

**AN ETHICAL INVESTIGATION INTO THE CAUSES AND
EFFECTS OF THE OVER-EXPLOITATION OF INDIGENOUS
TREES IN MULILIMA AND NDABALA WARDS IN SERENJE**

BY

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**A Dissertation Submitted to the University of Zambia in Partial Fulfillment of the
Requirements of the Degree of Master of Arts in Applied Ethics**

THE UNIVERSITY OF ZAMBIA

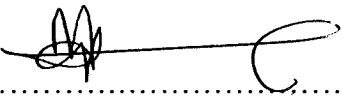
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DECLARATION

I MAJOR MWANZA, declare that this dissertation:

- (a) Represents my own work;
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APPROVAL

This dissertation of Major Mwanza is approved as
fulfilling the partial requirements for the award of the degree of Master of Arts in
Applied Ethics by the University of Zambia.

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ABSTRACT

This dissertation has conducted an ethical investigation into the causes and effects of the over-exploitation of indigenous trees in Mulilima and Ndabala wards in Serenje. The specific objectives of the research as relating to Mulilima and Ndabala wards were: to determine the types and values of indigenous trees that are over-exploited, to establish the people responsible for the over-exploitation of indigenous trees, to examine the environmental and human impacts of the over-exploitation of indigenous trees, and to recommend measures to ensure the sustainable use of indigenous trees.

The methodology used for the research was qualitative involving an ethical evaluation. The primary data were collected from observations, in-depth interviews and focus group discussions with relevant ~~selected~~ stakeholders. The secondary data involved information gathered from relevant books, magazines, journals and newspapers as well as from the internet. The analysis of data collected took the form of critical discussion and ethical evaluation.

The data collected for this research has been evaluated using both traditional and environmental ethical theories i.e., Value theory, Utilitarianism, the Land Ethic, Social Ecology and, Environmental and Intergenerational Justice theories, all of which helped to focus on different aspects of the problem.

The research findings were that the *Mutondo* and *Musamba* tree species are the most exploited. This excessive exploitation of such indigenous trees is perpetuated mainly by charcoal burners and tobacco farmers together with different stakeholders, and it is driven by social and economic conditions. Currently, the area around the two wards is now facing a serious shortage of the *Mutondo* and *Musamba* trees threatening the sustainability of both the charcoal and tobacco industry as well as the livelihood of the local inhabitants. Caterpillars and some animals are now almost extinct while some streams are also affected.

The ethical evaluation of the over-exploitation of the indigenous trees in the two wards revealed that people's interaction with the natural environment is largely influenced by anthropocentric attitudes in which instrumental value alone is attached to trees to the neglect of intrinsic and inherent values. Furthermore, there is no explicit awareness of the importance of the health of the ecosystem. Unjust social structures have also contributed to the problem. The loss of valuable trees in the area is not only an environmental injustice to the present generation without providing substitutes. It is also creating victims who would be disadvantaged in the future. The final ethical conclusion has been that all of the ethical theories help towards making a more comprehensive ethical analysis of the problem, and all these perspectives need to be taken into consideration.

It is recommended that the various stakeholders participate in establishing and implementing appropriate measures that would create conducive social, economic, and environmental conditions for the sustainable exploitation of indigenous trees. This may involve strengthening the capacities in the local inhabitants, revisiting the regulations, empowering the forest department, forging networks with relevant stakeholders, and exploring alternative energy sources.

DEDICATION

To my wife Namakau, my children Robby, Chiwego and Mutinta.

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LIST OF ABBREVIATIONS

AOI	Alliance One International
BOMA	British Overseas Military Administration
BORDA	Bremen Overseas Research and Development Association
CBD	The Convention on Biological Diversity
CFCs	Chlorofluorocarbons
CGA	Central Growers Association
CSO	Central Statistical Office
CSPR	Civil Society for Poverty Reduction
ECZ	Environmental Council of Zambia
ERB	Energy Regulation Board
EO	Extension Officer
FAO	Food and Agriculture Organisation
FD	Forest Department
FDC	Forest Dependant Communities
FO	Forest Officer
FRA	Food Reserve Agency
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHGs	Green House Gases
GNR	Great North Road

GZR	Government of Republic of Zambia
HEDON	Household Energy Network
IRIN	Integrated Regional Information Network
IPCC	Intergovernmental Panel on Climate Change
IPR	Indeni Petroleum Refinery
IPS	Inter Press Service News Agency
JICA	Japan International Cooperation Agency
KWSC	Kafubu Water and Sewerage Company
LCMS	Living Conditions Monitoring Surveys
LPG	Liquefied Petroleum Gas
MEWD	Ministry of Energy and Water Development
MTS	Mulilima Tobacco Scheme
MTENR	Ministry of Tourism, Environment and Natural Resources
NGO	Non-governmental Organisation
NWFPs	Non-Wood Forest Products
PFAP	Provincial Forest Action Plan
REA	Rural Electrification Authority
REMP	Rural Electrification Master Plan
REF	Rural Electrification Fund
SNF	Serenje National Forest
TBZ	Tobacco Board of Zambia

UNDP	United Nations Development Programme
VNRMC	Village Natural Resource Management Committee
WFPs	Wood Forest Products
WWF	World Wildlife Fund
ZAA	Zambia Agribusiness Association
ZLF	Zambia Leaf Tobacco

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CHAPTER ONE

INTRODUCTION

1.1 Background issues

Zambia's forest area is mainly composed of hardwood trees called *Miombo*. These tree species occur in open forests in the northern part of the country with higher rainfall and as scattered trees and bushes in the drier parts of the south. The growing national demand for energy by the increasing population has been putting pressure on the forest resources of the country. Rural and urban fuel demands in the form of charcoal and industrial usage are the major factors in forest degradation. In Zambia, most of the charcoal is used in the urban areas. For instance, to meet the demands of Lusaka alone, 2,000 hectares of forest are felled annually. McCullum (2000) stated that, at the current rate, deforestation around Lusaka would be about 12,000 hectares by the end of the 20th century.

Being a rural district, Serenje's main source of energy is firewood and charcoal. In this area, most of the people depend on trees for their domestic as well as commercial activities. In Mulilima and Ndabala areas, people use mainly firewood for their domestic activities. These two areas are also important sources for charcoal which is used in the township of Serenje as well as in other towns in the country. The charcoal burners are mainly villagers with limited available means of livelihood. These people do not seem to have easy access to various economic activities of the nation due to long distance to the main towns and their socio-economic status. In such areas, as is the case throughout the country, people cannot access subsidised farm inputs since they live far from the distribution centre. Furthermore, they are hampered by lack of knowledge on the procedures involved as well as by general poor

government policies and implementation. The charcoal burners usually sell the charcoal to traders from the local area or from towns like Kabwe and Lusaka. The local traders later transport the charcoal to the townships or wait at roadsides for customers while the traders from towns usually arrange for transportation to move the commodity to the urban centres. Customers for charcoal are mainly middle class Zambians with some income who can afford the price charged. They are found in the township of Serenje district and in other towns. In most cases, the charcoal is bought by traders who book transporters to carry the commodity to towns where the price and demand is good. The price of a 25 kg bag ranges from around K15,000 in Serenje Township to up to K80,000 in Lusaka. The growth in economic activities and the improvement of transport facilities have resulted in an even greater rate of depletion of the forest resources as various commercial ventures such as brick making, beer brewing and tobacco curing are now on the increase. Furthermore, people from different parts of the country are also contributing to tree cutting.

Serenje district lies within the central province of Zambia and has an area of approximately 9,016 square miles. The district lies within the area bounded by latitudes 12° 00' and 14° 00' South and longitudes 29° 30' and 31° 30' East. The district is dominated by the Great North Road and Tazara railway line. Since the British designated Serenje as a BOMA (British Overseas Military Administration) during the time that Northern Rhodesia was a British Protectorate, the locals still refer to Serenje as a BOMA. The main rivers within the district are Luwombwa, Mulembo, Lukusashi, Mulembo, Kaombe and Lusiwasi. The map in Figure 1 below shows the main features of the district.

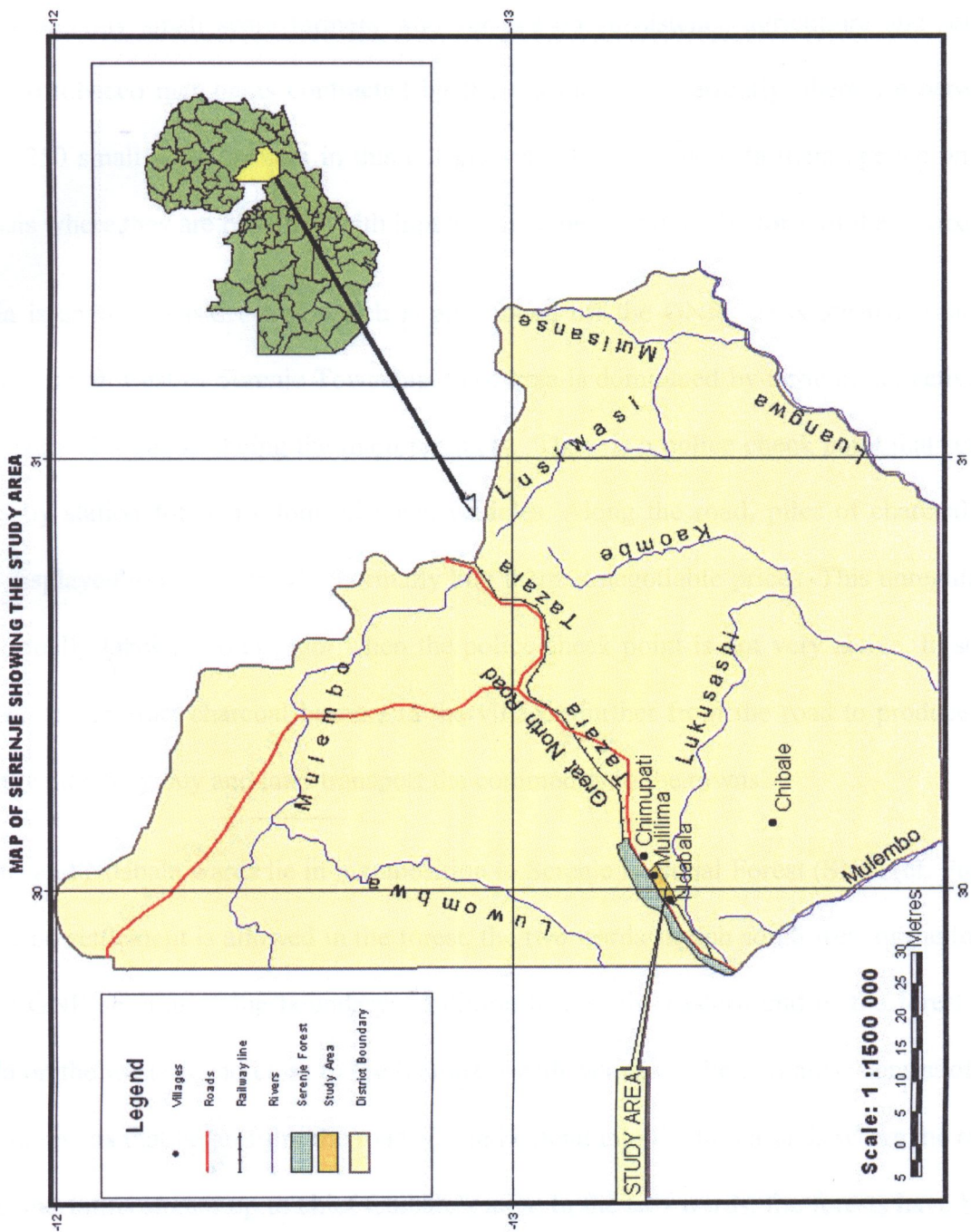


Figure 1:

Mulilima is an outskirt area located off the Great North Road (GNR). It is located 48km southwest of Serenje town center. The area is predominantly an agricultural area which is largely influenced by the Mulilima Tobacco Scheme (MTS). The scheme was established in the mid 1960s and is now run by the Central Growers Association (CGA). The scheme comprises mainly small scale farmers who survive on subsistence agriculture and selling tobacco to tobacco merchants contracted by the association. Currently, there are between 200 and 250 small scale farmers in this out grower scheme. These farmers operate on the loan-basis where they are provided with inputs which they repay in the form of the tobacco.

Ndabala is another outskirt area which is also found off the GNR. It is located some 62 kilometres south west of Serenje Township. The area is dominated by agricultural activities with maize and tomatoes being the main products. There is a police check point that serves as a lay-by station for many long distance vehicles. Along the road, piles of charcoal are always displayed to motorists who normally buy them at negotiable prices. This unregulated trade normally takes place at night when the police check point is not very active. In some cases, traders contract charcoal burners in the villages further from the road to produce the charcoal which they buy and later transport the commodity to the towns.

Mulilima and Ndabala wards lie in juxtaposition to Serenje National Forest (SNF) (cf. Figure 1). Since no settlement is allowed in the forest, the two wards stretch south west of the forest with the GNR serving as the boundary. Mulilima lies on the eastern end of the forest and Ndabala on the western end close to the boundary with Mkushi. The two areas consist of the main settlements that begin from the roadside and extend into the hinterlands where the main villages and farms stretch up to chief Chibale's area. In the two wards, the forests have been destroyed as they were cleared to establish settlements and farmlands. Currently, trees exist

mainly as scattered bushes or isolated plants usually in the early stage of their lifespan. The SNF like other national forests was established as a protected area for the purpose of conserving the ecosystems and biological diversity there. The idea was for government to protect and preserve the main water bodies as well as wildlife in the area. The forest consists of indigenous tree species of the *Miombo* type which are utilized for various purposes, especially for firewood and charcoal production.

1.2 DEFINITION OF CONCEPTS

Over-exploitation: This phrase will be used to mean the unsustainable exploitation of a natural resource such as trees, which are harvested or exploited by people at levels exceeding its capacity to regenerate.

Indigenous trees: These are local tree species described as *Miombo* that naturally grow or regenerate and contain species like *Brachystegia*, *Julbernardia* and *Isoberlinia*. These bear local names such as *Mubanga*, *Mukusi*, *Mukwa*, *Kayimbi*, *Mutondo*, *Muputu*, *Musamba* and *Kasabwa*.

Ethical evaluation: This refers to the evaluation made on the occurrence of the depletion of indigenous trees in Mulilima and Ndabala wards by applying traditional and environmental ethical theories.

1.3 STATEMENT OF THE PROBLEM

Zambia has a diverse and rich range of indigenous tree species. These form an important part of the country's natural resources. Indigenous forests have formed an integral part of the household economy of many communities in developing countries, providing an array of

valuable wood forest products and non-wood forest products. However, population expansion and related human activities have led to these tree species being over-exploited for a number of purposes. Furthermore, the forest department has not promoted the growing of these indigenous species. Among the major reasons for the over-exploitation of indigenous tree species are people's energy demands. In Serenje, a number of areas have shown marked changes in the abundance and density of tree vegetation. There is, therefore, need to identify those areas in Serenje which have shown significant vegetation changes, and to investigate from an ethical perspective the factors contributing to such a situation.

1.4 SIGNIFICANCE OF STUDY

Energy is a crucial factor for activities that directly relate to human survival. The demand for energy by humans is one factor that is affecting the indigenous trees in Zambia. Since trees are a major source of energy, they are more readily exploited. Although many studies have been done on various aspects of deforestation, nothing has been done on the ethical implication of the general demand for trees, particularly in a rural setting dominated by small scale farmers growing an energy demanding crop such as tobacco. This is the specific contribution which this study makes to the available literature. Data gathered will add to the body of knowledge on the extent to which the demand for energy sources is driving the charcoal and tobacco industry which, in turn, is resulting in the depletion of indigenous trees. Such information will hopefully help towards taking appropriate measures to resolve the ecological problem of the over exploitation of trees, especially indigenous trees that have special value. Further, the information will add to the body of knowledge on the role that demand for energy sources plays on the environment in general and on trees in particular.

1.5 AIM: To find out the causes and effects of the over-exploitation of indigenous trees in Ndabala and Mulilima wards of Serenje.

1.6 OBJECTIVES

- To determine the types and values of indigenous trees that are over-exploited in Mulilima and Ndabala wards.
- To establish the people responsible for the over-exploitation of indigenous trees in Mulilima and Ndabala wards.
- To examine the environmental and human impacts of the over-exploitation of indigenous trees in Mulilima and Ndabala wards.
- To undertake an ethical evaluation of issues relating to the over-exploitation of indigenous trees in Mulilima and Ndabala wards.
- To recommend measures to ensure the sustainable use of indigenous trees in Mulilima and Ndabala wards.

RESEARCH QUESTIONS

- What are the types and values of the indigenous trees that are over-exploited in Ndabala and Mulilima wards?
- Who are the people responsible for the over-exploitation of indigenous trees in Mulilima and Ndabala wards?
- How has the over-exploitation of indigenous trees impacted on the environment and on the human population in Mulilima and Ndabala wards?

- How can traditional and environmental ethical theories contribute towards resolving the problem of over exploitation of indigenous trees in Mulilima and Ndabala wards?
- What measures might be put in place to ensure the sustainable use of indigenous trees in Mulilima and Ndabala wards?

