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&
SOUTHERN NEW HAMPSHIRE UNIVERSITY**

**MASTER OF SCIENCE IN COMMUNITY ECONOMIC DEVELOPMENT
(2005)**

**ENVIRONMENTAL CONSERVATION USING RICE
BY-PRODUCTS AND REAFFORESTATION
NDUNGU VILLAGE**

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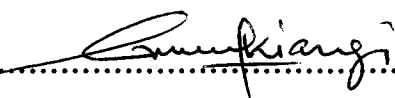

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DECLARATION BY THE CANDIDATE

I declare that, this document is my original work and that it has not been submitted for similar degree in any other university.

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Date..... 20TH SEPTEMBER, 2005.....

SUPERVISOR'S CERTIFICATION

I have read the student's work and found it to be in a form acceptable for final submission.

Name of Supervisor *NGEMBA MPR MAKUREL*

Signature *M. Makurel* Date Certified *20TH SEPTEMBER, 2005*

ABBREVIATIONS

CBO	Community Based Organization
CBFM	Community Based Forest Management
DC	District Council
EIA	Environmental Impact Assessment
FAO	Food and Agricultural Organization
FN	Facilitator's Notes
FBD	Forest and Bookkeeping Division
IUCN	International Union for Conservation of Nature
IFC	International Forest Conservation Agency
JICA	Japan International Cooperation Agency
JFM	Joint Forest Management
NADP	Ndungu Agricultural Development Project
NEMC	National Environmental Management Council
NGO	None Governmental Organization
NORAD	Norwegian Agency for Development
PFM	Participatory Forest Management
RAS	Regional Administrative Secretary
SFM	Sustainable Forest Management
SWAP	Sector Wide Approach
TANESCO	Tanzania Electric Supply Company
TATEDO	Tanzania Traditional Energy Development and Environmental Organization
TFA	Tanganyika Farmers Association
UNEP	United Nations Environmental Program
URT	United Republic of Tanzania
VEO	Village Executive Officer
VG	Village Government
WDC	Ward Development Committee.

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CHAPTER ONE

1.0 BACKGROUND INFORMATION

1.1 INTRODUCTION:

1.1.1 Village Organizational Structure

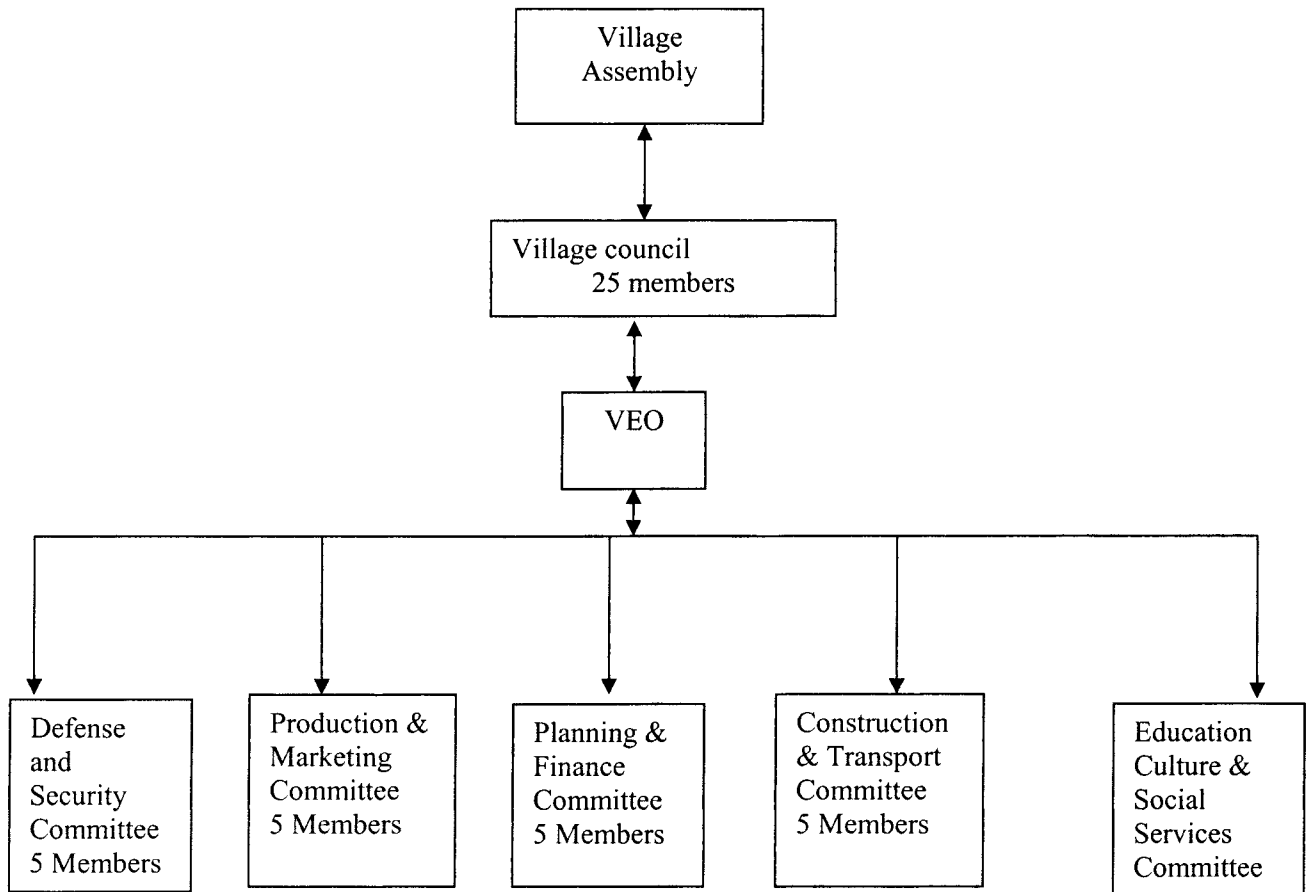
Villages in Tanzania are considered as community Based Organizations. (CBOs)

A large Majority of Tanzanians live in villages in rural areas, their main economic activities being farming and animal husbandry to support their life.

The villages and Ujamaa Villages Act, no. 21 of 1975 established governance organs at the Village level. The Act provides for the establishment of village Councils, village government, a number of Committees, and further stipulated the powers, responsibilities and duties of the village councils. The people aging 18 years and above, constituted the village Assembly, which elected leaders and other representatives including the village council whose members are supposed to be 25 only.

This was the highest organ for decision making in the village. Then there were five committees each comprising five members. These were the Defense and Security Committee, Production and Marketing Committee, Planning and Finance Committee, Construction and Transport Committee. Also there was Education, culture and Social Services Committee. All the committees and other organs are shown in the following organizational chart at the village level.

Village organization structure



1.1.2 The Constitution of the United Republic of Tanzania

The constitution of United Republic of Tanzania (URT) is the one, which has established the villages in Tanzania. This is well stipulated in the following cited articles of the constitution. Article 145 (1) of the constitution of the United Republic of Tanzania of 1977, expressly provide for local government at local levels where a village is expressly mentioned. *Also other statutes*, which talk about the village establishment, include Local Government (Urban Authorities) Act of 1982 and Local Government (District Authorities) Act of 1982 underscore devolution of powers to local levels and democratization being the fundamental basis of Local Governance.

The implication of these provisions is that the village governance is established by the constitution as a level of governance and that the village government has constitutional *foundation*.

1.1.3 The Fundamental Basis of Local Governance

➤ Article 145 (1) of the Constitution of the URT 1977, states that: -

Local government authorities shall be set up in each Region and District in both urban and rural areas throughout the URT. They shall be of the type and designation prescribed by law to be enacted by Parliament.

➤ Article 146 (1), stipulates clearly that the purpose of having local government authorities is to transfer authority to the people. Local government authorities shall have the right and power to participate and to involve the people in the planning and implementation of development programmes within their respective areas and generally throughout the country.

➤ Section 4 of the 1982 Local Government Acts provides that, the Minister shall in exercising the powers and discharging the functions under this Act, be guided and bound by the need to promote the decentralization and the devolution of functional powers and services from the central government system to local government and within the local government system from district council level to lower level of local government.

What can be noted here *is the so-called development from below*, which has been defined as the concept embracing the process of devolution and de-concentration. Devolution being a legal deposit of power to discharge specified or residual functions with formally constituted state or local authorities. De-concentration on the other hand is the “delegation of responsibility and authority by the central government to regional or local units within the definite geographical areas”. Under devolution there is a real transfer of powers and authority, while in de-concentration there is only an administrative structuring, without transfer of final authority. (URT constitution 1977). It can be concluded that *“A village is an organizational unit of community development.*

1.2 NDUNGU VILLAGE.

Ndungu village is located in the Eastern Low lands of Same District in Kilimanjaro Region in the North Eastern part of Tanzania in East Africa as shown in appendix IIIc.

In 1988 Japan Government through its development agency JICA extended a grant to the government of the United Republic of Tanzania for the purpose of improving cereals production in Kilimanjaro region aiming at the areas around lower Moshi and Ndungu village. In the same year JICA in collaboration with Ndungu Villagers established a project called *NDUNGU AGRICULTURAL DEVELOPMENT PROJECT (NADP)*.

1.2.1 Objectives of the NADP

- i) To improve rice yield per hectare
- ii) To improve agricultural field operations i.e. Land preparation, Seed preparation, Planting, Weeding, Irrigation system, Harvesting, Processing and Transportation.
- iii) To reinforce cooperation of Ndungu farmers.

1.2.2 Project activities /Programmes.

In order to achieve the pre-determined objectives, the project had to carry out the following activities: -

- i) Leveling and Partitioning of 680 hectares.
- ii) Constructing water supply system for irrigation.
- iii) Constructing Organizational and Management office, Training facilities and post – harvest facilities with a floor area of 2,590 square meters.
- iv) Improving domestic water supply system in terms of quality and quantity for 13,200 Villagers.

1.2.3 Achievement by the JICA project

In the year 1990 all intended activities were accomplished and the production activities started thereafter. One of the project objectives was to improve rice yield per unit area so the yield rose from 3 tons per hectare to 7 tons per hectare, i.e.

233.3% improvement. On the other hand all agricultural field operations were improved and enabled farmers to work more efficiently than before; for example land preparation is done by using tractors.

1.3 PROBLEM IDENTIFICATION

The problem was identified after conducting a survey by asking twenty villagers each to list down five needs of their village and the outcome was as indicated in table 1.

Table 1. Percentage of responses by need

Need/Requirement	Score	Percentage
i) Tarmac road	20	100%
ii) Another Secondary School	14	70%
iii) Modern Health Center	18	90%
iv) Reliable supply of fertilizer	17	85%
v) Fuel for domestic use	20	100%
vi) Grazing area	9	45%
vii) Village car	5	25%
viii) Village rice miller	7	35%

The need for fuel was given first priority although the need for tarmac road is also a crucial one for the people of Ndungu. This need was left aside because it involves all villages in the Eastern part of Same District and the study focuses on a single CBO. It has been observed that the village is supplied with electricity and most of the villagers use wood fuel as source of energy for cooking food and burning bricks while electricity is a source of light only.

Based on the study conducted in Ndungu village 96% of the interviewees claimed that electricity is expensive if used as source of heat energy compared to fuel wood i.e. charcoal and firewood. Also women respondents revealed that firewood collection is currently a very difficult work because they have to walk long distances to get this source of heat energy.

The problem of getting firewood could be considered as an indication of environmental

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Also women respondents revealed that firewood collection is currently a very difficult work because they have to walk long distances to get this source of heat energy.

