, transport and water supply. There have been a shift in development thinking of the view that growth and modernization would be enough, with benefits trickling down to the poor: that the main gain from increased agricultural production often goes to urban population and rural rich, and that the better off and the more powerful benefit more from rural services than do the poor and weak. According to World Bank sector paper on rural development (1975), rural development is a strategy designed to improve the economic and social life of a specific group of people - the rural poor. It involves extending the benefits of development to the poorest among those who seek a livelihood in the rural areas. This group of people includes small scale farmers, tenants and the landless (1975, p.3). In putting the last first, rural development is a strategy to enable a specific group, poor rural women and men, to gain for themselves and their children more of what they want and need. It involves helping the poorest among those who seek a livelihood in the rural areas to demand and control more of the benefits of development. The group includes small scale farmers, tenants and the landless (Chambers, 1983).

2.4 Food Security:
The problem of hunger and malnutrition can not be solved simply by producing more food, rather food security is achieved when individuals concerned have secure and sustain access to the food they need for healthy active lives. But sometimes, the priority is to provide income earning opportunities which enable the poor people to acquire the food that already exist. Food security commonly refers to access by all at all times to enough food for an active, healthy life, including availability and the ability to acquire it. A country might experience severe food shortage even though world food supply is excessive, and a household or an individual might go hungry even though food is available within the country. To be secure, both the country and the individual must have the ability to acquire food by production, purchase or exchange. Food insecurity is probably more the result of social and political factors than of drought or floods which occur at long interval. In common with Africa, export cash crops like coffea spp, tea(Camellia sinensis), bananas(Musa paradisiaca) and others) are priority for government policy. The production of food for local consumption is largely left to subsistence producers, with inadequate resources and infrastructure(The Courier, No.197  2003  pp  21  41).

The Nobel Laureate, Amartya Sen in his seminal work on poverty and famines (1981) asserted that famine can, and often does occur where there is no overall shortage of food. He pointed out that when an individual household's "entitlement” (that is, its ability to acquire food through the legal means available in a society.) is eroded because of the fall in asset ownership (in the form of crops, livestock, and property, jobs, etc.) its members will, if not protected by some form of social security, face starvation no matter what the prevailing food situation might be.
Benin is a model sub-Saharan country in which food security is largely ensured by a stable political environment and the absence of war, and where agriculture is the driving force behind national economic development. So it is the responsibility of the governments to create democratic institutions that guarantee the participation of all national players and particularly women, in the design and implementation of national development policies so that the fight against hunger truly becomes a priority. Amartya Sen again points out that "one of the most remarkable facts about the awful history of hunger is that there has never been a serious famine in a country with a democratic government".

For a conducive agricultural growth and food security, policymakers must ensure that farmers have the technologies they need. The markets function well, that the poor people have access to health and nutrition services and that good governance eliminates violent conflicts. Food aid and food security projects are largely present throughout the entire cycle of crises.

Due to long term underdevelopment and impoverishment of the most vulnerable rural dwellers that are unable either to store sufficient grain to offset "lean years" or deprived of cash to purchase food on the market. It is the cruelest irony of famine that the producers of food and not those who only consume are the first to suffer starvation. Initiating and maintaining emergency food aid without introducing harmful effects on local incentives to produce is always very difficult.

In an EEC report (Pearson, lessons from famine, p.86) that the continued intervention by aid agencies and government one full season after the 1984 drought in Darfur effectively means that farmers in the project area have lost both their markets and their labour supply. This meant that in future seasons, these farmers will be less willing to produce a surplus and the grain required by deficit areas of Northern Darfur will have to be supplied continually by grain imported into the region. To achieve sustainable rehabilitation and development of a country or region, it is vital that local economies and production are supported and dependency is avoided.

Nowadays the European Union allows more and more regional and local purchases of food aid, including agricultural inputs. From aid point of view, the acceptance and feasibility of the product is increased as it complies better with local nutritional habits and customs; from development point of view, market distortion caused by competition with subsidized goods are avoided, and both local and regional production and trade are supported(The courier, No.197 2003 pp 49).

ACCOMPLISH, a community based organization in Terekeka with the principles of local initiatives through self-help for rural development have programmes on animal production and assistance in primary education in the area.

2.5 Household Food Security and Forestry:
For many poorer people, forest emergency foods may be essential component of their diets in hard times despite the commercialization and food relief programs. Traditionally, in Africa at least, trees have been important in emergency periods, especially in times of drought, famine and wars. They provide foods for consumption when crops fail, as well as products which can be gathered for cash income (Gum Arabic). Famine foods are characteristically more energy-rich; however they often require complicated and time consuming processing and having an unpalatable taste. Traditionally, people eat fruits between meals "on the job" herding, gathering or working in the fields. Most agricultural communities suffer from seasonal nutrition gaps known as "hunger periods". They generally occur at the beginning to middle of the rainy season (Longhurst 1986; Hassan et al. 1985; Hassan 1985; Ogubu 1973; Chambers and Longhurst 1986). Seasonal nutrition problems are not necessarily confined to the natural cycle of dry and wet seasons, institutional factors also cause food shortages. For example, mass education causes an exodus of farm labour and a need for lump sum cash for school fees. Truscott (1986), notes that farms rely on year-round sales of vegetables for their cash-food needs, whereas the cash from crop production is saved to pay the large lump sum expenditures of school fees and fertilizers purchases. In Bangladesh there are two lean seasons (corresponding to the pre-rice harvest period). Hassan et al. (1985), found that vegetables were available year round, while tree fruits were available principally during one of the lean periods in Bangladesh. In the traditional villages (as opposed to modern), the use of roots and tubers, increases greatly during one of the lean period. Fruits are consumed in great quantities during the May-June lean period.

In Senegal, Becker (1983) found that wild foods were most commonly used to meet seasonal shortages of vitamins which occur at the beginning of the wet season. Harvesting of fruits occurs in the same period as agricultural crops harvesting but two fruit species, Boscia spp (year round fruiting) and Sclerocarya spp (end of the dry season) fruit during the hunger period.

In Zimbabwe, most fruit are consumed during hunger period. Campbell (1986) found that peak collection and consumption of wild fruits did not correspond to the main fruiting season. People use the fruits as supplements when they are most needed rather than when they are most plentiful and easier to find. Some forest foods, especially leaf vegetables and wild animals are used on a year-round basis in rural communities. Tallantaire (1975), found that wild leaves are essential ingredients of the daily diet on a year-round basis. They add diversity and flavouring to the diet thus encouraging greater food consumption. In addition they provide vitamin and minerals to characteristically grain-dominated diets.

Irvive (1952), gave a thorough review of the emergency foods used in West Africa. Rhizomes, roots and tubers are the main source of energy in the time of famine. Wild forest fruits are useful in periods of crop failures. In
severe famine, roots and tubers are more appropriate food sources as they tend to be good source of energy. For example, *Adansonia digitata* fruits are commonly consumed during periodic food shortages while their roots are consumed in famine periods. About 150 species representing nearly one-fifth of the number of the wild species consumed in India, Malaysia and Thailand have been identified as source of emergency food crops (FAO, 1984).

Forest often provide the only medicine available to the vast majority of the world's population (75-90%) of the developing world. Some plants contain high concentrations of different chemicals, which are bases for modern drug equivalents. Also many plants chosen for their medical qualities are high in particular vitamins and minerals, which can counteract illness caused by vitamin shortages or meet a need for additional quantities of particular vitamin or mineral (FAO, 1991). The home gardens of South-East Asia provide the most vivid illustration of the importance of trees in providing family food. Within perhaps 50 meters of each dwelling can be found *Musa paradisiaca*, coconut (*Cocos nucifera*), *Mangifera indica*, *Psidium guajava*, avocardos (*Persea americana*) and breadfruit (*Artocarpus altilis*).

In Indonesia, no less than 37 species of fruit trees have been found growing in just one home garden. In Kalahari, the staple food of the Bushmen comes from the mongongo tree (*Ricinodendron digitata*) which provides both a fruit and a nut. The nut is roasted and if necessary stored. The sap of palms can be used as an oil that is important in providing energy and vitamin A, lack of which causes eye lesions in small children.

In the Sahel, working pressure during the planting season can be so intense that there is not enough time to cook, and many families rely for nourishment on *Mangifera indica* fruit that grow in their fields. In nearly every society trees are used, either in the fields, in the homestead or both, as a mean of increasing soil fertility, preventing soil erosion and altering micro-climate so that annual crops may grow better. In the fierce heat of some tropical countries, the shade that trees provide is essential to the survival of domestic animals. A full granary is not a guarantee against famine, without fuel to cook with, as the women of the Sahel know well, there may be nothing to eat. Thus the fuel wood women collect and transport has many functions. When it become short, much more, then the family meal is threatened, the basis of the village life is altered.

### 2.6 Some Traditional Farming Systems in the Sudan:

Just as ecosystem consists of all the natural relations in the environment, the farming system is to a certain extend determined by the ecosystem. Human decisions, based on social or economic considerations play their role in molding the farming systems. Farming systems are in balance with the ecosystem if they do not negatively affect essential environmental factors. A common farming system of the Sudan savanna zone is
characterized by the garden of gum Arabic trees (*Acacia senegal*). The trees in the garden can be tapped for their valuable gum for 6 to 10 years before they deteriorate. They are then removed leaving the big Balanites (*Balanite eagyptiaca*) and the land is cleared for growing a mixture of sorghum *spp* and bulrush millet (*Pennisetum typhoides*), groundnuts (*Arachis hypogoea*), sesame (*Sesamum indicum*), watermelon (*Citrallus vulgaris*) and cowpeas (*Vigna sinensis*). This cropping last for 4 – 10 years until the soil is exhausted or *striga spp* is no longer manageable. When left fallow in the first three years, acacia trees and grasses colonize the field, a stage at which the trees are a meter high and become fire resistant. At the age of eight years, the tapping begins and the whole cycle starts again. The trees play an important role in the cycle, restoring soil fertility and yielding the valuable gum as well as firewood (Noordwijk, 1984).

The Zaghawa living North of Jebel Marra in the Sahel-savannah zone has an interesting interaction between animal husbandry and an early stage of crop husbandry. The area is too dry for the successful growth of most crops, but several grasses with edible seeds grow naturally in the short rainy season. The valleys with good grasses were traditionally reserved for collection of grass seeds after which animals can graze and this ensures ripen seeds for next year. The collection of wild grass seeds is replaced by growing millet (*Pennisetum spp*) which fails in many years because of drought. The grazing land degenerate as a result and also the positive interaction with the collection of the grass seed is lost thus, no restriction on early grazing in the rainy season and many parts are grazed before the grass could produce the ripe seeds. As such the grass cover deteriorates and *Cenchrus biflorus*, which is not palatable to animals, becomes dominant in the vegetation which previously was low in density because its edible seeds were being collected. With this not being done, it replaces the grasses which provided valuable grazing. A course of development, which will do justices to this farming system might have been not to introduce the growing of millet but to improve the available edible grasses by careful selection because these are better adapted to the climate conditions and fit in the animal production system as well (Noordwijk, 1984).