1.7 METHODOLOGY

The methodology used in this research was qualitative involving an ethical evaluation. The primary data involved observations, in-depth interviews and focus group discussions with selected stakeholders such as villagers, charcoal burners, tobacco farmers, charcoal traders, officials from the forest department and tobacco firms operating in the two wards. The sampling techniques are discussed in chapter 4.

The secondary data involved information gathered from relevant literature from appropriate books, magazines, journals and newspapers as well as from the internet. The analysis of data collected took the form of critical discussion and ethical evaluation.

1.8 LIMITATIONS

- Although there is a lot of literature on the exploitation of trees within the country, there is little written literature that has been published on the over-exploitation of indigenous trees in the two wards.

- Problems in soliciting responses from many participants claiming they were busy while others demanded money before being interviewed. In some cases, the participants were usually not available to provide information on appointed dates. In a number of cases, the relevant people did not have the required information.
- Some of the participants were reluctant to provide genuine information fearing the legal implications, especially as cutting of trees in the forest and charcoal production are criminal offences.
- Most of the targeted participants were not directly involved in the cutting of indigenous trees in the two wards since they normally engaged other people for such labour intensive activities.

1.9 SUMMARY

This chapter has discussed the background of the study by giving an overview of the growing demand for energy in form of charcoal and firewood in Zambia generally and Serenje in particular. The effect of this demand on the forest resources of the country is also highlighted. Later, a geographical position of the study area was given. Further, the definition of the essential concepts, the problem statement, significance of the study, aim, objectives, research questions, methodology and limitations have been provided.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter is arranged in five parts. The first part discusses the world forests highlighting the nature of forests and the forest trends. The second part provides an explanation on the different values of trees and forests in general. The third part looks at the Zambia's forest situation giving details on the nature of forests in the country, the national demand for firewood, the poverty situation and the charcoal industry. The fourth part gives the different effects of the over-exploitation of indigenous trees. The last part provides some of the available alternative sources of energy in the country.

2.2 WORLD FORESTS

Long before the emergence of dinosaurs, about 400 million years ago, trees had already appeared on earth. In the initial period, trees were similar to the world tree ferns and cycads, although none of these original species survive today (Collins, 2001). In terms of lifespan, trees outlive people with an average lifespan of typical trees being between 100 and 200 years old. The *Brachystegia* species and other species which make up the majority of the *Miombo* forests have an average lifespan of between 40 to 90 years. Moreover, some tree species may exist for a much longer period. For instance, the Baobab live for up to 2,000 years while the Bristlecone pines in North America are nearly 5,000 years old (ibid.).

Most of the vegetation in the world is made up of trees, be it scattered, shrubs, woodland or forests. The quantity of trees present in a particular area determines the name given to the

vegetation in the area. According to the Food and Agriculture Organization (FAO) Report of 2000, forests are lands of more than 0.5 hectares with a tree canopy cover of more than 10 percent which are not primarily under agricultural or urban land use. Forests are determined both by the presence of trees and the absence of other predominant land use. The trees should be able to reach a minimum of 5 metres in situ. Forests are crucial for the wellbeing of humanity. They provide foundations for life on earth through ecological functions by regulating the climate and water resources and by serving as habitats for plants and animals (FAO, 2000).

Of all the world forests, 95 percent are estimated to be natural forests. Most of these world forests (approximately 90 percent) are found in the tropics and, in these tropical forests, the main causes of over exploitation of trees are settlements, agriculture, and the use of wood for fuel. Although humans have been engaged in the over exploitation of trees for ages, it was in the mid-1800s that the forests began to be destroyed at an unprecedented rate. With regard to Europe, Putatunda (2000) writes: "As a matter of fact, throughout the earlier part of the medieval age, Europeans used to live amongst vast areas of forested land. But later, they began deforestation at such a high rate that they started to run out of wood for cooking and heating." By the 1990s, the majority of deforestation was caused by industrial factors, including extractive industries, large-scale cattle ranching, and extensive agriculture. For African forests especially, social-economic factors have had a major influence on the depletion of trees. Interest in forest management has increased worldwide in the last decade because of a decline in the forest cover and loss of biodiversity throughout the world. The Convention on Biological Diversity (CBD) and the Convention on Forests at the Rio

Conference in 1992, as well as the FAO Report on forests in 2000, reflects this growing international concern (Greene, 2006).

Forests all over the world cover an estimated area of one third of the earth's surface. This is an area covering some 3.9 billion hectares. Worldwide, only some 290 million hectares of forested land are under protection from logging. Sadly, even these protected areas are not free from illegal exploitation. Forest plantations cover an estimated area of 187 million hectares which is less than 5 percent of the total global forested area but account for 20 percent of the world wood production. Though vast, the global wooded area is only half the size of what used to be the forest land at the beginning of the agricultural era some 11,000 years ago (Larsen, 2003). Today, most of the forests no longer exist in their original condition having changed in composition and quality. In fact, large areas of forests have now been lost mainly because of human activities. This vital natural world resource has been diminishing at an alarming rate posing a serious threat of extinction. The degradation of forests throughout history can be traced to the economic incentives that make forest conversion appear more profitable than forest conservation. Forest resources are harvested throughout the world for shelter, traditional medicine, dyes, oils, intoxicants, fuels, beverages, fiber, and tools, as well as for religious purposes. These uses threaten the existence of forests and biodiversity in several ways. According to McCullum (2000: 87): "Almost 100 million people in developing countries cannot get sufficient fuel wood for their energy needs and almost 1.3 billion people are consuming fuel wood faster than it is being replenished." In Malawi, for instance, the over exploitation of indigenous trees in the Machinga and Nalikule forests has led to the establishment of exotic tree plantations that grow faster to meet rising demands (ibid: 92). However, even with such a solution, there are

a number of problems that arise. One of the challenges is the fact that the exotic tree plantations do not possess the same capacity for biodiversity as that of the natural forests. In most cases, these plantations lack most of the natural living organisms and the varying habitats of the natural forest. According to Larsen (2003): “Even when plantations are put in place, the functioning of a mono culture plantation is a far cry from that of an old-growth forest where a number of species of differing ages, each playing a particular biological role, and ecosystem processes are thus bound to change.” Many important forest functions have no markets and, hence, no economic value that is readily apparent to the forests’ owners or communities that rely on forests for their well-being. Forest scientists estimate that somewhere between 30 percent and 50 percent of the world forests have already been destroyed, mostly because of clearing for agriculture, firewood production, and commercial cutting (Chiras, 1988). The Global 2000 Report projected that by 2020, virtually all of the physically accessible forest areas in the developing countries are expected to have been cut if the present deforestation trends continue. In these countries, 90 percent of wood consumption goes for cooking and heating (Panneerseluam and Ramakrishnan, 2005).

Although global estimates of forest loss are quite difficult to arrive at due to inadequate information, the UN Food and Agriculture Organization conservatively estimates that the world lost 94 million hectares in the last decade of the twentieth century. Conflicting views on the definitions of forest, lack of satellite and radar data, and unmonitored land use change together make it difficult to come up with accurate global forest cover change. An estimated 94 million hectares of global forest loss results from the assumption that the developing countries lost 130 million hectares while the industrial world gained 36 million hectares as abandoned agricultural areas returned to forest (Larsen, 2003). Table 1 shows the loss of

forest in the different continents. Change of forest cover in the tropics accounted for about 94 percent of the global loss of natural forests in the 1990s (ibid.).

Table 1: Change of forest cover between 1990 and 2000.

Continent	AFRICA	ASIA	OCEANIA	EUROPE	NORTH AND CENTRAL AMERICA	SOUTH AMERICA	TOTAL WORLD
Total Forest (1990)	702	551	201	1,030	555	923	3,963
Total Forest (2000)	650	548	198	1,039	549	886	3,868
Percentage change (1990 – 2000)	- 7.8	- 0.7	- 1.8	+ 0.8	- 1.0	- 4	- 2.2

Note: Areas are in millions of hectares. Percentages are based on non-rounded area measurements.

Source: U.N. FAO State of the world's forests 2001 (Rome, 2001)

As tree cutting in many parts of the world increases, nearly half of the present forest cover remains at risk. The World Resource Institute estimates that about 40 percent of the world's intact forest will be gone within 10–20 years, if not sooner, considering the current rate of deforestation.

In the United States, forest land occupies about 300 million hectares of the land surface (Chiras, 1988). According to the FAO Report of 2005, the largest forested countries include Russia (809 million hectares), Brazil (475 million hectares), United States (303 million hectares), China (197 million hectares) and Congo DR (197 million hectares). During the nineteenth century, Brazil is said to have had the heaviest loss of forests amounting to 23

million hectares. Meanwhile, the United States gained 4 million hectares of forest within the same time. China also experienced a gain to its forest stock during the same period with an average of 1.8 million hectares added each year (Larsen, 2003). The gain in forest area was largely as a result of bans on deforestation, which heightened the country's reliance on plantations and imports of forest products from other countries.

Africa contains about 15 percent of the world's remaining forests and is second to South America in the amount of dense tropical forests (Fleshman, 2008). The Congo forest in central Africa is the second largest tropical forest in the world. However, these forested areas of Africa are continuously being lost with some 52 million hectares destroyed during the 1990s. Although FAO data suggests that global world forest loss is lessening, deforestation in the tropical areas is accelerating. Of this destroyed area, Zambia along with Sudan and Democratic Republic of the Congo account for half.

In terms of economic contributions, the forest industry is an integral component of the economies of most countries. The FAO's 'State of the World Forests 2009' Report reveals that the forest industry accounted for US\$324 million in Cameroon, US\$3,545 million in South Africa, US\$41,208 million in China, US\$28,206 million in Brazil and US\$108,428 million in the United States. Forests also provide a home and a source of livelihood for both humans and wildlife in many parts of the world. According to the United Nations, the Ituri forest provides a habitat for an estimated 500,000 Pygmies and a variety of wildlife. The Pygmies and others living around the forest derive their subsistence from it.

2.3 ECOLOGICAL VALUE OF FORESTS

2.3.1 Useful for a clean and healthy environment

Trees or forests are usually a good measure of the health and quality of the environment. When trees are in large numbers and are healthy, the ecological system (i.e., soil, air and water that support it) is also healthy. Green plants remove carbon dioxide from the atmosphere through photosynthesis. The carbon is stored in the foliage, stems, root system and, most importantly, the woody tissue in the main trunks of trees. Trees are good storehouses of carbon because of their long lifespan and large size. Because they take carbon from the atmosphere and produce oxygen, forests are often referred to as ‘the lungs of the world’ for releasing oxygen, or ‘the carbon sink’ for absorbing carbon. In the words of Fleshman (2008), “through a chemical process known as photosynthesis, trees and many other plants absorb carbon from the air and combine it with sunlight to generate the energy they need for life. Trees convert the carbon gas into solid form, store it in the trunks, branches and leaves, and release oxygen back into the atmosphere.” This process by which a carbon sink removes carbon from the atmosphere is called carbon sequestration. Much of the carbon from the carbon dioxide is integrated into the trees’ biomass and released safely into the soil upon death. Conversely, if the trees are cut and burnt, the stored carbon will be released into the atmosphere and hence contributes to the greenhouse gases (GHGs.)

Storing of carbon dioxide in trees is an important process in reducing the greenhouse effect on the earth. The greenhouse effect is a process by which radiative energy leaving a planetary surface is absorbed by some atmospheric gases called greenhouse gases. These gases include methane, nitrous oxide, chlorofluorocarbons (CFCs) and, more importantly, carbon dioxide.

The greenhouse gases transfer energy to the surface and lower atmosphere, and are re-radiated in all directions, including back down towards the surface. Consequently, this transfer of energy to the surface and lower atmosphere results in increased temperatures greater than it would be if direct heating by solar radiation were the only warming mechanism.

2.3.2 Vital for the rain cycle

Forests play a protective role to watersheds by ensuring a sustained flow of water from catchments throughout the year. Springs and rivers originate from mountainous areas covered by forest vegetation. The presence of vegetation enables the falling precipitation to be absorbed, infiltrated and stored in the soil. “Trees, like all plants, create galleries with their roots, thus encouraging rainwater infiltration. Infiltration increases as the root system and root hairs develop; deep roots mean deeper water circulation when rainfall is abundant” (Dupriez and De Leener, 1993: 197). The infiltrated water is subsequently released slowly through the leaves. Vegetation is also vital in the process of transpiration which, in turn, leads to condensation and the formation of clouds that later produce precipitation. Trees extract groundwater through their roots and release it into the atmosphere by transpiration. McCullum (2000: 66) agrees when he states: “Evaporation will normally occur from plants, land, lakes, rivers, streams and other sources holding water. More energy absorbed by trees and the land surface results in increased evapotranspiration, which later condenses to form clouds and, under certain conditions, precipitation may occur.” Evapotranspiration describes the transportation of water into the atmosphere from surfaces, including soil (soil evaporation) and from vegetation (transpiration). Evaporation and transpiration are the most important contributors to evapotranspiration. In fact, evapotranspiration is also an important

part of the rain cycle. The evaporation component of evapotranspiration is comprised of the return of water back to the atmosphere through direct evaporative loss from the soil surface, standing water and water surfaces such as leaves and roofs. Transpired water is that water which is used by vegetation and subsequently lost to the atmosphere as water vapour.

2.3.3 Vital for enriching the soil

Soils benefit from trees as their far-reaching roots hold the soil in place preventing erosion. Furthermore, trees improve soil quality as their leaf litter makes a perfect composite. Litter may be in the form of leaves, twigs, branches, bark and roots which are an essential link in organic production-decomposition. According to Dupriez and De Leener (1993: 197): “The litter protects the ground from the shock of the raindrops and prevents surface clogging, while at the same time feeding the host of insects, worms, larvae and microorganisms which live by breaking down plant debris and moving around in the soil layer.” Some trees, such as Acacia, have bacteria living in their roots. The bacteria convert nitrogen from the air into nitrates which the tree can use to grow and reproduce while the soil is enriched.

2.3.4 Provision of food

The resources of the woodlands and forests throughout the world are central to the livelihood systems of millions of people. Forests provide various foodstuffs which contribute to the survival of a lot of people as well as to their nutritional levels. Among the many foods provided by forests are wild fruits, mushrooms, honey and edible insects in addition to a variety of animals as well as birds. According to Bingham (undated) “Another very valuable product of *Miombo* are edible caterpillars, *ifinkubala*, and emperor moths *saturniidae* which are harvested in great quantities in certain areas, and sold dried in the urban markets.”

Historically, traditional knowledge had been used to identify many edible plants which are useful today for a variety of purposes. These may be in the form of berries, roots, bulbs and gum. In the same way, bush meat from various wild animals has been a staple diet of many communities for millennia.

2.3.5 Provision of habitat

Forests, especially tropical forests, provide the world's most important diverse ecosystems. They support biodiversity and a habitat for wildlife. They contain hundreds of plant, animal and insect species. Shukla and Chadel (2007: 325) argue that “there is a mutual correlation between plants and animal communities. The composition of the animal community is more or less constant and is characterised and maintained by vegetation type which provides habitat and food for animals.” For instance, the Amazon forest is considered to be one of the richest ecological treasure chests on earth. It is a habitat for thousands of varieties of butterflies which float and flutter through the thick air, thousands of types of orchids which flaunt the flowers, for more than eight dozens species of snakes which lurk in tree limbs and along the forest floor, and for other thousands of species of fish which patrol the rivers and streams. The *Miombo* forests are an important habitat for the edible caterpillars. The *Julbernardia Peniculata* is the hosting tree which provides food for the caterpillar (Bingham, undated).

2.3.6. Aesthetic value

Trees are important since they contribute towards the natural beauty of the vegetation. A number of trees have a beautiful appearance and they occur in a variety of forms. Additionally, some tree species are tall and thin, others flat-topped and with spreading leaves

which come in every shape and size. These features of trees create natural scenery that can be appreciated by many people. For instance, the Ituri forest in the Democratic Republic of Congo (DRC) stretches for as far as the eye can see, broken only by distant, shining ribbons of rivers and streams. It is remarkably dense, deep, and seemingly impenetrable, and it inspires a sense of awe. According to Shukla and Chandel (2007: 328), “large numbers of people visit the forest for peace, beauty and recreation.” Other trees bear flowers and fruits, and are frequently decorative. Such qualities of trees make them ideal for beautifying gardens, cities, and even industrial estates.

2.3.7 Necessary to prevent soil erosion

Trees are vital in the protection of the soil from direct rain water that may cause erosion. The leaves help to reduce the impact of rain on the soil which is obstructed as it lands on the surface. Water erosion is one of the greatest contributors to the degradation of the soil. It mainly consists of splash and runoff. Rain splash occurs the very moment the rain drops hit the ground and it destroys soil structure by shifting the grains. It also clogs the surface soil layers containing a little clay and makes them impermeable. When the water hits the ground as rain, it cannot infiltrate because of the impermeable structure of the soil. Consequently, this rain water will begin to flow on the surface as run off. Rain off has varying speed and this makes it the main cause of soil erosion. Trees, on the other hand, have leaves which absorb rain water before it hits the surface. This protects the soil from the splash and therefore prevents soil erosion. According to Dupriez and De Leener (1993: 193): “When they form a compact cluster, trees give excellent soil cover from destructive rainfall, and do so all the more effectively because they form several layers of vegetation and maintain thick

litter on the ground surface.” Therefore, in areas where there are trees, very little or no soil erosion occurs and the land surface is more healthy and stable.