The problem of getting firewood could be considered as an indication of environmental degradation. So a quick survey on environmental impact assessment was done at Ndungu areas in collaboration with Ndungu Agricultural Development project and came up with the following findings.

- i. Over population has created a very high demand for fuel wood, which has lead to severe tree felling (deforestation).
- ii. After the trees were cut other problems have emerged i.e. soil erosion, scarcity of firewood, poor rainfall and drying of water sources.
- iii. Tree felling has been extended to the adjacent villages i.e Lugulu, Vumba, Kalemane and Mroyo.

1.4 STATEMENT OF THE PROBLEM

Improved agricultural practices at Ndungu Village have attracted many people from other villages. The survey has shown that 29% of the rice growers and 88% of business people have migrated to Ndungu village from different places. The population in the year 2003 was 12,950, and in the year 2004 it has increased to 14000 people (an upward of about 8%). Living standard of the people improved greatly because of an improved income and food supply. Before the introduction of the project, annual yield of rice per household was 1.5 tons and after the take off of the project the average annual yield per household is 9.1 tons. The improvement of yield was the main objective of the project (NADP).

However an environmental assessment carried out by the researcher around Ndungu

premises has revealed that, there is a very great loss of trees because of high demand for fuel wood in a form of fire wood and charcoal. Nearly three quarters (71%) of the studied population use firewood as source of heat energy while 28% depend on charcoal and 1% use electricity. The use of firewood has been extended to brick burning. All houses, which are constructed now in the village, are of burnt bricks (improved houses).

All trees along the river (which is the major source of irrigation water) have been cleared out. In general the land is left bare and unprotected; as a result this has caused:

- Soil erosion
- Excessive evaporation from the river reducing greatly the amount of water during dry season.
- Reduced production volumes of rice by 25 % because during dry season only half of the area is cultivated (cultivation is done twice in a year).
- Due to chemical fertilizers and irrigation practices some of the farm areas have developed salt-affected soils (saline soils and Alkali soils). Saline soils are sometimes referred to as *white alkali* because of the appearance of a white crust on the soil's surface after the evaporation of water. The salts in saline soils are mostly chlorides and sulphates of calcium, magnesium and sodium.

Alkali soils contain substantial amounts of sodium carbonate (Na_2CO_3), which hydrolyses to Sodium hydroxide (NaOH). They are often called *black alkali* because the surface appears black or brown due to the reaction of organic matter with sodium hydroxide, which breaks down the organic matter. The dispersed organic matter imparts the black colour to such soils.

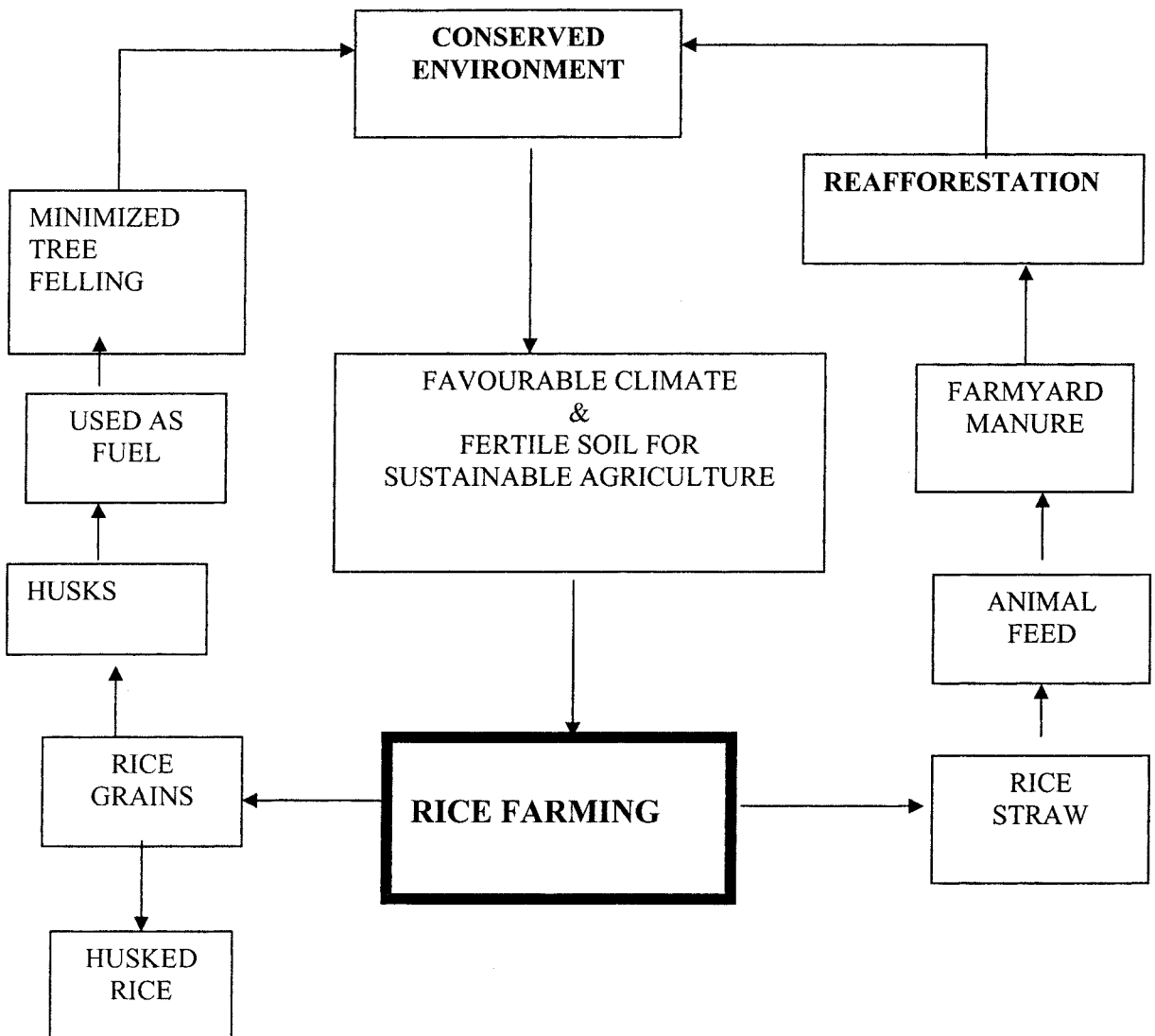
According to the problems which have been identified i.e. soil erosion and drying of water sources because of felling trees and the formation of salt – affected soils due to the use of

chemical fertilizers, the study focuses on developing participatory community based approaches to conserve the present environmental degradation happening in Ndungu village.

Specifically the study will address tree felling, soil erosion and community involvement and local authority by-laws. To guide the intervention process on the identified problems the following conceptual framework has been proposed.

THE CONCEPTUAL FRAMEWORK

The use of rice by – products in environmental Conservation.



The conceptual framework shows that from rice plants, we obtain food materials and by-products such as straws, and husks.

The straws may be used as animal feed and be converted to farmyard manure which can be used in the improvement of soil fertility.

The husks may be used as fuel and help in reducing tree-felling practice in the community. Using both straws and husks in this way will enhance soil and forests conservation and therefore bring about favorable environment for agriculture.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Review

2.1.1. Development and Environment.

Wherever there is development, human beings are interacting with the environment. People meet their basic needs by harvesting and utilizing the earth's natural resources such as water, air, plants, soil and wildlife. In the process, people can severely harm or destroy the environment that provides these resources. Often human activities damage the environment's capacity to satisfy human needs. When this happens the quality of life is inevitably affected.

Environmental problems are a global concern. Among other factors, poverty, overpopulation, and emphasis on short-term economic gain without regard for environmental consequences are some of the causes of environment degradation. Throughout the world, national governments and private groups have begun to realize that improvement of national natural resources means an improvement in the lives of their citizens. From this idea the concept of sustainable development was developed, that, sustainable development as a concept has been defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. According to the World Commission on Environment and Development (1987).

This definition was found to be ambiguous hence in 1992 the United Nations Environment programme (UNEP) suggested the following definitions: -

- Sustainable development means improving the quality of human life while living within the carrying capacity of supporting ecosystems.

- Sustainable economy is the product of sustainable development, it maintains its natural resources base and it can continue to develop by adapting to changing circumstances and through improvements in knowledge organization, technical efficiency and wisdom.
- Sustainable living indicates the lifestyle of an individual who feels the obligation to care for nature and for every human individual and who acts accordingly.
- There are many concepts on sustainable development but in this paper sustainable development is defined as consisting of policies, strategies, plans, production systems, and technologies used in executing projects and programmes aimed at satisfying real human needs in perpetuity while maintaining environmental quality, biodiversity, the resilience of ecosystems and the welfare of all organisms by integrating conservation, management and rational utilization of resources at individual, institutional, community, national, regional, and global levels.

Conservation here, according to Jacobs (1988) is an indispensable part of a wide field known as *the wise utilization of natural resources* that aims at: -

- (a) Maintaining essential ecological processes and life – support system
- (b) Preserving genetic diversity and
- (c) Ensuring the sustainable utilization of species and ecosystems.

In its report entitled *our common future* the World Commission on Environment and Development (1987) states that sustainable development is development that meets the needs of today without compromising the ability of future generations to meet their needs.

Sustainable development requires a growth where increased productivity is combined with combating of poverty. At a minimum, sustainable development must not endanger the ecosystems that support life on earth. To attain this kind of development the population growth must not exceed the productive potential of the ecosystems.

The biosphere must, be managed in a way that preserve the nature's potential for future generations.

The concept of environmental protection has thus been considerably expanded and is different in content from what was formerly understood by the term *Nature Conservation*.

The protection of the environment, in the sense of ecologically rational management of natural resources, is understood today to be a necessary condition for social and economical development and growth.

Environmental Protection (conservation) should therefore be integrated into social planning and project planning in equal terms with economic, political and other social-cultural considerations.

2.1.2 Environmental Problems

Any form of social economic development including life, depends on the environment. With increasing population and technological advancement without regards to the consequences; now the impact is showing potentially irreversible changes in the global environment. The main environment problems in the developed countries are due to overproduction and over consumption leading to the pollution of the environment and depleting the environmental resources. Whereas in the developing countries the main environmental problem is environmental degradation due to: Overgrazing, Deforestation and Over-cultivation. These lead to food shortage, hunger and poverty. Mankind has invariably exploited the physical environment, there by creating environmental problems we are experiencing today. These problems can be distinguished between environmental changes of global significance and changes, which although occurring in variety of environment contexts, have only a local or a regional context. The local impact may, however, be of great importance to those affected. The environmental impact on human communities is not globally uniform, but the sum total of this impact is creating changes on

global scale that is altering life support system (NORAD 1989).

All development projects, will to a greater or lesser extent tend to affect the environment. The type of environmental impact may be classified as either Direct (primary) or Indirect (Secondary tertiary etc). The direct impacts are the simplest to predict, but many types of impacts appear to be indirect through a long chain of cause and effect, over which it can be difficult to get a clear overall view. This may be viewed in both positive and negative impact. This perspective on environmental impact suggests that before initiating any development project Environmental Impact Assessment (EIA) should be carried out together with all other planning processes.

2.1.3 Environmental Impact Assessment (EIA)

The EIA – system consists of three stages; -

- Initial screening of project
- Initial environmental assessment
- Full assessment

All the three stages make a complete or an actual environmental Impact assessment.