The Azande are regarded as excellent practical ecologists because of their choice as to where to cultivate, what crops to grow and sowing their seeds following a system closely adapted to their environment when one enter an Azande homestead ….crops, food and household belongings may lie about the courtyard in what seems to be the most disorderly fashion …the thicket of plants surrounding the homestead seem as patchy and purposeless as any wild vegetation. It is impossible to distinguish a crop from a weed. It seems almost incredible that a human intelligence could be responsible for this tangle (Schlippe, 1956).

Azande agriculture should be looked at in the light of two concepts, the field type and pseudo-rotation. The field types consist of the following association of crops which are grown together from time to time.
- Oti-moru; the main finger millet (*Eleusine coracana*) association in which maize (*Zea mays*) and finger millet (*Eleusine coracana*) are sown side by side.
- Baawande; the groundnut (*Arachis hypogoea*) association, in which groundnut (*Arachis hypogoea*), maize (*Zea mays*) and cassava (*Manihot esculenta*) occupy the same field, perhaps followed in the same year by finger millet (*Eleusine coracana*), maize (*Zea mays*) or other crops.
- Bamuno, the finger millet through grass association, with perhaps sesame following.
- The ridge cultivation around the homestead with many vegetable crops.
- Various beans are sown through grass and finally the cassava fallow.

In view of the large number of crops cultivated, it is not surprising to learn that the Azande enjoy a diet balanced in most aspects.

When subsistence farmers enter into the money economy of the modern world, they feel strong pressures of competition. Just as a natural ecosystem, competition leads to specialization. Farmers will start to concentrate on the one crop with best financial prospects, neglecting the other component of their farming system. Often the diet of the rural families deteriorates when the variety of traditional crops disappears because all the time is spent on cash crops. More diverse, complex farming systems may not give the best short term economic returns but they may well be the best way of preserving the natural resources and fulfilling all basic needs (Noordwijk, 1984).

### 2.7 Participation:

In the past twenty years, the field of development has been dominated by the so-called new policy agenda. If the 1960s were the years of the "myth of the State" (the state could provide all the needs of all citizens) by the end of the 1970s, the "myth of the market" (the private sector could provide for all the consumption needs of the consumers) dominated development theory and practice. Finally, by the end of the 1980s, a new myth was found, "the myth of the market plus civil society". Markets and private initiative were thus seen as the most efficient mechanism for achieving economic growth and providing most services to most people (The Courier, No.199 2003 pp 24 25).

The growing recognition given to civil society organization (CSO) by international donors was meant as an essential counterweight to some of these market-oriented strategies; thus donors supports civil society because it was able to provide service to those who could not be reached through the market. Also, in changing context of development cooperation, new issues such as environment, gender, and social development were included. CSOs played two roles in development policy:
- Implementers, and thus they are involved in the delivery of goods and services, which may also entail contracted by a government.

- Catalysts, as they have the ability to inspire, facilitate or contribute towards development change.

Over the past few years, many CSOs have moved from a "supply-side" approach, which concentrated only on development projects, to also a "demand-side" approach, which seeks to help communities to attribute their preference and concerns in order to become more active participants in the development process. Comparative advantage of the CSOs social argument is, they work at the micro-level, and they are able to reach the most disadvantaged people who are often by-passed by the larger projects of multilateral donors. Culturally, they are particularly sensitive to the needs of the poor as they are embedded more in the local culture, with many people working permanently on the ground; furthermore, due to their relationship with local communities, they can foster participatory approaches to development (The Courier, No.199 2003 pp 24 25).

In the past, projects were drawn without consulting the beneficiaries who were expected to understand and carry them out. Based on many projects failures, the earlier notion has given way to the realization that projects should be based on people's analysis of the problems they faced and their situation if they are to succeed (Long, 1977). According to Keboitse Machangana, the traditional system is one of the reasons why civil society is weak in Botswana where Kgotta (public meeting place where people meet to discuss issues of public interest) was used to mobilize consensus, to test public acceptance of the issues already discussed between the chiefs and his advisors. Many Botswanese still look at government from that angle. If you live in a culture where you do not feel it appropriate to question the authority, the emergence of a vibrant civil society is not possible.

The widely accepted United Nations definition (1958) refers to a community as a unit of action which combines outside assistance with organized local, self-determination and efforts. People do not much contribute to projects that do not take into account the local socio-cultural conditions from their early stages. The participation of the people is a driving force through which they can take an active and influential part in shaping decisions on problems that affects their lives. In many community based-activities, knowing the community itself is important. At this point, the community will get the benefit of working together, gaining confidence and attracting more people into joining its activities. As trust and confidence develops in the development agency, the community will be prepared to listen to its suggestions for further action. The development agency plays an encouragement role for the community taking responsibility in maintaining the continuity of the development program. The local community supports the survey team and data collection and while evaluating such results, the community should participate and be given the opportunity of seeing their achievements and are equally a part while deciding on the long term plan for their own benefits. For the
community participation to withstand its activities when the external support is withdrawn depends on the community structures created during the early stages. But it is in this approach where the rural poor are put to deciding their own problems and fate. It is through this that the Participatory Rural Approach (PRA) method emerged (Chambers, 1992).

2.8 Endeavour for Food Sufficiency:

An emphasis on production, a belief in the neutrality of technology, and a poor accounting of the environmental and social cost have encouraged the replacement of ecologically complex systems with extensive monoculture systems. However, the lack of recognition of traditional farming techniques, the contribution of various household members, or even self-sufficiency is not the only gap in present and past efforts to alleviate problems of low levels of agricultural production and poverty in the Mexican tropics. An inadequate food supply in Mexico is not a matter of inadequate food production. It is related to unequal income distributions and flawed food distribution policies. Mexico has initiated many efforts to address the constant problems of unequal food distribution and living conditions in the rural areas. Yet, they have not solved the underlying discrepancies in income and wealth distribution. In the early 1980s, the Mexican government initiated the Sistema Alimenteria Mexicano, SAM (Mexican Nutrition System), a program for food self-sufficiency. The main objective of SAM was to make Mexico self-sufficient in basic grain production within two years. This was possible given that funds were available for credit, fertilizers were provided, no constraints were placed on the use of livestock pastures for growing crops, and the producers were able to make a good profit. The program was successful in terms of production that the country was not prepared for the surplus. Thousands of metric tons of maize spoiled because of a lack of storage capacity in Vera Cruz or were used as fodders for cattle. Results of the SAM program show that distribution, storage and access to land suitable for crop production are more important for low income families than is increase production for improving the lives of people in Mexico. The experience of SAM shows the potential capacity of agricultural lands and Mexican farmers to produce food surpluses if farmers are given sufficient means and incentives (National Research Council, 1993).

High yielding “yellow” maize was the focus of the World Bank financed Northern Nigeria Agricultural Development Project launched in 1974-75 (Clough & William, 1987). Traditionally, farmers in the region grew millet and sorghum, but adopted yellow maize along side their traditional cereal crops because yields were considerably higher. However, market for yellow maize was limited to poultry feed, except in years when there was a shortage of grain, since people prefer to eat sorghum and millet, and although the poultry feed market has been growing, many farmers were forced to sell at relatively low prices to the grain marketing board. So the argument that, the need to sell the technology (high yielding yellow maize) which has been developed was the main driving force behind the adoption of new agricultural technology. The new varieties of the yellow maize
are regarded as inferior in taste to the old white maize varieties and the demand for them is principally as an animal feed. Thus, they were intended to replace preferred staples such as sorghum and millet, and local white maize. The resistance the agencies found in the introduction of the high yielding maize underlines the failure of the agencies to take into account farmers’ objectives in managing the household economy, that is what they see as their priority crops, how cultivation of these and possible new crops fits into the production cycle and what the other income opportunities are open to them. There is a burgeoning literature on the consequences for health and ecology of development activities, which needs to be taken into account in assessing the costs and benefits of high yield variety (HYV) package. Greater intensification of agricultural production coupled with the abandonment of bush fallow system has its own cycle of increased soil mining, increased fertilizer use… (Lawrence, 1988).

Poor peasants, who have to sell their labour towards the end of the annual cycle and after, will not be available to work on their own farm at the crucial harvesting, preparation and planting periods and therefore, can not take on innovations which increase labour inputs (Lawrence, 1988). Over the major parts of Africa where labour rather than land is in short supply, farmers are reluctant to adopt innovations that produce more food but involved more work.

Yambio in 1950s is a relatively fertile but sparsely populated part of Southern Sudan. Research Workers developed a method of producing cotton which gave yields almost a time greater per hectare than those obtained by farmers. It involved digging trenches 45cm deep and 90 cm apart across the field. Grass was cut and carried from a wide areas of surrounding country and made into composed, which was put into trenches. The system, which gave a sustained yield from the same piece of land, received much praise from the experts. They preferred traditional method of planting new ground each season. Later it was found that the new method required 40% more labour per unit of cotton produced than the traditional method. The local farmers prefer to carry cotton seeds to fertility than to carry fertility to seeds (Adams, 1992).

Thus, new initiatives must also take into consideration income and land distribution inequalities along with insecure land tenures. Failure to take these factors into account led to high social cost of the green revolutions technological packages. Despite dramatic increase in food production, the green revolution provided greater benefit for the large scale producers and land holders and provided few benefits for the small scale farmers (Dahlberg, 1990; Perelman, 1976).

In Southern Sudan, in the green belt, a new maize variety was introduced which gave a higher yield, even under average farming conditions. But the maize (Zea mays) cannot be stored with traditional methods, as the cobs are much more sensitive to attack by storage insects. Thus the gain of a higher yield was quickly lost for the farmer,
who sell the maize just after harvest when the prices are low. So even if higher yields are obtained, the small farmers may not benefit; the benefit may go to the merchants and the towns. Thus adjustment to the local climatic conditions is necessary and careful testing of the new varieties in the wider farming system is essential than just a revolution (Noordwijk, 1984)

The activities in which women and men use natural resources are part of wider systems of production and consumption, which are supported and maintained by economic and political interest. From a planning perspective, focusing on individual and households without recognition and understanding of the systems of production and consumption in which they are operating in a particular context may result in incorrect definition of the problem and therefore, an inappropriate formulation of strategy. Mahdu Sarin highlights how in the 1970s and 1980s planners assumed that “…firewood consumption for domestic energy by millions of households in the third world countries was causing rapid deforestation, which was in turn leading to ecological crisis. In response to this, programmes to introduce more energy efficient stoves were implemented to reduce the rate of deforestation and save the third world countries from the impending energy crisis.” These programmes were not often successful, the primary reason being a miss-diagnosis of the problem. Empirical evidence has shown that … domestic fire-wood consumption is only a minor contributor to deforestation; the major causes lay elsewhere, that is, in wider systems of production and consumption, in this case, planned intervention by the government to promote uncontrolled commercial forestry and the extension of agriculture.

