

KAMPALA INTERNATIONAL UNIVERSITY
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF ENVIRONMENT

HUMAN ENCROACHMENT EFFECTS ON FORESTS;
A CASE STUDY OF MOUNT MERU-ARUMERU DISTRICT
ARUSHA

BY

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DISSERTATION

SUBMITTED IN PARTIAL FULFILLMENT FOR AWARD OF THE
DEGREE OF BACHELOR OF SCIENCE IN ENVIRONMENTAL
MANAGEMENT OF KAMPALA INTERNATIONAL UNIVERSITY,
UGANDA

JULY 2006

DECLARATION

I, Anatoly, Paul Emmanuel. Declare that this dissertation is my own work, and that, it has not been submitted to any other University for award of degree or for any other activity.

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Date..... 11th July / 2006.

Signature.....
Supervisor

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Date..... 11.7.2006

DEDICATION

This work is dedicated to my beloved Parents for sending me to school in the first place, the challenge and encouragement given by them was the contributory factor for my academic success. I remember my Mother encouraging me by saying, "the only inheritance you will ever get from parents in this world of today, is the best education they help support you with".

ACKNOWLEDGEMENTS

It will not be easily for me to mention every participant in this piece of work. I still believed that this dissertation is not a result of my own efforts; rather it is also a result of many other people's efforts.

First and foremost thanks are due to Dr. Twaha. Alibasamba Meenyi from Makerere my supervisor, whose critical comments and challenges provide me with valuable insights about the subject I was studying.

My deepest gratitude's goes to my Parents (Anna Mboka and Emmanuel Moshi) for their inspiration, tolerance and understanding. God bless them all.

I am also indebted to my only sister, Elizabeth and my brothers Peter and Nelson Herbert and also to my dear good friend Sella V. Chelesi, who spent their time to make sure I finish my degree course and this dissertation in particular, also their full support throughout the time of my studies.

I would like to grant my thanks to NEMC workers, Malihai Club of Tanzania, and Arumeru forest Authority who provided me the materials any time I required.

I would also grant my thanks to my classmates for their cooperation at the time of the study, I will particularly give my thanks to Joyce, Carol, Kemboi Andrew, Nelson Kaptuya (resource).

To my dear good friends; Husna A. John, Irene Macha, Caren Stumai, Teddy Nasson, Rodney Quintine Kassala, Eric Ngabona, Gideon Mweyunge Mwijage, Simon Seni, Fuad Omar, Ombeni Mbilinyi and many others. For they were too good to see this appreciated piece of work come out. Peace be with you all.

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ABSTRACT

It is common knowledge that ordinary Tanzanians are struggling for basic survival. These Tanzanians are poverty-stricken in all aspects of their existence.

For his food man needs to cultivate land, to keep livestock's for his meat and other source of protein, also man needs shelter as a life necessity. In doing so man destruct environment and encroach forests and fragile ecosystem either knowingly or unknowingly.

The main purpose of this study was to investigate the human activities which contributed to the encroachment of forests and then find out some solutions to overcome this kind of problem.

Poor managed areas by human can for example significantly degrade environmental resources by contaminating soil, water and air. Health and safety risk escalate in areas where housing or other land uses are allowed to be located in forest areas.

Thus despite the fact that various campaigns have been made for encroachment of forests, this study seeks to show the impact of human activities to the environment and at the same time it is aimed at finding the solutions over this problem. Therefore the study will benefit the environmental planners and forest rangers in a number of ways and consequently will benefit the whole society at large. The study also will be able to establish criticisms and recommendations wherever required on various aspects of the methods to be used by the environmentalists on provision of education to the people.

This will help planners and environmentalists to reach necessary amendments on required issues on such methods. However it must be noted that majority of Tanzanians who are living below the poverty line must be assisted to lift themselves up from this dividing line if the call for environmental protection has to make sense and fulfill the national expectation to protect the national environment.

Thus Poverty plus Environment equals to Environmental degradation while Prosperity plus Environment equals to environmental protection.

CHAPTER I

INTRODUCTION

Man and environment are interrelated, as the two are always interacting. The term environment has been defined differently by various organizations and authorities. The United Nations Environmental Programme (UNEP) and International Labour Organization (ILO), both defines environment as the sum of all the external physical and biological systems within which man and other organisms live. The physical systems include soils, rocks, water and air, while the biological systems include plants and animal (UNEP, 1979).

Tinker (1989) defines environment as the aggregate of surrounding space, conditions and influence, the totality of external conditions and influences affecting the life and development of an organism.

This study will confine itself to the above definitions, since in a broad sense; life is sustained through the external, physical, biological and non-biological systems.

Background to the study

Man needs natural resources to cater for his survival and developmental needs. It is therefore common knowledge that as he goes about achieving these life objectives, he invariably plunders nature and all that makes it.

For his food, man needs to cultivate land. In pre-stone age, and during stone-age, smaller units of agricultural land would be quite enough for subsistence. With increased population, more and more land is required for food production.

Uncontrolled lumbering has continued unchecked in a lot of countries especially the third world. Without replacement, tree felling is a big enemy not only to ecological balancing but to life in general. And once a tree has been felled, the remains after timber are firewood-a source of energy.

What of the present day industrial and trade development with its diversity? Apart from the use of natures inputs in

the building of large factories and big trading enterprises, destruction of vegetation and, the consequent emission of air polluting gases in another man-made grave-yard path.

Mount Meru forest is a Tropical rain forest. And the ecosystem contains more plant and animal species. In general, rain forests are some of the oldest ecosystems on Earth. As a result of this continuity, rain forests boast millions of different species, many of which are endemic, or unique, to rain forest habitats.

High rates of human encroachment on forests are inevitably followed by alarming rates of plant and animal extinction because many rain forest species cannot survive outside their pristine rain forest habitat. (NEMC, 2003)

Reasons for encroaching forest vary, but logging has been advanced and the major one is hardwoods. However some logged forests, if left alone, can regenerate in a few decades. But typically, logged forests are not left alone—the roads built by logging companies often provide access for landless farmers to enter a new area, as well as a means to transport agricultural crops to market. For every 1 kilometer of new road built through a forested area, 4 to 24 sq km (1.5 to 9.3 sq mi) are encroached. (WCED, 2002)

Once the loggers abandon the land, a typical cycle of destruction ensues. When the landless farmers arrive, they clear the land for planting. Poor rain forest soils produce a low crop yield, especially after a couple of years. At that point, the farmers often sell their land to cattle ranchers or large plantation owners. After nutrients have been exhausted and soils compacted by cattle, lands are then abandoned and often laid to waste.