An EIA should be carried out at the earliest possible stage of the planning process, and it must be integrated into all regular planning and decision making. The number of assessment stages a project must pass through will be determined by the probable extent that the project will cause major environmental impacts. In case of large and controversial projects a full assessment is essential.

The first stage is to predict whether major impacts on the environment may be expected to occur and make recommendations as to what action should be taken. In this stage the checklists developed by NORAD (1989) will be adopted and used as working tools in analyzing the environmental impact. Four checklists for Agriculture, Livestock holding, Forestry and Water supplies will be used.

(i) Agriculture

The project should be subjected to a more detailed assessment if it fulfils one or more of the criteria set out below; or if insufficient information is available to answer “no” with a reasonable degree of certainty.

The questions to be asked by an environmental impact assessor are: -

Will the project lead to a substantial increase in acreage under cultivation?

- Remove or change the natural vegetation in areas exposed to desertification, Areas with tropical rain forest, or areas with especially productive or vulnerable types of vegetation?
- Will the project affect areas with animal and plant life, which is worthy of protection, or areas with particularly vulnerable ecosystems?
- Lead to a substantial increase in erosion?
- Lead to a substantial pollution of water and soil?
- Affect areas with historical remains or landscape elements, which are of importance to the local population?
- Will the project change the way of life of the local residents in such a way that it leads to a considerably increased pressure on the natural resource base?
- Lead to major conflicts with regard to existing land use and ownership of land?
- Will the project obstruct or lead to substantial changes in the local inhabitants
- Exploitation or use of natural resources and land other than those directly affected by the project.

(ii) Livestock holding.

As stated above the project should be subjected to a more detailed assessment if it fulfills or more of the criteria set out below, or if insufficient information is available to answer “no” with a reasonable degree of certainty.

The questions to be asked by an environmental impact assessor regarding livestock holding are as follows.

Will the project: -

- Change the vegetation in areas exposed to desertification, in areas with especially vulnerable types of vegetation, or in areas with animal and plant life worthy of protection?
- Lead to a substantial increase in erosion?
- Lead to a considerable increase in water consumption in areas with limited water resources?
- Create pollution problems?
- Lead to increased grazing and increased problems due to trampling in areas with limited pastures?
- Obstruct the protection and development, or traditional management, of wildlife stocks?
- Lead to the spreading of diseases among domestic animals?
- Change the way of life of the local population in such a way that it leads to considerably increased pressure on the natural resource base?
- Lead to major conflicts with regard to existing land use and ownership of land?
- Obstruct, or lead to substantial changes in the local population's exploitation or use of natural resources and land other than those directly affected by the project.

(iii) Forestry:

The questions asked by the environmental impact assessor regarding the forest are as follows: -

Will the Project:

- Lead to a higher degree of felling than the natural rate of growth?
Lead to considerable encroachments on tropical rain forest or other particularly vulnerable areas?
- Lead to a substantial increase in erosion?
- Introduce tree species of which there is little ecological experience?
- Affect areas with plant and animal life, which are worthy of protection, or areas with especially vulnerable eco-systems?
- Affect areas with historical remains or landscape elements, which are of importance to the local population?
- Change the way of life of the local population in such a way that it leads to considerably increased pressure on the natural resource base?
- Lead to major conflicts with regard to existing land use and ownership of Land?
- Obstruct, or lead to substantial changes in the local population's exploitation or use of natural resources other than those directly affected by the project?

(iv) Water Supplies and Irrigation

This includes projects, which for example comprises tapping of groundwater, reduction of water in watercourses, creation of open channels and reservoirs and changes in water utilization.

The questions asked by an environmental assessor regarding water supply and irrigation are

Will the project:

- Lead to tapping of ground water in such quantities that there is a danger for permanently lowering of the groundwater – table?
- Flood areas which are of great local importance because of human settlement, agriculture, animal husbandry, or similar?
- Flood areas which support animal or plant life worthy of protection or especially vulnerable eco-system?
- Flood areas, which contain historic remains or landscape elements, which are important to the population?
- Cause a noticeable reduction in the flow of nutrient elements or fish production?
- Lead to substantial water logging or salination of cultivated or cultivable land?
- Create pollution problems?
- Create a risk for increased spread of water – borne diseases?
- Change the way of life of the local population in such a way that it leads to considerably increased pressure on the natural base?
- Lead to major conflicts with regard to existing land use and ownership of land?

- Obstruct, or lead to substantial changes in the local population exploitation or use of natural resources or land other than those directly affected by the project?

2.1.4 Environmental Issues

The environmental impact of human communities is not globally uniform, but the sum total of this impact is creating change on global scale that is altering support system.

2.1.4.1 Global Environmental Issues.

The current global environmental issues include the followings: -

- Deforestation.
- Fossil fuel energy production
- Global warming together with greenhouse gases effect.
- Loss of biodiversity.
- Population growth and demographic trends
- Bio – technology and genetic engineering.

Among the issues this paper is going to focus on is deforestation.

2.1.4.2 Deforestation

Forests are very useful to man. Our livelihood depends upon a wide range of forest products and services. In brief the diverse functions of forests can be stated as follows: -

- (i) Forests provide a number of products such as timber, firewood, nuts, fruits, seeds, medicinal plants etc. without which human life shall become miserable.
- (ii) Forests shape natural environment by influencing such factors as temperature, humidity and precipitation.
- (iii) Forests shape the soil environment by affecting its composition, structure, the chemical properties, water contents etc and play an important role in bio-geo-

chemical cycles of Water, Carbon, Nitrogen, Oxygen, Phosphorus, Sulphur, and a number of other elements.

- (iv) Forests help in checking soil erosion by obstructing currents of water or air, roots of plants bind the soil particles together in larger lumps, which is helpful in preventing erosion.
- (v) Forests influence flood conditions by intercepting surface runoffs, infiltration, evaporation etc. which is helpful in water retention by the soil and in recharging ground water resources.
- (vi) Forests help in public health protection by reducing physical and chemical contaminants of the environment. Forest soils and vegetation acts as an effective sink for a number of pollutants.
- (vii) Forests provide suitable habitats for a number of important plant and animal species. They help in maintaining a broad genetic base from which future strains and varieties could be developed (Asthana 2003).

2.1.4.3 Major Causes of Deforestation.

According to a global survey conducted in 1970 A.D. about one – fifth of earth's closed forests covered land with a canopy cover of over 20% or more while another 12% was under the open woodland with 5 – 19% of canopy cover (Parson 1974).

This forest cover is already considered a *meager* one and even this too is shrinking at a fast rate. However, elsewhere on this globe conditions are different. Extensive deforestation has been taking place in developing countries, which lie, in tropical and temperate regions of the world.

According to a study by FAO/UNEP (1981) it was estimated that in the 20th century there were 7.0 billion hectares of trees. However, there has been enormous tree felling globally and if this trend continues we will be left with only 2.35 billion hectares of trees by the end

of the 21st century. In the same study it was observed that an estimated 7.3 million hectares of rich tropical forests are lost every year. In other words 14 hectares of closed forest are lost every minute. This situation is more common in tropical areas where tropical forests are being destroyed every year at a rate of 30 times faster than they are being replanted (Masatu 2001). This observation is caused by: -

i) Agricultural activities:

In Africa, Latin America and Asia, forests are destroyed through burning and felling. Lack of land and rapid population growth have necessitated both intensive and large scale agricultural activities. The aims are to produce ample food and cash crops for export to earn foreign exchange.

(ii) Energy and mining.

In many parts of the developing world, forests are destroyed to open up land for hydroelectricity dams. Major mining projects have also contributed to forest degradation (Masatu 2001).

(iii) Logging

Vast tracts of forest are cleared for the roads which logging companies build.

This initial clearance is followed by those who settle in the forest land for logging purposes. The logging itself is highly destructive. For every tree cut many more trees are destroyed and the soil is sufficiently disturbed to prevent regeneration. This leaves a badly dried environment. Worse still, cleared area dry out quickly and easily catch fire (Johnson and Dykstra 1978).

(iv) Cattle ranching.

Large areas of tropical forests in central and South America have been cleared for use as grazing land to raise cattle for export to USA. But In those cases too the problem of poor productivity of tropical soil makes the venture non-viable. The soil degenerated within a short span of time due to overgrazing and massive soil erosion

occurred. Cattle ranching has done much damage to the tropical forest cover in south and Central America (Fearnside 1980).

(v) Fuel wood.

Fuel wood is one of the threats to tropical dry forests. The fuel wood requirements of urban people are even increasing. The tropical forests that are close to urban areas are under the threat not only for wood but also for the land.

Charcoal burning is a major cause of degradation in the poor nations. But it is

Also an attractive source of income in towns and cities. About two billion people are short of fuel wood to cook their food. This problem is acute in the arid and semi- arid areas of Sub- Sahara Africa especially in poor rural areas where a lot of trees are being cut for preparing charcoal to serve the urban market.

2.1.5 Local Environmental issues.

(i) Acidification and Eutrophication.

Acidification and eutrophication are processes that occur naturally in the environment as a response to changing nutrient status in the soils, the run-off from which influence the pH and nutrient loading of the drainage system.

Currently it has been noted that human activities together with population growth have accelerated the rates of these processes. These processes have since become environmental issues because of the adverse impacts they have had on environmental quality. Cultural eutrophication result from high concentration of people, which in turn produces a range of waste products, notably nitrates and phosphate, in sewage and wastewater. Furthermore, the intensive use of nitrates and phosphate fertilizers, which, in conjunction with inappropriate cropping systems, also contributes significantly to nutrient enrichment in aquatic environment.

The industrial emissions containing the acid gases- sulphur dioxide (SO₂) and Nitrous (NO), produced through combination of fossil fuels are one of major air pollution in developed countries. The accumulation of acidic gases leads to “acid rain” formation. The problem of acidification has also political repercussion, mainly due to the fact that high acid producing nations are not only polluting themselves but also their neighbors.

(ii) **Loss of habitats and biodiversity.**

Usually disturbances of any type in an ecosystem tend to reduce its biological diversity as human population creates an ever-increasing demand for raw material, food and space. This demand is directed to the natural ecosystem while enormous quantities of wastes and other pollutants are introduced into the environment. The pressure of human demands and pollutions of environment collectively damage the biotic component of natural system either partially or completely.

Major causes of reduction in biological diversity can be viewed in various ways including the need of space and food and raw materials for expanding human establishments. Among others, this is one of the most important singular cause of such a rapid decline in biodiversity. Much of the surface area of our globe where agriculture or cattle ranching is possible has been brought under human use.

All over the world the process of biological impoverishment is taking its toll of species.

Biological diversity is the richness and vast variety of forms of life on earth. There are almost 1.5 million species on earth, which have been classified and named, including insects, birds, fish, animals, plants and other life forms. Scientists estimate that there are about 5 – 30 million species on earth. Now a number of species becoming extinct at an ever increasing rate, and with them the whole range of possibilities that once existed within that species.

Thus, conservation of biodiversity entails prevention of extinction and efforts to maintain the huge range of differences among and within the species of the earth. It is estimated that the rate of species extinction had accelerated to over 40,000 each year.

Loss of Wildlife habitats.

The use of land for agriculture has decreased the amount of space available for wildlife. Logging and timber harvesting and sometimes fire burning have destroyed habitats for wildlife.

Loss of wetlands.