2.9 Environmental Degradation:
New agricultural technology such as improved seeds, chemical fertilizers and irrigation did not increase production of basic crops and averted mass starvation in spite of population increase of over two million people from 1960 to 1990 (UNEP, 1995). This contributed to environmental degradation in the long run where the poor, who lack assurance of the future, access to resources and because they lack other economic opportunities, they rely directly on the non-marketed natural resources for their immediate survival. Environmental degradation in the industrialized countries is linked to pollution while land and natural resources degradation are some of the environmental problems in the developing countries, which are the core problems in rural communities.

2.2.1 Land Degradation:
This may result from wind and water erosion, chemical deterioration and physical deterioration. Mankind induced land degradation in the context of rural development include excessive logging, expansion of cropland, overgrazing, reduced fallow periods, monoculture practices, erosion from mechanized ploughing and compaction, careless use of agrochemicals and irrigation, and uncontrolled wood cutting. These processes lead
to phenomena of land degradation like desertification, deforestation, loss of biodiversity, soil degradation, and migration problems.

2.2.2 Desertification:
Desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Climatic changes may alter the frequency and severity of drought and may cause desiccation, but whether desertification occurs or not depends on the nature of resources management in dry land areas, although desertification itself may contribute to climate change. Symptoms of desertification include reduction of crop yields, reduction of biomass (thus increases the distance that must be traveled to obtain firewood), reduce water availability, encroachment of sand on productive land and human settlements and societal disruption resulting from environmental deterioration (Tolba et al., 1994). Principal land uses in the dry lands are irrigated crops, rain fed croplands and rangelands. The key problems in rain fed croplands have been water and wind erosion, depletion of nutrients and physical deterioration; in irrigation dry lands are water logging, salinizations, and alkalization of soils, aquifer depletion, water quality degradation and increased water borne diseases, and in rangelands, degradation of vegetation and soil erosion (UNEP, 1991; Tobla et al., 1992). Desertification is in part driven by growing population pressure in arid regions, which has in turn led to increased demand for fuel wood and the growing of food crops in areas not suited for agriculture. FAO estimates that 5.7 million hectares a year of agricultural land, and an additional 1.5 millions hectares a year and 1 million tones of grain are lost to water logging and salinization and alkanization of irrigation land (FAO, 1993).

2.2.3 Deforestation:
Deforestation in developing countries allegedly for the purpose of increasing food production has instead decreased. According to Christian Castellanet, in Haiti the economic situation offers no alternative to the sons of peasant farmers who have to divide up family lands and are thus forced to cultivate areas, which get smaller and smaller from one generation to the next (The Courier, No.189 2001 pp 47). The consequence is that, the forest has disappeared, and even small copses surrounding the houses have succumbed to peoples’ desires for greater crop growing areas. Also in Yetenga, in the arid North of Burkina Faso, demographic pressure and climate favoured the intensification of agriculture by all possible means. This lead to soil degradation, shortening of fallow periods and a drop in fertility. Peasant farmers were then forced to go further and further from their villages until they encroached upon ancient hunting lands. In Cote d’ivoire, for thirty years or so the authorities have encouraged the farmers to clear near areas in order to increase the extent of their crops(The Courier, No.189 2001 pp 46). In general, there are several countries with land and forestry legislation that grants the right of use of land to those who farm it. Thus most tropical deforestation is done for agricultural
purposes (FAO, 1993). Forests currently occupy approximately one third of the earth’s land surface (4 million hectares), approximately 15% less than in pre-industrial times (Williams, 1990). Between 30 to 40% of the world’s population depends on fuel wood for cooking and warmth because cash is not available for purchasing fossil fuels (Tobla et al., 1992). Deforestation leads to impoverishment of people as well as of the environment because, in addition to providing timber and fuel wood, forests are relied on by many local communities for food, medicine and many non-timber products that produce means for generating income. Internationally traded non-timber products include gum, resins, bambusa spp, oils, rosins and turpentine, tanning materials, honey, seeds and spices, wildlife products, bark and tree leaves and medicinal plants. They are also the source of locally used material for building and handcrafts. In Sweden agriculture and a part of the permanent conversion of forest to agriculture contributes the equivalent of a quarter to a third of carbon dioxide produced from burning fossil fuels. Carbon-dioxide emissions are responsible for about half of the current and projected global warming (Canway, 1994).

2.2.4 Loss of Biodiversity:

It has been estimated, based on habitat loss that 27,000 species a year are currently being lost in tropical forest alone. The biggest threat to Biodiversity is the loss and modification of habitats because of clearing for agriculture and human settlement and for logging. Agricultural lands support far less diversity than the natural forests, grasslands and wetlands that they replaced. Even so, the biodiversity harboured in agricultural regions is important in its own right. From a purely agricultural prospective, the diversity of naturally occurring predators, bacteria, fungi and plants in a region can contribute to agricultural productivity by helping to control pest and disease outbreaks, improving soil fertility and soil physical properties and improving the resilience of agro-ecosystem to natural disasters such as floods and droughts. Moreover, the genetic diversity found in traditional crop varieties and in wild species provides a reservoir of genetic material that breeders can use to develop, improved crop and animal varieties. Within agro-ecosystem, different management practices can further alter biodiversity. Intensification tends to greatly diminish the capacity of agro-ecosystems to support biodiversity by fragmenting and reducing the area of hedge rows, copses, wildlife corridors, and other refugees and natural habitats within agricultural landscape. Pesticides and other agrochemicals can also be toxic to wildlife and soil microorganisms, including many beneficial birds, pollinators and carnivorous insects. On the positive side, the increasing use of trees on agricultural lands can increase their biodiversity potentials, as they shelter and provide microclimate to microfauna and flora beneath them. In Latin America, Sub-Saharan Africa and South-East Asia, trees are a significant and often a growing part of the agricultural landscape (Wood et al., 2000).

2.2.5 Soil Degradation:
One measure of the long term productive capacity on an agro-ecosystem is the condition of its soil. Natural weathering processes and human management practices can both affect soil quality. Sustaining soil productivity requires that soil degrading pressures be balanced with soil conserving practices. The principal processes of soil degradation are erosion by water or wind, water logging and salinization (the build up of salt in the soil), compaction and crusting, acidification, loss of soil organic matter and soil micro-organisms, soil nutrient depletion and accumulation of pollutants in the soil. Different types of soil degradation are associated with different types of agricultural land use. Salinization is associated most often with intensification of irrigated land and compaction with mechanized farming in high quality rain fed lands. Nutrient depletion is often associated with intensifying production on marginal lands but can occur on any soil if nutrients extracted by crops are not adequately replenished. Water erosion is also often associated with marginal lands that have been extensively cleared and tiled. Soil pollution is a particular problem in pre-urban agriculture (Scherr, 1999).

2.2.6 Water Quality and Supply:

Since water is essential for human health and welfare as well as for agriculture and industrial production, access to clean fresh water is a key factor that limits the potential for growth. Access to water depends on the factors related to allocation and management, as well as on supply. Currently one billion people do not have access to running water, and 1.7 billion are without sanitation facilities, placing them at risk from water related diseases (UNEP, 1995). Seventy percent of water consumption is for irrigated agriculture, which comprises 18% of total cropland but produces one third of the world food supply (WHO, 1992). Intensive industrial farming poses environmental problems, for example banana growing requires significant irrigation, with plantation holders in the Caribbean and Africa being tempted to sink boreholes for their supplies, which threatens the water table especially when not balanced with the rate of replenishment. Irrigation is also an inefficient process as less than half of the water used actually reaches the crops and is polluted by salts and nitrates before returning to rivers and aquifers (Clarke, 1993). In addition to aquatic ecosystem disturbances, polluted water is estimated to be responsible for illness in half of the population in developing countries and 80% of all illness in those countries (WHO, 1992). Poor water quality can also affect the rate of deforestation and air quality because of the need to burn more wood to boil drinking water (Briscoe, 1992). Concentration of pesticides in drinking water has been found to be much higher than WHO guidelines in a number of developing countries (WHO, 1992). Subsidies often promote laudable social goals, employment, high productivity, economic development when first initiated, but these goals are often subverted overtime through unintended consequences such as environmental impacts. For example, governments have subsidized the use of various farm inputs such as pesticides and fertilizers partly to boost agricultural productivity and partly to support the industries producing these chemicals. Pesticide subsidies in particular have been common in developing countries. In the mid 1980s, Indonesia was spending
about $150 million annually on pesticides subsidies, mostly to protect the rice crop. This led to considerable overuse, rather than reducing crop damaging insects however this liberal pesticide use actually triggered periodic outbreaks by reducing natural predators and promoting resistance among target insects. It also caused substantial downstream pollution and adversely affected the health of farmers. When the government ended its subsidies, pesticide use dropped, the government saved money and rice production continued to increase (World Bank 1997: 26).

The increasing health and economic costs associated with declining water quality and availability have the greatest impacts on the poor. In addition to disease, these costs include energy costs for boiling drinking water; time spent producing it, or the increased cost of purchasing it from water vendors. Obtaining water supplies has been estimated as taking up to 15% of women’s time. Diseases associated with water in developing countries fall in several categories (WHO, 1992). Water borne diseases that are associated with water contaminated by human and animal wastes, which upon ingestion, may lead to cholera, typhus and diarrheal diseases.

Water washed diseases which are associated with water scarcity or inaccessibility making it difficult to maintain personal hygiene and leads to diarrhoeal diseases and contagious skin and eye infestation as well as water borne diseases and infestation with lice or mites that may also be vectors of typhus. Water based diseases which are associated with insect vectors of disease for which water provides the habitat. These vary according to the types of habitats. Mosquitoes that transmit malaria breed in clear stagnant water while those which transmit filariasis breed in flooded pit latrines and polluted water. Simulium black flies that transmit river blindness breed in moving water and chrysop deer flies that transmit eye worm breed in muddy swamps.
Chapter Three.

Background to the Study Area.