STATEMENT OF THE PROBLEM

Mount Meru rain forest is a forest which lies on the slopes of Mount Meru. With increase in human population, land has become scarce and people have resorted to encroachment of the forest for timber; land for agriculture; as well as land for pasture for their animals, since the area is predominantly occupied by pastoralists, the Maasai. Thus encroachment has resulted into deforestation of the forests resources and the surrounding environment.

OBJECTIVES OF THE STUDY

- To identify the causes of human encroachment on Mt. Meru forest,
- To evaluate the consequences of human encroachment on the forest.
- To identify the strategies and solutions to control human encroachment of the forest.
- To find out the level of awareness on environmental degradation on the area.

HYPOTHESIS

- Human encroachment on the forest is the major activity affecting the environment around Mount Meru.
- There is awareness on environmental degradation in the study area.

SIGNIFICANCE OF THE STUDY

The study will provide suggestions, recommendation and findings that are expected to:

- Give additional knowledge of human activities that lead to encroachment of forests.
- Stimulate further research on the issue (encroachment of forests).
- Be used by different organizations (forest authorities, NEMC) and institutions (universities, high schools, and libraries) that are directly and indirectly involved in educating and raising awareness on the effects of forest encroachment.

SCOPE OF THE STUDY

The research will cover the following areas that relate to recognition of aspects of human activities while encroaching the forests and other related effects of encroachment in the Mount Meru forest reserve.

- i. Forest departments in the region,
- ii. Population and agricultural organizations,
- iii. Other parts related to aspects of human activities and management of the environment,

CHAPTER II

LITERATURE REVIEW

The world forest cover is shrinking. Over the past 50 years, nearly half of the world's original forest cover has been lost, some 3 billion hectares. Each year another 16 million hectares of virgin forest are cut, bulldozed, or burned.

Population growth, along with changes in people's standard of living, largely determines changes in demand for food. Throughout history societies have struggled to keep the food supply equal to or ahead of population growth. The struggle has never succeeded. Currently, the world population is growing at a rate of over 80 million people a year - that is by one billion people every 12 to 13 years (UNFPA, 1996).

In many developing countries, rapid population growth has meant that arable land per capita has declined sharply in recent years, leading to encroachment of marginal lands and fragile ecosystems. For example, in Uganda because of shortage of land for cultivation and the need for land for food production, more than 450 families have encroached the South Busoga Forest Reserve in Mayuge District (The New Vision, 2006).

Characteristics of tropical forests;

Worldwide, less than 5 per cent of remaining tropical forests are protected as parks or reserves. Tropical rainforest climate by definition receives 2.4 inches or more of rainfall every month, and it has uniformly high temperatures throughout the year, monthly and annual temperatures average about 80 degrees Fahrenheit (about 26 degrees Celsius) for typical tropical rainforest environment. The climatic type is located astride the equator, and usually extends from 5 degrees to 10 degrees north and south latitudes. Tropical rainforest is nature's most extravagant garden. Beyond its tangled edge, a rainforests open into a surprisingly spacious interior, illuminated by dim greenish light shining through a ceiling of leaves.

Due to variation in evaporation rates, slope exposure and soil conditions, it is reasonable boundary to use the climatic classification scheme; the tropical wet (Af), or tropical rainforest climate, is somewhat restricted in area

than the tropical wet and dry (Aw), or tropical savannah and the tropical monsoon (Am) climates together. The efforts to tie climates to vegetation are evident in the names attached to various climatic types, but we must stress that many factors other than mean and monthly conditions of rainfall and temperatures are important in the ecological matrix that creates vegetation regions. Soil textures and structure, slopes and exposure and evapotranspiration rates are all meaningful, but this is a climatic classification and many data other than temperature and precipitation are not readily available, especially for many of the less developed areas of the world (Molles Jr, 2002).

Mount Meru rain forest is characterized to be having the characteristics of tropical wet and dry forests. During the dry season is all earth tones; in the rainy season, it's an emerald tangle. Life in the tropical dry forest responds to the rhythms of the annual solar cycle, which drives the oscillation between wet and dry seasons. During the dry season, most trees in the tropical dry forest are dormant. Then, as the rains approach, trees flower and insects appear to pollinate them. The pace of life quickens; eventually, as the first storms of the wet season arrive, the trees produce their leaves and transform the landscape (Molles Jr, 2002).

Tropical wet and dry forests occupy a substantial portion of earth's surface between about 10 degrees and 25 degrees latitude. In Africa, tropical wet and dry forests are found both north and south of central African rain forests. The soils of many tropical wet and dry forests are of great age, particularly those in parts of Africa. The soils tend to be less acidic than those of rain forests and generally richer in nutrients. However, the annual pulses of torrential rain make the soils of tropical wet and dry forest highly vulnerable to erosion, particularly when deforested and encroached (converted to agriculture), (Molles Jr, 2002).

Uniqueness of forests;

Forest cover is of great ecological importance. It protects and stabilizes soils and local climates, improves the soil's ability to hold water, and increase efficiency with which nutrients are cycled between the soils and vegetation. Forest also provides a habitat for people and numerous plant and animal species.

Virgin forests, especially those in tropical regions, are an irreplaceable repository of the genetic heritage of the world's flora and fauna. Forests also provide timber and firewood, as well as medicinal and other plants of use to humankind.

Forests have many functions both to human and to nature itself. For example forests absorb carbon dioxide and produce oxygen, anchor soils, regulate the water cycle, protect against erosion, and provide a habitat for million of species pf plants and animal. Furthermore, forest products are essential to the world economy, worth about in US\$400 billion annually in timber, pulp, paper and fuel wood. Products other than wood, such as medicine, vegetables and fruits, provide another US\$20 billion and are growing in importance (MYERS, 1992).

Healthy forests boost food production. Trees soak up and store water from season to season, slowly releasing moisture during dry periods. Without tree cover, water runs off faster during the tropical rainy season, carrying away the valuable topsoil. Forest cover regulates climate, while destruction of forests contributes to global warming. Whereas living trees soak up and store carbon dioxide from the atmosphere, trees that are cut down and burned release carbon into the atmosphere. In the last decade, tropical deforestation has released large amounts of stored carbon, accounting for roughly one quarter of the carbon dioxide emissions to the atmosphere due to human activity (OECD/IEA, 1991).