Wetlands include a range of inland, coastal and marine ecosystems whose characteristics and processes are dominated by water. The range of wetland types is very wide, including, estuaries open coasts, flood plain, freshwater, marshes, lakes, peat lands, mangrove wetlands and swamp forests. The hydrology is the single most important determinant for establishment and maintenance of specific types of wetland processes. The wetlands are characterized by temporal variability in wetland hydrology (hydro period) this is the seasonal pattern of water level, with integrated inflows and outflows of water, which is influenced by the physical features of terrain and proximity to other water bodies. The mangrove ecosystems are of major importance to the livelihood of local communities in Asia, Latin America and Africa. Many villages sited within mangrove area harvest mangrove products for firewood charcoal and fishing.

(iii) Depletion of energy sources and its impact.

The major energy sources include oil, coal natural gases (fossil fuels) nuclear power, hydroelectric power and bio-mass fuel. The biomass fuels are a major energy, as well as for the rest of basic need. Production and use of all forms of energy has environmental consequences.

For example fuel wood burning contributes to deforestation and causes pollution. Electric production can cause serious pollution problems and environmental degradation.

Hydroelectric dams cause widespread environment degradation through flooding and regulation of downstream water flows. Nuclear power stations create nuclear waste, the disposal of which is very dangerous, burning of fossil fuel such as coal and petroleum also produces carbon dioxide, which contributes to climatic changes including global warming.

(iv) Soil Erosion.

Soil erosion refers to the removal of surface soil by running water or wind and being deposited elsewhere. Deforestation, Agriculture, Mining and Construction may give rise to accelerate erosion. This can create a variety of environmental problems such as decline in land productivity, excessive situation of drainage systems. Accelerated soil erosion and its environmental impacts are increasingly becoming a major problem throughout the humid tropics as forests are cleared. Therefore the major current problem facing conservationists is the adoption of soil conservation measures Particularly in developing countries.

(v) Desertification.

It is the term applied to the process of land degradation that ultimately leads to transformation of productive lands into ecological deserts. The main cause of deserts is mans activities, which leads to reduction or destruction of vegetation cover such as overgrazing, uncontrolled fire, faulty irrigation in dry area, urbanization and other activities, which disturb the natural conditions. The land is exposed to wind and water erosion, which accelerates the degradation process. The restoration or recovery of the so damaged lands may take a long period. In many instances the damage is irreversible.

(vi) Waste disposal.

The main wastes in developing countries may be categorized as: -

- (i) Agricultural and mining waste (ii) Industrial waste (iii) Human habitat waste.

The disposal of such materials has become a problem to the environment. Community participation, community by-laws and physical destruction or recycling of the wastes may be used to control the situation.

2.2 EMPIRICAL REVIEW

2.2.1 Meaning and principles of forest conservation.

Deforestation is a consequence of over exploitation of our natural ecosystems for spaces, energy and materials. To maintain a healthy environment and obtain a sustainable supply of a number of forest products, natural forests should involve the following two aspects, prevention of deforestation and Extension of our forest wealth (Todaro 2003).

- (a) In order to prevent an extensive deforestation the society should adopt rather strict measures, which involve controlling unregulated expansion of agriculture and cattle ranching at the expense of our natural forests, unregulated grazing and destruction of green cover and unregulated fuel wood collection and tree felling.
- (b) In order to extend poor forest wealth we have to utilize the plenty of space around us such as hill slopes, arid regions to plant more trees. This exercise needs a combination of soil conservation measures and techniques of growing and maintaining plant life.

It also needs the co-operation of local people without which all efforts could end up in utter failure.

To sum up the discussion above we can conclude that the conservation of forest requires two principles, policy formulation to prevent deforestation practices and replanting trees on bare places and where trees have been harvested.

2.2.2 International forests conservation.

Within the developing countries, in recent years, there is a growing awareness of the many interrelationships between deforestation and land degradation, floods, droughts, famine and rural poverty. Popular movements in several countries by indigenous and other groups negatively

affected by the deforestation process have contributed to political concern about deforestation issues.

There is now ongoing debate among conservationists about how remaining forests in developing countries could best be protected, sustainably managed and used (Barracough and Ghimire, 1995). In the rich industrialized countries in the North, the recent concern about deforestation in developing countries is partly explained by increasing evidence that the rapidly disappearing tropical forests contributing significantly to global climatic changes. Scientists, industrialists and civic leaders also commonly emphasize the scientific and industrial importance of preserving the rich biological diversity found in tropical forests. The growing environmental awareness in the north is also closely associated policies proposed by dominant political parties. Several environmental groups are now increasingly concerned with plight and future prospects of forest-dependent indigenous people in developing countries (Barradough and Ghimire, 1995).

International concern about deforestation has been articulated through the United Nations system, of which the 1972 Stockholm conference of the Environment programmer is the most notable example.

The world conservation strategy emphasizing the interdependence of conservation and sustainable development was launched in the early 1980s by the International Union for Conservation of Nature (IUCN) together with the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environmental Protection Programme (UNEP), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and by the World Bank and the United Nations Development Programme (UNDP). The United Nations system had a role in organizing the "Global Conference on Environment and Development" (UNCED) referred to as "Earth Summit" in Rio de Janeiro, Brazil held in June 1992.

Deforestation issues received high priority in preparation discussions as well as in the UNCED proposed plan of action, known as "Agenda 21". This declaration stated that, "Deforestation is a result of many causes some natural, but mainly due to human development, such as inappropriate land tenure systems and incentives, expansion of agricultural areas, increased forest product demand and lack of information and understanding on the value of forest (UNICEF, 1992 p 58). The Rio declaration emphasizes the critical value of natural forest in protection of biodiversity and the role of forest in contributing to wood supplies, watershed and soil protection, carbon dioxide absorption and to reduce pressure to overexploit natural forests. Against this background UNCED proposed an international forestry convention aimed at providing legal basis for protecting biodiversity and regulating forestry use in developing countries, but this was subjected to a heated debate. The Northern governments favoured more international controls, while southern governments argued strongly in favour of local community control (UNCED, 1992).

Tropical deforestation will undoubtedly continue to be a central international issue during coming years, but the socio-economic and implications continue to be rather poorly

understood if the widely conflicting claims about its causes extent, impact and remedies can be taken as evidence (Barra clough and Ghimire 1995). International Union for the conservation of Nature Institute.

- (i) Develop national and international policy frameworks to foster the sustainable use of natural resources and the maintenance of biodiversity.
- (ii) Design and adopt accounting system that give appropriate economic value to natural resources and establish economic pricing based on the polluter pays principle.
- (iii) Promote conservation action through international cooperation and national planning.
- (iv) Maintain representative example of the full spectrum of ecosystems, biological communities, habitats and their ecological process.
- (v) Increase scientific understanding of natural resources and apply that understanding to their efficient management.
- (vi) Expand research into the biophysical resources as a basis for improving management.
- (vii) Develop indicators of social sustainability and incorporate them into overall indicators of sustainable development.
- (viii) Give full consideration to issues of cultural diversity when designing and implementing projects.

2.2.3 National Forest conservation

According to the National Forest Programme (NFP) Tanzania is endowed with large and valuable forest resource. Recent studies indicate that forest-based income accounts for a large share of rural income in the country.

Forest related goods and services have a significant potential for the economic development of the country (NFP Nov. 2001).

At the same time, Tanzania is facing serious environmental degradation problems. Among the most important ones are deforestation and forest degradation. For a long time the government of Tanzania has attempted to curb the problem of deforestation by promoting village and community forestry aimed at producing sufficient amount of forest products and service to meet both local demands and promote the forests contribution to global environmental conservation. Despite these efforts, environmental degradation continues at a fast rate. This is partly due to unsustainable land-uses such as shifting agriculture, but more so because of the relationship between environmental degradation and poverty in attempts to satisfy basic needs.

The consequences have been loss of biodiversity and general decline of forest products and services such as fuel wood, and water catchments value. The government of Tanzania has realized that a more comprehensive approach was needed to ensure sustainable forest management in country.

Also recognizing The broad and cross – sectoral linkages between the forestry and other sectors, the NFP has thus been prepared taking into consideration macro-economic and social policy developments related to land-based resources such as land, environment, water, energy and agriculture.

The NFP is an instrument for implementing the National Forest policy approved in 1998 towards sustainable management of her forest resources. The NFP has been prepared through broad based consultations at local and national levels with key stakeholders of related sectors and institutions as well as development partners (NFP Nov 2001).

The most pressing environmental challenges in developing countries in the next few decades will be access clean water and sanitation indoor air population from biomes stoves and

deforestation and severe soil degradation almost common where house holds lack economic alternatives to unsuitable patterns of living.

The following table summarizes the principal health and productivity consequences of environmental damage in the developing word (Tadaro and Smith 2003).

Principal Health and productivity Consequences of Environmental Damage		
Environmental Problems	Effect on health	Effect of productivity
Water population and Water scarcity	More than 2 million deaths and billion of illness a year attributable to pollution poor household hygiene and added health risks caused by water scarcity	Declining fisheries rural household time and municipal costs of providing safe water, aquifer depletion leading to irreversible compaction, constraint on economic activity because of water shortage
Soil degradation	Reduced nutrition for poor farmers on depleted soils, greater susceptibility to drought.	Field productivity losses in range of 0.5 to 1.5% gross national product (GNP) common on tropical soil, off site station of reservoirs river-transport channels and other hydrological investments.
Deforestation	Localized flooding to death and disease	Loss of sustainable logging potential and of erosion prevention, water shed stability and carbon sequestration provide by forests.
Loss of Biodiversity	Potential Loss of new drugs	Reduction of ecosystem adaptability and loss of genetic resources.
Atmospheric Changes	Possible shifts in vector born diseases risks from climatic natural disasters diseases attributable to ozone depletion (perhaps 300,000 additional cases of skin cancer a year worldwide 1.7 million cases of contracts.	Sea -rise damage to coastal investments regional change in agricultural productivity disruption of marine food chain.

Source: From World Development Reports, 1992: Development and the Environment.

All those problems have been addressed in a number of studies that recommended various measures to be taken so that the environment could be conserved. Such measures include controlling unregulated expansion of agriculture and cattle ranching at the expense of our natural forests, unregulated grazing and destruction of green cover, unregulated fuel wood collection and timber harvesting and planting and/or replacing felled trees. These attempts have been made and are still being made by individual countries in East Africa to ensure that forests, as natural resources are properly maintained. Despite such measures the problem is still increasing. This observation indicates that tailored community participatory control measure should be developed and applied in the process of conserving our forests. For instance reforestation or replanting of trees both local and exotic species in the depleted areas, opening of new forest estates, establishment of game and forest reserve where the cutting of trees or hunting is completely restricted, and training foresters and game wardens and educating communities through direct and indirect methods of mass education on the need and importance of forest conservation.

In Tanzania the planting of exotic conifers particularly cypresses and pines has been encouraged, with a target of planting over 65,000 hectares by year 2000.

Conservation of biological diversity is a cross cutting issue. This will require cross sectoral collaboration in terms of creating awareness on their values for effective management in all development aspects. Provision of appropriate mechanisms for ensuring this is important in terms of protecting key biodiversity sites/habitants with endangered species and management approaches including use of local knowledge. Most of the highland close forests serve also as water catchments sources that serve both domestic and industrial water supply including hydropower generation. Collaborative management in these areas with all beneficiaries is crucial.

Key stakeholders include Division of Environment, National Environmental Management Council (NEMC), wildlife Division of ministry of National Resources and Energy and Minerals, Tanzania Electric supply company (TANESCO), Communities, private sector, CBOS, NGOS, and other Development partners.

A typical example of an NGO which is collaborating with the community to access to sustainable energy service for poverty reduction, economic growth and social development is the so called Tanzania Traditional Energy Development and Environment Organization (TATEDO). One of the goals of TATEDO is to reduce environmental degradation resulting from increased use of wood and fossil fuels.