3.1 Location:
Terekeka is in Southern Sudan, a province that lies in the northern part of Bahr El Jebel State. It is traversed on the Eastern part by the White Nile. Its East-West length measures to about 200 miles and 70 miles North-South and has a total area of 10,223 square kilometers. It is located north of Juba province and west of Torit province. It is southeast of Bor province, southwest of Yirol and east of Mundri provinces. Terekeka lies south of longitude 6° N and east of latitude 30° E.
Map (1) shows its location.

3.2 Administrative Division:
Terekeka is one of the four provinces of Bahr El Jebel State. It is administered by a commissioner whose seat of office is located in Terekeka town. The province has six districts with Gemeiza on the Eastern bank of the Nile and Tali on the extreme West. Muni and Terekeka districts are along the western bank of the Nile, with Muni to the North and Terekeka Southwards; while Tindilo and Central districts are central in the province (Lodiyo, 1998).

3.3 Climate: Generally, the climate in Southern Sudan is equatorial and characterized by high temperatures. The mean monthly temperatures are at the range of 26 °C in August to 31 °C in March as shown in Table (1) of Juba temperature. There is a great daily variation in temperatures at the range of 3 °C−4 °C but there is no recognizable change of maximum and minimum temperatures throughout the year as it is seen in Table (2) of Juba temperature. According to Fullard (1956), rainfall average around Terekeka area was between 760 mm to 1016 mm that begins from May to October. Of recent, rainfall has become irregular with short cycles than the previous longer patterns of drought intervals. These patterns disturb cultivation in the area. Rainfall averages for Juba are shown in Table (3) and graph 1. Prevailing winds during the rainy season which are moist moves
northwards to the low pressure areas in the Arabian Peninsula while during the dry season, dry prevailing winds from the Arabian Peninsula bring sometimes dust and dry weather condition to the area (Fullard, 1956).

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Table (1): Mean Annual Highest and Lowest Mean, and Annual Range of Temperature from 1931-1960 and 1974-1984
Source: Sudan National Metrological Office – Khartoum

<table>
<thead>
<tr>
<th>Year</th>
<th>Altitude</th>
<th>Mean Annual Temp. (°C)</th>
<th>Highest Monthly Mean Temp. (°C)</th>
<th>Lowest Monthly Mean Temp. (°C)</th>
<th>Annual Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1931-1960</td>
<td>460</td>
<td>28</td>
<td>Feb. and Mar 31</td>
<td>July and August 25.2</td>
<td>5.0</td>
</tr>
<tr>
<td>1974-1984</td>
<td>460</td>
<td>28</td>
<td>Feb. and Mar 31</td>
<td>July and August 26</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Table (2): Juba Mean Monthly Temperature in °C from 1974 – 1984
Source: Sudan National Metrological Office – Khartoum
### Mean Annual Temperature (°C)

<table>
<thead>
<tr>
<th>Months</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
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</tbody>
</table>

### Table (3): Juba Rainfall in Millimeters

Source: Sudan National Metrological Office – Khartoum

<table>
<thead>
<tr>
<th>Months</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
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<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1931-1960</td>
<td>5</td>
<td>10</td>
<td>43</td>
<td>103</td>
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<td>105</td>
<td>101</td>
<td>35</td>
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<td>1974-1984</td>
<td>3</td>
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<td>1993-1995</td>
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<td>103</td>
<td>94</td>
<td>52</td>
<td>1</td>
<td>916</td>
</tr>
</tbody>
</table>


3.4 Land Forms:
Main features are the large alluvial plains of the Nile, which is joined by the plains of the other tributaries. Terekeka lies in a flat stone plane and apart from Mountain Tindilo and a rock outcrop South West of Terekeka town; it is a flat landform with some dots of lakes along the Nile. During the rainy season, it is swampy and often flooded (Lodiyo, 1998).

3.5 Soils:
At main tributaries of the recent alluvial plains, the soils are silty-clayey and other parts are dominated with light loams. There is a local sandy characteristic thus lack of deep soils resulting into problem of moisture availability (Lodiyo, 1998).

3.6 Vegetation:
Terekeka occupies a dry savannah area, which consists of tall perennial grasses. The vegetation is composed of deciduous, broad leafed and shady woodland trees. Most dominant trees in the Western part are the *Butyrospermum paradoxum* (the shear butter tree). In the Northern part through Muni to Tombek are the *Hyphaene thebaica* and *Borassus aethiopum*.

In gallery forest, common trees are *Kkaya senealensis* and *Diosypros mesipiliformis*. The tree that is common almost everywhere is the *Balanites aegyptiaca*, important for its fruits and *Tamarindus indica* and *Ziziphus spinascihrisl*. Among the thorny shrubs is the valuable gum Arabic tree, *Acacia senegal* as shown in plate (1). *Acacia seyal*, variety *seyal* and its variety fistula is commonly seen with its variegated colours. *Leltis integrifolia* is a common homestead shade tree in the areas.
3.7 Water Resources:  
The River Nile traverses along the Eastern part of the land and there are about five lakes on the Western bank. These lakes have developed long time ago from the meandering of the Nile and they are Muni, Jor, Bayak, Jolori and Jorin. Some of these lakes like Jolori are giving the inhabitants a worrying rate of infection from *S. haematobium* as defecation, not only urination is on the open bush. Thus the cycle of bush to water and mankind is not interrupted. Guinea worms whose origin is in the Western part of the Province is already a cause of fear in the lakes like Muni as filtering for the purpose is common. The source of clean water could be the underground water. Like the hand pump in Plate (2) is just near Lake Muni, which is a source of clean water but these borehole pumps are not common in the area. Besides rivers like Gwir, Tapari and Ngalen, there are many streams on the Western part of the Province, which despite their swift current during the rainy season, are dry during the dry season. Map (2) show river networks in the area(Lodiyo, 1998).

Water wells are rare; the one in Tali goes back to the colonial administration. In the fertile places like Lojara, hand dug wells with durable water supply are just few. In Plate (3) the youth worked the whole day but failed to reach the watertable.
Plate (2): Water pump, source of clean water west of Lake Muni.

Source: Field Study, Dec. 2003, the Researcher.
Plate (3): Youths in Lojora village digging water well.

Source: Field Study, Dec. 2003, the Researcher.

This is because the water table is remote in many of the central and Western parts of the Province. Groundwater that collects during the rainy season and persists to the beginning of the dry season becomes useful for both mankind and animals like the one on Plate (4) on the road from Juba to Terekeka.
Plate (4): Juba- Terekeka road during dry season, water is scarce. This standing water becomes valuable for both human and animals.
Source: Field Study, Jan.2004, the Researcher.

Map (2) showing river networks in the area.

3.8 Demographic Characteristics:
The Mundari are the exclusive inhabitants of the Province and the centres are Terekeka, Tali, Tindilo, Muni, Gemeiza, Tombek and Mongalla. The population is dense in the riverian areas thus there are compact settlements. According to the 1983 census, the population was 69,000 persons, a third of these people live in the riverian areas. In the last census conducted in 1993, the population was 280,000 people.

The Mundari ethnic composition has two major groups. The Gboronga occupies the Western and Central areas surrounding Tali Post and Tindilo respectively. They are thought to have descended from the mythical ancestor of Mac Nyikwac constituting the major clan of Bura. They are boarded by the Nyangwara on the South-West, the Muru and Jur on the West, the Aliab Dinka on the north and the Atwot on the North-West. Thus blending with these neighbouring tribes led to clans like the Dari, Mundari Nyangwara beside other clans. The other group is the riverian, which is composed of the Korbura and the Sera. The Eastern people like the Korbura origin is traced to the Pori, West of the Lapon Hills where their ancestors once lived. The Sera relate their origin to the Sera clan in Kajokeji. They are boarded by Bor Dinka and the Pori on the North-East and the Bari on the South. Beside these are the clans of Buko and Mundari-Bari. The clan is the basis of Mundari political organization and their traditional homestead is composed of huts and granaries as seen on Plate (5).

Girls are regarded as source of wealth, from the dowry paid after marriage, thus their hut (Kondore) is lifted up, a sign of their specialty as shown on Plate (6) in comparison to a normal traditional hut on Plate (7).
Plate (5): Common granaries in the area for storage of foodstuffs.
Source: Field Study, Dec. 2003, the Researcher.

Plate (6): A Kondore, special hut for ladies.
3.9 Access to Resources (land, fishing, grazing and water):

As the clan is the basis of political organization in Mundari area, the chief who is the head of clan or a group of clans is always a member of the landowners. There is land ownership based on individual inheritance but the right of ownership rest on the clan leadership. A person from a different clan can move to settle in different clan where he or she can cultivate or even live. The permission to live or cultivate can be granted by an individual or the clan leadership. As the land produces fruits, lending it to a brother will at the harvest time means sharing of some product than keeping it idle.

Regarding fishing, there are many lakes in the area like Jor that during the rainy season flows into the Nile. Fish then move upstream into the lake for spawning. Fishing activities take place in these lakes and some positions of the Nile like 'Buliton. The clan, into which the lake is located, do the fishing and outsiders are equally not barred.

The bank of the Nile is marginal land that is flooded during rainy season but good for grazing during dry season. Animals are grazed following pattern of the clan land orientation to the Nile. During the rainy season, the animals are taken to distant grazing lands at Jebel Ladu between Bari-Kiden and Khor Jamus. The grass here is said to be halophytic.
Water is a scarce resource during dry season. Although some parts become flooded during the rainy season, the lakes and the Nile provide water all year round. Apart from some deep wells, the streams are mostly dry and do not support a concentrated population.

3.4.1 Economic Activities:
Activities of economic importance in the area include, farming, animals husbandry, fishing and off farm money generating activities.

3.4.2 Farming:
Traditional agro-pastoral system is the main practice in the South. The seeds and tools applied in farming are rudimentary. Some tribes take to depend on small range of food crops, which make them vulnerable in case of slight imbalance in weather conditions. The tools applied are not moderate enough to increase crop production. Groundnut (*Arachis hypogaea*), sorghum *spp.*, millet (*Pennisetum typhoides*), maize (*Zea mays*), cowpeas (*Vigna sinensis*) and sesame (*Sesamum indicum*) are grown in the area. During the rainy season, the male move with their animals to distant grazing lands leaving the women to do the farming activities. Groundnut (*Arachis hypogaea*) and sorghum *spp.* are staple crops grown almost everywhere while maize (*Zea mays*) is grown in Gemeiza especially along the Nile, in many of the islands. Root crops like cassava (*Manihot esculenta*) and sweet potato (*Ipomoea batatas*) are common with Mundari Nyangwara. Millet (*Pennisetum typhoides*) which is drought resistant stands out better than sorghum in terms of drought tolerance. An off season drought resistant variety of sorghum introduced by SFM in Muni did well but because of ripening late, they are grazed on upon the return of the animals to the area. The returning animals then graze them before their harvesting. These produce are sold in the internal market and grain prices are cheaper to those in Juba despite the cries of the drought in the area.