Human activities on forests;

Population pressure on the environment, soil pollution, land degradation and deforestation have led to adverse encroachment on the forests in search of natural resources, leading to natural hazards such as droughts, frosts and storms, and the spread of pests and diseases, degrading the quality of forests (El-Hinnawi, 1991).

Forest fires have caused serious damage to forests in Sudan, Tanzania, Nigeria, Niger, Ethiopia, Mali and Burkina Faso. Air pollution (especially acid deposition and oxidants) can affect forests directly by acting on the foliage or indirectly by changing the properties of the soils supporting forest growth; this has been seen in France, Greece, Spain, and the United States (OECD, 1991).

One reason that agricultural yields have fallen in sub-

Saharan Africa is that vast amounts of forest cover have disappeared, hastening soil erosion and loss of soil nutrients (Trapez, 1985).

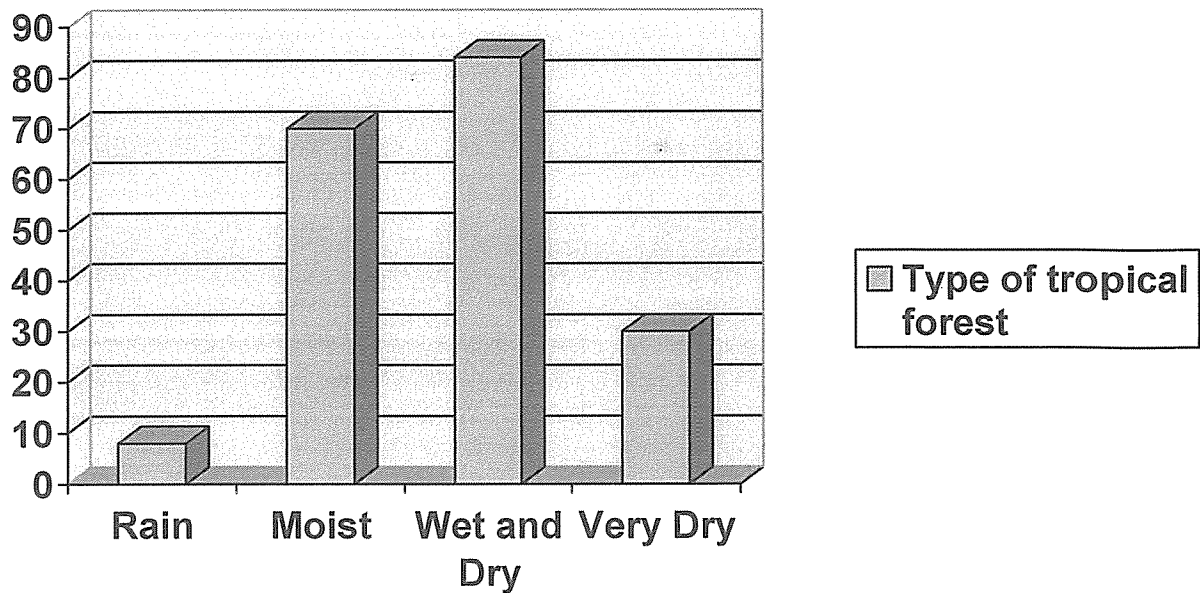
The rate of soil loss was 10 times higher on forest lands where slash and burn shifting cultivation was practiced than in undisturbed forests. In a study carried out at Kenya (World Bank, 1991).

The growing focus on the interrelation between people, resources, environment and development has stemmed from three basic considerations. Firstly, it has become increasingly evident that development at national and regional levels affects productive processes in a variety of ways, not all of them beneficial. Secondly, while such effects involve the vigorous interaction of economic, social, demographic and physical factors, it is difficult to establish their causal relationships. Thirdly, there has been great uncertainty about the likely long-term impact of development as far as quality of life and environment are concerned; appraisals have tended to focus on risks of negative rather than positive outcomes (UNEP, 1991).

In many developing countries, rapid population growth has meant that arable land per capita has declined sharply. This has led to more adverse effects on the forests; for example, developing countries as a whole had an average of about 0.6 hectare of arable land per person; by 1992, the amount had fallen to less than 0.2 hectare. If the current trends in population growth and land use continue, in 2050, the amount of arable land will be just over 0.1 hectare or less per person, increasing the risk of more marginal lands being encroached (UNFPA, 1991).

Like other places in the world, Tanzania in particular experience the same problems, especially in some rural areas. Arusha city, in Arumeru District; is densely populated in some areas by Tanzania standards. Growing population have stripped the forests from the habitats areas on the southern slopes of the mountain, the slopes can no longer hold the rainwater, and major floods are increasing throughout the Ngaramtoni watershed.

Human population density in the Tropical forests



Source; Murphy and Lugo 1986, after Tosi and Voertman 1964

Heavy human settlements have devastated the tropical wet and dry forest. While the world's attention has been focused on the plight of rain forests, intact tropical wet and dry forests have nearly disappeared. Why have tropical wet and dry forests been more densely settled or encroached? The relatively fertile soil of tropical wet and dry forests has attracted agricultural development. People have replaced tropical wet and dry forests with cattle ranches, grain farms and other land uses. Tropical wet and dry forests are vulnerable to human exploitation than tropical rain forests, because the dry season makes them more accessible and easier to burn. Also there may be less impact from human disease (Murphy, 1986).

Intensive settlement and agricultural development have whittled away at tropical wet and dry forests over a period of centuries. In contrast, rain forests are disappearing in a recent push involving far fewer people but an enormous application of mechanical energy. This energy is directed at the extraction of lumber and minerals and at large-scale conversion of land from rain forest to agriculture. Though human impacts on tropical wet and dry forests have differed in tempo, their ecological consequences appear to be the same, massive loss of biological diversity.

Impacts of human activities on forests;

Forest degradation have many negative consequences, tropical forests are the richest biotic environments in numbers of plant and animal species, for example monkeys, parrots and large cats i.e. Tiger in Asia. Loss of tropical forests causes the extinction of increasing numbers of these species, and forests degradation causes serious reduction in the genetic diversity of others (El-Hinnawi, 1985).