In order to achieve the intended goals the NGO has developed a firewood and thus lessen the cost and emission in the house holds as well as women's and children's workload and time on the firewood supply (Web site www.tated.org).

Five strategies for implementing forest Resources conservation and management programme in Tanzania.

- (i) Participatory forest management (PFM) will be used to develop clear ownership for all forests on general lands. This will be done through villages and private individuals in participating in forests management. Under the land and village Act, the boundaries of forest reserves under central, local and village governments and private individual will be marked. It also gives user rights as incentives for sustainable forests management (SFM). Ministry of natural resources and Tourism, (Aug. 2004).
- (ii) Protected buffer zones around forest reserves with important biodiversity and water resource will be marked and managed in collaboration with local communities through schemes joint forest management (JFM) and Community Based Forest Management (CBFM).

Also the value of forest biodiversity in Tanzania will be analyzed in order to set priorities and make strategies and actions for implementation of the NFP.

- (iii) Methods will be developed to overcome the limited financial capacity of governments and villages by sharing the costs and benefits of implementing JFM and CBFM.
- (iv) The viability of gender sensitive participatory programmes will be evaluated in figure out the expected costs and benefits over the long-term (NFP, August 2004).
- (v) Sharing management responsibilities will be encouraged among local communities, civil society, executive agencies, and the private sector using updated management plans for plantations, private sectoral involvement will be achieved through leasing, joint ventures and contracting. Private and forest farms will be promoted. (NFP, August 2004)
- (vi) Coordination among stakeholders in different sectors will be encouraged. Development partners, civil society, the private sector and local communities will play key roles. The forest Development section of the forestry and Beekeeping Division (FBDO) will be in charge of the coordination. (NFP, August 2004). Implantation of NFP under community-based forestry will be largely guided at local levels through RAS, District council (DC), Ward Development committee (WDC) and village Government (VG). The local communities are the actual decision makers during the planning and implementation, but need be guided by the District authorities through established guidelines. Natural resources management is under the village Government and respective committees in the village level. These bodies are legal entities with respective powers. The government is engaged in program of reforestation by using fast growing hard wood trees.

The 1968/69 – development plan estimated Tanzania to requires over 850,000m³ of wood a year by the year 2000. From that high demand it was felt necessary that the planning rate be stepped up to a rate of 2,400 hectors per year (Tanzania Institute of Education 1997). Together with such plans and programs the rate of felling trees is very high comparing to the rate of planting (NFP 2004). This is mostly influenced by the rate of population growth.

Another problem is that the planted trees may face bad climatic conditions and dry off. Not only that but the planted trees cannot take the place of felled trees immediately, they have to grow for several years to be old enough for human use. This also suggests that an alternative to fire wood and charcoal should be worked on.

2.2.4 The use of different sources of energy other than fire wood in Tanzania

Existing literature points to alternative sources of fuel-wood and heat energy.

There are several sources of heat energy including sunlight, coal, gas, petrol, diesel, kerosene, Electricity livestock wastes.

-In Tanzania coal gas is now mined from Songosongo in Lindi Region and Kimbiji in

Dar es salaam. This type of gas is used by TANESCO for generating electricity. Another source is sunlight (solar Energy). This type of energy is used at individual level to institutional levels mainly as source of light during dark hours.

- Livestock wastes are used for the production of biogas . Biogas is used as source of heat and light energy. Regions identified as biogas users are Arusha, Kilimanjaro, Dodoma, Mara, Shinyanga and Dar es salaam . In these areas there are several livestock keepers.
- Petrol, Diesel, kerosene are fuels mostly used in urban areas. Kerosene is mainly used as light and heat.

In rural areas kerosene is a source of light while in urban areas where electricity is available it is used as a source of heat.

-Coal is a source of energy used for heating.

Heat energy from coal is used for boiling water in big containers and the steam so produce is use to run big plants. Coal is mined from Songwe – Kiwira in Mbeya Region.

Industries which are now using this source of energy are tea industries and Cement industries in Mbeya and Mgololo paper industry in Iringa .

Electricity is widely used in urban area as light and heat energy Taasisi ya Elimu { 2004 }

All these sources have not yet shown the ability to replace fire wood within the entire community of Tanzania. This may be explained by the economic status of the community members. The main problem is poverty which is related to lack of capital and Education. Because of poverty people can not organize the resources to get the energy required.

In places where lumbering is done like Arumeru and Lushoto sawdusts has shown to be a good source of heat energy.

The main occupation of Ndungu people is rice growing. They can also practice the use of rice husks as an alternative source of heat energy to wood fuel .The use of rice husks will help in reducing the rate of tree felling in this particular area.

2.2 POLICY REVIEW

There is need for economic incentives and legal and legislative instruments as a back – up for development projects, in which maintenance of environmental quality and the conservation of resources are given high priority. Without such instruments, it would be difficult to ensure the achievement of resources conservation and environmental quality and to take the necessary measures to enforce compliance.

In developing such legal and legislative instruments, would be necessary to develop appropriate guidelines based on ecological and economic principles at all levels.

2.2.1 International convention on forest conservation

i) Convention on biological diversity (Nairobi 1992).

Background and Objective of the convention

The convention on Biological Diversity has been developed due to the growing recognition that Biological diversity is a global asset of tremendous value to present and future generations. Despite the importance, threats to species and ecosystems have been so great and, species extinction caused by human activities continues at an alarming rate.

The objective of the Convention is to promote the conservation of biological diversity, sustainable use of its components and the fair and equitable sharing arising out of the utilization of genetic resources.

Date of Adoption:

The Convention was adopted in Nairobi on 22 may 1992.

Date of Entry into force:

The Convention entered into force on 29 December 1993.

Date of Ratification:

Tanzania ratified the Convention on 8 March 1996.

ii) The Cartagena Protocol On Biosafety To The Convention On Biological Diversity.**Background**

The Cartagena Protocol on Biosafety to the convention on Biological Diversity addresses the safe transfer, handling and use of Living Modified Organisms (LMOs)

That may have adverse effects on Biodiversity with a specific focus on trans boundary movements. The protocol establishes an Advanced informed Agreement [AIA] procedure for Import of LMOs, incorporates the precautionary principal and detailed information and documentation requirements.

Objective

The objective of the Protocol as contained in Article 1, is to contribute to ensuring an adequate level of protection in the field of Living Modified Organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity ,taking also into account risks to human health ,and specifically focusing on trans boundary movements.

Date of adoption:

The Protocol was adopted in Montreal January 2000.

Date of entry into force:

The protocol has not entered into force . The Protocol shall enter into force on the 90th day after the date of deposit of the 50th instruments of ratification ,acceptance ,approval or accession by states or regional economic integration organizations that are parties to the convention.

Date of ratification

Tanzania is yet to ratify the protocol.

iii] **United Nations Convention To Combat Dese ratification****Background**

The Convention to Combat Desertification arose as a result of the 1992 United Nations Conference on Environment and Development [UNCED], which was held in Rio de Janeiro, Brazil. The conference called on the United Nations General Assembly to establish an Intergovernmental Negotiating Committee [INCD] to prepare a Convention to Combat Desertification in those countries experiencing serious draughts and /or desertification, particularly in Africa.

Objective

The objective of this convention is to combat desertification and mitigates the effect of drought in countries experiencing serious draught and /or desertification, through effective action at all Levels, supported by International cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in the affected areas.

Date of Adoption

The Convention was adopted in Paris on 17th June 1994.

Date of Entry into Force

The Convention entered into force on 26th December 1996.

Date of Ratification

Tanzania ratified the Convention - April, 1997.

iv] **The United Nations Framework Convention On Climate Change (UNFCCC)**

Background

In the 1980s, scientific evidence Linking greenhouse gas emissions from human activities with the risk of global climate change started to arouse public concern.

Objective ;

The main objective of the Convention is to achieve stabilization of greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, within a timeframe to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Date of Adoption;

The UNFCCC was adopted in New York on 9 May 1992.

Date of entry into force:

The Convention entered into force on 21st March 1994, being the 90th day after the date of deposit of 50th instrument of ratification / acceptance /approval /accession.

Date of ratification

Tanzania ratified UNFCCC ON 17th April 1996.

v] **The Kyoto Protocol To The Convention On Climate Change.**

Background

When governments adopted the UN Framework Convention on climate change in 1992, they recognized it was a necessary step for stronger action in the future . The Convention establishes an ongoing process of review, discussion, and information exchange, making it possible to adopt additional commitments in response to changes in scientific understanding and in political will.

The first review of the adequacy of commitment of developed country was conducted as required at the first session of the Conference of the Parties which took place in Berlin in 1995. The parties decided that the commitment by developed countries to aim at returning their emissions to 1990 levels by the year 2000 was inadequate for achieving the Conventions long term objective of preventing dangerous anthropogenic interference with the climate system. Parties decided to adopt the Berlin Mandate and launched a new round of talks on strengthening developed countries Commitments.

The Ad Hoc Group on the Berlin Mandate [AGBM] was set up to draft an agreement . After eight sessions it forwarded a text to COP 3 for final negotiation.

Date of Adoption

Kyoto Protocol was adopted in Kyoto, Japan , December 1997 at the conclusion of COP 3.

Objectives

The Objective of the Kyoto is to strengthen the Commitments of developed country parties with a view to reducing their overall greenhouse gas emissions by 5% below 1990 levels in the first commitment period 2008 to 2012.

Date of Entry into force

The Protocol will enter into force 90 days after it has been ratified by at least 55 parties to the Convention, including developed countries accounting for at least 55% of the total 1990 CO₂ emissions from this industrialized group.

Date of Ratification

The process of ratification is underway.

2.3.2. NATIONAL FOREST POLICY

Over the past ten years Tanzania has developed policies, strategies and legislation that is supportive of the broad principles of participatory forest management. This has not only included sector – specific topics such as the Forest Policy and the Forest Act, but more general policies and legislation relating to local government reform, land tenure, rural development and poverty

alleviation. Together, these make up a significant enabling environment for community – based management of natural resources, though it is notable that there is no coordinated national natural resource management strategy per se. The Tanzanian farmer and her husband make these crucial inter-sectoral Linkages on a daily basis, so it would be helpful if service providers could do the same. While there are certainly some shortcomings, beyond the need for a coherent NRM policy, it is unlikely that policy and national Legislation is a major constraint to the development and expansion of PFM in Tanzania and the main thrust must be for a more holistic ,integrated planning system at the district level.

The lesson is that there is the need to develop a National Natural Resource Management Strategy to provide a framework for integrant PFM into a wider sphere of Community based Natural Resource Management and through that, to rural development and poverty alleviation. It must be acknowledged that this will neither be easy, nor will it have a rapid impact at the community level. But experience from an increasing number of Sub Saharan countries indicate that medium – term benefits of this approach can be considerable

(see, for example, Reij and steeds, 2003.)

Forest Policy and Legislation

The 1998 National Forest Policy does not make general statements on PFM and the current broad approach to PFM is not clearly defined in national forest policy. This is mainly because the terms and concepts are rapidly evolving and clarifying in Tanzania, and PFM is seen as a process. One component of PFM, joint Forest Management (JFM), is however specifically mentioned in the policy and defined as:

Involvement of local communities or non-government organizations in the management and conservation of forest land with appropriate user rights as incentives.