3.4.3 Animal Husbandry:
The Mundari cattle are low milk producers, kept just for prestige, marriages, funerals and ritual ceremonies. When the rain fails then there will be crop failure and death of animals, this leads to starvation and at times death of the cattle keepers. The animals are good buffers against famine as they are sold locally in the area. Selling of animals in Juba market is a growing economic activity.

As cattle ownership is a major economic feature in Mundari society, ACCOMPLISH, a civil society organization in the area has a significant contribution regarding veterinary care. They introduced the paravet project where cattle camp chiefs were requested to select Mundari youth of average abilities to be trained and
render veterinary services in an area void of such government services. They were trained for identification of
diseases, preventive care, proper use of antibiotics and conductive storage of vaccines and drugs. The cattle
owners who were relying on their traditional methods as there was no organized system of animal health care in
the Province, when faced with an epidemic, their methods become ineffective. Epidemics of rinderpest have a
regular occurrence in the area; other diseases are the contagious pleura –pneumonia (CPP) and haemorrhagic
septicaemia (HS) being common and other occurring seasonally including trypanosomiasis (Nagana) and tick-
bovine diseases.

ACCOMPLISH and OXFAM also created a revolving fund from the sale of vaccines and drugs, which became
the most successful experiment in ACCOMPLISH, by 1998. The pricing of vaccines and drugs was jointly
managed by the community and ACCOMPLISH. The paravet program received its highest acclaim under the
management of a veterinary scientist Sam Gonda in 1986 when he discovered the East Cost Fiver, which was a
havoc to the displaced Mundari cattle camps around Juba. The paravet program services improved the health of
cattle, thus increasing their numbers by reduction of mortality(Lodiyo,1998). In Tali district, an indigenous
NGO Vet Works Sudan has established veterinary activities for existing livestock, with support from UNICEF
and FAO. It offered training and vaccination activities in 2002(Starbase,2003).

3.4.4 Fishing:
Fishing has the potential of food security in Terekeka as influenced by the combination of swamps, lakes, rivers
and streams. Fishermen are not involved in the practice due to the lack of fishing gear, processing facilities and
good market for the fish products.
Fishing by the Mundari is very much a seasonal practice, which is done during dry season, and very much in
time of famine. It is regarded as a shameful thing for a Mundari to do commercial fishing. Because a wealthy
man with cattle does not fish, the poor equally do not want to be seen doing it for the fear of being despised by
girls thus no admiration leading to marriage. It is becoming a growing economic activity to the Mundari people,
although the well established fishermen are from Juba but many of whom are just for subsistence. The Sernum
Cooperative Society was established with help of Swedish Free Mission (SFM) with benefits going to the early
adopters(Swedish Free Mission,2000). Juba is a good market not only for the sun-dried or salted fish, smoked
fish as on Plate (8), even fresh fish during the dry season when communication is easy.
Plate (8): Smoked fish, west of Lake Jor, ready to be sold in Juba market.
Source: Field Study, Dec. 2003, the Researcher.

3.4.5 Off Farm Money Generating Activities:
Cultural values and market are yet limiting factors to active participation in such areas like selling of firewood and charcoal. Poor women are seen selling fire wood in Terekeka market. While the selling of charcoal is an economic activity, it is mostly done by persons who came from Juba. But many church members are already living outside the cultural fear of being laughed at as a poor man, thus some do carry fire wood on bicycles to the bakeries in town. The Nile reeds are good for fencing in Terekeka and other towns; they are drifted along the Nile to Terekeka from Mongalla including grass for hut thatching. Common with women is the local beer and wine that is being sold in markets and along the roadsides than the very limited sell of tea and food by women in the main market. Water on bicycles is being sold by school age boys in Terekeka town while selling of honey is a seasonal activity; with the guns everywhere, wild meat is also becoming a source of money. Although the material for making baskets is abundant, innovative individuals to benefit from these are lacking as is the case with Gum Arabic in the area. Although building materials are abundant there is a limited demand but the outlet to Juba will be promising market wise.

3.4.6 Transport and communication:
Sudan following independence, especially the South has faced two civil wars. During these periods, most of the countryside was not accessible in terms of adequate agricultural supplies, primary health care services,
education and local capacity development. Local infrastructures that were established before the war were demolished; main roads were land mined and bridges blasted. During the rainy season, most of the areas become inaccessible by land, making forwarding relief aid only possible through the expensive air drops or boats by the river (Swedish Free Mission, 2000).

In Tali district, the only portion of the road that was improved in 2001 by Zuid Oost Azie Refugee care (ZOA) and Agency for Cooperation and Research and Development (ACORD) with support from USAID, Norwegian People Aid (NPA) and the community, is the Tali-Amadi-Mundri-Yei road. The Yirol-Tali road is fully operational during the dry season as are most of the roads in the Province. Tombek, a river port is linked to Tali through Gboronga. Tombek is also linked with Juba through Muni and Terekeka along the Western bank of the Nile. Juba-Bor road passes through Mangalla, Gemeiza and Yabisak on the Eastern bank of the Nile. During the rainy season, vehicle communication is very difficult because of the swift currents of the stream networks in the area and flooding of the flat plain. The River Nile is a link in all season to Bor at the North and Juba Southwards. In Tali, there is an airstrip that was not on use because of the war as is the Nile (Starbase, 2003).
3.4.7 Trade and Markets:
There are tradable produce in the area like groundnut (Arachis hypogoea), sorghum spp, millet (Pennisetum typhoides), varieties of beans besides honey living animals and fish. Milk and butter have an economic value in the area. Produce in the area whose value is not much realized include hides, Gum Arabic, varieties of wild fruits like balanites, ziziphus, tamarinds and dom. With Terekeka as the main internal market, outside markets can be reached through the old existing road infrastructure that needs a great improvement. Tombek river post was a link to the Azande Complex thus remains a trade link through Kuda to Juba and through Tindilo to Tali and Amadi.

3.4.8 Food / Livelihood and Security:
Although meat and milk are regarded as a significant food source for the Mundari people, milk is mostly for children and especially those on weaning and the people moving with the cattle. Their diet is composed of sorghum porridge that is either mixed with groundnut paste plus the pulpy part of the balanite fruit as sugar substitute or porridge in a boiled meat soup. The Korbura and the Sera clans who are wealthy in animals do not prefer hard food like cassava and sweet potatoes than is the case anywhere beside varieties of beans in the area. Agro-pastoralists as they are, keeping animals is a livelihood strategy for those with animals but most of the people depend on sale of agricultural products. Honey and shear butter contributes to their livelihood including oil from balanite fruit. In most crises, food aid plays a major role in the survival of victims of natural catastrophes and man-made disasters. The highly vulnerable group whose income is derived from subsistence agriculture is affected most. The socio-economic categories used in the food security are derived from the Household Economy Approach (HEA) developed by Save the Children Fund-UK (SFC-UK) and used as a survey approach by the food agencies in Southern Sudan. Tali district residents are food insecure. They, like other Mundaris, are agro-pastoralist who lost most of their livestock during the 1997 fight in the area, many cattle were driven to Juba and the land for cultivation was restricted by the war. Poor climate conditions and pests too have affected the areas food security. During the April-May food gap, varieties of wild green leaves are consumed, including fruits like Lulu and coconut. Coconut shoots among other tubers are also eaten while Water Hyacinth is mostly consumed in the dry season (Starbase, 2003).
Chapter Four

4 Swedish Free Mission (SFM) Food Security Project.

Swedish Free Mission (SFM) is a Christian based organization, which is non-denominational. The Swedish International Development Agency (SIDA) and Swedish Church are funding its activities on its long-term development plans. Regarding health, it started its activities back in 1983 with the establishment of Terekeka and Muni Primary Health Care (PHC) centers that are completed but due to the war, they closed in 1985. Part of the premises of Terekeka Primary Health Care Unit (PHCU) is to date still on the temporary occupation by the Sudanese Army. On the time of research, the Tombek Primary Care Unit was on construction while Rijong PHCU remains a proposal. The above puts the whole Terekeka Community on the western part of the Nile Valley access to health centers(SFM, 2000).

OXFAM was the NGO on ground then, as a result of the drought, the Terekeka program was reinitiated as an emergency program, merging the water drilling and sanitation project with Humanitarian Assistance Program (HAP). It started to implement the program in the field during 1999 to 2000 whereby 16.8% of the vulnerable people received food as food- for- work, seeds, tools, and development training. In 2001 phase, it was known as Terekeka Relief and Rehabilitation Program (TRRP) under the HAP. The actual Terekeka population that received sustainable support from SFM during the beginning of the project from 1998 to 2001 amounts to about 48.5% of the vulnerable estimated during the drought of 1997. Down to 2002/2003, SFM has supported up to 61.5 % of the targeted population, following the start of the Humanitarian Assistance Programme in Terekeka(SFM, 2000).

4.1. Target Group:
The group targeted is part of the population still experiencing poverty due to lack of improved technology as a root cause for low production and development in the area. Thus they need enlightenment on local participation on development, on appropriate technologies and provision with appropriate tools, seeds and improvement of their skills to sustain themselves.

4.2. Project Objectives:
The vision of SFM in Juba office is to ensure a sustainable livelihood for all. SFM works on short-term objectives.
The aim of the programme is commonly awareness to enable Mundaris mobilize their local resources in order to improve their standard of living. To build local capacity and empower the community through training to enhance economic growth, peace building and gender balanced participation.
The Swedish Free Mission objectives are outlined below:

- To improve household food security by supporting the agricultural system. This requires awareness and change of attitudes in the community to make them understand that dependence on single crop is risky.
- Improvement of sustainable primary health services by promoting preventive and curative health service.
- Improvement of accessibility to basic education to all school age bearing children.
- To alleviate poverty by strengthening grassroot organization.

4.3 Project Activities:
The planned activities include provision of various types of seeds and tools. Training workshops, training on ox-plough, provision of fishing gears, training on cheese making, support of basic schools and provision of food- for-work and establishment of cooperative societies.

4.3.1. Provision of seeds and tools:
The village development committee in each village and the SFM extension worker undertakes the process of identifying persons who were not able to cultivate the previous year. The cause may be lack of seeds, tools or the effect of the sometimes-recurrent drought. The agency supplements the revolving seeds on the retrieval system in areas where the amount cannot meet the chosen participants. Participants are chosen in each village based on the head of household as shown in the table (4).