4 ECONOMIC VALUE OF FORESTS

4.1 Income generation

Forests are important as an income generating resource for individuals and countries through commercial logging. Timber obtained from forests is normally exported or used in the construction industry to generate valuable revenue especially in developing countries. Meshman (2008) explains that “although forest products, primarily unfinished logs, account for only about two percent of sub-Saharan Africa’s exports, forests generate an average of six percent of the region’s gross domestic product – triple the world average. Eighteen African countries, including Cameroon and Ghana, are among the 24 countries worldwide that rely on forests for ten percent or more of their economies.” FAO reveals that the industry contributed US\$26.2 million to the Zambian economy between 1989 and 1993 translating to 0.9 percent of the gross domestic product (GDP).

Various other forest products are also vital in the wealth generation of the world as well as of individual countries. For instance, the Zambia Agribusiness Association reveals that the honey bee has contributed over US\$200 billion to the global economy. Meanwhile, Zambia has emerged as Africa’s largest exporter of honey and bee products to the European Union and the USA, and the supply to these markets was projected to reach 1,000 tonnes by the end of 2010 (Kapekele, 2010). Of importance in the production of the honey bee in Zambia and many other countries is the Moringa tree. This tree increases the quality of honey and is a good source of nectar for honey production. Forests also provide other different products

that are used to generate incomes especially for forest dependant communities. Some communities depend on forests for their sustenance and as a means to raise revenue. According to Reuters (2010), the Pygmies obtain their necessities from the forest. Traders bring foodstuffs and other items which they exchange with bush meat obtained from the Ituri forest. Sometimes the trader can buy a duiker for 15 dollars by the road side.

2.4.2 Employment generation

The forestry industry is important for employment generation in many countries. Many people are employed in the conservation of forests, in logging, and in the processing of forestry products. This is more so with the booming manufacturing and construction sectors of many countries in recent years. The FAO 'State of the Forests' Report of 2006 itemises the contribution of the forestry industry to the total labour force of the following countries as follows: 1.9 percent in Gabon, 0.5 percent in Congo, 1.5 percent in Swaziland, 2.3 percent in Malaysia, 5.0 percent in Latvia, and 3.6 percent in Finland. According to the Integrated Regional Information Network (IRIN), the charcoal industry in Malawi employs an estimated 93,000 people as producers, bicycle transporters and roadside or urban vendors.

In terms of income and employment generation, the charcoal industry is still an important industry in Zambia. Many people have found full-time employment estimated at around 41,000 in rural areas, 3,500 in the transport sector, and another 1,000 in marketing and distribution (Hibajehe, 2008). Other forest products are also important in the provision of livelihood activities for many people in Zambia. According to the Zambia Agribusiness Association, the country had 50,000 people deriving their livelihood from honey and bee

products. More people are attracted to this industry by the price of honey which has since risen from K1,500 per kilogram in 2009 to K3,500 in 2010 (Kapekele, 2010).

2.4.3 Medicinal value

Forests have been a source of medicines to cure various human and other ailments since time immemorial. For instance, the Amazonian peoples know thousands of different plants and use the forest as a medicine chest. From it, they extract treatments for snakebite, dysentery, and skin ailments. Even today, most modern medicines are produced from leaves, tree barks or roots. In fact, there is now a growing trend to use herbal medicines as opposed to the conventional ones. McCullum (2000: 139) states: “In 1960, a child suffering from *leukemia* had only a 20 percent chance of survival; today a similar child has an 80 percent chance of survival due to treatment from the *Rosy Periwinkle*, a tropical forest plant from Madagascar.”

2.5 THE ZAMBIAN SITUATION

2.5.1 Zambia’s Vegetation

Zambia is normally regarded as one of the highly forested countries whose forests cover about 64 million hectares most of which is administered traditionally under customary law (PFAP, 1998). The total area of indigenous forest in Zambia is 44.6 million hectares out of which 9.6 percent are gazetted forests. There are 481 Protected Forest Area, 181 National Forests and 300 local Forest Reserves in Zambia (Shakacite, 2000)

Zambia’s woodland area is composed of mainly hardwood trees locally known as *Miombo*. *Miombo* is the Swahili word for *Brachystegia*, a genus of tree comprising a large number of species. The word *Miombo* is used in a number of Bantu languages in the southern African

region such as Shona and Bemba. In Bemba, the word '*Miombo*' is the specific name for the species *Brachystegia Longifolia*. The *Miombo* woodland is classified in the tropical and subtropical grasslands, savannas, and shrublands biome. The savanna ecoregion is dominated by the *Miombo* species, with a range of climates ranging from humid to semi-arid, and tropical to subtropic or even temperate. Characteristically, trees of the *Miombo* woodland shed their leaves for a short period in the dry season to reduce water loss, and produce a flush of new leaves just before the onset of the rainy season. *Miombo* woodlands form a broad belt across south central Africa, running from Angola in the west to Tanzania in the east. In Zambia, these tree species occur in the open forests in the northern parts of the country which receive higher rainfall while in the much drier southern parts of the country there are scattered trees and bush. Zambia's vegetation map classifies 66 percent of the country's area as *Miombo* woodland dominated by genera such as *Brachystegia*, *Julbernardia* and *Isoberlinia* (Noragric, 1990). The woodlands are distinctive because of the shape of the dominant trees – their trunks are mostly short but relatively slender, with branches that markedly ascend before spreading out to support light, shallow, flat-topped crowns. Trees are mostly 10 – 20 metres tall and deciduous, although some are ever green (McCullum, 2000).

2.5.2 Human Demands for Trees

Currently, the forests in Zambia have been vulnerable to both human and natural induced disasters. These forests are reducing at an increasing rate and, if this situation remains unchecked, there is a risk of a complete loss of biodiversity in the Zambian forests. The loss of forest cover from 1990 to 2000 was established at 851,000 ha forest loss per year (FAO, 2000). Forest loss is said to be 56,000 hectares, which is about 28 percent of the

Environmental Council of Zambia (ECZ) estimated annual loss. In Central, Copperbelt and Luapula provinces, annual deforestation arising out of wood harvesting for energy purposes is estimated to be 150,000 ha (PFAP work plan, 1995).

2.5.3 Poverty situation

Poverty is an important factor in the over-exploitation of indigenous trees since it is one of the causes of woodland degradation. In fact, poverty is both a cause and a consequence of the depletion of trees just as it is for other natural resources. As McCullum (2000: 24) says: “When people lack adequate financial and other resources, they are left with no choice but to turn to unsustainable use of natural forests and woodlands to meet their basic needs.” The high poverty levels in the country have meant that trees have remained a major source of energy for the majority of Zambians for a long time now. Furthermore, many people have been driven to over-exploit natural resources such as trees in order to earn some income to meet their daily household requirements. In the rural areas especially, people engage in businesses that make use of natural resources either by selling them or using them to produce various commodities which they later sell.

The World Bank has classified Zambia amongst the poorest nations in the world. Further, the Human Development Report of 1999 ranked the country 156 out of 174 countries. An analysis of the social indicators has revealed a declining trend in most of the social and economic conditions over time. Life expectancy has declined significantly since independence while mortality rates have risen. In many rural areas of the country, the people concentrate their income, spending and employment on consumption. According to the Central Statistical Office (CSO 2007), more than 70 percent of the population has incomes

below the minimum level determined. This percentage has risen with the passage of time and it is also higher in the rural areas where the poverty levels are more pronounced and widespread. HEDON (2004) states that: “In 1998, 73 percent of Zambians were below the poverty line. The proportion of the population that was poor in 1998 was 56 percent in the urban areas and 83 percent in the rural areas.” Although the Living Conditions Monitoring Surveys (LCMS) which were conducted by the CSO from 1991 to 2006 showed some reduction in the incidences of poverty in the country, the levels still remain high. During this period, the national poverty levels stood at 64 percent with rural poverty being at 78 percent while that of the urban areas was 53 percent. Furthermore, at the time that poverty levels were reducing in some provinces of Zambia, this was not so in Central, North Western and Western provinces (CSO, 2006). Table 2 below shows the percentages of poverty estimates in Zambia from 1996 to 2006.

Table 2: Poverty Estimates in Zambia (% of population)

	1996	1998	2004	2006
Zambia	86	67	58	59
Rural	84	83	77	77
Urban	40	40	29	27

Source: CSO Poverty Trends Report, 2010.

It can be seen that Zambia experienced a slight reduction in the general poverty levels over the period 1996 to 2006. During the same period, the poverty levels still remained higher in the rural areas compared to the urban areas. This difference in the poverty levels between the urban and rural Zambia indicates the inequalities that exist in the two areas. It means that the wealth of the country is not equally distributed between the rural areas and urban areas.

However, these statistics continue to change with time depending on the socio-economic situation in the country.

With such widespread poverty levels in the country, biomass fuels have remained the major source of energy for different activities such as tobacco-curing, tea-drying, fish-smoking, brick-burning, pottery and salt production. Furthermore, very little wood fuel consumed by the urban population of Zambia is from exotic plantations. Dupriez and De Leener (1993) explain that the firewood economy is at the heart of family life, especially the life of women. Bwalya and Naidoo (2004) also state: “In many rural areas, people rely mainly on firewood for cooking and other household tasks, whereas in urban areas, people rely less on firewood and tend to use more charcoal.” In fact, wood fuel is still the common energy source in Zambia supplying the majority of the rural and urban households.

2.5.4 Demand for firewood

In most Zambian villages, firewood is neither bought nor sold but collected for home use. However, in some urban areas it is sold because of its scarcity and the time taken to collect it. In most rural parts of Zambia, women are the main collectors and consumers of firewood for domestic use, and they are highly selective in the species used. Typically, there are three or four preferred firewood species. These include *Julbernardia Globiflora*, *Colophospermum Mopene* and *Brachystegia Boehmii* which are also the most abundant. The main features of the preferred firewood by most communities include a hot flame, burning with little smoke, and long-lasting embers. Different sizes and species of wood are selected for different purposes: smaller pieces which catch fire easily are used for kindling; large logs are used for preparing food which has to cook for a long time; and hot or cool-burning wood may be

selected depending of the type of cooking required. In most cases, trees with smaller stems are targeted for firewood since they are easier to collect and carry. The wood that is selected is mostly that which can easily be split and has low moisture content to dry faster.

In tobacco growing areas, the demand for firewood for tobacco curing has been identified as one of the principle causes of deforestation and depletion of the natural woodlands. Consequently, tobacco curing has contributed towards the depletion of indigenous tree species in Zambia. In Zambia, most of the small-scale tobacco growers use the flue method to cure tobacco because of their socio economic status. This method involves building a brick barn with a furnace on the outside. The furnace is fueled with wood and from the furnace a large metal pipe about 25 centimetres in diameter is placed around the floor of the barn. The barn is then filled with tobacco leaves which hang freely from wooden bars, and it is heated with humid air to about 35 degree Celsius for about one day (White, 1998).

Tobacco is grown in various parts of the country including Lusaka, Eastern and Central provinces. Furthermore, tobacco growing is an important economic activity in the country. The government has been promoting this crop because of its role in employment generation and in the creation of revenue for both the government and the general citizenry. According to Chitala (2010), the country has sold tobacco estimated at \$98.9 million to international markets during 2010. This industry has created as estimated 450,000 jobs for farmers and transporters as well as for companies producing chemicals and inputs, and processing the crop.

2.5.5 The charcoal industry

In urban areas, charcoal is extensively used for a variety of domestic and commercial tasks, although the price of charcoal as well as the poverty situation limits its use in certain areas. Small scale charcoal production is an important source of income for many rural and some urban dwellers, and it is consequently a significant cause of deforestation of the *Miombo* woodland of Zambia. Charcoal used in Zambia is produced from *Miombo* woodland by the traditional method of earth kiln. According to HEDON (2004), charcoal is produced in rural areas from trees harvested from natural forests. In most cases, charcoal burners will fell any of the trees in their locality to produce charcoal. The method involves trees of various sizes and types being cut mainly by hand, kiln building and covering, wood carbonization, kiln tending and breaking to recover the charcoal. The charcoal industry has been an industry that has existed in Zambia for a long time involving a variety of stakeholders. Some of the stakeholders include transporters, traders, buyers and producers. In Zambia, as in many other countries, the charcoal industry operates as an unregulated industry. Although, the product is taxed through production and conveyance licenses, these are not normally collected. In most cases, the producers and conveyers of charcoal remain unknown to the authorities.

The charcoal industry is a major source of livelihood for many people. According to Hibajehe (2008), charcoal meets the energy demands of about 83 percent of the urban households and, with the rapid rate of urbanisation, this demand covers more than a third of the entire population. This situation has been attributed to the privatisation of electricity generation imposed on many countries by the International Monetary Fund (IMF) and the World Bank. Since electricity generation is now a purely profit accumulation venture, consumers have to pay high prices to the government. This has hampered the electrification

policy, especially the rural electrification programme. Consequently, the socio-economic situation has had the effect of driving people to cut trees for charcoal as energy. In fact, even many households with access to electricity turn to the use of charcoal since they cannot afford to pay for the electricity tariffs and to purchase electrical appliances such as stoves, electric kettles or pressing irons.

2.6 ZAMBIA'S POLICY AND INSTITUTIONAL FRAMEWORK

Zambia's current energy policy and programmes are mainly focused on increasing access to modern energy services with some minor efforts on reduction in the use of bio-fuels. According to HEDON (2004), the following benchmarks were established as a strategy for survival with regard to the energy and poverty situation in Zambia:

- to increase urban electricity access from 48 percent in 1998 to 70 percent by 2010;
- to increase rural electricity access from 2 percent in 1998 to 15 percent by 2010;
- to reduce household charcoal consumption by 30,000 tonnes annually;
- to increase the number of households with solar home system from 400 in 2002 to 20,000 by 2010;
- to promote an increase of solar energy in rural schools and rural health centres;
- to find a viable alternative to charcoal as an urban household fuel.

The country is definitely not on course in meeting any of the above mentioned benchmarks. According to the 2010 CSO Report, the urban access to electricity is still below 50 percent while that of rural areas is below 5 percent. The loss of forest cover is currently estimated to be as high as 300,000 hectares per annum (Mwanangombe, 2009). Currently, there is no

viable alternative source of energy to charcoal especially that very little is being done to promote various different sources of energy such as solar energy.

2.6.1 The Rural Electrification Authority

The Rural Electrification Authority (REA) was formulated to expand access to electricity in the rural areas. Government has realized that the majority of people in Zambia do not access electricity and that this has hindered development. According to the Rural Electrification Master Plan (REMP, 2004), only 3.1 percent of the population of the rural population has access to electricity as compared to 47.3 percent in the urban area. REMP also revealed that Zambia's national electrification rate is still as low as 20.3 percent. Electricity has been identified as one of the prerequisites in order to open up the rural areas to development. The plan was formulated using the concept of improving people's living standard in rural areas and to enhance competitiveness in the agriculture, education and health sectors, as well as to check the depletion of trees as a result of the demand for energy. By working with the Japan International Cooperation Agency (JICA), the Ministry of Energy and Water Development (MEWD) plans to expand the access to electricity in rural Zambia from the present 3 percent (2010 percentage) to about 15 percent by 2030. To achieve this, a Rural Electrification Fund (REF) which has been established requires US\$1.1billion.

However, this ambitious plan is faced with a number of challenges with regard to the process of implementation. The main one has been the funding required for the massive infrastructural development in the vastly rural areas. An estimated \$9.1 million is required to complete the electrification of several districts in northern and western Zambia (REMP, 2010). Government has been collecting a levy from the formal sector as well as sourcing for

funding from cooperating partners. The levy has been introduced on every electricity unit billed. It is unlikely, however, that the funds realised will be adequate to complete the project. In fact, the plan does not clearly state when the project is likely to be extended to other provinces.

Another challenge is the provision of affordable electricity for the majority poor in rural communities. Most consumers of electricity in Zambia have been failing to meet the ever-rising costs of tariffs for the commodity. Although the electricity company claims that the tariffs are among the lowest in the region, many rural people simply cannot afford them because of the high poverty levels. Furthermore, the Energy Regulation Board (ERB) announced an upwards adjustment in the electricity tariffs by an average of 25.5 percent for the year 2010/2011. This revision comes in the wake of an earlier increase in the salaries of civil servants by less than 15 percent and the announcement of the same selling floor price of maize to the Food Reserve Agency (FRA) in 2010 as in 2009 (K65,000 per 50kg). The salaries for civil servants and the sale of maize have been the main pillars of Zambia's rural economy for a long time.

2.6.2 The Energy Regulation Board

The Energy Regulation Board (ERB) was established as a general regulator in the country energy sector. It was meant to be a balancing mechanism between the needs of the energy undertakings and the needs of consumers. Among the responsibilities of the Board are to see to it that the undertakings in the energy sector generate a reasonable rate of return on their investment in order to provide good service, and that the consumers are given quality service at just and reasonable prices.