The destruction of forests undermines the basic operation of the ecosystem and may thus cause irreversible changes. The most serious of these appear to be due to the large-scale exposure of forest soils to wind and rain, leading to increased erosion and, in turn, indirectly affecting water resource development. Where deforestation has eliminated plants and animals and degraded water supplies and soil fertility, families can no longer support themselves. Major deforestation can cause the displacement of whole communities, such disruption can force people to flee and seek livelihood elsewhere. Several million of these 'environmental refugees' have left their home countries in Central America, the Caribbean, Africa and Asia, to escape poverty and environmental deterioration related to deforestation (El-Hinnawi, 1985).

Deforestation has an important influence on regional and global climate. Deforestation affects regional climate by altering sensible and latent heat flux, precipitation and albedo. On a global level, deforestation has resulted in a net release of carbon dioxide and other greenhouse gases into the atmosphere. It has been estimated that tropical deforestation accounts for 26-33 per cent of the carbon dioxide released annually into the atmosphere; 38-42 per cent of methane; and for 25-30 per cent of nitrous oxide (Houghton, 1990).

Wood is primary source of energy for domestic heating and cooking for well over 2000 million people. Fuel wood and charcoal supplied 17 per cent of total energy consumption in developing countries in 1990 (FAO, 1991), but there importance is even greater in rural areas where they are the main source of energy for most households and rural industries. In Arumeru wood is the main source of energy, providing more than 80 per cent off energy use in the area.

In countries like Sudan, Nigeria, Niger, Ethiopia, Mali, Nepal, Tanzania and Burkina Faso; current estimates indicate that on average every person consumes about 0.45 meter cubic of wood as fuel wood or charcoal per year, although values as high as 2.5 meter cubic may be encountered in rural areas (Hashmi, 2000).

The loss of the wet and dry forest is significant because, while rain forests may support a somewhat greater number of species, many dry forest species are found nowhere else. However, out of this devastation has come Arusha National Park in Arusha, a model attempt to restore a wet and dry forest in a way that also helps serve the cultural and economic needs of local people.

CHAPTER III

METHODOLOGY;

PRIMARY DATA:

Primary data collected through appropriate questionnaires, in depth interviews and observation.

SECONDARY DATA:

Secondary data obtained from documented sources from the University of Dar es Salaam main Library, NEMC, NEMA, WWP, Ministry of Industries & Trade, Ministry of Natural Resources and Tourism and other relevant sources of information like publications.

SAMPLING PROCEDURE:

The data used in the study was collected from sample of 35 individuals, where the number of environmental planners and other officers were included. The study also was conducted around the logging companies and agricultural areas where individuals live so that they can express their views on impact of forests encroachment. Respondents were sampled (chosen) randomly.

DATA ANALYSIS:

Percentages was used to compute and summarize data on indigenous people's knowledge on environmental degradation through encroaching the forest and their own activities i.e. agriculture and lumbering and timber extraction. Also data composed of tables and figures.

AREA OF THE STUDY

The study was conducted in Olmotonyi, Ngaramtoni and Namanga. All these areas are in Arumeru district, Arusha region, and they have all types of the respondents wanted. These groups are official workers, forest rangers and farmers just to mention few. These groups are composed of both classes thus the higher class and the lower class.

Arumeru district is in Arusha region; the district has a total population of almost 150000, occupying an area of sq km. This is of the total population of Arusha region.

MAP; Tanzania;



Limited time for the research was also anticipated to hinder the study. It should be borne in mind that the study was to be carried out while class routines are continuing as usual, thus making the two incompatible. It sometimes required a sacrifice of some lecture hours to make a study and time allocation was therefore integral to the problem.

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This anticipation was, they might be unwilling to express their feelings, thinking that the exercise is a government refer means to punish those who are in one way or another encroaching the forests and degrading the environment.

Organization of the study

The study consists of five (5) chapters the contents of the chapters could be presented as follows: The first chapter has an introduction of the study; it carries the statement to the problem, background to the study, statement of the problem, objectives of the study, hypothesis, and significance of the study and scope of the study.

Second chapter will only describe the literature review of the problem from various sources of information.

Third chapter describes the Methodology to be based in carrying the study. It divided into primary data, secondary data, sampling procedure, data analysis, area of the study, anticipated problems in executing the study and organization of the study.

The Fourth chapter presents analysis and discussion over the findings in-relation to the research hypothesis and objectives as shown in the first chapter.

The last chapter will provide a summary of the findings concluding remarks, suggestions and recommendation for the further studies.

CHAPTER IV

RESEARCH FINDINGS, ANALYSIS AND DISCUSSIONS

Aspect that show the level of people's knowledge on environmental degradation through forest encroachment;

The study was aimed at assessing the level of people's knowledge on environmental degradation through forest encroachment. However it is important to note that one cannot just claim to know the environmental degradation while he/she doesn't know anything about the term environment.

Any knowledge on environmental degradation largely depends on the extent of how people consider it being the major problem of the human environment. Of the respondents from all areas, Olmotonyi, Ngaramtoni and Namanga, two thirds considered the total patterns of land, water, forest and air to be major constituents of the human environment.

When all respondents were asked to clarify more on their responses, most of them, 90 per cent explained that the human environment comprises the total aspects that surround a human being. To support this, one of the respondents said that;

We kijana, wahenga wanasema, "mazingira haya hatujaachiwa na wazee wetu, bali tumeazimwa na watoto wetu. Kwahiyo hatuna budi kuyatunza ili na vitukuu vyetu wakayakuta safi. Huko shuleni, tulifundishwa kuyaweka mazingira yetu safi, sijui kuhusu sasa"!

This quotation means that, speaking to the researcher; the environment we are, it was not left to us by our fore fathers, but lent to us by our children. So we are obliged to conserve and maintain for our grand daughters and sons find it clean, at school we were taught to put our environment clean, I do not know this days?

This statement also indicates that in the old days, a subject on the environment was included in the school syllabuses for students to learn, but also it seems that they knew it mainly from the activities done with their teaching.

Responses from the study imply that most of the individuals from these areas understood what constitutes the human environment. Although there were some different opinions for examples, people from Namanga seemed to have a

clear understanding of the term environment much more than that of other two remained areas. However, the difference in the level of understanding each respondent had, from the study, it was observed that respondents from Olmotonyi had clear understanding on the meaning of encroachment of the forests; this is due to Institute of forestry in Ol'motonyi.