Given current usage, this now would be taken to embrace PFM. Policy Statement (5) relates to forestry on public lands. It states that:

To enable sustainable management of forest on public lands, clear ownership for all forests and trees on those lands will be defined. The allocation of forests and their management

responsibility to villages, private individuals or to the government will be promoted. Central local and village governments may demarcate and establish new forest reserves.

This provides the policy basis for participatory forest management on village land. The policy goes on to state that primary policy instrument in this regard is the establishment of village forest reserves. Sections of the policy, however, remain ambiguous between the options of communities outright to ownership and only permission to manage and to harvest resources and retain revenues. This is the critical difference between JFM and CBFM. As already mentioned, the lack of specific PFM mention is mainly due to the fact that the participatory forest management concepts are still evolving and the evolution has somewhat outdistanced the existing forest policy, however, it is not a constraint to day - to - day PFM implementation in the field and it is not recommended to review the policy at the moment.

Inter –Sectoral Legislation

The success of PFM will depend not only upon effective forest laws and policies, but also on support from other laws and policies. These include land laws, wildlife laws, local trade and marketing laws, and cooperative laws.

However, this wider approach is currently hindered both by the absence of any effective overarching framework legislation on the environment or natural resource, and by inadequate coordination mechanism between sectors and institutions. (NFM 2000)

The vice Presidents Office, through the Institution and Legal Framework for Environment Management Project (ILFEMP) has been attempting to tackle this legal framework, but progress has been very slow. It is to be hoped that new framework legislation will be available within the twelve month to resolve the problems of current gaps and weaknesses in inter – sector legislation.

Land Laws.

The village Land Act of 1999 is an important primary legislation in empowering communities and individuals to have a Certificate of Village Land, or the Right of Occupancy to forest land, as well as other types of land.. On the other hand, the Forest Act of 2002 provides for the establishment of Village Forest Reserves which, when followed according to the Community –Based Forest Management Guidelines, proposes a very different procedure to that provided for by the Village Land Act. This is a dichotomy that requires clarification and is discussed in more detail in Section 7.3 of this report.

Different projects have pursued different strategies. MEMA in Iringa District, for example, has used the Village Land Act and eight villages involved in CBFM now have their certificates of Right of Occupancy .On the other hand in Rufiji District, REMP has sought to help villages obtain control of their land through by-laws, but have met with considerable resistance from the district council which still has not approved draft by-laws submitted in 1999 (John and Hamerlynck,2003)

The Ruvu Fuelwood project in Kibaha uniquely allocates the right to individuals to use land within a state forest through in agreement though the legal validity of this has not been stated. The Lesson is that different legal routes are currently being explored to secure communities on their land. There is a need for rationalization and harmonization, though this should not be undertaken until the Forest Act of 2002 becomes effective legislation. This solution will best be developed by the practitioners working on the ground, with support from technical specialists from the land use planning, legal and institutional sectors.

2.2.2 Bylaws:

PFM projects recognize the importance of by-laws. Consequently, most JFM projects have developed Memoranda of Understanding between the communities and FBD ; and most CBFM Projects have either developed, or are enacting, by-laws. The extent to which the Local Government Authority has been involved varies somewhat: though for bylaws to have validity they must be approved by the LGA as well as being underpinned by current national legislation.

Despite the recognition of the value of by-laws, the process is slow and their potential power is not being exercised. Constraints include lack of legal knowledge on the part of communities, on one hand, and resistance from district officials and councilors on the other hand, especially in resource rich areas.

However where by-laws have been passed communities have used them and they have been instrumental in empowering villages to control their resources.

There are different types of by-laws. In the context of PFM, it is crucial that they be related to the Forest Management Plans, and therefore should not be written before the Management Plan has been finalized. On the other hand, as the underlying issues are similar for most areas, it is possible to use a generalized outline of a by-law, and then adapt it to specific local conditions. A review of the experience of EUCAMP in the East Usambara has provided examples of by-laws for both JFM and CBFM operations (Veltheim and Kijazi, 2002).

It must also be remembered that in order to have legal value, a by-law needs to be supported by both current primary national legislation, and to have been approved by the relevant District Council. This important point is not understood by some projects.

For the moment, the Forest Act of 2002 cannot be used to underpin Local Legislation until the regulation are finalized and approved.

The Lesson is that although various legislation is prepared and approved, they remain little known or understood by the crucial actors on the ground who actually make resources management work. There is priority need to ensure that there is a wider and deeper understanding of a new legislation.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research design and Units of Inquiry:

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure, (Kothari 1985)

Research design can be categorized as

- (i) Exploratory research studies
- (ii) Descriptive and diagnostic research studies
- (iii) Hypothetic testing research studies. (Kothari 1985)

This study was done by using descriptive and diagnostic method and is concerned with describing the characteristics of Ndungu villagers in relation to the environmental degradation caused by tree felling practice. The study aimed at generating data (benchmarks) on the rice farming, source of heat energy for domestic use and the use of rice by-products.

A random sampling framework was used. Specifically the study elicited data concerning:

- i) Social demographics of Ndungu community
- ii) Rice farming as a source of food and income for Ndungu community members
- iii) Ndungu villagers' occupational activities other than rice farming
- iv) Ndungu villagers' source of domestic fuel
- v) Ndungu villagers' knowledge, attitude and practice related to environmental conservation.
- vi) Ndungu villagers' knowledge and practice on use of rice by-products for environmental conservation and soil management.

3.2 Sampling techniques;

‘A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample’ (Kothari 1985).

Sampling techniques or methods may be classified into two generic types: (i) Probability or random sampling and (ii) Non-probability or Non-random sampling (Krishnaswami, 1993). In this study sampling was done by simple random method based on respondents daily activities.

Ndungu village was purposely identified and included in the study because it is a rice growing area. More so as it enjoys modern agricultural techniques facilitated by bilateral relationships between Japan and Tanzania. At village level the sampling framework was used to obtain a random sample of respondents based on their occupations or daily activities. On average a total of 85 respondents participated in the study.

Therefore the participants were grouped according to following categories: -

- Rice growers, Charcoal makers, Livestock keepers, business people .
- Women group, civil workers/employees, Village officials, Project officials
- Forestry officials, Agricultural officials.

3.3 Data collection.

The task of data collection begins after a research problem has been defined and research design chalked out (Kothari 1985).

Data are facts, figures and other relevant materials, past and present, serving as bases for study and analysis (Krishnaswami, 1993). There are two types of data namely primary and secondary data.

The primary data are those, which are collected afresh and for the first time. The secondary data on the other hand are those which have already been

collected by some one else and which have already been passed through the statistical process (Kothari, 1995). Collecting data differs from one type to another. With Secondary data the method used is compilation while primary data are collected during the process of finding the facts. Primary data can be obtained through observation or direct communication with respondents. (Ibid)

In this study both observation and direct communication with the respondents were used;

(i) Primary data collection.

This was done through the process of surveying, Questionnaires, interviews and physical observation.

(ii) Secondary data collection:

This was done through reading published data or records of the project. The main data collected focused on the Environment and farming which aimed at seeing the effect of the project impact.

3.4 Data Analysis.

Data analysis particularly in case of survey or experimental data involves estimating the values of unknown parameters of the population and testing of hypotheses for drawing inferences. Therefore analysis may be descriptive analysis or inferential (statistical) analysis. (Kothari, 1985)

Data analysis is done by both quantitative and non-quantitative methods (Kristinaswami, 1993). In this study data analysis was done by both qualitative and quantitative methods. Quantitatively tables were used to show quantities and percentages as shown below. While qualitative giving thorough explanations did analysis.

TABLE 3: Livestock Keepers

Q/NO.	Particulars	Score	%
1	Numbers of livestock keepers for (i) Cattle	15	75
	(ii) Goats	3	15
	(iii) Sheep	2	10
	(iv) Chicken	17	85
2	Livestock keeping system (a) free range	18	90
	(b) zero grazing	2	10
3	Source Of Pasture For Zero Grazing from the farms	2	100
4	Free range grazing area (a) Within the village	18	90
5	Livestock keepers using manure form their animals	20	100
6	Other activities other than livestock keeping i.e. Farming business employees	15	75

From the table 3 above it is clearly seen that:

- The livestock keepers contribute a lot in environmental degradation especially in soil erosion caused by their animals.
- Rice straws could be used to feed their animals but they are thrown away.

Table 4: Women activities at Ndungu village

Qn.	Particulars	Scores	%
1	Main Occupation (a) Farming	15	75
	(b) Domestic work	3	15
	(c) Business	2	10
2.	Women using (a) Charcoal	8	67
	(b) Firewood	15	75
	(c) Electricity	2	10
3.	Acquisition of Fuel (a) Buying	12	60
	(b) Collecting	8	40
(Fuel means firewood from forest)			
4.	Average time spent for collecting firewood from the forest of Ndungu	3 hours daily	
5.	Walking distance when fetching firewood from the forest in Km	3 km daily	
6.	Women wishing to use an alternative kind of fuel i.e. rice, husks, electricity etc	18	90
7.	Suggested alternative fuel (a) Electricity	18	90
	(b) Rice Husks	2	10
	(c) Biogas	0	0

From table 4, above it is clearly seen that most of the women in Ndungu village about 75% of them are engaged in farming activities and firewood collection from the forest. From the researchers view, the three hours used in collecting firewood from the forest could be used in farming and be able to increase their agricultural out put. So the alterative energy should be rice husks, which they already have from there farming activity.

Other observations

The total people who are engaged in rice farming currently are more than 55% of the whole population of Ndungu village compared to 15% of the population who were dealing with rice farming in the year of 1961.

About 70% of all farmers who are engaged in rice production are indigenous while 30% are immigrants from other villages or other part of Tanzania.

Also the researcher has found that the production rate per acre has increased from 10-20 bags, to 35-40 bags of 85kg each. And one household is able to produce 91 bags in a year.

One bag of paddy rice weighing 85kg produces 32kg of husks and 53 kg of husked rice.

This means Ndungu village can produce more than 61200bags during rainy season and during dry season 30600 bags. So in total they produce 91800bags of paddy rice.

The total rice husks produced in every year is about 38% of the total weight of the paddy rice, i.e. 34560kgs of rice husks.

Uses of rice straws in Ndungu village are: -

- Feeding animals 50% of the straws
- Manure 30% of all straws
- The rest are just burnt as wastes.

Table 5: Charcoal making

Q no.	Particulars	Score	%
1.	Total charcoal makers	5	100
2	Total bags produce monthly	165	
3	Price per bag	Tsh 2800	
4	Attitude Of The Villagers Towards Environmental Destruction Through Charcoal Making, Firewood And Clearing Land For Farming	5	100

From the table 5: above it is clearly seen that tree felling is at alarming rate which means environmental degradation is serious and dangerous.

However all villagers are against that happening and are willing to stop as soon as another alternative for fuel and a good method of conserving the trees is found.

CHAPTER FOUR

4.0 FINDINGS AND RECOMMENDATIONS.

4.1 Findings and Discussion.

4.1.1 Awareness

According to the study Ndungu villagers are not very much aware of what is taking place in their environment. Their land is becoming dry and unprotected, but tree-felling activity is still going on. Charcoal making business is increasing. This shows that the people of Ndungu do not know the consequences of cutting trees excessively. This situation suggests that these people need to be trained (educated) on the importance of environmental conservation.

4.1.2 Feelings

According to the interviewed groups as can be seen in table 5, 100% of respondents showed that the land does not look beautiful without trees. They feel that they should not cut down trees, but there is no other alternative source of energy. This suggests that Ndungu villagers need an alternative source of heat energy to be introduced to them so as to rescue the situation.