The Board has been facing a number of challenges leading to people alleging that it does not often carry out its mandate effectively. It has received a lot of criticism from the consumers and the general public who have alleged that the institution acts mainly in favour of the energy providers at the expense of consumers' interests. It has been argued that whenever the energy providers make proposals to the Board on price adjustments, these are always taken on board without considering the interests of consumers. For instance, in July 2010, the Board approved the hike of electricity tariffs by 25.6 percent on the basis that ZESCO limited was incurring high costs in the production of electricity and on account of the low value of the kwacha in relation to major currencies. The residential consumers were to be the most affected by this hike in that domestic power tariffs went up by 41 percent while that of small power consumers and large power consumers increased by 14 percent and 12 percent respectively. These hikes were affected even after numerous concerns were raised by consumers during the 2009 public hearing in Lusaka and on the Copperbelt. It has been argued that small residential consumers who cause much damage to the forest estate by resorting to charcoal use need to be enticed to use electricity so that the country's natural resource can be saved. However, this cannot happen with such upwards adjustments which only result in people using more charcoal and firewood as sources of energy.

It is ironic that wood fuel, which provides about 80 percent of the household energy, still remains an unregulated market. The government does not manage the system for the supply of firewood and communities therefore collect firewood or buy firewood from the unregulated market. In the same way, the charcoal industry is not managed by any government structure. This industry is in the hands of the informal sector where government has very limited control. Research in Malawi has shown that if the charcoal industry was

regulated, it could make it one of the country's top earners after tobacco and tea (IRIN, 2010). Such regulation of the industry would then lead to the establishment of a mechanism that would encourage the sustainable use of forest areas. The charcoal industry is potentially a renewable forest product, but current production and distribution methods prevent reinvestment in the next cycle of harvest.

2.6.3 The Forest Act, 1999

Zambia's forests are generally governed by the Forest Act, number 7 of 1999. This Act established the Zambia Forestry Commission and defined its functions to include, among other things, the establishment and protection of forest areas as well as the implementation of international conventions on forests and related natural resources. According to the Act, the ownership of all trees standing on customary areas, national forests, local forests, state lands and open areas, and all forest produce derived from them, is vested in the President on behalf of the Republic.

The Forest Act of 1999 was a response to the inadequacies of an earlier policy formulated in 1965. This policy was designed to be a set of instructions to the forest department and became renowned for its rigidity as it gave absolute control over ownership, planning, and management of forests to central government. Provisions for community participation in forest management were lacking. As a consequence of this policy to conserve natural resources, the livelihood of local communities had become unsustainable since it had removed forest resources from them.

2.7 ALTERNATIVE SOURCES OF ENERGY

Larsen (2003) writes: “Crucial to slowing the loss of the world’s natural forests is finding alternative sources of energy for low-income countries so that valuable wood is not burnt.” There are several alternative energy sources that would ensure a reduction on the loss of forest cover. Many countries are promoting various energy sources to mitigate the impact of deforestation. The first is the use of coal as a cheap source of energy. Many European countries use coal as a source of energy. African countries can also use this source as an alternative source of energy especially for commercial purposes such as tobacco curing. Zimbabwe is one country that has been using coal for curing tobacco. However, the sustainability of this source of energy has been affected by the high cost of transportation and mining. There has also been a problem of erratic supply of coal as well as the unreliable railway system in the country. One of the solution to the challenges of using coal as a source of energy in curing tobacco is the use of exotic tree species. In an era when most areas are experiencing the fast disappearance of indigenous trees, exotic tree species, particularly gum trees are the most viable alternative energy source for curing tobacco since these are affordable and accessible. Kadzere (2010) agrees with this assertion when he notes: “With a minimum maturity period of five years, hybrid eucalyptus is the most recommended variety. For optimum results, a farmer should grow one hectare of woodlots every year.”

The use of biofuel is another important alternative source of energy that can help reduce the reliance on the traditional sources such as charcoal and firewood thereby reducing the rate of deforestation. One of the new biofuels that has now been introduced in Zambia is biogas. This has been developed by the Kafubu Water and Sewerage Company (KWSC) working with a German NGO, the Bremen Overseas Research and Development Association

(BORDA). Kabushi Township was chosen for the pilot scheme for a decentralized wastewater treatment system intended as a waste and energy solution for the neighbourhood lacking sanitation. The system depends on a bio-digester to process human waste to give off methane gas which is piped away to feed stoves in nearby homes. This energy is cheaper than charcoal in that consumers are expected to pay about 60,000 Zambia kwacha while some families spend as much as 150,000 Zambia Kwacha on charcoal per month (Mwanangombe, 2009). The Ministry of Environment and Natural Resources has praised the project for benefitting the residents in improving sanitation and providing cheap fuel. Harnessing renewable energy from human waste will go a long way to protect Zambia's fast disappearing forests. At the moment, charcoal burners destroy as much as 300,000 hectares of forest cover each year (ibid.).

Greengel is yet another valuable source of energy that may be of use to many people in Zambia. This is a relatively cheap and safe heating fuel for household use. The gel is used in special cookers called Greengel cookers. It burns cleanly and therefore eliminates almost all other poisonous greenhouse gases. Greengel contains a mixture of ethanol, water, thickeners, colorants and flavouring agent. The ethanol is a sugar cane based alcohol which can easily be grown in many parts of the country. At present, Greengel is imported from other countries and is used by a number of households, hotels and restaurants throughout the country. However, this product still remains quite unknown in many parts of the country, mainly because of lack of publicity as well as an organisation to promote its use. Many people are still not guaranteed the continued supply of the gel should they switch to the use of Greengel cookers. These are some of the challenges the government is supposed to overcome with the help of various local and international partners.

The government of Zambia has also been promoting Liquified Petroleum Gas (LPG) as an alternative source of energy at household level. LPG is also called Heating Gas. This gas is produced in large quantities as a by-product at Indeni Petroleum Refinery (IPR) in Ndola. It is unfortunate that such a valuable resource has largely been left to go to waste with very few quantities being exported to some neighbouring countries. It is common knowledge that this and other gases have been used for cooking and other activities in many countries for many years. According to AllAfrica Global Media (2010): “The government is currently working out a number of initiatives which will see to it that people reduce the dependence on electricity and charcoal as the major sources of heating energy at household level.”

2.8 SUMMARY

This chapter has looked at the global situation regarding of trees and forests. It has discussed the trends in forests worldwide and the different values which they provide. The chapter further provided the Zambian picture in relation to forests. Here, a discussion on the country’s poverty trends and its link to the over-exploitation of indigenous trees was given. The chapter also gave an overview on the demand for firewood and the charcoal industry in the country. Finally, the chapter looked at the various effects of the over-exploitation of indigenous trees and the different alternative sources of energy in the country. Among the effects of the over-exploitation of indigenous trees include the loss of biodiversity, increase in the amount of greenhouse gases, and destruction of water catchments, loss of the soil quality and the increase in natural disaster. The literature available has not focussed on Serenje in particular nor has it included a specific ethical evaluation. This study intends to make a specific contribution in these dimensions.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.1 INTRODUCTION

This chapter describes the ethical theories that will be used to evaluate the causes and effects of the over-exploitation of indigenous tree in Mulilima and Ndabala wards. Ethical theories provide the framework within which ethical perspectives can be applied, and they guide the analysis of data. The first part will discuss some traditional ethical theories which have been extended to the natural environment (i.e., value theory and utilitarianism) while the second part will look at some specific environmental theories (i.e., the land ethic, social ecology, environmental and intergenerational justice).

3.2 Value Theory

Traditionally, ethics concern relationships between people. However, it has now been extended to include the natural environment because of the value which the environment possesses. It should be noted that with traditional ethics, there is a two-way relationship involved. Human actions have an effect on other humans who will, in turn, react. However, with environmental ethics, there is a one-way relationship in which human actions can have ethical responsibilities with regard to values whereas the natural environment does not have such mutual responsibilities and obligations since it has no reasoning or moral capacities. Value theory is important in evaluating the natural environment of which indigenous trees are a part. The value of something is the worth of that thing which makes it desirable, an object of interest, or simply a good in itself. Value theory encompasses a range of approaches

to understanding the degree to which humans should value things. Early philosophical investigations sought to understand good and evil, and the concept of 'the good'. Moral goods are those that have to do with the conduct of persons, usually leading to praise or blame.

A number of useful distinctions have been made in the treatment of value with respect to the natural environment as follows:

- (1) Utility value: This is the use value or instrumental value of the environment. This value is based on the worth of something as a means towards getting something else that is good. This is an anthropocentric view insofar as the environment is seen as good only in as much as it is of value to humans.
- (2) Intrinsic value: This is the value that the environment has in itself, that is, regardless of its use to humans or other beings. An intrinsically valuable thing is therefore something that is valued because of the worth that it has in itself irrespective of its use to anything else.
- (3) Inherent value: This is the value that is identified in people's appreciation of something. It is the worth of something that is valued on account of someone's appreciation of it, i.e., looking with awe and wonder at the beauty of a rainbow or a waterfall.

Value theory will be used in assessing how the community in the two wards perceives the trees in their area. Traditionally, African communities attributed intrinsic and inherent value to the environment largely through the association of spirits with natural objects. However, this has been changing on account of modernisation and economic necessity.

3.3 Utilitarianism

Utilitarianism belongs to consequential theories. It holds that the rightness of an action depends solely on the maximisation of its good consequences. The utility principle was stated by Jeremy Bentham in terms of bringing about “the greatest pleasure of the greatest number”. Pleasure was later replaced by ‘happiness’ or ‘preferences’ or ‘good’ but quantitative measurement remained a key feature of the principle. The main focus of utilitarianism, then, according to Bentham, is to bring about the greatest welfare to the greatest number of people affected by the action as the determinant of the value of the consequences. Later Utilitarians restricted the Utilitarian principle to maximising the good such that actions are morally right if they maximise the overall good, or if there is no other possible act that is perceived to have better consequences.

Utilitarianism has been extended to the natural environment in environmental ethics insofar as the consequences of degrading the environment impacts negatively on the overall good of the people and the environment itself. Utilitarianism, then, will be applied to evaluate the consequences of the over-exploitation of indigenous trees on the local inhabitants of the two wards and on the overall environment. The research will also examine which other possible alternative actions are available to the community, and whether these could have better consequences than the act of the over-exploiting of indigenous trees.

3.4 The Land Ethic

The Land Ethic is a term that was coined by a nature lover, Aldo Leopold. In his work as a forester, Leopold observed the various interrelationships that exist between the different components of the ecosystem. He also recognised the important role each of the components

plays to retain the equilibrium, harmony and stability of the ecosystem. The Land Ethic theory, therefore, is mainly concerned about the holistic value of the ecosystem. Land, in this theory, signifies the totality of the biotic community which includes soil, water, plants, animals and people. Every living thing that exists in the ecosystem (i.e. the biotic community) is related to and interacts with all the other members for the good of the ecosystem. Hence, for Leopold, humans must also see themselves as members of the biotic community and should not claim exclusive rights. The ecosystem, therefore, should not be treated as a 'property' for the exclusive benefit of humans. Individual members of the biotic community can only survive within the ecosystem and, hence, the ecosystem is more important than the various parts. As Wenz (2001: 155) states: "Human beings, like many other species, are social. Our survival depends in large part on our ability to work cooperatively with other members of our species." Since humans have been endowed with moral consciousness and the ability to reason, they have a greater role to play in the biotic community. Consequently, Leopold describe a right action as one that tends "to preserve the integrity, stability, and beauty of the biotic community" Leopold (1968: 224-5).

3.5 Social Ecology

Social ecology, as a theoretical perspective, was initiated by Murray Bookchin. He believed that oppressive social structures are crucial in understanding human–environment interaction. For Bookchin, inequalities in society are the main source of environmental problems. Hence, present ecological problems cannot be clearly understood or resolved without resolutely dealing with the social problems. According to Bookchin (1993: 354), social ecology is based on "its recognition of the often overlooked fact that nearly all our present ecological problems arise from deep-seated social problems. Conversely, present ecological problems

cannot be clearly understood, much less resolved, without resolutely dealing with problems within society.” Social ecology emphasises that nature and social structures are essentially interlinked and that the environmental crisis has arisen as a result of the hierarchical organisation of power and the authoritarian mentality rooted in the structures of our society. This approach rejects the dualistic structure that has developed between the ruler and the ruled, the rich and the poor, the urban and the rural. Bookchin insists on the need for a more democratic, decentralised and egalitarian form of social structure if the environment is to be protected.

3.6 Environmental Justice

John Rawls’ theory of justice restricts itself to discussing the interrelationships of people to one another in fairness. On the other hand, Environmental justice challenges humans to evaluate their actions with reference to their impact on the environment and the impact of the environment on others. In essence, Environmental justice theory is an extension on traditional justice theories.

Figueroa and Mills (2003: 427) states that “environmental justice refers to the conceptual connections and causal relationships between environmental issues and social justice.” There are two different dimensions to environmental justice. The first is distributive justice which looks at how environmental benefits and burdens are distributed; the second is participatory justice which focuses how these distributive decisions are made. The concern for distributive justice arose with the observation that many of the environmental burdens are normally borne by the least advantaged and usually poor local communities in a disproportionate manner. Such environmental burdens include exposure to hazardous materials and toxic waste,

pollution, health hazards as well as the exploitation and loss of traditional environmental practices and the depletion of local natural resources (ibid.). Participatory Justice, on the other hand, attempts to counter the common 'discriminatory environmentalism' that dominates many decisions and policies on the environment by not involving the local people in decisions relating to the natural environment that affect them more directly.

3.7 Intergenerational Justice

John Rawls provides the traditional theory on justice. In his theory, he explains two conditions by which fairness could be reached and therefore be acceptable to all reasonable persons. The first condition is the "original position" where free, equal and rational individuals are in a certain hypothetical state of nature. In this state, people must create society with all the rules and institutions to govern their interactions once they leave the "original position" and enter society. The second condition is the "veil of ignorance". This is another hypothetical state where individuals lack their personal information such as age, sex, race, social status, religion etc. Rawls suggests that people in such conditions would choose two principles to govern society. These are the equal liberty principle that guarantees each person an equal right of basic liberties. The second principle is equality for all and that inequalities would only be permissible if it benefits the poor.

Intergenerational Justice extends the principle of justice to future generations. This arises from the fact that the foundation of justice is that we are morally obliged to treat others in just ways because unjust actions are harmful to others. Although Rawls does not focus on environmental justice he does speak of "just savings" with respect to future generations. This refers to what and how much should the present generation save for the benefit of future

generations. According to Rawls “Veil of ignorance” in the “original position”, our generation would choose the principle of “just savings” since we would want earlier generations to have adopted it (Wolf 2005). Our present actions can determine the lives of future generations, so that if our actions make them worse off, we will have clearly harmed them and those actions would be considered unjust. The 1987 Brundtland Report defines sustainable development as that one which “meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations 1987). Consequently, the unsustainable exploitation of natural resources today and the general degradation of the earth’s ecosystem can negatively affect future generations.

3.8 SUMMARY

This chapter has discussed the following ethical theories: Value Theory, Utilitarianism, the Land Ethic, Social Ecology, Environment and Intergeneration Justice. Value theory looks at the following three dimensions of value, namely, utility, intrinsic and inherent. Utilitarianism holds that the rightness of a particular course of action depends solely on the maximising of its good consequences. The Land Ethic recognises the importance of the holistic value of the ecosystem. Social Ecology is based of the belief that oppressive social structures are vital in explaining the degradation of the natural environment. “Land” here signifies the totality of the biotic community. Environmental Justice extends social justice principles to the natural environment by focusing on distributive and participatory justice. Intergenerational Justice, on the other hand, extends discussion justice to future generations.

CHAPTER FOUR

METHODOLOGY

4.1 INTRODUCTION

This chapter provides the methods that were used in the collection of information for the research. This is followed by a description of the general process of collecting information for this research. An explanation of the sample used in the data collection is also given.

4.2 Methods used

The method used in this research was qualitative involving an ethical evaluation. The primary data involved observations, in-depth interviews and focus group discussions with selected stakeholders such as villagers, charcoal burners, tobacco farmers, charcoal traders, officials from the forest department and tobacco firms operating in the two wards. These were purposively selected because of their experience and knowledge on relevant aspects of the research.

The secondary data involved information on relevant literature gathered from appropriate books, magazines, journals and newspapers as well as from the internet. The analysis of data collected took the form of critical discussion and ethical evaluation.

The research area was Mulilima and Ndabala which are two outskirt areas of Serenje district. In these areas the population is relatively low and generally poor. The residents are mainly subsistence farmers growing maize and other food crops. The people in these two wards live in small cluster villages with one village consisting of a household. These villages are about a kilometre apart.

During the collection of data, the researcher had difficulties in accessing most of the areas since they were very far and without roads. For instance, the area in the interior of the forest where charcoal is produced is about 6 kilometres from the main road. The movement was further hindered by the rains. The researcher also had problems in organising FGDs in the two wards because some of the intended participants could not be found on the appointed dates. These had gone out for various activities such as farming and charcoal production. This also applied to some of those meant to be interviewed. In such cases the researcher had to make many trips to the same area. Further, it was unfortunate that some of the relevant stakeholders such as the forest officers and the representatives from the tobacco firms were not able to provide adequate information on the aspects relating to the problem involved in.