Trees cut down and left out within the forest at Olmotonyi



Perception on encroachment of forests

Generally people will not strive to conserve and care for their environment, unless they consider it having some significance for their survival and well being, nor they will strive to acquire knowledge that would enable to conserve it (World Bank, 1993)

Respondents were thus asked to mention their perspective, when we say encroachment of the forests. Most of the respondents 91 per cent mention, acquiring areas for agricultural practices and cutting down of trees is the correct answer to the meaning.

Fundamental importance of land was considered by most of the respondents from all the three areas. As to, what forces people to encroach the forests, most respondents include timber for industries and agricultural practices. These activities affect simply because most people in urban centers want furniture made out of hard wood and mostly Mahogany and others, leading to logging companies creating new markets

thus further encroaching and cutting down of forests. Opening up new area for agricultural practices, forests areas are undisturbed areas where soil profile is still in order although poor, but appropriate for some crops.

THE IMPORTANCE OF FORESTS, WHERE THE RESPONDENTS HAVE ANSWERED MORE THAN ONE QUESTION

Importance of forests	Ngaramtoni	Namanga	Olmotonyi	Total	(N/35)%
: Timber for construction and industries	14	11	10	35	100
: Firewood	15	10	10	35	100
: Medicinal	11	-	02	13	37.14
:Regulate local climate	09	12	14	35	100
:Reduce soil erosion	05	13	15	33	94.28
:Encourage water resource development	06	05	14	25	71.42
:Habitat for wildlife/locals	04	13	16	33	94.28
:Ecological importance/Genetic heritage	04	02	10	16	45.71

Source: Field Survey, March 2006.

Responses for the study suggest that most of the individuals from these areas have some awareness over the importance of forests for their survival. However, there is an indication that people consider the importance of forests mostly in terms of how it is able to meet most of their immediate demands from nature such as food, materials for their shelter and earning income. Thus only few respondents were able to explain the importance of ecological importance, encourage water resource development, and medicinal. For instance, only thirteen respondents out of the total respondents was able to explain that despite other importance, of forests it could also provide human with medicinal. However, 94 per cent of respondents could possibly identify that; forests can reduce soil erosion by holding the soils through vegetation cover.

Human activities responsible for Forest encroachment/ Deforestation in Arumeru

Awareness towards human activities is very important in determining the level of how people can conserve their environment, such awareness may influence people to retrain from those activities considered to be environmentally destructive and seek for alternative ways and methods of dealing with nature so as to ensure a good state of their environment. It also helps us to understand if at all individuals are aware of their activities that have affected the environment.

People from all over the globe owe more to the tropics than is generally realized. People in Arumeru owe a lot to the mount Meru forest, their staple food including maize, bananas, rice (small amount) and sugarcane. Medications about 20 per cent are originally derived from the tropical plants from the forest.

Agriculture practices around the forest



People in Arumeru have exploited tropical wet and dry forest for years through mixture of gathering and hunting for gazelles and other wild animals. Also shifting cultivation, since most of the people are the Maasai, this is their tradition. Furthermore they have encroached for building materials and medicines.

Other areas in Ngaramtoni, they encroach the forest, for timber and short lived agricultural profits. Traditional system of exploitation have given way to bulldozers and chain saw, and also pave way for logging companies like; i.e. Fibreboards Limited to encroach for timber purposes. Expressing his views one of the respondents said;

"Aisee, sio jambo la mzaha, Fibreboards bwana inaharibu mazingira hapa Olmotonyi. Wameshaambiwa mara nyingi juu ya uvunaji wa miti upungue lakini wametoa nje. Hili eneo ulikuwa huwezi kuona mpaka eneo lile lenye mawe kwenye mlima, ila sasa unaliona vizuri kabisa miti iliyo kuwepo imevunwa yote. Na waliambiwa waangalie njia mbadala ambayo itatunza mazingira na kurudia kupanda miti tena. Watu wa misitu bwana, sio mchezo."

Here respondent was expressing his feelings about the encroachment made by the logging company which contributed to environmental degradation in Olmotonyi area. He proved that in few years back one could not have seen the rock line of the mountain, but today is seen clearly simply because trees are cut down leaving the area bare. Instead they were told to look for alternative means to conserve the environment and replanting of trees. He further appreciated the forest rangers and forest authority for job successfully done.

Loggers carrying logs at Ngaramtoni



Thus in all areas of my research I observed that Olmotonyi respondents are more aware over the issue concerning forest encroachment, as compared to the others two areas i.e. Namanga and Ngaramtoni.

The Olmotonyi residents are the ones who complained to the forest authority that forests are being encroached at the rate that is alarming, only for areas of agriculture, buildings material and areas for their livestock's, which leads to environmental degradation. For example, floods once affected one villager's house and it led him to ban cutting of trees surrounding his area and nearby areas.

HUMAN ACTIVITIES RESPONSIBLE FOR FOREST ENCROACHMENT/ DEFORESTATION IN ARUMERU, WHERE EACH RESPONDENT GAVE MORE THAN ONE ANSWER

Human Activities	Ngaramtoni	Namanga	Olmotonyi	Total	Percentage (N=35)
Area for agriculture:	10	06	16	32	91.42
Finding pasture for their livestock's and establishing cattle ranches:					
Timber for firewood and for construction	06	07	17	30	85
Small Farming and settlements	12	13	10	35	100

Source: Field research, 2006 March

Human activities on forest; clearing and burning method ready for agriculture at Ngaramtoni



The findings generally show that people from all three villages had adequate knowledge on the human activities responsible for forest encroachment/deforestation in Arumeru. However, there were some differences among respondents from 3 areas in attributing human activities to most of the environmental problems associated with forest encroachment/deforestation. For instance in Olmotonyi area, most of the people were aware of only agriculture practice and livestock grazing as contributing to forest encroachment and they are not aware that small farming and settlement also contribute to forest encroachment and their impact also spell harmful consequences to the surroundings. Respondents from Namanga are mostly aware about small farming and settlement as contributing to forest encroachment/deforestation as compared to other areas of research. If one refers to the above table, one will see that the respondents from Olmotonyi and Ngaramtoni are areas with large forest cover. However, this difference in responses might have been accounted for by the difference in the nature of activities that are available in each area.

Danger of Forest encroachment/deforestation to the environment and society around

Awareness towards the dangers resulting from forests encroachment/deforestation may influence people to refrain from those activities considered to be environmentally destructive and seek out to conserve their own environment. Generally people care for things that have some prospects for their survival and avoid those that have detrimental effects upon it.