4.1.3 Knowledge

95% of rice growers seem to agree that there is a big relationship between rain and forests according to what they believe, that “forests attracts rains”. This also suggests that it is easy to train them on how and why we should conserve forests.

4.1.4 Existence of By-laws

The study has revealed that locally the village has no by-laws and programs on how to replace felled trees and forests conservation. Therefore this study suggests that the village needs to be trained on the importance of by-laws in forest conservation and the need to replace felled trees.

4.1.5 NADP effects.

The success of NADP has attracted many people from different places and has caused high population in the area. Due to this there is a high demand for fuel wood that has caused environmental degradation such as soil erosion and drying of water sources. This also indicates that there is a need for another alternative source of heat energy to help in reducing the rate of tree felling.

- Husks used as fuel particularly at Ndungu village may reduce tree felling by 40% as elaborated below:

Calculation: -

- The area under cultivation is 680 ha, and cultivation is done twice a year

$$680\text{ha} \times 2 = 1360\text{ha}.$$

- One bag produces 32 – 35kgs of husk (According to survey). This gives an average of 33.5kg husk.

- One ha produces 90 bags of rice paddy

∴ One ha produces $33.5\text{kg} \times 90 = 3015\text{kg}$ of husks therefore; 1360 ha will produce 4,100,400 Kg of husks.

One-year husk production is 4,100,400 kg.

One family can use 2kg of husks per day.

In one year a family uses $360\text{ days} \times 2\text{kg} = 720\text{kg}$ of husks.

∴ Number of families who can utilize the produced annual husks =

$4,100,400/720 = 5695$ families. This equal to 40% of the village population as calculated below; -

$$(5695/14000) \times 10 = 40\%.$$

- Therefore the Husks if used as a source of heat energy can reduce tree felling by 40%, but this has to be accompanied by strategy of population increase control strategies i.e reduce population growth rate.

4.2 RECOMMENDATIONS:

The village should set a program of replacing the felled trees. In so doing the villagers should be educated or trained in the following aspects: -

- (i) The importance of the forests conservation
- (ii) The effect of tree felling trees excessively
- (iii) How to replace felled trees
 - ◆ Seed preparation
 - ◆ Seedling management
 - ◆ Transplanting
 - ◆ Tree Management
- (iv) The importance of using husk cookers and other improved firewood cookers in reducing tree felling.
- (v) Establishment of by laws and regulations for conservation of the forests.
- (vi) The people of Ndungu should start using rice husks in burning bricks used in constructing their houses

CONCLUSION

A participatory need assessment was conducted and the problem of environmental degradation was identified. The following effects were revealed.

- (i) Over population has created a very high demand for fuel wood and led to severe tree felling (deforestation) (Appendix V).
- (ii) Tree felling has caused problems like soil erosion, scarcity of firewood, poor rainfall and drying of water sources (Appendix IV).
- (iii) The land is becoming bare so desertification is imminent.(Appendix V)

The study suggests tree solutions to the problem so as to rescue the situation.

One: Ndungu villagers should be trained on environmental conservation,

Two: an alternative source of heat energy for Ndungu people should be introduced.

(The researcher suggests rice husks in this case)

Three: there should be by-laws to help in the process of forest conservation.

The suggested solutions are expected to bring about the following outcomes.

- By introducing the use of rice by-products as fuel, tree felling shall be reduced.
- Replacement of trees will help in controlling soil erosion and protection of water sources from drying off.
- By improving the environment using the suggested methods it is expected that climate shall be improved hence adequate rainfall shall be received. Generally the living standard, economic status and the environment of the village of Ndungu shall improve greatly. In this perspective the use of rice husks as fuel may be introduced to all rice growers in Tanzania especially in all places where rice is grown in large quantity.

CHAPTER FIVE

5.0 IMPLEMENTATION OF ASSIGNMENT

5.1 TRAINING MANUAL ON FOREST CONSERVATION TECHNIQUES AT NDUNGU VILLAGE

5.1.1 Background to the training Program.

Ndungu village has improved its agricultural practices through Ndungu Agricultural Development Project (NADP), which was established in 1988.

The improvement has been noted as the increase of yield per hector, which has been raised from 1.5 tons to 7 tons. This great improvement has attracted many people from outside the village to immigrate for farming and business and causes a very high population. An increase in population has created a very high demand on fuel wood as firewood and charcoal.

The survey conducted has revealed that there is a very big loss in trees due to high demand for fuel wood. 71% of the population use firewood as source of heat energy while 28% depend on charcoal and 1% on electricity.

The use of electricity which can reduce tree felling is not practiced because electricity is sold at a very high prices compared to fuel wood.

The practice of tree felling for domestic use has created the following problems, which have to be addressed as soon as possible so as to conserve the environment.

- i) Soil erosion
- ii) Drying off of water sources
- iii) Increased workload to women who are responsible for firewood collection.

Due to such problems there is a need for training Ndungu Villagers on forest conservation techniques focusing on: -

- a) The importance of forests.
- b) Replacement of felled trees
- c) Legal and regulatory frame work
- d) The use of husk cookers and improved firewood cookers as means of reducing tree felling.

5.2 TRAINING PROGRAM OBJECTIVES

This particular program targets at all Ndungu residents, and the purpose is to sensitise them on how their life is in danger because of severe tree felling around their living place. It is also intended to bring about the sense of relating daily activities and the environment and realizing that we have to use our natural resources wisely.

5.3 SPECIFIC OBJECTIVES

At the end of the training Ndungu Villagers should have the knowledge on: -

- i) The importance of forests in human's life.
- ii) The effect of trees felling.
- iii) How to replace felled trees.
- iv) The legal and Regulation frame work on forest conservation.
- v) The use of Husks cookers and improved firewood cookers and their economic importance

MODULES DESCRIPTION

Module	Topics	Time
I. THE ECONOMIC IMPORTANCE OF FOREST	1. The use of forests and the effects of felling tree excessively. 2. Replacing felled trees	80 Min. 240 Min.
II. LEGAL AND REGULATORY FRAME WORK IN CONSERVING FORESTS	1. Development of Laws and Regulations.	40 Min.
III. MEANS OF REDUCING TREE FELLING	1. Introducing an Alternative fuel. 2. Using improved cookers <ul style="list-style-type: none"> - Husks cookers - Improved firewood cookers 	40 Min. 60 Min

5.4 TRAINING METHODOLOGY: -

- Short lectures and discussion
- Discussion groups
- Demonstration/Practical
- Watching video and discussion.
- Visitation (Visiting affected areas)

5.5 TRAINING MATERIALS: -

1. Video set
2. Pictures describing conserved and un conserved areas.
3. Chalk board/ Flip charts
4. Masking tape or cello-tape
5. Marker pens or chalk

6. Pieces of paper
7. Brochures
8. Developed cookers (firewood cooker and husks cookers)
9. Polythene tube

5.6 ASSESSMENT:

- Questions
- Result of the group work
- Participation in practical work.

MODULE I: THE ECONOMIC IMPORTANCE OF FORESTS

Topic I: The use of forests and the effects of felling trees excessively.

Time Frame: 80 Minutes

Topic Objectives:

At the end of the topic participants should be able to: -

- Describe the uses of forests.
- Describe the natural benefits we get from forests.
- Describe the effects of felling trees excessively.

Content: -

- Uses of forests
- Natural advantages of forests.
- Disadvantages of felling trees excessively.

LESSON DEVELOPMENT AND PRESENTATION:

Specific activities	Time	Remarks
1. Introduce the topic	5 Min	FN 1
2. Give a lecture on forests uses and their Natural advantages	20 Min.	
3. Discussing the effects of felling trees excessively	20 Min.	
3. Group discussion regarding the pictures	20 Min	
5. Conclusion	15 Min	

FACILITATOR'S NOTES (FN1)**1. Introduction**

If development is sustainable it means that it meets the needs of the present without compromising the ability of future generations to meet their own needs.

The new idea in managing forests is to manage them; as ecosystems that meet a wide range of environmental, social, and economic needs at Local, national and global levels.

This involves preserving biodiversity, improving the quantity's quality and range of forest products and creating new livelihood and employment opportunities so as to reduce poverty. Another idea is that management should be participatory and involve all the relevant stakeholders. Good management involves having clear aims and objectives, well-designed plans and clear ways of monitoring and evaluating progress. It also involves addressing cross-sartorial issues.

This prevents waste and lack of coordination and increases efficiency.

2. Uses and Advantages of forests

- **Uses: -**

Forests supply us with wood, honey, fruits, wild animal meat, manure and medicine

- **Natural advantages: -**

- Forests influences climate.
- Forests are habitats of different organisms
- Forests protect soil against erosion
- Forests generate fresh air (oxygen)
- Forests remove dusts from the air
- Forests beautify the land.

3 The effect of felling trees excessively.

- The land remains bare exposed to erosion agents (water, Wind)
- Desertification
- Causes climatic changes i.e. Rains become few, Temperature raises, Wind moves free in high-speed etc.
- Causes poverty by cutting off all the supplies and advantages mentioned above.
- Environmental degradation.

TOPIC II: REPLACING FELLED TREES

Time frame: 240 Minutes (4hrs)

Topic Objectives: -

At the end of the topic participants should be able to: -

- Describe how to prepare good seeds
- Describe how to prepare a seedbed.
- Describe how to take care of seedlings.
- Describe how transplanting is done.
- Describe how to take care of transplanted seedlings.

Contents: -

- Seed preparation
- Seed bed preparation
- Seedbed management
- Transplanting
- Caring of transplanted seedlings.

LESSON DEVELOPMENT AND PRESENTATION: -

Specific Activities	Time Frame	Remarks
1. Introduce the topic	5 Min	FN2
2. Discussing how to prepare seeds of good quality.	20 Min	
3. Discussing how a seedbed is prepared (a) Site selection (b) Materials preparation (c) The process of seedbed preparation.	120 Min.	Practical work
4. Discussing seedbed Management.	40 Min	
5. Give a lecture on how transplanting is done	40 Min.	Demonstration
6. Discussing how to take care of the transplanted seedlings.	15 Min.	

FACILITATORS NOTES (FN2)**1. Introduction: -**

Replacement of trees is very important for environmental conservation. We have several reasons as to why we should replace felled trees.

- Trees protect the soil from erosion.
- Trees are very important to our life and to the life of other organisms.
- Trees provide us with employment and basic needs.

Trees should be replaced in order that future generations also can meet their needs.

2. Seed Preparation: -

Tree seeds can be obtained from the District forestry office or TFA shops. Seeds that are obtained in this way need not to be selected. But seeds that are harvested from the trees need to be selected before they are used.

- **Seed Selection;**

- Quality seeds are comparatively big.
- Quality seeds are of good shape
- Quality seeds have no damage
- Quality seed contain suitable moisture
- Quality seeds have a germination rate of about 85 – 95%
- Quality seeds contain no Impurities.

Seedbed Preparation: -

A seedbed is a piece of land varying in size from a few square meters to hundreds and even thousand of hectares, that has been prepared in such a way that it is ready to receive the seed or planting material.

- **Location (Site);**

- A seedbed should be located away from many people and animals.
- It should be located near to the water source.
- It should be located to a place where sunlight can be received adequately.
- Fencing should protect the site.