4.3 Sample size

A sample population of 45 people was taken for the purpose of collecting information to be used for the research. This sample included 29 in-depth interviews and three Focus Group Discussions (FGDs). The number was arrived at considering that the areas under study are rural in nature with people living closely together. People in such areas are, therefore, likely to be influenced by the same cultural, social, environmental and economic conditions. Hence, larger sample size would most likely have produced similar findings and be merely a duplication of information once saturation point had been reached.

For the purpose of this research, eight (8) charcoal burners were interviewed. Of these, four (4) were selected from Ndabala ward and the other four (4) from Mulilima. There were eight tobacco farmers interviewed with four from Ndabala ward and four from Mulilima ward. Half of the tobacco farmers interviewed were women. This was done in order to understand

gender variations pertaining to the subject. Table 3 below shows the distribution of the interviewees for the research.

Table 3: Distribution of interviewees

Category	Area	Female	Male	Total
Charcoal Burners	Ndabala	2	2	8
	Mulilima	2	2	
Forest Officers	Serenje	1	2	3
Tobacco Farmers	Mulilima	4	4	8
Charcoal Traders	Ndabala	2	2	8
	Mulilima	2	2	
Representatives of Tobacco Firm at MTS	Mulilima	1	1	2
Total				29

The following were also interviewed: three forest officials from the forest department in Serenje (one female and two males) and two representatives from a tobacco firm operating at MTS (one female and the other male). Finally, eight charcoal traders composed of four males and four females were interviewed. Half of these were from Ndabala and the other half from Mulilima.

There were three FGDs conducted, two from Mulilima and one from Ndabala. In Mulilima, the first FGD composed of five male residents while the second one had four males and two female residents (cf. Table 4 below). It was planned to have equal numbers of males and females but one of the female participants could not attend and was replaced by an available male.

Table 4 below shows the composition of participants in the three FGDs in the two wards.

Table 4: Composition of FGDs

	FGD 1		FGD 2		Total
	Male	Female	Male	Female	
Mulilima	5	–	4	2	11
Ndabala	-	5	–	–	5
					16

In Ndabala, one FGD was conducted made up of five female residents. All the participants had lived in the area for more than five years. This was done to ensure that the experience gained in those years was utilized for the subject under research. It was noted that males were more free and participated more than females, whether on their own or while mixed with females. However, females were more active participants when they were on their own than when they were mixed with males. Generally, the FGDs provided more details than the interviews since the contributions from the participants were varied. In most cases an opinion of one participant was built upon by the different views of other participants. Consequently, the groups come up with well deliberated positions on different aspects of the problems.

4.4 SUMMARY

This chapter has discussed the methods used to collect the information used for the research. It has given the stakeholders that were involved in the interviews and focus group discussions

as well as the different sources of secondary data that was used. Further, the general setting of the study area and the circumstances that prevailed during the research have been provided. Finally, the description of the sample used during the collection of information for the research was outlined.

CHAPTER FIVE

RESEARCH FINDINGS AND DISCUSSION

5.1 INTRODUCTION

This chapter will present the research findings as obtained by the researcher in the two wards of Mulilima and Ndabala. These findings were gathered mainly by direct observation of the main physical features related to the aspects under study, by interviews with the relevant people and by focus group discussions. A sample size of 45 persons was taken, of which 29 were interviewed while 16 were involved in the focus group discussions. The findings were then discussed in order to address the following three research questions which were as follows:

- What are the types and values of the indigenous trees that are over-exploited in Ndabala and Mulilima wards?
- Who are the people responsible for the over-exploitation of indigenous trees in Mulilima and Ndabala wards?
- How has the over-exploitation of indigenous trees impacted on the environment and on the human population in Mulilima and Ndabala wards?

The chapter begins by giving an overview of the socio-economic situation of the two wards. This is followed by the establishment and operation of the tobacco scheme at Mulilima. Thereafter, the findings on the charcoal industry that exist between the two wards are discussed. Later the findings on the over-exploited tree species are discussed along with their impact on the people involved. Finally, the chapter looks at the different implications of the

over-exploitation of the trees, as well as the conservation and protective methods that have been instituted in the two wards.

5.2 Socio-economic situation

Mulilima and Ndabala wards are rural areas that lie off the GNR. The two wards stretch southwards of the road which separates them from the SNF (cf. Figure 1). Many residents of the two wards are not in formal employment which is only provided by the government institutions for those working in basic schools, health post, police post, and police check point and the tobacco scheme which make up the main sources of formal income for the people. Most of the people are small-scale farmers or make use of the natural environment as a means for survival. The majority of these people are engaged in the growing of food crops of which maize is the main one. This is because it is the crop heavily supported by the government in terms of the provision of subsidised inputs and a market for the produce. In order to access the government subsidised inputs, the farmers are required to belong to farmers' clubs or associations known as co-operatives. In these farmer co-operatives, the farmers are required to pay a membership fee and a subscription fee as well as matching-grants. After harvesting the maize the farmers are required to transport the maize some 15 kilometres to the nearest Food Reserve Agency (FRA) depot in order to sell the maize. At the depot, the farmers are asked to buy the FRA bags to pack the maize before it is put in the warehouse. All these activities require money. In the meantime, the farmers have to wait for almost eight months to receive payment for the sold maize. There are literally no reasonable activities in the two wards that the people can engage in to generate income apart from the exploitation of natural resources. The local population is therefore left with the land for farming, and the forest is their only reasonable source of livelihood. Since the forest does not

provide a habitat for sufficient edible animals to encourage the local people to engage in hunting, trees have become the best alternative source of income left for the residents. The SNF provides trees for the production of many tools and it helps in various construction works. It is also a source for various products that serve as food and medicines for many illnesses. More importantly, for the people of the two wards, the forest is a major source for day-to-day survival in that it provides trees that can be used to produce charcoal and firewood for curing tobacco which generate incomes for the residents. It must be noted that the SNF has not always been the source of trees for firewood in the two wards. Previously, these were obtained in the presently settled southern part of the GNR. However, many years of continuous exploitation of the trees without conservation measures to ensure sustainability has led to the loss of the forest vegetation. Later on people began to encroach upon the forest for trees for the production of charcoal in particular. With the coming of the Central Growers Association (CGA) who negotiated with the forest department, the forest was now been made accessible to the people in the two wards. At present, people take advantage of the inadequate protective measures in place in order to exploit the trees in the forest at will.

5.3 Mulilima Tobacco Scheme

The Mulilima Tobacco Scheme (MTS) was established in 1967 under the department of agriculture. The scheme was officially opened by Dr Kenneth Kaunda in 1970. Initially, government carried out experiments to assess the suitability of the area for growing tobacco. Later, in 1971, the Tobacco Board of Zambia (TBZ) took over the operation of the scheme while farming and production began in earnest in 1972. TBZ was established by the Tobacco Act (Cap 237) whose function, among others, is to promote, protect and monitor the production, sale, preparation for subsequent use, and export of tobacco grown in Zambia

(GRZ 1967). There have been a number of tobacco organizations that have run MTS after the TBZ which included Remba Leaf and Zambia Leaf Tobacco (ZLF) Company. Currently, the MTS is being run by the CGA. However, the TBZ has continued to supervise the operations of the scheme by regularly sending its officials to monitor the activities that take place at the scheme.

The CGA is a farmer owned and managed agribusiness association operating an out grower programme for tobacco and paprika amongst many of its farmer members in central province. Some of the roles of the association include recruiting tobacco farmers and helping to market tobacco. In Mulilima, the CGA is currently working with 206 tobacco farmers consisting of 67 females and 139 males. These farmers are working with an extension officer (EO) employed by CGA. The role of the EO is to see to it that the functions of the CGA are undertaken in the scheme. The association procures inputs such as fertilizer, agro chemicals, tobacco seed and paprika which are given to farmers on a loan basis. In most cases, the association works with different partners such as the financial institutions and fertilizer companies who provide the inputs or finance to the association.

However, farmers interviewed complained that the loan system lacks justice in that they are not normally told the value of the inputs they collect until during the repayment period. The value for the inputs and, consequently, the amounts which each farmer has to repay the association is only made known in the marketing period. However, Mr Kunda, the EO at the scheme explained that it is difficult to make known the prices of inputs to farmers during the period of distribution because they are quoted in America dollars, a currency which is constantly fluctuating. He said that the price of the inputs is arrived at through consultation with farmer representatives. Nevertheless, the farmers claimed that the voice of their

representatives is hardly heard at such meetings owing to their status as recipients and people in need of loans. The amount liable to the association is then deducted from the amount the farmer is due to receive from the buyer of the tobacco. In some cases, some farmers fail to repay these loans, especially in seasons of poor yields, mainly due to weather conditions. In such situations, the farmers are excluded from the loan inputs and, in extreme cases court bailiffs are engaged to seize various assets from the farmers. Three tobacco farmers interviewed agreed that many farmers are found in such situations and end up working for fellow farmers in order to survive. The EO explained that most defaulting cases are as a result of diverting inputs by farmers to raise money for various needs and of the increased cost of producing tobacco in some cases. He said that poverty is the major reason for farmers diverting inputs, especially since the sale of tobacco does not guarantee immediate cash. In most cases, farmers are forced to sell some of the inputs so that they can have access to cash for their daily needs like school fees and food. Farmers, therefore, end up applying a smaller quantity of the required inputs such as fertilizer with results in poor yields that cannot allow them to repay the loans to the association. On a positive note, however, the EO explained that the loan recovery process has improved tremendously as a result of measures taken by the association. These measures include a system whereby the association has undertaken the process of fertilizer application with the help of leaders of the farmers clubs. As a result of such measures, the association has achieved between 90-95 percent loan recoveries in the 2009/2010 farming season.

A further problem is that farmers do not understand why they have to pay for the empty bags for packing the tobacco which are later taken by the buyer together with the tobacco. The farmers are again made to buy the hessians (sacks) the following year. Many tobacco

farmers explained that they are made to pay 60 cents per piece of hessians. Hence each bale of tobacco is made up of two pieces, each bale cost \$1.20. In the following farming season the farmers are compelled to buy other sacks which are also taken together with the tobacco. The EO agreed with the farmers that tobacco agents buy tobacco packed in the standard hessians which they can only supply at a cost. He agreed to pursue the issue with the buyers and the relevant authority.

The CGA is also involved in the marketing of tobacco. This is done with the collaboration of one of the main tobacco merchants in Zambia, the Alliance One International (AOI). The AOI purchases tobacco from individual farmers at between \$1-\$3 per kg depending on the grading, quality and other factors related to the tobacco. However, the price of tobacco is constantly fluctuating and is said to be sometimes manipulated by the merchants. Some tobacco farmers bemoaned the lack of transparency in the process of pricing the tobacco. They explained that they do not understand how the prices are arrived at by AOI since no meeting is called to discuss this. In some cases, the farmers are puzzled to note that the price of the same quality and same grade tobacco decreases when approaching the close of the marketing period.

In Mulilima, the CGA has been involved in helping farmers to purchase a tractor to be used for the transportation of firewood, inputs and harvested tobacco as well as for helping in other activities in the scheme. The association also pays license fees to the forest department to allow the farmers to have access to the trees to be used as firewood during the curing process. The payment of this license allows the farmers to begin the cutting of trees for firewood in the SNF. The farmers use the association tractor to transport the firewood which is obtained from about a distance of 4 kms from the scheme. Although they are allowed to

use the tractor, the farmers have to buy fuel for its movement. The farmers do not usually cut the trees themselves, instead, they buy the firewood from other people or hire people to cut firewood on their behalf. A number of people are now engaged in the business of selling firewood which they illegally obtain from the SNF. Others merely offer themselves for hire to cut the trees for curing tobacco. A tractor trailer load of firewood consisting of two cords costs K40,000. A cord is made up of a 2 by 2 metres pile of firewood which requires the cutting down of approximately three mature trees.

5.4 The charcoal industry

According to Mr Kangwa, the forest officer (FO), the stretch from Chimupati to Ndabala along the GNR is commonly referred to as the 'charcoal belt' mainly because of a high number of charcoal burners in this area. Many of these are illegal charcoal burners who produce and/or sell the commodity without any forest license. Most of the charcoal traders interviewed explained that they are not involved in the actual production of charcoal but that, instead, they order these from the producers who live in the farms in the Luwombwa area, north of the SNF. According to many of traders and villagers in the two wards, the majority of the people who sell the charcoal along the GNR are female. These traders buy the charcoal from those who produce them in the SNF near the Luwombwa river (cf. Figure 1). The producers normally transport this commodity by bicycle to the roadside where they sell it to the traders from within the area and from other towns. The males are also involved in the sale of charcoal and they normally undertake the production themselves. These have to move some 4-6 kms into the forest to produce the charcoal. Most of the producers of charcoal live in the traditional land of chief Muchinda's area and encroach on the forest to cut trees and produce the charcoal. They do not usually pay the required license fees to the forest

department. The traders agreed that the producers of charcoal conduct their activities illegally, but they cannot report them to the authorities since their livelihood depends of them. They said that most of the people in the area are involved in the charcoal industry as a way of survival. They attributed this to the high poverty levels in the area. The traders explained that they cannot survive without the charcoal trade since their daily needs are met from it. Income from charcoal sales is used to pay various household needs such as groceries, school fees and food.

Although most of the people in the two wards are farmers, they cannot rely entirely on this activity for their daily needs since agriculture is seasonal. Income from agriculture is only realized during a particular period of the year making it impossible for the villagers to depend on it for their day-to-day expenses. In most cases government inefficiencies and bureaucracy leads to a lot of delays in payments to farmers who sell their maize to the Food Reserve Agency (FRA). For instance, the majority of the participants in the three FGDs complained that those that sold maize to the FRA as far back as April had not yet been paid by as late as November. It is such situations that have compelled people to look for other ways of earning a living. Furthermore, they explained that for them to access government subsidized inputs, they are required to pay up to K400,000 as a matching grant as well as to pay other farmers' co-operative fees. The matching grant is the subsidized amount or contribution which farmers pay towards the amount of the inputs. The government guidelines on the subsidized inputs require that a farmer becomes a member of a farmers' co-operative and pays the subsidized price for the inputs before these can be accessed. Since the two wards are in the rural setting, there are very limited activities which people can engage in to raise the sum of money that is demanded by the government as matching grants and

farmers' co-operative fees. The selling of charcoal is one of these limited activities with reduced or no overheads.

All the traders interviewed agreed that they always pay the required K54,000 per 10 bags of charcoal conveyance license to the forest department. However, the FO explained that most of the people along the 'charcoal belt' do not pay the required fees. Such people are supposed to have their charcoal confiscated but this is rarely done due to shortage of transport. It is highly likely that some of the charcoal traders in the two wards pay some of the license fees once in a while but those that are engaged in the production of the commodity do not pay any of the license fees. This can be explained by the fact that the traders conduct their business in the open where the forest officers can easily access them whereas the producers cannot be only accessed. However, since the forest patrols are very erratic, the traders do not usually pay these license fees.

According to the 2009 statistics from the district forest department, 70 illegal charcoal burners were recorded and these are concentrated in the nearby outskirts area around the district township. This is explained by the shortage of transport which the district forest department is facing which forces it to concentrate its operations around the township. It clearly shows that the department is unable to conduct the usual patrols in the far outskirts of the township so that illegal charcoal burners and traders may be traced. On the other hand, 20 registered charcoal burners recorded by the FD in 2009 were concentrated along the 'charcoal belt'. The FO further explained that the people who mostly pay the forest licenses are those traders who come from other towns to buy charcoal for sale. This is mainly because licenses are required during the transportation of the charcoal, especially at checkpoints and road blocks along the main roads. Such traders pay the licenses fearing that

the charcoal may be impounded at police check points along the road as they transport the commodity to the different towns. The FO revealed that local charcoal traders are usually unable to pay the required forest licenses mainly because of poverty levels. The main forest licenses include K108,000 production cost which is charged per cord of firewood used in the production of charcoal, and the conveyance fee amounts to K5,400 per bag of charcoal transported to other towns. The traders interviewed explained that there are traders who occasionally come to order charcoal from town. These traders buy a number of bags of charcoal from charcoal producers around the area. They usually camp at a particular place where the local traders and producers bring bags of charcoal for them to buy (cf. Figure 2). They explained that such traders always pay the necessary license fees to the forest department before they look for a vehicle to transport the charcoal. The charcoal which is bought is normally stored in a particular house until the required number is reached and then transported to the urban towns such as Kabwe and Lusaka.



Figure 2: Bags of charcoal along the GNR, 2010.