From the findings, it was observed that most of the respondents were not aware of the dangers emanating from forests encroachment/deforestation, which degrade human environment. Only one third of the total respondents were able to explain that human life would become uncertain if their environment continued to be eroded through cutting down of trees and soil erosion and other activities associated with forests encroachment. Explaining the dangers of cutting down of trees and soil erosion, the majority claimed that they have very little knowledge about the study. Other respondents argued that, if the forests become encroached, the climate changes no cool breeze and shade again, also different animal escape from the area; i.e. monkeys and other wild animals.

Other respondents did not mention anything rather than "I don't know". Another respondent from Namanga blamed that the level of education that they have had makes have little knowledge on the matter, although they can see the effects in reality. He argued that many of individuals are not aware of the environment conservation method; they might have some of which they have shown to be more of failures than success. One of the respondents argued that

"Hivi wewe nani alikudanganya eti msitu hautaisha kabisa? Huo utakua upunguani sasa. Mungu bwana sio mjinga, aliumba mbingu na ardhi na alisema katawaleni kila kitu Duniani. Ingawa hakuna kiumbe yeyote yule anayeweza eti kuimiliki msitu, lakini hatuna budi kuitunza misitu yetu"

The respondent here point that; forest will disappear or vanish from the face of the earth. He also says that God is the one who created heaven and earth, and said go and rule over everything I created on earth. Although no one can own a natural forest or have control over it, but it's our duty to conserve them.

Dangers of deforestation; leading to soil erosion near Namanga



Where deforestation has eliminated plants and animals and degraded water supplies and soil fertility, families can longer support themselves. Such disruption can force people to flee and seek livelihoods elsewhere; in Arumeru the disruption has shown its detrimental effects. Most of families around the area have no clean water, the boreholes

which used to have water table near the surface, are now seasonal boreholes which also at times they become dry completely. Major rivers, i.e. Naura and others which their source was from mount Meru forest are drying out and some becoming seasonal. Climate is also showing some changes, the copious quantities of precipitation can fall in a short period of time temporarily and substituting the drumbeat of volumes of water and rumble of thunder, through the year and the cold month of March which had 18 degrees Celsius are no longer observed. Rather it's dry all through till the rainy season and warmer.

Forest Conservation

Important consideration was given to assess whether respondents were aware of the various ways through which they could conserve the forests. Responses varied along the factors responsible for forest encroachment as each respondent-explained.

METHODS FOR FOREST CONSERVATION OF WHICH EACH RESPONDENT GAVE MORE THAN ONE ANSWER

Methods	Ngaramtoni	Namanga	Olmotonyi	Total
: Reduce Farming and Grazing	08	14	02	24
: Government Control through Law and policies	06	10	12	22
: Reforestation method	14	05	16	56
: Improve forest management	04	07	05	27
: Initiate being a protected area	20	10	05	56

Source: Field Research, March 2006

The findings revealed that there is the need for government to enact some laws and initiate new policies to control the activities of human which cause deforestation. Also respondents mentioned that, grazing activities should be controlled by individual themselves, thus the degradation to

land from mentioned factor will be reduced to a greater extent.

Many respondents suggested the reforestation, as a means of preventing environmental degradation and deforestation. The advantages derived from reforestation that firstly it will bridge the gap of the deforested area, and secondly allow water development from its source, water which is let into rivers and lakes.

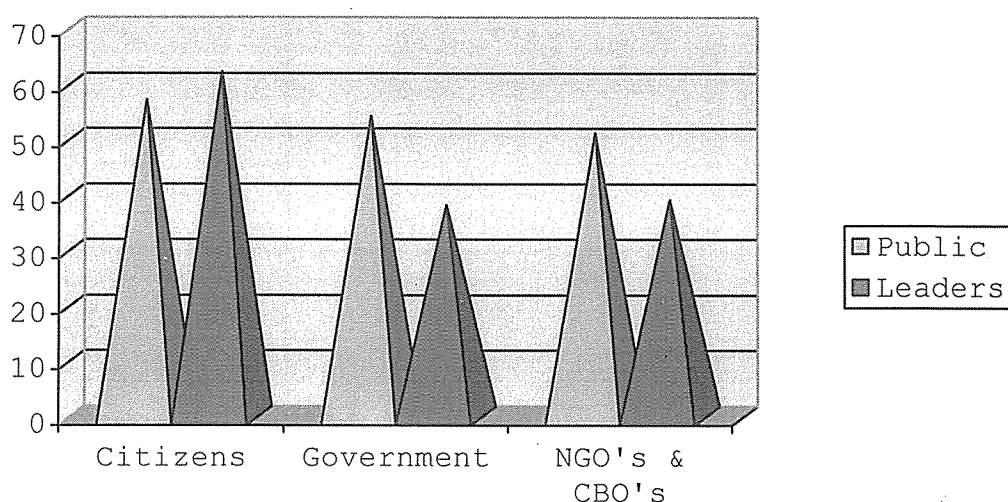
Reforestation on process at Olmmotonyi



Examining the results from Table above, it can be seen that most of the respondents from these three areas understood the methods of conserving forests. However, differences among them seemed to be accounted for by respondent's perceptions on what they had believed to be the factors responsible for environmental degradation and deforestation which also was determined by the type of human activities and natural resources available in each area as discussed in the preceding sections. Responses on the methods of conserving the forests were largely confined to the factors each respondent had believed to be causing environmental problems by deforestation. The study investigated further people's awareness on who they thought was largely responsible for conserving the forests. This was an important investigation for it could show whether people did any efforts on their own to conserve the forest or if they had left everything to the government and NGO.