Table (4)

Population by villages from whom beneficiaries were chosen

<table>
<thead>
<tr>
<th>Village</th>
<th>Number of Households</th>
</tr>
</thead>
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<tr>
<td>Bagi</td>
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<tr>
<td>Bori*</td>
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<td>Boriye</td>
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<tr>
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<td>Bukgo</td>
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<tr>
<td>5</td>
<td>Bura</td>
</tr>
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<td>Buranga</td>
</tr>
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<td>Bura-regong</td>
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<td>Gabuta</td>
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<td>Giging</td>
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<td>10</td>
<td>Guluku*</td>
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<tr>
<td>11</td>
<td>Jongkok-pay*</td>
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<td>Juba-gondi</td>
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<tr>
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<td>Tali*</td>
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<td>Wongleri</td>
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<td>Yari</td>
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</table>

**Total**: 5190
4.3.2 Training Workshops:
Training workshops are conducted involves 360 participants chosen from among the 25 villages each year. The participants are either self nominated or nominated by the community, persons who are willing to volunteer as village community motivators. The training is informal, which includes short lectures and group discussions on the following topics:

- Management and planning in local development.
- Nutrition and health education.
- Cooperative administration and management.
- Farm planning and control.
- Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS)

The practical aspects of the training includes:

- Identification of local problems, local resources and those from outside that can be used in solving identified problems.
- Specification of individuals' or stakeholders' (chief, community motivator, farmer and the NGO) role in the development of the community.
- Looking at the attributes of the local culture in regards to environmental sanitation.
- Classification of local food products for body dietary needs.
- Demonstration of daily household activities.

4.3.3 Training on Ox-plough Traction:
A two months training period is conducted every year for about one hundred farmers on ox-plough farming practices. The participants are to produce their own bulls while SFM provides the 50 ox-plough discs.

4.3.4 Provision of Fishing Gears:
Fishing is an activity very common at Bulton on the Nile and at the lakes of Bayak, Jor and Muni. Local fishermen are chosen from these fishing sites. Then SFM provides them with the fishing gears, fishing twine and hooks besides monitoring the activities of the already established Sernum Fishery Cooperative.

4.3.5 Training on Cheese Making:
About 45 participants are initially trained on cheese making who are chosen from three cattle camps. The training remains a refresher as the initial group did not continue to develop the technology efficiently. The participants are tutored on processing methods and marketing.

4.3.6 Support Basic Schools with Stationery and Equipment:
To encourage girl education, school uniforms for 300 girls in primary schools were supposed to be supplied, but this has yet to happen. In a peaceful country, education belongs to the field of development. In Sudan, it is a component of emergency aid (The Courier, No. 189 2002 pp 71).

4.3.7 Provision of Food for Work:
Food is being given out as food for work to farmers who are involved in agricultural activities. The food is given as incentives to those who participated in production of cassava (Manihot esculenta) and sweet potatoes (Ipomoea batatas), mangoes (Mangifera indica), citrus and guava (Psidium guajava), and their fencing with thorns and road maintenance.

4.3.8 Cooperative Initiative:
The initiation was through:

- Enlightenment workshops for the community on the formation of cooperatives.
- Encouragement’s of community participation in cooperative formation through there own labour and finance.
- Formulation of the cooperative local constitution, which is to govern the society and to be legally passed by the community general assembly.
- Training of a manager and a salesman both of whom are to be chosen from the community.
- Nyori Cooperative Society was targeted for construction, which is of the same structure, composing of an office, shop and a store as shown by the Lokweni Cooperative Society on Plate (9).
Plate (9): Cooperative society building at Lokweni village.
Source: Field Study, Dec. 2003, the Researcher.

4.4. Environmental Impacts:
Although in the past three years (1999-2002), drought was common; the seeds revolving in the communities' retrieval was good though not without defaulters. The cooperatives that on the long run are expected to be sustainable will guarantee the sustainable use of the revolving seeds. Increased crop production will positively improve household food security and household income. As the local communities get better living condition, the movement of goods in the markets will be useful for economic growth, which eventually leads to increase in revenue collection in local councils. But this is at the expense of the natural ecology/environment, which is being depleted by cutting trees without replacement due to shifting agricultural practices. Initially the project effect in the ecology was not significant but much land was and is being cleared for agricultural purposes. On the future plan, agroforestry is put forward to remedy the ecological impact the project has on the environment. At the present, trees planted are fruit-trees only. From their nursery in Juba, they give out Eucalyptus seedlings to persons interested in planting. Some, like these on Plates (10) and (11) were doing well as they will serve the purpose of building poles, energy and of course their environmental aspects. These activities when implemented in terekeka will be of environmental importance.

With the agricultural activities around Juba town, especially regarding sesame, they have done a selection on the early flowering plants as on Plate (12). The seeds from these plants on planting out produced multiple fruits
on the whorls as seen on Plate (13). They also reduce the growing period of 120 days to 85 days. But what are common especially in the South are the whole lot varieties of insects, whose damage is evident as shown on Plate (14). The farmers in Terekeka will benefit when they are encouraged to do this field seed selection.

Plate (10): Eucalyptus trees, SFM extension program in Juba.

Source: (SFM).
Plate (11): *Tectona grandis*, around Juba, SFM extension program on tree planting. Source: (SFM)

Plate(12): Result of field selection of seeds from dominant early flowering sesame
Plate (13): Result of field selection of seeds from dominant early flowering sesame fruits.  
Source: (SFM)
Plate (14): Insects damage on sesame fruits. source: (SFM)
Chapter Five.

5. Evaluation (from the people’s point of view):

What follows is the evaluation of the data collected during the field study. Benefits introduced by the agency for developmental and environmental concern are also mentioned. In the study of the environmental conditions, a comparative approach that took into consideration the historical background of the area before the developmental activities and changes that deemed to have happened were noted. Some of the environmental indicators that can be characterized by increase, decrease or constant, near or far and appear or disappear were used. The environmental indicators among others included:

- Decline or failure in crop yields.
- Reduction of wood biomass, putting pressure in time and distance to be traveled in search of firewood.
- Reduction of biomass in range lands required as animal feed.
- Human settlements and society disruption as a result of environmental deterioration.
- Water related diseases.

5.1 The Householder:

A random sample of the participants chosen among the population was 120 respondents, majority of whom were males, only 6 were females. Female-headed households (FHH) are in minority, as the brothers of the deceased husband immediately inherit young widows.

5.2 Marital Status of the Respondents:

There were 2 single respondents, 6 widows, and the rest were married. When a family is blessed with males but is poor in cattle, then all the family members will work to see to it that the eldest son is married first then gradually down to the youngest. Even if the youngest son has become wealthy, with fear of evil eye, he will have to follow the tradition.

5.3 Level of Education:

There were only 2 respondents who completed secondary school and 22 respondents completed primary school. The majority were illiterate, few of whom are church members, especially the Catholic Church, they attend
adult education sessions in bari language, thus can read the bible in Bari. Children of respondent in primary school were 81 and 4 in secondary school. The agency's objective on this item remains unrealized.

**Table (5) Level of Education of respondents, their children and dependants.**

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>96</td>
<td>80</td>
</tr>
<tr>
<td>Completed Primary</td>
<td>22</td>
<td>18.3</td>
</tr>
<tr>
<td>Completed Secondary</td>
<td>2</td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

5.4 Occupation:
The area is predominantly a peasant community; as such 99 of the respondent are peasants, one civil servant that is a bookkeeper, plus 7 teachers. There were 6 soldiers and 6 respondents who were engaged in charcoal production and a single fisherman. Fishing and charcoal production are economic activities regarded to be shameful by Mundari. But with the agency's workshops, fishing has become economic to some Mundaris.

5.5 Family Size of the respondents:

**Table (7): Family Size**
<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants 0 – 5</td>
<td>217</td>
</tr>
<tr>
<td>Youths 6 –18</td>
<td>495</td>
</tr>
<tr>
<td>Adults 19—45</td>
<td>393</td>
</tr>
<tr>
<td>Elders 46 and Over</td>
<td>82</td>
</tr>
</tbody>
</table>

This is composed of the children and dependants of the members of the 120 households. The number of children was 601 and that of dependants was 293, this gives an average of 5 children in every household. Youths are the majority in the population.

Graph (2): Showing Age on the X-axis versus population on the Y-axis.

5.6 Abandonment or No Enrolment in School:
Up to 58 respondents reported the problem of lack of schools in their area as a reason for not enrolling their children into school. While 21 respondents have economic problems of sending children to long distant and hunger that makes children to run away from school. About 39 respondents have the common social problem of
who will take care of their cattle, if the boys are registered into school. Like Elia Ladu of Lopuja village whose father have three wives, following his death, there was no room for them to go to school. They have to help in cultivation in order to feed their mothers, only his small brother will be registered later. Zacharia Laku of Lokweni considers small children like many others, not good for registration to school as they will be disturbing their teachers compared to big boys. Michael Jada of Molujore in Lojora has small boys who he wanted to register for school for, they as Mundaris can not continue to be looking after cattle, thus his children has to be educated. School is seen by others to be robbing them of their children who after education disperse and do not come back to the village and some of the educated class choose to marry from other tribes rather than their Mundari girls. While 2 respondents were not interested.

5. 7 Girls’ Education:
A 17.8% of the respondents consider girls education of less importance and this feeling is strong in Tombek and Nyori. Ladu Mere of Lojaro thinks an educated girl will end up getting married to people outside their tribe, far away from their home where she will have no help to her parents. Others consider educated girls to be traditionally not promising for a good marriage, they are to be kept out of school for a dowry wealth. While 37.5% consider it very necessary like Paullino Wani of Muni-jai, said that educated girls fetch a lot of dowry wealth as they are married to their educated class. 42.5% considers it to be as necessary as that of the boys while 2.5% said they do not it’s importance. All is centred on the dowry wealth to be received than the value of the educated individual. But the agency’s interest on gender balance is strong, as seen in the village committees women, are included although some men complain that the agency is giving women powers over them.

5. 8 Types of Latrines in the Area:
There was only one respondent with a pit latrine, this is because he was a leader in a Protestant Church compound. When asked the question of latrines in the area, there was a sign of surprise, others could point to the vast God-given land where they go deep into the bush for the purpose. Some complain of not knowing how to dig a pit latrine, The soil in some places, which is sandy could too present a problem anyway. In community medicine, development can be related to how far you are from your faeces, which was not the case in the towns as latrines are few.

5. 9 Source of Drinking Water:
Most respondents to about 60.8% drink from the lakes in the area while 4.2% drink from the few bore holes that are constructed by the few agencies working in the area. 14.2% drink from the streams and 12.5% from dug wells. The agency's strive in this area needs to be realized yet.