Source: Photo taken by the researcher

5.5 Over-exploitation of *Mutondo* and *Musamba* trees

Mulilima and Ndabala wards are found within the *Miombo* forest which has a variety of *Brachystegia* tree species. These trees are part of the indigenous trees in the area. *Brachystegia* tree species occur in different varieties and have many uses for both humans and the environment. Generally, people look for the type of tree species that is best suited for the purpose they are meant to serve. Consequently, those species which have many uses are more in demand by the residents. Members of the three FGDs in the two wards explained that *Mutondo* and *Musamba* tree species are the most exploited indigenous trees in the area. These indigenous trees belong to the *Brachystegia* species and have a variety of uses. The two FGDs in Mulilima revealed that the *Mutondo* trees are habitats for caterpillars which

people harvest for consumption as relish and for sale in town. These edible insects are seasonal and appear before the commencement of the rainy season. They attract traders from various parts of the country especially in Lusaka and some Copperbelt towns. Therefore, many people are involved in the harvesting of these insects which they sell to the traders. The harvest of these insects is sometimes unsustainable in that people cut the host trees (*Mutondo* trees) in the process of harvesting, thereby reducing these indigenous trees in the area.

All the charcoal burners and tobacco farmers in the two wards explained that the *Musamba* and *Mutondo* tree species are the best sources of energy since they burn slowly, produce more heat and do not produce a lot of smoke and ash. Consequently, they mainly target the *Mutondo* and *Musamba* species for firewood and charcoal production. But where these are in short supply, they go for the *Kasabwa* or the *Muputu* trees as alternatives since they have similar characteristics to the *Musamba* and *Mutondo* trees. Table 5 shows the indigenous trees mostly used for firewood in the two wards.

Table 5: Indigenous trees mostly used for firewood (according to priority)

Local Name	Botanical Name	Reasons
<i>Mutondo</i>	<i>Julbernardia Paniculata</i>	<ul style="list-style-type: none"> • Produce a lot of heat. • Burn continuously. • Produce less smoke. • Produce less ash. • Easy to catch fire and burn. • Not fruit bearing. • Readily available
<i>Musamba</i>	<i>Brachystegia Longifolia</i>	
<i>Kasabwa</i>	<i>Brachystegia floribunda</i>	
<i>Muputu</i>	<i>Brachystegia Spiciformis</i>	

Source: Field Data, 2010.

According to Hines and Eckman (1993), people are compelled to exploit indigenous tree species as long as they are available because the species possess the following characteristics:

- They tend to be of higher quality.
- They are known and respected by the users.
- They are generally a common property resource.
- They can be obtained without maintenance or cash payment.
- They provide products that cannot be duplicated with fast growing species.

Twelve members of the three FGDs said that most people in the area value fruit bearing trees because of the fruits which are used both as supplementary and alternative food. Therefore, people do not cut fruit bearing trees in the two wards for firewood and other purposes. Hence, the tobacco farmers and charcoal burners turn to non-fruit bearing trees such the *Mutondo* and *Musamba* trees as sources of firewood and charcoal. The effect of this practice is evidenced by research observation which revealed that the SNF is now full of fruit bearing tree species especially the *Masuku* (*Uapaca Kirkiana*) tree, while the *Musamba* and *Mutondo* species are left in truncated forms as small trees. Figure 3 shows the average size of the *Musamba* and *Mutondo* trees which are currently remaining in the SNF.



Figure 4: The effect of charcoal burning in SNF, 2010.

Source: Photo taken by researcher.

Previously, people used to cut trees for firewood south of the GNR in the area now occupied by settlement and farm areas, but the excessive cutting down of trees in this area has led to the loss of the entire forest. Today, only small trees and shrubs can be found there. The destruction of the mature trees in this area has driven people to shift to the forest area. The Extension Officer (EO) at Mulilima Tobacco Scheme (MTS) explained that the CGA took over the scheme when it was under threat of collapsing as a result of the general shortage of firewood in the area. This compelled them to seek permission from the forest department to use the SNF as a source of firewood. The association has since been using the forest after paying the required license fees. On the other hand, some tobacco farmers revealed that no forest officers are present to monitor the cutting of trees in the forest. In fact, no area has been specifically allocated to tobacco farmers for obtaining firewood; people simply cut trees indiscriminately.

Sadly, the forest area is now showing signs of degradation and, if no action is put in place to reverse the trend, the entire forest area will be destroyed in a few years to come. The major signs of this destruction include the shortage of *Mutondo* and *Musamba* trees. As a consequence of the shortage of these two tree species, farmers and charcoal burners have to move long distances to access the two tree species in the area. Six of the tobacco farmers explained that they have to move for up to 4 kms into the forest to access these two tree species for firewood. It is clear that the two species are being harvested at a rate that is higher than the regeneration rate. In the words of Haile et al. (2010): “When the rate of harvesting is in excess of the annual increment, mining of firewood stock is said to be taking place which would bring a wood fuel deficit.” The shortage of the two mostly exploited tree species indicates that there is mining of indigenous trees in the two wards. A *Miombo* forest in Zambia is composed of the many *Brachystegia* tree species of which the *Mutondo* and *Musamba* trees are in the majority. However, this is sadly not the case in SNF. These trees have been over-exploited by the people in the process of meeting their needs.

5.7 Loss of Biodiversity

The loss of trees in SNF has been creating a corresponding loss in biodiversity in the forest. Since forests contain the most diverse natural habitats, their destruction results in the loss of the various living organisms therein. The SNF is a haven for many life forms such as insects, animals, birds and many others. These have been showing signs of reduction and, in some cases, extinction. Many of the participants in the FGDs in the two wards revealed that they used to collect a lot of mushrooms and harvest caterpillars. However, currently they can only collect very few mushrooms and caterpillars are almost extinct. These two forest products

had been an important source for food and income to many residents of the two wards. Consequently, many people are now turning to other sources of food and income in the area.

Another of the effects of the shortage of the *Mutondo* and *Musamba* trees is that it has led to people encroaching on the forest. Some of these interviewed revealed that some villagers have now started living in the forest in order to have easy access to the indigenous trees. Others end up cutting trees in private farm areas illegally. This in turn has brought about some conflicts in the two wards. Some respondents claimed that it is now difficult to take such cases to the chief's representatives since they are also involved in the vice. Indeed, some of the people hired by the chief's representatives sometimes cut the trees in people's farm areas without permission, and the owners of the farm areas have threatened to take to court all those involved. They said that people should not cut trees in their areas without permission as they (farm owners) pay loyalties to the chief for the farm area.

The excessive exploitation of indigenous trees in the two wards has also affected the cost of production in both the charcoal and the tobacco industries. Many tobacco farmers have to spend more money than usual with regard to the cutting of trees for firewood as well as their transportation. The EO gave the amounts which tobacco farmers pay for the firewood as K45,000 for the use of the association tractor and K140,000 for the fuel. Although the EO stressed that the farmers would pay much more than this if they were to use private transporters, these costs are not benefitting the farmers. Some farmers cited the cost of production as one of the reasons for loan defaulters as well as for some farmers stopping the activity altogether. Some of these interviewed revealed that some of the farmers have ended up being screened out of the loan scheme and have opted to work for other farmers. In some cases, however, farmers just change their registered names to those of other family members

within their household so that they continue to benefit from the loan scheme. For instance, when a husband is screened out of the loan scheme, he may register the following year in the name of his wife or of any of his relatives.

5.8 Conservation strategy

Conservation measures are mainly the form of regulations on the exploiting of the indigenous trees and educational campaigns. Many of the participants during the three FGDs revealed that people have information on which trees to cut. Charcoal burners and tobacco growers are being advised to cut mature trees leaving the young ones to grow. Six tobacco farmers and four charcoal burners expressed knowledge of the value of young trees in the conservation of forests. They understand that mature trees have reached the peak of their lifespan and are about to die. Consequently, cutting down such trees would not have as much of an adverse effect on the forest ecosystem as when the young trees are cut. The FO explained that people are usually taught how to cut trees to permit easy and faster regeneration. He said that the trees are supposed to be cut at an angle. However, most of the charcoal burners and tobacco growers do not have direct control on the cutting down of trees as this is done by hired people. Many of the tobacco farmers explained that, although they often instruct the hired people on the nature of trees which are supposed to be cut, it is highly unlikely that such instructions are strictly adhered to by people who are merely motivated by wages. In fact, the educational campaigns that the FO claimed to be taking place are not well coordinated and structured. This was seen by the lack of any particular programme for sensitising people on the conservation of trees. People usually transmit such messages casually as they go about their normal business, and it is clear that no real importance is attached to these messages.

This can also explain the general casual approach people have given to conservation measures in the two wards.

The EO at MTS explained that they have introduced a new tobacco barn called 'rocket barn'. This barn is specifically made in such a way that it has reduced the consumption of firewood during the process of curing the tobacco. However, the officer revealed that only four farmers out of the two hundred and six in the scheme are to have these barns which are all under construction. A visit by the researcher also revealed that it was still a long way from being completed even though the farmer argued that it would be ready before the next curing process. He explained that the new barn was being constructed with the help of the loan from the association. However, this facility has not benefitted all the farmers and it is not likely that they can afford the expense of such an undertaking and help contribute towards the conservation of indigenous trees.

According to the FO, the department only conducts highway patrols once a quarter. This was attributed to a shortage of transport and other logistics for such activities. Mbindo (1998) similarly noted: "The Forest Department (FD) that is entrusted with responsibility over forest resources has inadequate staff and funding to effectively perform their role of natural resource conservation. Forest inspections to forest areas are therefore almost absent." These are some of the challenges that the local forest department is facing which are contributing to the over-exploitation of indigenous trees. The highway patrols help to trace illegal forest users such as charcoal producers who can later be arrested and prosecuted. The FO revealed that the illegal cutting of trees attracts a penalty of K180,000. The sentence corresponds to the number of trees illegally cut multiplied by the cost of a standing tree or an equivalent of not more than two years imprisonment. While the FO explained that there are many illegal

charcoal burners, he could not specify the exact number. Meanwhile some members of the FGDs revealed that the forest department may only patrol the area once for up to six months. Consequently, it is difficult to monitor the use and conservation of indigenous trees in the two wards.

The forest department indicated that they have incorporated the local villagers in the conservation of forests through the formation of Village Natural Resource Management Committees (VNRMCs). These committees consist of ten members elected by the local residents. They function as the 'eyes' of the forest department at the local area and they are also involved in sensitising the locals on the importance of the conservation of forest resources as well as their sustainable use. VNRMCs are also involved in putting up protective measures for natural resources as well as implementing them. One of the issues on which the forest department has been sensitising villagers has been the cutting of trees during the harvesting of caterpillars as the two wards are in the region in which caterpillars exist periodically. Another issue on which the VNRMCs have been advising the locals has been the method of cutting trees either for charcoal production or tobacco curing. The department encourages the villagers to target mature trees and to cut at an angle to enable their easy and faster regeneration.

However, a request for the records of the activities of the VNRMC showed that these were non-existent. Those interviewed also agreed that there are no conservation activities that take place in the area except for those initiated by the traditional authorities. The forest department is mainly known to them for demanding forest licenses, confiscating charcoal or arresting forest offenders. Although the department has elaborate conservation methods in place, they are not implemented due to a number of structural and financial challenges. The

officer explained that the department consists of six members of staff who are required to manage the whole district which is made up of six protected areas out of a total area of 112,082 hectares and three plantations. However, the department has no vehicle to assist in conducting inspections and other activities. It depends on borrowing vehicles from other departments, something that is not usually possible as many departments do not have vehicles to spare.

5.9 SUMMARY

This chapter has discussed and analysed the research findings. Primary data was collected through interviews, personal observation and focus group discussions. From the findings, it emerged that the *Mutondo* and *Musamba* trees are among the most exploited indigenous trees in Mulilima and Ndabala wards. The excessive exploitation of these trees is perpetuated mainly by tobacco farmers and charcoal burners, the latter of whom are driven by adverse social and economic conditions. Currently, the area around the two wards is facing a serious shortage of the *Mutondo* and *Musamba* trees threatening the sustainability of both the charcoal and tobacco industries. Caterpillars, mushrooms and some animals are now almost extinct while some streams are also affected. The conservation strategy for the indigenous trees in the two wards is entirely in the hands of the forest department. Although the department has planned a number of strategies, the implementation has been hindered by lack of financial and logistical support as well as by the lack of involvement by the necessary stakeholders.

CHAPTER SIX

ETHICAL EVALUATION

6.1 INTRODUCTION

With reference to the fourth objective which states: "To undertake an ethical evaluation of issues relating to the over-exploitation of indigenous trees in Mulilima and Ndabala wards," this chapter makes an ethical evaluation of the findings from the research using some traditional and ethical theories. Traditional ethical theories (i.e., value theory and utilitarianism) will be availed of in addition to the following specific environmental ethical theories: the Land Ethic, Social Ecology, Environmental and Intergenerational Justice.

6.2 Application of ethical theories

6.2.1 Value theory

Values are at the root of ethics and value theory is concerned with questions about the worth of things. Three kinds of values have been identified i.e., inherent value, intrinsic value and utility value, as they relate in different ways to the over-exploitation of indigenous trees in Mulilima and Ndabala wards. It is clear that people in the two wards make use of trees as a means for getting something else. The value that the people of the two areas attach to the trees is purely instrumental. The participants in the three FGDs explained that the main purpose of trees in the area under study is as a means for getting such things as wild fruits, mushrooms, caterpillars, tools, and most importantly, charcoal and firewood.

People do not see trees as valuable in themselves which are precious owing to their unique nature after so many years of development. Some participants agreed that it is wrong to cut these valuable and unique natural features but still explained that the value of trees in

themselves is not important to them. People of the two wards are mainly preoccupied with the search for the means for survival in terms of income generation, and they therefore focus on deriving benefits from the natural environment. This preoccupation overshadows all other activities and attitudes that people of the two wards have in relation to the natural environment. In Mulilima, many tobacco farmers and charcoal burners interviewed looked upon trees as a means of obtaining firewood for their activities. This function of trees is what matters most to them. Many tobacco farmers and charcoal burners expressed ignorance about the intrinsic value of trees. While they acknowledged that the forest is uniquely made and is beautiful, this inherent value which they attributed to trees is wholly subservient to utility value.

There is also an attitude of property being there for common use as regards the utilisation of forest resources in the two wards. People regard any natural resource as a "God-given gift for all" and that therefore there should not be any restriction in its utilization. Hence, the local people resent the activities of the forest department with regard to the confiscation of illegal charcoal and the arrest of illegal users of forest resources. This has led to the work of the forest department being shunned by the villagers. It is only supported by a few of the chief's representatives and other traditional authorities. The reason that ordinary villagers resent such activities is that they do not see any direct benefits coming to them. This explains why most of the illegal forest users who are well known to the villagers can neither be reprimanded nor reported to the responsible authorities at community or district level. In fact, participants in the FGDs were suspicious as to whether the confiscated charcoal is truly auctioned as per procedure. They claimed that the confiscated charcoal ends up in the homes of the forest officers for use. The villagers would rather want that these natural resources

would go to benefit the locals than outsiders in the name of forest officers. The FO, for his part, explained that the confiscated charcoal is auctioned and the money banked in the department's bank account. The participants in the FGDs asked who the forest resources are supposed to benefit if not the locals. This is especially so in that all, including the local villagers, are supposed to pay for the exploitation of trees in the forest. They argued that it is unreasonable to ask for people to pay for their resources when the government knows very well that the locals have no means of earning money. They said that the only alternative left to the villagers was to engage in the illegal harvesting of these forest resources.

Nevertheless, it is interesting to note that this sense of common property is not exhibited in the care for resources. Many of the users of the forest resources in SNF do not seem to care whether this resource is cared for or not. Many FGD participants agreed that the trees should be cared for, but they also revealed that they are merely ordinary people who cannot do much to change the prevailing situation. Many villagers in the two wards do not seem to understand that it is individual actions that have created the problem of over-exploitation of indigenous trees. Instead of exercising personal responsibility, the villagers have to wait for government or the traditional authorities to set up measures to protect and care for the trees. For instance, some interviewees explained that the chief had banned the *chitemene* system of slash and burn in some areas as a conservation measure. They said that this measure had been complied with by many of the residents and that the chief's representatives were there to make sure that people did not violate it. They said that they were waiting for the forest department to establish and enforce measures that would protect the trees. It is evident that the local population in the two wards would abide by measures which were initiated and implemented by the local authorities.

The attitude of the tobacco farmers and charcoal burners towards the trees has mainly been driven mainly by the exclusive focus on deriving use value from them. This has led to the situation which Hardin (1968) referred to as the 'tragedy of the commons'. It describes a dilemma arising from a situation in which different people acting independently and rationally for their own individual self-interest ultimately deplete a shared limited resource even though it is not in anyone's long-term interest for this to happen. The SNF may have been an adequate resource for wood when the population was reasonably low, but with the increase in population, this resource has now become a limited resource with regard to indigenous trees. Consequently, tobacco farmers and charcoal burners continue to cut more trees from the forest with a view to increasing their products and the benefits obtained therefrom. While such an action benefits individual farmers and charcoal producers, the quality of the forest is temporarily or permanently damaged for all the users as a result of such over-exploitation. When applied to the over-exploitation of trees, the tragedy of the commons suggests the urgent need for valuable recognition that forests are common property and as such require to be managed. With such an attitude, people's individual freedom to have access to the benefits of a common resource would then be limited. Although not properly implemented, the government is clearly aware of the need to conserve the value of indigenous trees in particular.