THE RESPONSIBILITY FOR CONSERVING THE FOREST EACH RESPONDENT GAVE ONLY ONE ANSWER

The Responsible For Conserving The Environment	Ngaramtoni	Namanga	Olmotonyi	Total	% N=35
Citizens	05	04	11	20	57.14
The Government	03	06	10	19	54.28
NGO's & CBO's	02	10	06	18	51.4
Others (specify)	06	01	05	12	34.28



Source: Field Survey, March 2006

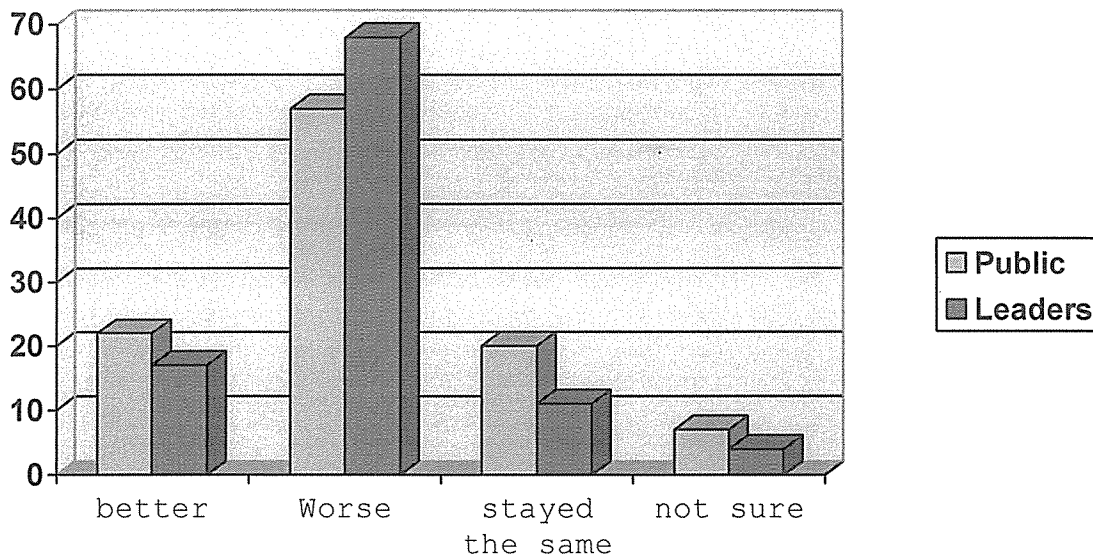
Table above indicates that most of the respondents had a clear knowledge on who was largely responsible to conserve the forest. 20 of the total respondents considered citizens to be fully accountable in protecting the forest. Some of the reasons given was that it is important to involve both citizens and the government in conserving the forest because if things were left to the government alone, it (the government) might be lacking most of the necessary information on what is taking place (on the environmental matters) by people.

Again respondents explained that environmental matters could not be left to the citizens alone because, they might be lacking sufficient resources to deal with most of the environmental problems.

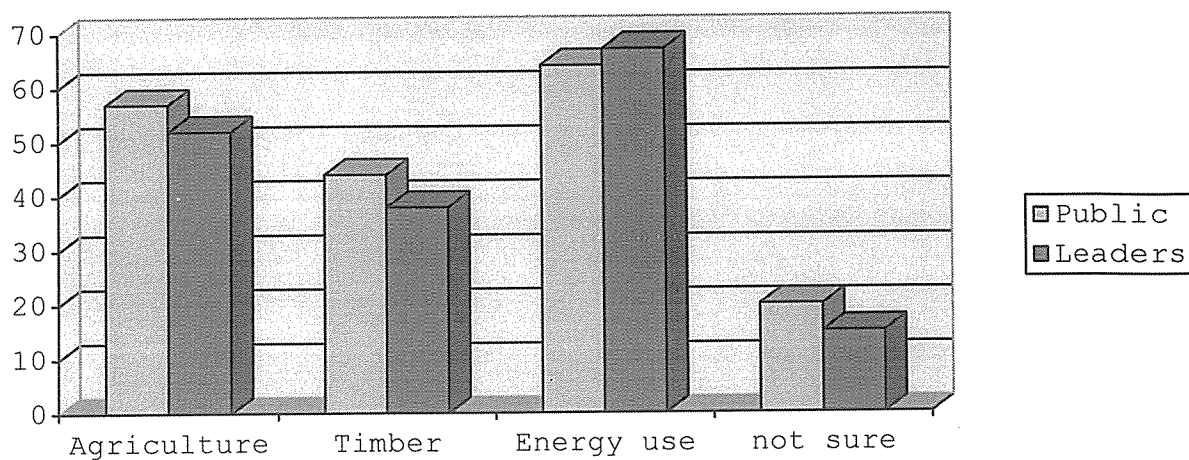
Although some respondents considered citizens as the most responsible in conserving their own environment, the government was considered by some as important in enacting laws that would prohibit people from encroaching the forest. They considered environmental matters to be a concern of citizens because they use it, whereas the government is considered as having different responsibilities such as protection the rights of citizens. One respondent from Olmotonyi said "why should the government protect the environment while the degradation of the forest is done by us and finished his sentence by saying the government is here to guide and correct us, it has a lot to do for the country".

Graphs below gives a clear perspective of the public and leaders on the state of the environment and forest, willingness to conserve as conducted on the field research.

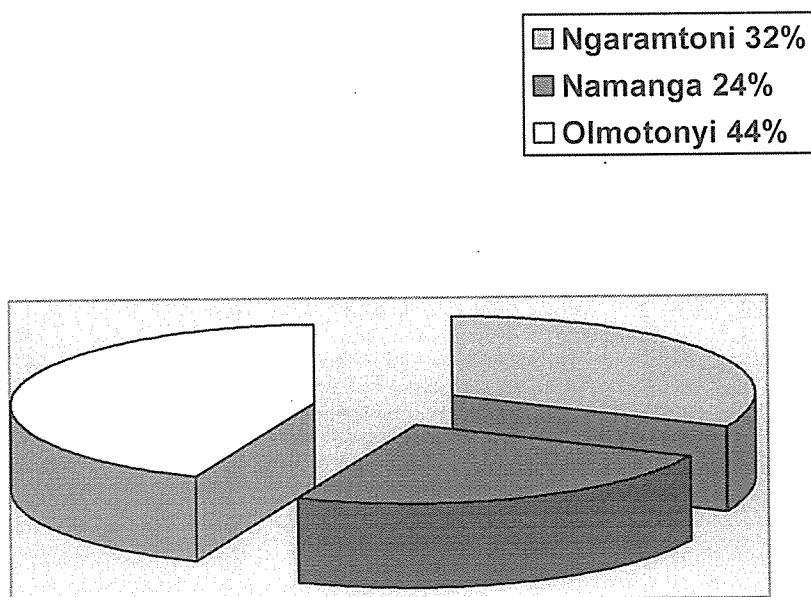
Is the environment getting worse or better?



What are the major activities of forest encroachment?



Are you willing to conserve the forest if, provided with education on how to conserve?



CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS:

SUMMARY OF THE STUDY

Findings and the interpreted data were based on the sample of 35 respondents from various parts of Arumeru district in Arusha. Data were collected in two main ways, where 25 responded through questionnaires and 10 respondents were interviewed (face to face interview).