5.2.1. Available Remedy in Case of sickness:
Majority of the respondents, 43.3% take herbs in case of sickness; 35% visit health centres; 20% practice witchcraft. Witchcraft is practiced in places where health centres are far away or with individuals who lack the financial requirements needed at the centres. According to Ladu Issac of Murti-Tukoro, many of the people practising witchcraft have become church members, so herbs are initially used and when the ailment persists, an animal is sold and a health centre is visited. James Gore of Lwoki said that, the witch gives nothing, but in a health centre tablets and injections are given. The agency established two health centers; the one in Terekeka town is operational but that in Muni was not in operation. Those buying tablets from the shops and pharmacies represents 1.7%.

5.2.2. Types of Animals Owned:
Animals in the area are cattle, goats and sheep. Majority of the people 52.5% have all three types and those with only goats were 17.5%. Those with cattle and sheep were 17.7%, those having goats and sheep represent 5% while those with cattle alone were 2.5% and those with sheep alone were 5.8%. The number of animals is on increase thus the re-orientation of the riverian people's diet from subsistence farming to pastoralism.

5.2.3. Number of Animals Owned:
It is not uncommon to the Mundari alone but everywhere people are not happy in declaring their wealth. Thus, it is not easy to know the exact numbers of the animals each individual have. Using the term increase and decrease, 61.7% respondents declared an increase in their number of animals while 21.7% noted a decrease. Respondents whose animals were remaining constant were 16.6%. Reasons for the decrease are related to diseases like diarrhoea, running nose and insect bites during rainy seasons and chest diseases during dry season.

5.2.4. Animal Grazing:
Theft of animals is a common reason for keeping watch over them but up to 43.3% respondents’ release and gather the animals in the evening. An interesting 36.7% take their animals to distant grazing lands and this is the group that is rich in animals. They take their animals away from the Nile to places free from mosquitoes only return to their villages when the harvest is over. When the grasses have dried up in their villages then they move to the grazing lands along the Nile. During the movement, children on weaning are taken along, upon returning
home, these children do not know their parents but their baby sitters. In the villages, the animals are pegged in camps, their dung become manure to the place but their track are compacting and pulverising the soil. Respondents keeping watch over their animals without taking them away from the area were 12.5%, while others represents 7.5%. This movement of the animals' relief pressure on grazing resources.

5.2.5. Type of Land Owning:
Although the clan leaders have more to say over the land, there is individual ownership of land. Most of the ownership is acquired through inheritance, 59.2% and 15.8% is on lease bases; these are individuals who moved to the area from other clans. While those who regarded the land to be communally owned were 25%.

5.2.6. Difficulties Experienced in Farming Activities:
Difficulties range from hunger, lack of tools and seeds, pest and diseases and soil erosion. Hunger is the major difficulty as shown by 36.7% of the respondents. Pitia Ladu of Murti, said that hunger motivates one to cultivate; if you do not have food, you will watch those eating while you sit with nothing to eat. Some will migrate to Juba but for those who remain to cultivate will have good harvest. In order to have seeds, you need a healthy animal for exchange as you move around with it.

Gore Loku of Buko said that hunger leads to poor harvest, as one is not able to cut a new land but just to cultivate the previous piece of land, which is already exhausted.

Lack of tools and seeds was a common complaint as cited by 30% of the interviewees. The sandy soil makes the hoes finish off within a year and the seeds are being brought late in April or May rather than at the beginning of the rain.

Pests and diseases according to 25% of the respondents, termites become destructive when the rains are sparse. Anthills were common in some of the areas as shown by the one on plate (15) in Muni. 7.55 of the respondents consider, soil to be their difficulty whereas 0.8% worry of animal diseases.
Mosaic diseases and weeds like striga spp are serious problems. Birds only damage the early and late grains to ripen, which are a minority, their effect is less when the grain ripens at the same time. A serious damage is in groundnuts in the granaries, where the seeds end up in powder inside the husks Soil erosion is recognized by 7.5% of the respondents. The concentration in places near drinking water results into bareness of the soil, the same crops are planted in the same place and during planting, the land is cleared of any residue that could add up manure to the soil. This leaves the soil bare to wind and water erosion as moving to new place too is restricted by lack of water. So human induce land degradation problems here includes soil erosion, monocultural practices, which leads to pests, mosaic diseases and weeds.

5.2.7. Success in farm production can be attributed to:
Predominantly good rain is the main contributor to the success of farming activities in the area as noted by 83.3% of the respondents. About 6.7% thought that the cultivation of a large piece of land is a good to overcome the declining yield and pest and diseases. While 10% of the respondents were motivated by good prices. Generally, a man will fill up four granaries with grain, where two will be for food and the other two for sale. People in need of the grains will come to look for the grains than the owner taking it to the market. But others whose number of children have grown, the food meant for consumption is finished before the start of
the cultivation. Chief Raymond Laku of Nyori said that, with the poor rains, their granaries were empty and families that do not have animals to sell will migrate. The water of Jolori, which they drink make his people to urinate blood at times and the small children who go bathing or fishing in it die of cold and the water is itching. According to him, although they complained of this, they received no response such that, while they talk as of now, they are pessimistic about any attention to their problems. Regarding extension services, fruit like mangoes were being planted. Big mango trees in the area were mostly planted by non-Mundaris for they regard mango tree to be taking a long time to fruit but Yakobo Lumagor of Muni-Wudu felt that their parents were deceived by their southern neighbours. They were made to believe that when you plant a mango tree, you will die; as a result they were not planting mango trees. But some who travelled to other places, on their return, planted mango trees and their mangoes are fruiting and none of them died. Unfortunately, the very people who deceived their fore parents have and are selling mangoes.

5.2.8. Month of Food Shortage:
Food shortage is reported to be from March to June by 72.5% of the respondents. For those who did not cultivate large field and the harvest turns out poor, they experience food shortage right from the harvest period in November to February by 12.5% of the respondents while 155 experience it from July to October. The food gap period of March to June is crucial period for assistance as farmers with no food, seeds and tools will choose to migrate.

5.2.9. Swedish Free Mission Activities in the Area:
The activities Swedish Free Mission is doing in the area the encouragement of food production, relief and clean water. It is known very much for food production in the area by the seeds and tools it gives. Their extension activity includes the encouragement to plant fruit trees like those on the village development committee members' compound Plate (16). With the fruit trees many were regarding them as common properties. Some were not happy when the agency was telling them to protect their trees until they are ripened. They accuse the agency for teaching them selfishness. Those with the fruits following the teaching were able to sell and bought goats from the proceeds, they thank the agency instead. Some of them were doing better with cassava (Manihot esculenta) and sweet potatoes (Ipomoea batatas), the drought resistant crops. So 57.5% know Swedish free Mission for food production, 32.5% for food production and relief, 5% for clean water and 55 for relief work.
5.3.1. Household Energy Sources and how they are gathered.

Firewood is the predominant energy source, 66.7% of the people collect it from trees fell during field preparation for cultivation while 33.3% collect dead twigs in the bushes. In the areas surrounding the growing towns like Terekeka, dead wood is no longer available.

The women and children gather the wood for the family cooking needs while men and boys provide the logs for camp fire, which is meant for driving away mosquitoes and other biting insects. Men gather firewood on ceremonial festivals, in most cases, it is the man who cut the trees in preparation of the cultivation. He cut and stalked them for the women to carry home.

5.3.2. Trees Preferred for Firewood:

Although the trees much preferred for firewood are available, 50% of the respondents indicted that they are no longer near but far away. Where they are available like Pitia Ladu of Muriti, he worried about the trees being cut to rot. If he is to have a lorry for transporting them to Juba, he could cultivate trees rather than crops. Regarding the availability of the preferred firewood species, 45% of the respondents fell they are available and 4.2%
thought that they are decreasing very fast. Regarding the price of the firewood whether it is decreasing or increasing, many do not know, as there is no market for firewood in the area.

5.3.3. Destruction of the Vegetation:
As the preparation of a new piece of land requires cutting down of trees, 76.7% of the respondents regarded agricultural activities as the cause of vegetation destruction. While cutting the vegetation, fruit trees like the Dom and Balanite whose fruits have a good taste are the only ones left standing in the field. The aspect of this land preparation is shown in Plates (17) and (18) in the extreme south of the Teak Forest Reserve in Terekeka town and Plate (19) with the Dom in the Muni.

Plate (17): Clear cutting of a natural forest thicket, an encroachment for food production, and South of Terekeka Forest Reserve
Plate (18): A cause vegetative change by clear cutting for food production.
Source: Field Study, Dec. 2003, the Researcher.

Plate (19): Dom vegetation after clearing for food production in Muni, Dom with good taste are only left standing.
Source: Field Study, Dec. 2003, the Researcher.
When felling is done and cultivation follow suit, the debris and logs are burnt, in this way the fertility is not maintained for a long time.

Jacob Wani of Juba gondi and Paulino Wani of Muni-jai, said when the felled trees are left for a year to rot on the ground and the land is prepared for planting the following year, the place will maintain fertility for four to six years. But when the logs are burnt immediately, the spots containing the ash will be fertile only.

Although 19.2% of the respondents considered energy and construction needs responsible for the destruction of the vegetation, with hostilities coming to an end in the area, and as many Mundaris are making charcoal which is cheap in Terekeka but has a good market in Juba, this will represent a threat to the vegetation. There is a growing interest in cultivation, and places that were forested five years back have become cleared of forest. Withdrawal of tools like axes and cutlasses as stipulated by some officials, may not be the right remedy then the use of right cultural practices for the sustainable use of the existing piece of land. Grazing is considered by 4.1% of the respondents to be a cause of vegetation destruction.

5.3.4. Consequence of Soil Deterioration:

Signs of soil deterioration in the area is noted and 69.7% of the respondents attributed it as the cause of the decrease in crop yield. Regarding the cycle of grazing animals, following the rainy season, the animals are taken to distant grazing lands, which after crop harvest are then brought to the villages. When the grasses dried up, they are then taken to the banks of the Nile and its inlands. The decrease in grazing land comes from the animals that are not taken to the distant grazing lands which represents to about 7.8%. Soil deteriorates is due to improper crop rotation, lack of crop diversification and conservation tillage practices. It is regarded by 9.2% of the respondents as the cause to the disappearance of some plants in the area while 15.8% regarded it to be the reason for the appearance of unpalatable plants in the grazing lands.
Chapter Six.

Conclusion and Recommendations

6 Conclusion:
The area was neglected since the colonial departure and by successive national governments. The few signs of development that remained were initiated by the British colonial administration. It came late as the area was first marked as part of Bahr El Ghazal Province, but remoteness made it to be annexed to Amadi District. Language lastly made it to be part of Juba District. ACCOMPLISH, a Community Base Organization (CBO) was formed to rescue the people of Terekeka from impoverishment. The concept was the promotion of local initiative through self help in rural development. Swedish Free Mission on similar ground came to the area.