6.2.2 Utilitarianism

Utilitarianism is a form of consequentialism which determines the moral worth of an action based on maximising the good of the outcome. It states that the usefulness of an action in maximising positive utility and minimising negative utility is the sole basis for determining its moral worth. Human actions are ethically evaluated depending on their consequences.

The focus is on whether the action results in bringing about the greatest good. Extending this theory to the natural environment means evaluating ‘the greatest good’ not just for humans but for all living and non-living forms. The question at issue then is, “Does exploiting indigenous trees in Mulilima and Ndabala wards result in the greatest overall good?” To evaluate this question using the utilitarian principle, the findings provide two possible options for the people of the two wards. The first option could be to continue with the over-exploitation of the indigenous trees while the second one could be to stop the over-exploitation of these trees. Each of the options has both positive and negative effects. (cf. Table 6)

OPTION 1: Cutting down trees

(a) Positive Effects: The FGDs revealed a number of benefits which the exploitation of indigenous trees has brought about. Many residents are now engaged in some income generating activities as a result of the exploitation of trees in the area. Those benefitting include tobacco farmers, charcoal burners, labourers and transporters. All these people are depending on the activities that are supported by indigenous trees. They are now able to meet the various household needs from the income generated from their activities. The exploitation of trees has also promoted a number of organisations such as CGA, FD and AOI that gain considerable income from the activities supported by the exploitation of indigenous trees. These organisations have, in turn, employed a number of people who support their families through the work they do in these organisations.

(b) Negative Effects: However, the exploitation of indigenous trees in the two wards has had some negative effects for both the local inhabitants and the natural environment itself. The

loss of precious trees has now become the common feature in the two wards. This means that the ecological functions that were performed by such trees are now no longer enjoyed by both human and non-human beings. For instance, the caterpillars are almost extinct in the area because of the absence of the *Mutondo* tree. The shortage of these insects that serve as a valuable relish and as a means for revenue to most people in the area and beyond means that people will be deprived of the necessary food insect. In the same way the communities of the two wards are faced with the difficulties of living in a changing climatic condition. Those interviewed explained that the rainy seasons are now shorter and delayed. They related this to the loss of vegetation cover in the area. In such a situation, people's agricultural activities are now largely affected. People do not get as much yield as they would have gotten, especially if they do not apply as much inputs as necessary. This means that people have to spend more in terms of inputs to improve the yields.

The excessive cutting of trees has also led to the shortage of valuable trees species, especially those that are mostly targeted. Currently, the two wards are facing a shortage of the *Mutondo* and *Musamba* trees which are the main source of firewood. As a consequence, the major activities for the people of the area are affected negatively. People now have to travel long distances to have access to the trees on which their activities are based. The EO indicated that some tobacco farmers ended up defaulting on the repayment of loans as a result of low incomes from the tobacco sales. One of the causes for low incomes is the increased cost of firewood in terms of fuel for transportation and the cost involved. Such unfortunate farmers have ended up being screened from the loan scheme and later working for fellow farmers. With the current rapid depletion of the required trees, many tobacco farmers doubted the future of the tobacco industry in the area in years to come. The local charcoal traders along

the area have also complained about the increased price of charcoal from the producers and the unstable supply of the commodity. In the recent past, the price of the charcoal from the producers has increased from an average of K5,000 per 50 kg bag to an average of K15,000 per 50 kg bag in view of the shortage of the necessary tree species. The producers have also complained of the long distance between the area of production and where the traders live along the road which has limited the number of bags they can carry. This is mainly because their main mode of transportation is by bicycles which carry a maximum of three bags. However, since they have now moved further inside the forest, they cannot even carry that much and they cannot travel as often to supply charcoal to the traders who live along the GNR.

OPTION 2: Not cutting down trees

(a) Positive Effects: The alternative option to cutting down of trees would be to stop the over-exploitation of indigenous trees. If such an action were adopted, people would benefit since the SNF would not be degraded to such an extent as to affect the various natural processes and the natural environment. The forest would then be a source of various products which humans could enjoy. For instance, there would be a lot of mushrooms which people could access as food and for sale to other towns. Seasonal edible caterpillars would also be in abundance for the locals to access both as a source of income and as relish. The villagers in the two wards could then obtain honey from the forest which can be another valuable source of income. Currently, honey is one of the important NWFPs that is generating substantial revenues to FDCs and the entire country. All these activities would be possible since the indigenous trees that make up the forest would not be extensively degraded. The trees which provide habitats for the bees, mushrooms and edible caterpillars such as the *Mutondo* trees

would be in abundance. In this way, the forest would be useful as a source of income, employment and food not only to the locals but to the people in other towns throughout the country.

(b) Negative Effects: However, stopping the over-exploitation of indigenous trees in the two wards may bring with it a numbers of negative consequences. The most to be affected would be the tobacco farmers and charcoal burners who entirely depend of the indigenous trees in the forest. It would mean that their source of livelihood would be disrupted which would increase their poverty levels. In the absence of what seems to the only source of reasonable income available, people would definitely be failing to meet their basic needs. In the same way, the various organisations and traders that depend on the indigenous trees would have to scale down on their operations rendering many people working in two wards unemployed.

Evaluating the two possible courses of action that may be chosen in the two wards using utilitarian theory, the focus is upon the greatest overall benefit to be obtained for both the local inhabitants and the environment. Much will depend on whether the decision is made on the short-term or the long-term basis. On the short-term basis, the cutting down of trees would appear to bring about greater benefits. However, this may not be a long-term basis for sustainable development.

Table 6: Two options regarding the approach to trees

Option 1: Cutting down trees	<p>(a) Positive Effects</p> <ul style="list-style-type: none"> - Income generation for tobacco farmers, charcoal burners, labourers, transporters, etc. - Employment opportunities for these working in organization such as CGA, FD, AOI, etc. <p>(b) Negative Effects</p> <ul style="list-style-type: none"> - Loss of indigenous trees especially the <i>Mutondo</i> tree. - Loss of edible organisms e.g. catapillars and mushrooms. - More expenses in purchasing artificial fertilizers. - Difficulties in accessing trees for charcoal production and tobacco growing.
Option 2: Not cutting down trees	<p>(a) Positive Effects</p> <ul style="list-style-type: none"> - Natural environment maintained. - Abundance of edible organisms. - Potential for various NWFPs such as honey. <p>(b) Negative Effects</p> <ul style="list-style-type: none"> - Loss of source of income. - Increase in poverty levels.

Source: Field Data

6.2.4 The Land Ethic

In his Land Ethic theory, Aldo Leopold (1968: 224-5) has defined his ethical approach to the environment as follows: "A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise." In this ethical approach the terms preserve the integrity imply the full health or fullness of the environment. Stability refers the general harmony and balance or equilibrium which the natural environment has

achieved over long periods. On the other hand, beauty is the aesthetic (inherent) value in the natural environment which evokes the sense of wonder in people. Humans are able to appreciate beauty in the natural environment since they have an aesthetic capacity. Leopold's meaning of the right thing to do can be viewed in relation to people's interaction with the environment. In his theory, 'land' does not just apply to soil but refers holistically to all the life and non-life forms within the whole ecosystem including soils, water, plants and animals. It explains the importance of the whole community of life, rather than the moral significance of individual beings in the whole. The Land Ethic expands the framework of ethics to the entire ecosystem. It challenges people to evaluate their actions based on their effect on the entire ecosystem as opposed to their effect on individual members of the biotic community. In the two wards, the people cannot be said to be preserving the integrity of the biotic community by removing the trees. The absence of trees disturbs the fullness or the health of the entire biotic community in that most of the members whose survival depends on them will be lost. Consequently, the two wards have been experiencing a shortage of such things as caterpillars, mushrooms, bees and different animals. Further, some of the streams and rivers have had some reduction in their water levels. This disturbance in the biotic community affects the overall equilibrium of the ecosystem which has taken a very long time to be achieved. Leopold called for what is called 'wilderness conservation' in which he saw wilderness as an arena for a healthy biotic community. By conserving the wilderness, the aesthetic value is also maintained. Currently, the SNF cannot be said to be of aesthetic value due to the degradation that has been going on. There are many areas which lie bare only made up of tree stumps and almost a lifeless environment (cf. Figure 4).

Many people who were interviewed revealed that people who are engaged in the cutting down of trees do seem to have some general knowledge of the interdependence of trees with other aspects of the biotic community. For instance, a number of interviewees explained that trees benefit certain animals, birds and insects, and that they provide humans with such things as fruits, honey, wood, etc. However, they do not comprehend how the absence of trees would affect the entire ecosystem. They seem to understand better those aspects of the biotic community that affect them directly.

On human responsibilities, interviews and FGDs revealed an understanding of the environment as largely anthropocentric. They agreed that people have a responsibility to care for the natural environment and for trees in particular but only because careless use of such would disadvantage them and their children. When probed on the effect of the careless use of trees on the environment at large, some interviewees acknowledged that some individual members of the biotic community would be affected but that this was not something that was of value to them. This was largely because they do not see individual non-human members of the biotic community as having even negative rights, i.e., rights not to be harmed. Evidently, they do not see the need for moral consideration to be given to all members of the biotic community. Most of the people interviewed exhibited the 'dominion' mentality, i.e., that human beings are entitled to have mastery over the natural environment for their own use and benefit. They revealed that charcoal burners and tobacco farmers do not select which trees to cut and that there are no people to guide them on the process of cutting for firewood. Their relationship with the 'land' is largely economic, emphasising privileges but without obligations. People of the two wards want to use the biotic community as 'property' where they obtain trees for firewood towards which they but do not have any moral obligations.

This attitude is contrary to the Land Ethic which urges for a change in the attitude of humans towards the natural environment. They should rather regard themselves as members of the biotic community just like the others. The theory challenges humans to show respect or moral consideration to fellow members and ultimately to the entire biotic community. However, although the tobacco farmers and charcoal burners in the two wards might choose to cut down the mature trees and leave the younger ones for regeneration purposes, and although they may avoid cutting trees near rivers or those that serve as habitats for other living things, it is quite unlikely that those directly involved in the cutting down of trees really make sure that young trees are left to grow undisturbed. This is because those who cut down the trees are merely doing it for money. They are not permanent residents in the areas where the trees are cut and therefore have little or no concern for the wellbeing of the ecosystem.

6.2.5 Social Ecology

Social Ecology focuses on the social dimensions in relation to human-environment interactions. It identifies the existence of inequalities in social structures as being responsible for environmental destruction. These inequalities are expressed in the dialectic relationship existing between different social groups such as between men and women, the rich and the poor, or the weak and the powerful. For Murray Bookchin, as long as such social inequalities exist in society, the environment will continue to be harmed. Therefore, social ecology emphasises that present ecological problems are the result of structural inequalities in society. Hence it opposes these inequalities and calls for a more democratic and decentralized social structure in order to protect the natural environment.

Most communities in Zambia are stratified into mainly the rich and the poor as well as the rural and urban population. These different social divisions are always in a dialectical relationship with one another. In the two wards under study, most of the people can be termed as poor, surviving on a subsistence economy. It is this poverty that has been driving people to turn to degrading the environment, especially with financial incentives coming from the rich traders and companies that operate in the area. The different charcoal traders from the towns, i.e., TBZ and AOI drive the locals into the over-exploitation of indigenous trees. As McCullum (2000: 24) states: "Poverty is one of the main causes of forest and woodland degradation in southern Africa and is both a consequence and a cause of this degradation. When people lack financial and other resources, they are left with no choice but to turn to unsustainable use of natural forests and woodland to meet their basic needs. It becomes a vicious circle." This scenario is also obtaining in the two wards. Although the residents do not necessarily require charcoal for their energy needs, they are still driven to produce it to satisfy urban needs. According to the local forest officers, most of the charcoal burners in the two wards cannot afford the production and conveyance fees required in the production and distribution of charcoal. Furthermore, many of the local residents of the two wards cannot afford the cost of charcoal and only use it occasionally. However, traders from the urban towns such as Kabwe and Lusaka contract the charcoal burners to produce the charcoal which the traders later buy for sale in the towns. The EO explained that the tobacco farmers in Mulilima are compelled to maximize their production in order to repay the loans obtained from the CGA and also remain with some income necessary to meet their needs. Even when some farmers cannot grow tobacco in a particular year as a result of defaulting on loans, they are compelled to work for fellow farmers in order to earn a living. Clearly, there

is a dialectic relationship existing between the tobacco farmers and charcoal burners on one side, and the organisations and traders operating in the two wards on the other. In this relationship, the organisations and traders are the powerful merchant classes that are driving the tobacco farmers and charcoal burners into cutting more trees by creating a system that perpetuates the *status quo*.

6.2.6 Environmental and Intergenerational Justice

Environmental Justice links together environmental issues and social justice. While environmental ethics is concerned about the relationship between humans and the ecosystem, environment justice focuses on the injustices that may arise during this interaction. In the words of Figueroa and Mills (2003: 428): "Environmental practices and policies affect different groups of people differently, and environmental benefits and burdens are often distributed in ways that seem unjust." Generally, environmental justice includes distributive justice and participatory justice and has implications for intergenerational justice.

Distributive Justice looks at the injustices that may arise in the distribution of environmental benefits and burdens in a particular area. In the two wards under study, it is evident that there is some unfairness in the way the benefits of trees are distributed among the various stakeholders. The government, through the FD, receives money from the producers and distributors of charcoal as well as from the tobacco farmers in various license fees. However, the money which the government gains from these fees does not benefit the local inhabitants since there are no forest activities that can help to conserve and ensure sustainable use of the forest. The FGDs in Mulilima revealed that the forest department rarely conducts activities in the area. It is therefore unjust for government to receive benefits from the trees in the two

wards in terms of the license fees but to deny the people the benefits of paying those fees. Furthermore, the traders and firms that operate in the two wards have not engaged in any activities that are meant to uplift the life of the residents there. CGA and AOI should be seen to invest in some social and environment activities in the area instead of enjoying all the profits that result from the trees. The EO revealed that CGA had planned to start facilitating the growing of exotic trees species that would be used as sources of firewood in future. However, this plan has not been implemented.

Environmental justice also focuses on the manner and extent to which environmental degradation is affecting non-human life forms. The excessive use of the *Mutondo* tree in particular has led to the disappearance of the caterpillars in the area. Previously the area had been a habitat for these seasonal insects but, with the loss of the hosting tree, this is no longer the case. The *Mutondo* tree is not only the host for the caterpillars but, more importantly, it is the food plant for the insect. Therefore, the burden of the excessive cutting of the *Mutondo* tree has impacted negatively on the caterpillars resulting in another form of ecological injustice.

Participatory Justice relates to manner in which the various stakeholders in the environment participate in the formulation of the policies and in the regulation of the distribution of environmental benefits and burdens. This is important in ensuring that the local inhabitants are involved in matters concerning the natural resources of a particular area. In this way, decisions made become part of the local community who will then become involved in their implementation. Although the 1999 Forest Act was meant to ensure local involvement in the forest resources, the Act gives the responsibility of control and management of national forests to the forest commission. It is the same commission which is tasked to come up with

means of involving the local community in the running of forests. The 1999 Forest Act was meant to improve on the 1965 Act which was highly centralised and rigid. However, it seems that the central government has just been replaced by another centralised body in the name of the Forest Commission. Since the new Act gives the responsibility of devising and implementing forest policies to the commission, the local people cannot be said to be fully involved. Indeed, no FGD participant or interviewee recalled a time when there was a consultative meeting in the area with the commission or its representatives. Although the FO explained that the FD had formed the VNRMCC, these committees exist only on paper since they do not perform any activities and they are not supported. Furthermore, the research participants did not know that the Act gives the President of the country the trusteeship of all the trees. They felt that only trees in the forest can be said to be entrusted to the care of the president or the government.

Intergenerational Justice emphasises how unjust actions of the present generation can create victims for a future generation. This assertion is premised on the fact that in various ways, present human actions and/or omissions can affect future persons in much the same way that they affect present persons. As expressed by Wolf (2005: 280): "It is worth noting that present actions may not only deprive future generations of benefits they might have enjoyed, they may also afflict future generations with problems and disadvantages." This argument should therefore compel people to consider their actions carefully, especially with regards to the environment. This is because our choices to consume, and/or our failure to conserve natural resources, may make these resources forever inaccessible to future generations who might have used them. The choices and actions of the present generation can have a huge

bearing on the quality of life for future generations. Indeed, the very existence of the future generations may largely depend on the actions and choices of the present generation.

Intergenerational justice can also be understood with relation to the concept of sustainability. Sustainable systems must be capable of “meeting the needs of those of us living in the present generation without compromising the ability of future generations to meet their needs” (United Nations 1987). As Ikerd (2009) argues, sustainability is about “short run, self-interest meeting our present needs; but it’s also about long run shared-interest, leaving equal or better opportunities for others both now and in the future.” This concept conveys limits and evokes the possibility of perpetual process. Environmentalists have used the term sustainability in an attempt to clarify the desired balance between natural resource exploitation on one hand and environmental preservation on the other. The future need for the environment and the overall quality of life are critically dependant on the quality of the environment today. The natural resource base of a country and the quality of its air, water, trees and land represents a common heritage for all generations. However, to over-exploit that endowment indiscriminately in pursuit of short-term benefits disadvantages both present and future generations. Whereas ethical responsibilities to distant future generations is questioned by some, the obligations of the present generation to each subsequent generation finds greater consensus among environmental ethicists.