THE ISSUE OF HUMAN ACTIVITIES THAT MOSTLY AFFECT THE ENVIRONMENT

From the findings, it was noted that almost all respondents were aware about the main activities that led to encroachment of the forest.

It was also noted that their awareness differ from one individual to another due to their differences in the level of education.

Economic constraints which contributed to poverty compelled individuals to degradate the forest environment either directly or indirectly, either knowingly or unknowingly for the purpose of making their survival more easily.

THE ISSUE OF AWARENESS OVER THE FOREST DEGRADATION

All surveyed respondents showed that they had little knowledge on the issue of forest degradation.

It was noted that people in rural areas are not provided with any special programmes on the issue concerning the forest and environment in general. Most of them know it through hearing from friends or they were taught when there were at school. Most of the respondents who lived under poverty, lack some informative instruments like TV's, newspaper and radios. This was considered as the main block to media based on education programmes. Again, most of the respondents especially student's lack special syllabus in their schools which has a special lesson on forest and environment at large. This hinders their awareness on the issue of forest degradation.

ATTITUDE TOWARDS CONSERVATION OF FOREST

It was noted that people are not aware of how to protect the forest environment, thus the majority of the respondents argued that there is a need of providing extensive environmental education.

Again the respondents suggested that, the government should enact some laws and policies to control human encroachment on forest and forest degradation, it was also pointed out that, individuals themselves also should play the major role on preventing their own environments.

Conclusively, it was observed that people's awareness towards the dangers resulting from forest degradation were not enough to worry them at all. Most of the respondents were not aware of the dangers emanating from degrading the the forest by some human activities.

Their idea and main hope was that the environment is a result of nature which controls itself, so if they will continue to degradate the existing forest, there is the possibility of natural replacement. This means that, still the education to these people is highly needed; thus there is no way out rather than educating them on the dangers of degrading the forest.

CONCLUDING REMARKS

In summation, one would agree with me that, the study has failed to reject the hypothesis that human encroachment is the major activity, which degradate the environment mostly than any other activity around Mount Meru.

It was also noted from the study, people are some how aware of the forest degradation than before although it was noted that the difference in the knowledge is too small to conclude that the respondents are aware.

Since people's awareness in general is too small, it is my opinion that education on the environment knowledge should be spread not only in Arumeru but also in other rural areas surrounding the forests.

I hope that much education will be provided so that the task of conserving the forest will be understood by the majority. This will go a long way to contribute to a harmonious environment that will provide good health to its inhabitants.

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NEWS PAPERS

- The New Vision, January, 2006
Article by

Appendix 1: Questionnaire:

Section 1;

Personal information;

1.0. Gender;

- (a) Male ()
(b) Female ()

1.1 Age;

18-24	25-31	32-38	39-45	46-52	53 ⁺

1.2. Educational Status;

No Education	
Adult Education	
Primary Education	
Secondary Education (Form 1-4)	
High school Education (Form 5-6)	
College/ Institute	
University	
Others (specify)	

1.3 Profession/ Job title;

- (a) Employed ()
(b) Employer ()
(c) Unemployed ()
(d) Student ()
(e) Others(specify) ()

1.4 (a) where is your area of residence?

(b) Is it far from where you're leaving and the forest?

(a) Yes ()

(b) No ()

(c) By which means do you reach to the forest?

(a) By walking ()

(b) By bicycle ()

(c) By car or bus ()

(d) Other means ()

Section 2;

2.0 What exactly do you understand by the term environment?

(a) Air ()

(b) Soil ()

(c) Water ()

(d) All of the above ()

(e) I do not know ()

2.1 When we say encroachment of the forests, how do you understand and perceive?

(a) Taking cattle for pasture & water in the forests ()

(b) Acquiring areas for agriculture practices ()

(c) Cutting down of trees ()

(d) Having settlement areas within the forests ()

(e) I do not know ()

2.2. (a) what do you think forces people to encroach the forests?

(a) Timber for Industries ()

(b) Firewood business ()

(c) Agricultural practices ()

(d) All of the above ()

(e) I do not know ()

(b) How do these activities affect the forests?

.....
.....
.....
.....
.....

(c) Do you think timber for industries and logging companies greatly affect the forests leading to gateways for human encroachment?

- (a) Yes ()
- (b) No ()

Explain briefly

.....
.....
.....
.....

(d) Do you think firewood business (Charcoal) leads to forest encroachment?

- (a) Yes ()
- (b) No ()

How?

.....
.....
.....
.....

(e) Can you provide other examples of human encroachment activities?

- (a)
- (b)
- (c)
- (d)

2.3 Is it dangerous to encroach forests and degrade them for the society you are living in?

.....
.....
.....

2.4 What is the importance of forests?

- (a)
- (b)
- (c)
- (d)

Section 3;

3.0(a) What is the meaning of forest conservation?

.....
.....

(b) Could you mention different ways by which forests
Can be concerned?

- (a)
- (b)
- (c)
- (d)
- (e)

3.1(a) Who is responsible for forest conservation?

- | | | |
|-----|------------------|-----|
| (a) | People | () |
| (b) | Government | () |
| (c) | NGO's and CBO's | () |
| (d) | Others (specify) | () |
| (e) | I do not know | () |

(b) Give reasons.....
.....

3.2 Is there a need to be provided with environmental knowledge in order to conserve the forests?

- (a) Yes ()
(b) No ()

Give reasons for your answer;

.....
.....
.....

3.3 Is there any knowledge being provided in your area on forest conservation?

- (a) Yes ()
(b) No ()

3.4 Are you able to acquire information on matters concerning forests and the environment from the Media, i.e. Radios and Newspapers or any other source?

- (a) Yes ()
(b) No ()

Give reasons if your answer is no.

.....
.....

3.5 Can you think of any possible ways of providing knowledge on forest conservation to the communities around?

.....
.....
.....

3.6 What do you think are the possible ways of putting an end to the activities leading to encroachment of the forests?

.....
.....

3.7(a) Are you aware about any law(s) restricting people from encroaching forests?

- (a) Yes ()
(b) No ()

(b) If yes, which one?

.....
.....
.....

(c) Do you think this law or these laws have it has helped in one way or another in reduction of human activities in encroaching the forests?

.....
.....
.....

-THE END-

Thanks for your co-operation and honesty.