6.1 Participation:
The mobilization of the grass roots in the community for their development was good as shown by their initiatives in the cooperatives and health centre establishment. The sense of ownership and responsibility was not only shown by their financial contributions but labour in construction works. They also give value to the agency for the five years of its work in food production than other agencies delivering relief in the area.

6.2 Local Institution:
It is a community that is mostly build up of traditional system. Thus, the chiefs based on hereditary chieftainships are the ones respected on the area of authority. The village development committee members,
some of whom are knowledgeable, are a good link between the agency and the community. Being gender balance is an interesting new challenge to the community.

6.3 Environmental Protection:
There was no Environmental Impact Assessment (EIA) done prior to the commencement of the project, thus no follow up or checks enshrined. The encouragement of ox-traction is appropriate as it is cost effective for the animals are available and are not damaging to the soil as could be the case with tractor traction. Soil erosion usually takes place within a short time of planting and germination as the land is left bare. With sandy soil, and while planting the land during preparation is cleared of all organic matter thus the soil organic matter diminishes leading to poor retention of water and fertility loss.

There is no soil conservation techniques, no shelter belts and live hedges instead fields are fenced with felled thorns, fences made of planted thorns like *Acacia mellifera* may be time taxing but will ward off animals for a long time.

Water at the lakes, especially Jalori and Bayak itches the skin, Guinea worms and aliment that was only known to Jalori are now encroaching the lakes.

The aspect of felling and burning without leaving the common leguminous trees as shelter belts or scattered in the fields reduces the tree vegetation in the area; coupled with monoculture practices results to soil deterioration. Settlement concentration where there is water gives pressure to the resource base thus the crop is affected.

6.4 Multi-Sectoral Approach:
As every aspect of development requires uplift, the multi-sectoral approach gives a stage for horizontal elevation of the people's standard of living. The establishment of the three cooperatives, three health centers, provision of seeds and tools for food production, water drilling, relief food and training workshops, needs further enhancement. The encouragement of cultivation of drought resistant crop like cassava and fruit trees beside other crops alleviates poverty.

6.2 Recommendations:

6.2.1 Environmental Impact Assessment:
Although environmental impact assessment (EIA) was not done from the beginning, where check-ups for assessing the impacts on the environment were placed, it needs to done to safeguard against further environmental degradation.

6.2.2 Sustainable Development:
Actions should be taken to ensure sustainable development right from the individual level through the community to the national level. An elderly man at the time of research had mixed reactions about the only forest reserve in Terekeka town. He was not happy because the colonial administration forcefully mobilized them for plantation of the forest. But his happiness was when Help Age, was building huts for the elderly in the area was buying building materials from the citizens, most of which was from the forest they planted. So the food for work can be used for establishing village forests around the town, with the government providing the land and protection.

There should be a proper crop rotation and improved cultural practice to serve soil conservation, with grazing as an issue and making the community to benefit from the Gum Arabic trees, an agro-silvi-pastoral system that considers farming, grazing and trees in the fallows will be important.

At the State level, grazing routes need to be protected, including the marginal lands on the banks of the Nile and its inlands. Provision of drinking water away from the riverian areas to relieve degradation due to concentrated settlement will be important.

The land that is flooded during the rainy season is dry during the dry season. There should be water harvesting techniques especially on the Western part to capture more of the surface run-off.

6.2.3 Institutional Setup:
The village development committees should be equipped with adequate training on community leadership and to foster well on agricultural extension, public health, nutrition, and education and environmental awareness. But as the system is mostly a traditional one, like in Plate (20), the village development chairman was a literate elementary school person than the chief, but the chief is the one respected and listened to by the community.

So the chiefs are as good as the village development committee members for development, thus they should be part of any training being awarded to the VDCs. The churches are also good agents in dispelling negative traditional attitudes and the individuals in the VDCs should be considered for financial incentives.
Plate (20): Tombek river post, the chief, the chairman (VDC) and members of the community on mobilization of labour for the construction of Tombek health center.

Source: Field Study, Jan. 2004, the Researcher.

6.2.4 Multi Sectoral Approach:

The cooperative societies established needs managerial skills in order to reach the stage of managing the revolving seeds. Although illiteracy is rampant, the people are resourceful thus such skills can be drilled in their vernacular.

The health center in Muni is almost wasting out without being on use, putting it on operation will give more impetus to the community for further mobilization on new initiatives.

The objective on education though good is yet to be realized. Some community members consider education bad because of the urban trap and globalization. Some feel encouraged when their educated elites and their children pay visits home, also provision of uniforms is good but not better than implementing school-feeding programme.
Tradition festivals that take place during the dry season are grains exhausting and when the production season comes, the people get themselves in dire need.

The poor road infrastructure affects the distribution of seeds and tools; they should be procured early before the onset of the rains, alternatively, the farmers should be taught how to do field selection of seeds from dominant phenotypic plants although use of certified seeds remains the best, the case of groundnut may be ascertain if the disease affecting them is seed borne or intrinsic in the soil.

6.2.5 The Authority:
People are always skeptical about paying tax, although the people are enthusiastic about the collections for initiatives that have their blessing, self-help projects that do not deliver make them restrain or withdraw. Political removal or appointment of commissioners affects the existing programmes especially when new one super side old project, the people were not enthusiastic with the commissioners guest house and were not willing to contribute as the project was slow in progress. The authorities should be educative to the people about their developments and supportive to the CBOs and NGOs with endeavour of assisting the area.

Bibliography


Appendix

Questionnaire
Terekeka Rural Area

1. Head of Household:
   Name-_____________________________________
   Age _______________________________________
   Sex   (Male)   (Female)
   Marital Status;
   (a) Single (b) Married (c) Separated (d) Divorced (e) Widowed
   Place of Residence. ______________________________

2. Educational Status:
   (a) Illiterate (b) Khalwa (c) Primary (d) Intermediate (e) Senior (f) Institute (g) University.

3. Present Occupation:
   (a) Peasant (b) Fisherman (c) Teacher (d) Soldier (e) Trader
   (f) Herder (g) Woodman (h) Others (specify)

4. Previous Occupations:
   (a) Government Worker (pensioned) (b) Soldier (c) Peasant
   (d) Others (specify)

5. Dependents:
   Male’s No.  Age    Female’s No.  Age
   __________________    __________________
   __________________    __________________

6. Own Children:
   Boy’s No.  Age    Girl’s No.    Age
   __________________    __________________
   __________________    __________________
7. Children and Dependants who are Schooling:

<table>
<thead>
<tr>
<th>Sex/Age</th>
<th>Level of Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Children and Dependants not Enrolled in School:

<table>
<thead>
<tr>
<th>Sex/Age</th>
<th>Children</th>
<th>Dependants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

9. Those who Enrolled but Abandoned School:

<table>
<thead>
<tr>
<th>Sex/Age</th>
<th>Children</th>
<th>Dependants</th>
</tr>
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</tbody>
</table>

10. What is the Reason for Abandonment of School or for not Enrolling:

   (a) Social  (b) Economic  (c) No School in the Area  (d) Others (specify)

11. Is Girls School Necessary?

   (a) Very Necessary  (b) Necessary as that of the Boys  
   (c) Of less Importance to that of the Boys  (d) I do not think so.

12. For how long have you been living in this area?

   (a) Right from birth  (b) Moved recently  (c) Just here for cultivation.

13. What types of latrines are used in the area?

   (a) Pit latrines  (b) Bucket latrines  (c) Open space (bush).

14. Source of drinking water in the area:

   (a) Dug wells  (b) Bore holes (hand pumps)  (c) Streams  
   (d) Depressions  (e) River Nile.

15. Incase of sickness, what remedy is available?

   (a) Herbs  (b) Tablets from the shops  (c) See health centre
16. What types of animals do you have?
(a) Cattle (b) Goats (c) Sheep (d) Cattle, Goats and Sheep
(e) Goats and Sheep (f) Cattle and Goats  (g) cattle and Sheep.

17. Is your animal wealth ____?
(a) Increasing  (b) Decreasing (c) Remaining Constant.

18. How do you graze your animals during dry season?
(a) Release and gathered in the evening
(b) Keep watch over them during day
(b) Taken to distant grazing lands away from fields of crop
(c) Others (specify)______________________________

19. Land ownership:
Do you own land?
(a) Yes  (b) No

20. If yes, specify the type of ownership:

<table>
<thead>
<tr>
<th>Type</th>
<th>Area in feddans</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Communal</td>
<td>_______________</td>
</tr>
<tr>
<td>(b) Inherited</td>
<td>_______________</td>
</tr>
<tr>
<td>(c) Lend</td>
<td>_______________</td>
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<tr>
<td>(d) Rent</td>
<td>_______________</td>
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<tr>
<td>(e) Purchased</td>
<td>_______________</td>
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<td>(f) Others (specify)</td>
<td>_______________</td>
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21. What difficulties do you experience in your farming activities?
(a) Pests and diseases  (b) Animal diseases (c) Soil erosion
(d) Hunger and human diseases  (e) Lack of tools and seeds
(f) Extension training

22. Success in farm production can be attributed to?
(a) Good rains (b) Extension services  (c) Size of land cultivated
(d) Good market prices.
23. If your farm production is below your family needs, which month/months do you experience food shortage?
   (a) March – June (b) July – October (c) November – February.

24. What do you use for household energy activities?
   (a) Animal dung (b) Firewood (c) Charcoal (d) Crop residues
   (e) Kerosene and Diesel (f) b & c.

25. How is your firewood obtained in the area?
   (a) Gathered from dead wood around (b) From cut and dried wood
   (c) From the market (d) All the above

26. Who gathers the firewood?
   (a) Children (b) Women (c) Women and children (d) Men

27. Are the trees preferred for firewood still available in the area?
   (a) Available (b) Available but far (c) Decreasing very fast.
   (d) No longer available

28. Is the price of firewood and charcoal ________?
   (a) Increasing (b) Remaining constant (c) Decreasing (d) I don't Know

29. In your opinion, is the vegetation under destruction due to?
   (a) Agricultural activities (b) Human needs and construction activities
   (c) Grazing (d) Others (specify) ____________________________

30. Have you noticed any sign of soil deterioration
   (a) Yes (b) No

31. What do you think soil degradation leads to?
   (a) Decrease in crop yield (b) Decrease in grazing area
   (c) Disappearance of some plants (d) Appearance of unpalatable plants to animals
   (e) Others(specify)

32. What activities do you know that Swedish Free Mission did in the area?
   (a) Food production (b) Relief work (c) Provision of clean water
   (d) Food production & relief work