- **Materials Requirement;**

- Loam Soil
- Humus
- Shovel
- Watering can
- Trowel
- Long-handled hoe
- Polythene tubes (Diameter = 6 inches)

- **The process of seedbed preparation**

- Collect loam soil and humus.
- Make sure that all tools are available.
- Cut the polythene tube into small pieces of 12cm.
- Mix the soil and humus at a ratio of 5:2 respectively.
- Water content should be maintained to allow soil particles to bind together.
- Fill each piece of polythene tube with the soil making sure that the soil is compact.
- Arrange the pieces in row to allow easy counting.
- Water the seedbed for one week before seeds are planted.
- After one week plant the seeds on each polythene tube.
- The seeds should be planted eight months before the rain season.

- **Seedbed Management: -**

- Every day the seedbed should be watered.
- Take care of the seedbed by checking diseases, pests and bad people who can destroy the plants.
- Don't allow roots to develop in to the ground.
- Remove weeds to avoid nutrients competition.
- After eight months the seedlings should be transplanted.

MODULE II: LEGAL AND REGULATORY FRAME WORKS IN CONSERVING FORESTS

Topic 1: Development of Laws and Regulations

Time frame: 40 minutes

Topic Objectives: -

At the end of the topic participants should be able to: -

- Describe the need for Laws and Regulations in forest conservation.
- Describe the participatory forest Management

Contents: -

- The need for laws and Regulations in forest conservation.
- The importance of Bylaws in forest conservation.
- The meaning of participatory forest management (PFM).

Lesson Development and Presentation: -

Specific Activities	Time	Remarks
1. Introduce the topic and the meaning of PFM.	5Min	FN3
2. Discussing the role of laws and Regulations in Forest management	15 Min	Class Discussion
3. Discussing some by-laws, which can help in forest conservation?	10 Min	Group Discussion
4. Conclusion		Compilation

FACILITATORS NOTES (FN3)

(1) The Meaning of Participatory Forest Management. The Government has recently adopted a new definition on PFM which is based on work undertaken by FAO: “The arrangements for management that are negotiated by multiple stake holders and are based on set of rights and privileges recognized by the government and widely accepted by resource users; and the process for sharing power among stakeholders to make decisions and exercise control over resource use” (Mgoo, 2003)

Participatory management that involves all stakeholders and that maintains and enhances the long-term health of forests for the benefit of all living things while providing environmental, Economic, Social and Culture opportunities for present and future generations.

The guiding principles of sustainable forest Management (SFM) are to: -

- Build local commitment to national and international policies
- Take a Sector Wide Approach (SWAP)
- Build Cross-Sector links and be consistent with the national development goals and global initiatives.
- Have an ongoing and long-term commitment to policy and institutional reform.

Other principles to make sure that all forest development is sustainable include the need to: -

- Raise public awareness about sustainability issues.
- Encourage the participation of a wide range of stakeholders.
- Work in partnership with communities and the private sector.
- Build the capacity of stakeholders at all level.

(2) The role of laws and Regulations in Forest Management.

(Notes will be obtained from the floor).

(3) Formulating some by-laws which can help in conserving forests by getting the Participant's opinions.

(4) Compilation of the opinions of the participants and send them to the village Government for approval.

MODULE III: MEANS OF REDUCING THE RATE OF TREE FELLING

Topic 1: Alternative sources of fuel.

Time Frame: 60 Minutes.

Topic Objectives:

At the end of the topic participants should be able to: -

- Describe other types of fuel and their importance in forest conservation.
- Use husks cooker.

Content:

- Types of fuels and their availability
- The importance of other fuels in forest conservation.
- Demonstration on how to use a husks cooker (Use husks as fuel)

LESSON DEVELOPMENT AND PRESENTATION

Specific Activities	Time	Remarks
1. Introduce the topic	4 Min	FN4
2. Discussing types of fuels and their availability.	15 Min	Class discussion
3. Discussing the importance of the alternative fuels.	10 Min.	Class discussion
4. Demonstrating how to use husks as fuel.	30 Min	Practical

FACILITATOR'S NOTES (FN 4)**1. Introduction.**

Development and innovation of affordable alternative sources of energy especially for the rural and urban poor communities is a key for minimizing tree felling for wood fuel that constitutes about 92% of the energy used in the country. Key stakeholders include Ministry of energy and Minerals, Ministry of Science and Technology, Commission of Science and Technology and respective research institutions development partners, Communities, Private sector, CBOs and NGOs.

2. Types of fuels:

Fuels may be classified according to their sources.

- Solar energy – Sunlight
- Biomass - Wood, charcoal, Biogas, cow dung
- Electricity – Hydroelectricity,
- Fossil fuel (coal, gas, oil)

Among the fuels wood fuel is obtained in large quantity and affordable to most of the people. The use of wood fuel is the one that creates environmental degradation. This practice should be avoided for the sake of our environment.

3. The importance of introducing alternative fuels to take the place of wood fuel

Will help to maintain the health of our forests and therefore: -

- Other living organisms will continue surviving.
- Forests will supply us with different needs like, humus, honey, fruits, and medicine

and so helps in fighting poverty.

- The Climate of the land will remain consistent.
- Water sources will continue supplying water.

4. Using Rice husks as fuel.

- Rice husks can be used as fuel for cooking and for burning bricks.
- Rice husks are compressed in cooker allowing an empty space at the central part of the cooker.

This space is also allowed to join the air inlet hole that is situated at the bottom lower part of the cooker. One piece of firewood is placed through the air inlet hole and ignited. The cooker produces a very hot fire and can be used for six hours. (Demonstration).

5.2 OPERATIONALIZATION OF THE TRAINING MANUAL

Operationalization of the training package will focus on capacity development at community level. This process will include identification of community trainers, preparation of training materials and setting up a participatory monitoring and evaluation mechanism. The process is scheduled to last for one year.

5.2.1 Monitoring And Evaluation

Monitoring and evaluation is an integral activity in designing and implementing environmental conservation interventions. Environmental conservation in Ndungu village in this context is designed to involve two phases: -

(i). Training phase. The community is going to be trained on the followings: -

- How to replace felled trees.
- Using husks as fuel.
- Formulating bylaws to protect the forests.

(i). Implementation phase.

Being trained the community is expected to implement the knowledge so obtained, that the following activities will start taking place.

- Seed preparation
- Seed bed preparation and management
- Transplanting and caring
- Using husks as an alternative fuel

M&E in this programme will be participatory where villagers and technical advisors will identify essential indicators to assess achievements in both training and implementation phases. Both monitoring and Evaluation process will be continuous starting from February to December. Indicators will be developed jointly by trainers and community members and be used in measuring achievements towards the use of rice by – products in Environmental conservation, felled trees replacement and existence of community by – laws on tree felling.

Proposed indicators.

- (i) Villagers with positive attitude to environmental conservation {%
- (ii) Villagers with knowledge on the importance of environmental conservation {%
- (iii) Number of household with husk cookers.
- (iv) Villagers using rice by – products as a source of heat energy {%}.
- (v) Number of tree seedlings prepared for transplanting
- (vi) Number of tree seedlings transplanted.
- (vii) District, ward and village leaderships support on environmental conservation.
- (viii) Existence and enforcement of community by – laws on tree felling and charcoal making.

All these indicators are intended to contribute towards the overall objectives of environmental conservation in same District.

5.2.2 TRAINING BUDGET

1. Duration of the Training 3 days.
2. Training Materials.

Table 7.

S/N	Item	Qty.	Unit Price	Total Cost
1.	Video set	1	1,150,000/=	1,150,000/=
2.	Pictures (big)	10	2,000/=	20,000/=
3.	Flip Charts	4	6,500/=	26,000/=
4.	Masking tape	8	400/=	3,200/=
5.	Marker pens	12	650/=	7,700/=
6.	Ruled papers	1ream	4,500/=	4,500/=
7.	Exercise books	50	300/=	15,000/=
8.	Polythene tube (D=6")	20kg	3,600/=	72,000/=
9.	Developed firewood cooker	1	50,000/=	50,000/=
10.	Husk cooker	1	6,000/=	6,000/=
	Sub Total Training Materials			1,354,400/=

3. Facilitator's allowances

Table 8.

S/N	Title	Rate per day	Days	Total
1.	Forest Officer	30,000/=	3	90,000/=
2.	Community Development worker	30,000/=	3	90,000/=
3.	Program Coordinator	40,000/=	5	200,000/=
SUB TOTAL FACILITATION				380,000/=

4. Participants allowances

Table 9.

Particulars	Qty	Rate	Day	Total
- From 10 cells of the village 2 members	20	20,000/=	3	1,200,000/=
- Village officials	3	20,000/=	3	180,000/=
- Committee members	25	20,000/=	3	1,500,000/=
SUB TOTAL PARTICIPATION ALLOWANCE				2,880,000/=

SUMMARY

- TRAINING MATERIALS	1,354,400/=
- FACILITATOR'S ALLOWANCE	380,000/=
- PARTICIPATION ALLOWANCE	<u>2,880,000/=</u>
GRAND TOTAL	<u>4,614,400/=</u>

SOURCE OF FUNDING:

Source of funding will be cost sharing among Donor agency, Same District Council and Ndungu villagers according to the contribution breakdown tabulated below.

Table 10:

S/N	Donor	Particulars	Rate%	Amount due
1.	Donor agency	Training Materials	100	1,354,000
2.	Donor agency	Participation allowance	50	1,440,000
3.	Donor agency	Facilitator's allowance	100	380,000
4.	District Council and Village Government	Participation allowance	50	1,440,000
TOTAL				4,614,400/=

Source of funding Summary

Donor agency----- 3,174,000 ... 68%

District council & VG -----1,440,000 ... 32%

4,614,000

REFERENCES:

Asthana. D & Asthana M (2003), Environment problems and Solutions.

S. CAHSNG & CO. Ltd 7361, Ram. Nagar, New Delhi 110055.

Benneh. G 1993, Population environment and sustainable development in Africa.

Paper presented at the General Conference and 25th Anniversary celebration of the AAU, University of Ghana Legon, 13 – 18 January.

Challenger and Hopes. The state of the Environment (1972 – 1992). Nairobi: UNEP.

Constanza R. 1991. The ecological economics of sustainability.

Dixon, John and others 1988 Economic Analysis of the Environment impact of development projects. London, Earthscan publication in association with the Asian Development Bank.

IUCN (international union for the conservation of Nature) 1991. Caring for the Earth. A strategy for sustainable, living. With the United Nations Environment. Program and the world wildlife fund, Gland Switzerland.

Jacobs M. 1988. The Tropical Rain Forest. A first Encounter, edited by R. Kruk et la. Berlin. Springer –Verlag.

Kothari C.R. 2000. Research Methodology & Techniques k.k. Gupta for new Age International (p) Ltd.

Mugenda O.M & Mugenda A.G. 1999 Research Methods, Qualitative and Approaches African centre for Technology Studies (ACTS) Nairobi Kenya.

National Forest Program in Tanzania 2001 – 2020

R. Mwalyosi, H. Ross & Howlet, D. Introductory course on Environmental Impact Assessment in Tanzania. IRA Research paper No. 46.

Todaro M.P. & Smith, S. 2003. Economic Development Person. Education (Singapore) Pte Ltd.

Uongozi bora kwa Wenyeviti wa Serikali za vijiji, vitongoji na mitaa Tanzania Bara April, 2002.

UNEP (United Nation Environment Programmer) 1992

Urio, P. 1990. Introductory Soil Science.

World Bank, 1992 World Development Report 1992: Development and Environment New York Oxford University Press.

World Commission on Environment and Development 1987 our common future, Oxford, England: Oxford University Press.

World Summit on Sustainable Development Johannesburg, 26 August- 4 September 2002.

World Summit on Sustainable Development Johannesburg, 26 August- 4 September 2002.