The people of Mulilima and Ndabala are clearly engaged in the over-exploitation of indigenous trees which is depleting this resource. By engaging in such activities, and by not providing substitutes, they are creating victims who may be disadvantaged both now and in the future. Although both sides of the GNR were previously occupied by the *Miombo* forest, excessive destruction of trees on the south-eastern side due to the creation of settlements and

farm land as well as the demand for firewood has left the area without trees. Consequently, the people today are now forced to travel long distances to the north-western side of the road in order to access this vital resource. Clearly, those who had destroyed the forest on the southern side of the road had worked against the interests of the present population. In the same way, the residents of the two wards are also working against their children and grand children who will be future residents. These future residents will be deprived of the benefits of the indigenous trees which the present people have.

6.3 SUMMARY

This chapter has made an ethical evaluation of the over-exploitation of indigenous trees in Mulilima and Ndabala wards. Particular findings from the research were analysed by applying the following traditional and environmental ethical theories: Value theory, Utilitarianism, the Land Ethic, Social Ecology, and Environmental and Intergenerational Justice.

The ethical evaluation of the findings revealed that the people in the two wards attach mainly instrumental value to the indigenous trees, and have ignored the overall welfare of the ecosystem. The area has a number of stakeholders that operate in a dialectic relationship and hence perpetuate the over-exploitation of indigenous trees. This phenomenon is also compounded by the anthropocentric attitudes that influence the human-environment interaction in the area. The consequences of the over-exploiting of indigenous trees have been negatively affecting both living and non-living forms both now and in future. Each of these ethical theories has contributed towards a more comprehensive analysis of dimensions

relation to the over-exploitation of indigenous trees in Mulilima and Ndabala wards. A final ethical evaluation will depend on the importance attributed to the perspectives of each theory.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 SUMMARY

World forests are quite immense and cover almost a third of the total land surface of the earth. However, these valuable natural resources have been exploited for a variety of reasons, especially for economic purposes. This is so because forests form an integral component of the economies of most countries. Ecologically, forests are essential for enabling a clean and healthy environment by facilitating the rain cycle, enriching the soil and providing a habitat as well as food materials for different life forms.

Zambia's forested area is estimated to be more than half of the country's land surface. This area is mainly covered by the *Miombo* trees of the *Brachystegia* species. Like the trend world over, the country's forests are also being lost at an increasingly high rate. Among the contributing factors for the current situation of the forests is the demand for household and commercial energy in the form of firewood and charcoal. This has been compounded by the increasing poverty levels in the country and the general difficulty in accessing electricity. Although there are a number of government policies and programmes that promote the reduction in the loss of forests and increase access to electricity, nevertheless, the failure to adequately implement these has only contributed to the increase in the depletion of the trees.

Currently, there are isolated areas within the country where alternative energy sources such as Biogas, Greengas or PLG are in use. However, the level of use of such sources of fuel still

remains too low to contribute significantly to the reduction of the loss of indigenous trees in the country.

In Mulilima and Ndabala wards, the *Mutondo* and *Musamba* trees have been the most exploited trees owing to their unique characteristics. This exploitation is mainly perpetuated by tobacco farmers and charcoal burners who have been driven by prevailing adverse social and economic circumstances. Consequently, the area is now facing a serious shortage of these two tree species thereby posing a danger to the continued survival of both the charcoal and tobacco industries which are the main activities of the area. Ecologically, the reduction in the forest cover has negatively affected the caterpillars, mushrooms, some animals and some streams in the area.

The Forest Department is aware of the environmental challenges brought about by the over-exploitation of indigenous trees. It has therefore put in place a number of strategies to address this situation. However, most of these strategies still remain on paper without being implemented due to lack of financial and logistical support as well as the involvement of the relevant stakeholders. Although the local inhabitants are willing to take part in conservation activities, the socio-economic conditions motivate them to act otherwise.

7.2 CONCLUSION

The comprehensive ethical evaluation of the findings of the research provides a framework within which the best ethical decision can be taken in relation to the over-exploitation of indigenous trees in Mulilima and Ndabala wards. The evaluation does not necessarily provide a clear-cut decision but it presents the perspectives of the different ethical theories upon which such a decision will need to be made. Each theory attempts to explain a

particular dimension of the ethical issue at hand. However, no one of the theories by itself can adequately provide the solution to the problem. The decision makers would therefore have to consider the contributions from all the theories in coming up with the best course of action.

This dissertation has highlighted a range of ethical theories that help to throw light on different aspects of the problem involved in the causes and consequences of the over-exploitation of indigenous trees in Mulilima and Ndabala wards in Serenje. As values are at the root of ethics, much depends on the values that are considered to be important. Since intrinsic values are not subject to quantitative measurement in the way that utility values are, a final decision will depend on the values that are considered to be more important. In considering the over-exploitation of indigenous trees in Mulilima and Ndabala wards, the harm done to the natural environment needs to be evaluated together with the harm done to the local inhabitants and the possible harm done to future generations.

On utilitarian grounds, the majority preferences of the local inhabitants are generally in favour of the cutting down of trees. However, such views do not in themselves establish what is good for the natural environment, nor indeed for future generations on a long-term basis. An adequate ethical evaluation will depend on the extent to which intrinsic values and the long-term good of the total ecosystem, inclusive of human and non-human life forms, is an essential ingredient in the final decision. Social Ecology highlights the need for government to pay greater attention to address the socio-economic causes of the depletion of trees. Finally, considerations relating to environmental and intergenerational justice must remain an important part of any final ethical decision.

7.3 RECOMMENDATIONS

The fifth research objective of this study was “to recommend measures to ensure the sustainable use of indigenous trees in Mulilima and Ndabala wards.” Consequently, the following recommendations are made to ensure the sustainable use as well as the protection of indigenous trees in Mulilima and Ndabala wards of Serenje:

- In areas where the *Mutondo* and *Musamba* trees have been extensively exploited, the government should ban the cutting of trees at least for a particular period in order to allow for the natural regeneration of these depleted tree species.
- The CGA, working with the district FD, should reintroduce the growing of fast growing tree species by every tobacco grower to provide future tree stocks for firewood for tobacco curing.
- The government, through the forest department, should strengthen the local forest department to improve on monitoring the use of indigenous trees which take long to grow and mature; as well as formulate and implement various forest conservation measures.
- Government should involve the local population in the formulation and implementation of forest policies and regulations. Various mechanisms should be put in place to ensure that the local populations have a sense of ownership of, and responsibility for their natural resources.
- There should be deliberate measures for empowering tobacco farmers by encouraging them to form associations, and to facilitate their progression towards becoming

emergent and, if possible, commercial farmers. The CGA should help farmers in acquiring ownership of land to empower them so that the title deeds can be used to access finance as capital from commercial banks which will be used to expand their activities.

- The government, working with the CGA and the FD, should promote alternative income generating activities such as the growing of other crops such as maize, groundnuts and beans, as well as bee keeping and fish farming to reduce the dependence on tobacco and charcoal. In this way, the government should, through the necessary departments, popularize environmental activities and projects such as those by the Global Environment Facility (GEF) which is funded by the UNDP.
- Government should institute feasibility studies to determine the viability of the use of different alternative sources of energy such as Greengas, LPG and Biogas in the country.

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APPENDICES

Appendix I

Focus Group Discussion Questions for Residents of Mulilima and Ndabala

Introduction: Researcher introduces himself and the subject. Assures the participations that the information to be obtained is purely for academic purpose and thank them for their participation

1. What are the main sources of livelihood for the people in the area?
2. Explain the main economic activities in your area.
3. What are the main sources of energy in your area?
4. Mention the main tree species mostly used in your area and indicate their uses (in order of importance)
5. Describe the charcoal industry in your area.

(Prompt: the buyers, traders, transporters, producers, areas of production, etc.)

6. Describe the process of curing tobacco:-

(Prompt: type of wood used, size of wood per barn, number of barns per farmer, rate of curing in a season, etc.)

7. Explain other values of trees in your area with regard to: (a) humans, (b) other life forms, and (c) the environment.
8. Explain how humans are connected or related to trees and the environment.
9. What do you think are the responsibilities of humans with regards to trees and the environment?
10. (i) Mention the tree species that have:-
 - (a) remained the same;
 - (b) reduced a bit;
 - (c) increased, in recent years.
 - (ii) Give reason/s in each case.

11. Mention the parties that are negatively affected by the over-exploitation of indigenous trees in your area. Explain your answers.
12. What are some of the positive impacts of the use of indigenous tree species in your area?
13. Mention the parties who benefit from the exploitation of indigenous trees in your area.
14. What are the changes that have resulted from the current status of trees in your area?
(Prompt: To rivers and streams, rainfall pattern, life forms such as animals, birds, insects, etc.)
15. Who controls the use of trees in your area?
(Prompt: Is it the chief/headman, government, none?)
16. What is the role of the traditional leaders and other stakeholders in the utilisation and protection of trees?
17. How are the decisions on the use, protection and care for trees and the environment arrived at in your community?
18. Suggest ways in which trees may be protected from being over-exploited in your area.
19. Suggest other activities that people who over-exploit trees in your area can engage in.

Thank the participants.

Appendix II

Semi-structured Interview Schedule for Interview Schedule

Introduction: Researcher introduces himself and the subject. Assures the participations that the information to be obtained is purely for academic purpose and thank them for their participation

1. Explain a little bit about yourself?
 - (a) When did you start your work?
 - (b) What does your work involve?
 - (c) Describe your work experience.
2. Explain the main tree species that are found in Serenje?
3. Describe the areas in Serenje covered by (a) indigenous trees and (b) exotic trees.
4. Explain the main uses of indigenous trees to humans and the ecology.
5. Mention the major areas in Serenje that have shown a remarkable reduction of indigenous trees. Explain the reasons for such reduction.
6. Explain the effects of the remarkable reduction in indigenous trees.
7. Who are the people involved in the reduction of indigenous trees in Serenje? Give reasons why they are involved in this practice. What are the alternative activities for these people?
8. Describe the main environmental as well as forest Acts and policies in Zambia.
9. Describe the role of the forest department in the utilization and protection of trees. What are the challenges and successes in the work of the department?
10. Describe the operation of the charcoal industry in Serenje.

(Prompt: registered charcoal burners, number of illegal charcoal burners last year, penalties for illegal charcoal burning, production quantity, traders of charcoal, etc.)

11. Describe the system of curing tobacco in Serenje. How has the tobacco curing impacted on the trees around Mulilima.

12. Describe the nature of the demand for firewood in Serenje

13. Explain the role played by different stakeholders in the protection of trees.

14. Are there any reported cases of encroachment in the Serenje National Forest?
(Prompt: reasons, people involved, alternatives for such people, etc.)

Thank the participants.

Appendix III

Semi-Structured Interview Schedule for Charcoal Burners

Introduction: Researcher introduces himself and the subject. Assures the participations that the information to be obtained is purely for academic purpose and thank them for their participation

1. Give a brief background about yourself.
 - (a) Describe the location and name of your village.
 - (b) Describe your stay in your area.
 - (c) Explain briefly about your family at home.
2. Explain how and when you began the practice of charcoal burning and why.
3. Describe the production of charcoal in your area. (Prompt: process of production, people involved, other activities they are involved in, problems and benefits, etc.)
4. Who are the main customers of your charcoal and where do they come from?
5. Mention the people involved in the production and selling of charcoal. What is the role of each one of them? (Forms of transport used and the transporters, buyers, agents, traders, consumers, etc.)
6. What are some of the things you consider before you select trees to be cut for the production of charcoal?
7. *Mention the tree species and type most suitable for charcoal production.*
8. Give an average quantity of charcoal which you produce. (Prompt: per kiln, the month and year.)
9. Estimate the number of trees that are used per kiln.
10. What factors determine the price of charcoal?

11. Describe the trends in the production of charcoal in your area in the last one to five years? What are the effects of such trends?
12. Estimate the average income which you earn from the sell of charcoal; per kiln, month and year.
13. Describe the area(s) you normally use for charcoal production and how you access it.

(Prompt: Distance from home, distance from where you obtain trees and who controls that area.)
14. How do you work with other stakeholders in the production of charcoal?
15. Apart from the production of charcoal, what do you think are the values of trees to:

(a) humans, (b) other life forms, and (c) the environment in general.
16. Explain how humans are connected or related to trees and the environment in general.
17. How do you get access to the trees which you use for charcoal burning?
18. What factors do ~~you consider when select~~ing trees to be cut for charcoal production?
19. How do you think trees should be protected from over-exploitation?
20. Who are the different groups and individuals that benefit from your activity as a charcoal producer? Explain your answer.
21. Who are some of the parties that are negatively affected by the production of charcoal? Explain your answer.

Thank the participants.

Appendix IV

Semi-Structured Interview Schedule for Tobacco Farmers

Introduction: Researcher introduces himself and the subject. Assures the participations that the information to be obtained is purely for academic purpose and thank them for their participation

1. Explain briefly about yourself.
 - (a) Explain briefly about your village and chief.
 - (b) Describe your family at home.
 - (c) Describe your main source(s) of livelihood.
2. Explain how and when you started growing tobacco and the reasons behind IT.
3. Describe your experience as a tobacco grower.

(Prompt: The scheme (operation, ownership of the land, etc.), size of the field, number of barns, number of times curing is done, duration for curing, how you obtain inputs and market your tobacco, problems and benefits, etc.)

4. What tree species are most suitable for tobacco curing? Give reasons.
5. Explain how you obtain the firewood for curing tobacco.
6. What factors do you consider when choosing trees for curing tobacco?
7. Where do obtain firewood for curing tobacco – distance from the field or home?
8. How do you think the supply of firewood for curing tobacco can be improved in your area?
9. Apart from providing firewood, what are the other values of trees to humans, other life forms and the environment?
10. Explain how humans are connected to the trees and the entire environment.

11. What do you think are the responsibilities of humans to the trees and the environment?
12. What are the other sources of energy that can be used for curing tobacco?
13. Who are the main customers for your tobacco and where are they from?
14. Give the estimated average price of tobacco per specific quantity.
15. What is your average income earned from tobacco per season?
16. Have you at one time stopped or reduced your production of tobacco? Give reasons.
17. Do you know of farmers in your area that at one time stopped or reduced in the production of tobacco (including those who have graduated from the loan scheme)? Give reasons.
18. Are there any farmers who have graduated from small-scale farmers to emergent or commercial farmers? Please explain giving estimated numbers.
19. What are the alternative activities that farmers (including you) are engaged in?
20. Describe the trend in tobacco growing in your area in the last one to five years?
21. Mention the parties that have benefitted from your activities as a tobacco grower. Explain your answer above.
22. Mention the parties that have been negatively affected by your activity as a tobacco grower. Explain your answer.
23. How are the decisions on the use and protection of trees that affect you and the community arrived at?

Thank the participants.

Appendix V

Semi-Structured Interview Schedule for Representatives of Tobacco Firms

Introduction: Researcher introduces himself and the subject. Assures the participations that the information to be obtained is purely for academic purpose and thank them for their participation

1. Give a brief background about yourself:-

(a) Describe your position and your work in the organisation.

(b) Explain briefly your work experience and duration.

2. Give a background about the organization:

(Prompt: registered name and address, main activities, organizational structure, etc.)

3. Describe the operation of your organization in Mulilima.

(Prompt: production of tobacco, marketing, loan scheme, financial support to the farmers, etc.)

4. Explain how your organization has impacted on:

(a) the lives of the farmers in Mulilima;

(b) the social and economic situation in Mulilima;

(c) the over-exploitation of trees and the general state of the environment in

Mulilima.

5. Does your organisation consultation meetings or educational campaigns (if any) with the farmers and the community of Mulilima? If yes, what issues are discussed and who is involved?

6. What are the problems that are faced by:

(a) your organization in its operation in Mulilima?

(b) farmers in Mulilima?

(c) the community of Mulilima?

(d) the environment (especially trees) in Mulilima?

8. Explain how you are helping farmers to graduate from small to emergent or commercial farmers. (Prompt: access to land, loans, assets, market, inputs, etc.) Give statistics of those who have graduated so far.

Thank the participants.

Appendix VI

Semi-Structured Interview schedule for Charcoal Traders

Introduction: Researcher introduces himself and the subject. Assures the participations that the information to be obtained is purely for academic purpose and thank them for their participation.

1. Explain briefly about yourself.
 - a. Explain briefly about your village and chief.
 - b. Describe your family at home.
 - c. Describe your main source(s) of livelihood.
2. Explain how and when your start trading in charcoal.
3. Explain briefly about your business.

(Prompt: Where you order the commodity, how much you order the commodity, transport

use for the commodity, quantity you sell in a month/year, etc.)

- 4 Who are your main customers for charcoal?
- 5 What do you consider as the best charcoal?
6. Do you have customers who come from other towns? If yes, explain briefly about these customers.
7. Do you pay any licenses for your business? If yes explain these licenses.
8. What are the challenges that you face in your business.

Thank the participants.

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