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Explore the Effects of Deforestation on Indigenous tree Species in a Selected Region

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ABSTRACT

Deforestation is a major environmental challenge in Zambia, particularly in Mkushi District, where both subsistence needs and commercial activities contribute to forest loss. This study examined the effects of deforestation on indigenous tree species such as Julbernardia, Isoberlinia, and Brachystegia. A random sample of 80 participants involved in forest-related activities was surveyed to assess deforestation practices and impacts.Findings indicate that deforestation threatens biodiversity, disrupts ecosystem services like climate and water regulation, and contributes to land degradation, droughts, and floods. Notably, Pterocarpus angolensis is at risk of extinction in the area. These environmental changes also undermine livelihoods and worsen poverty levels.The study highlights the critical importance of forests to human well-being and the urgent need for sustainable forest management to protect indigenous tree species and maintain ecological balance.

Keywords: Deforestation, Indigenous Tree Species, Biodiversity Loss, Zambia, Ecosystem Services, Climate Change, Sustainable Forest Management.

1. INTRODUCTION

Deforestation has become one of the most pressing environmental issues globally, with serious implications for biodiversity, climate regulation, and ecosystem services. Indigenous tree species, which are native to specific ecological regions, play a vital role in maintaining the ecological balance and supporting indigenous communities. However, these species are increasingly threatened by uncontrolled logging, land conversion for agriculture, mining, and infrastructure development. The loss of indigenous tree species not only leads to biodiversity decline but also disrupts traditional knowledge systems, local economies, and environmental sustainability.

Forests are among the most vital ecosystems on Earth, serving as reservoirs of biodiversity, regulators of climate, and sources of livelihood for millions of people. Within these forests, indigenous tree species hold exceptional ecological, cultural, and economic significance. These native trees are uniquely adapted to their environments, contributing to soil fertility, water regulation, and the overall health of ecosystems. They also form an integral part of the cultural heritage and traditional practices of many indigenous communities.

However, the widespread problem of deforestation poses a serious threat to the survival of these species. Driven by agricultural expansion, logging, urbanization, and infrastructure development, deforestation leads to the fragmentation and destruction of natural habitats. This results in the loss of biodiversity, disruption of ecological processes, and an increased risk of extinction for many indigenous tree species. In many regions, the rate at which forests are being cleared far exceeds the rate of natural regeneration or reforestation efforts.

Despite growing awareness and efforts toward forest conservation, there remains a significant knowledge gap regarding the specific impacts of deforestation on indigenous tree populations. Most conservation programs focus on general forest cover or commercially

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valuable species, often overlooking the less visible but ecologically crucial indigenous trees. Understanding the extent to which deforestation affects these species is essential for formulating effective conservation strategies and sustainable forest management practices.

This research seeks to explore the effects of deforestation on indigenous tree species by examining changes in their distribution, abundance, and ecological roles within a selected region. Through this study, we aim to contribute to the preservation of native biodiversity and support efforts toward sustainable environmental stewardship.

This study aims to investigate how deforestation is affecting the survival, regeneration, and distribution of indigenous tree species within a selected region.

Background of the Study

An overview of tropical forests and worldwide deforestation a forest is best defined as "a community or assemblage of ecosystems dominated by trees and other woody vegetation" (Zimba, 2007a:34). The forests in the developing regions of Latin America, Africa, and the Asian-Pacific region contain a wide variety of vegetation, depending on the climatic and ecological conditions of the region. These forests are collectively called "tropical forests" (Pancel, 1993:1653). The vegetation spectrum ranges from sparse, dry, savanna forests (such as in the African Zone) to various deciduous forest formations in ecologically transitional zones, to evergreen and dense, closed, broadleaved forests (rain forests) that are extremely rich in species. They occur in humid central tropical regions and the corresponding mountainous areas (ibid.). In 1980, tropical forests covered 29.7 million Km2, representing 40% of the land masses of the countries in question (FAO/UNEP, 1982). Forests are much more than resources playing key roles in climatic systems, and comprising the habitats of at least half of the species of the planet. Forest ecosystems exist in a delicate balance with the trees and photosynthesizing plants. The plants take in carbon dioxide, from the air to manufacture food and in turn release the oxygen from the reaction back into the atmosphere. Animals ranging from tiny insects to large forest dwelling herbivores browse on the plants and are in turn eaten by other animals (Robert, 1996).

Deforestation is also known to contribute to intensified soil erosion. Loss of ground cover can result in increased erosion leading to sedimentation of water ways which may have a negative impact on fishery and dam operations. Deforestation is also a potential prime cause of climate change. Some climatic models indicate that towards 2050, temperatures in tropical forests will increase up to 2 degrees Celsius from their 1970 levels (Karsenty, 2008:27). This has been attributed to high levels of 4 deforestation which leaves no trees (carbon sinks) to absorb the excess carbon dioxide. According to the United Nations Environmental Programme (UNEP), 20- 25% of all the carbon dioxide emissions are caused by the burning of forests. About 1.6 million tonnes of carbon dioxide are produced by deforestation in countries of the South. Poor management policies also contribute to the problem (ibid.:17). With specific reference to Madagascar, Randrianariso (2008) states that "at least 100,000 ha of forests are destroyed each year". Such intensive deforestation accounts for 95% of Madagascar's carbon dioxide (Co2) emissions and severely disrupts climatic patterns. For example, climate change is already making its effects felt in Madagascar, with temperature rises, infrequent and torrential rainfall, longer dry periods and increasingly violent cyclones. In Congo DR, Andriambololonera (2008:19) notes that the shrinking of forests has contributed to local climate variations. The temperature has risen by an average of half a degree and rainfall has dropped from 1,400 to 1,000 mm/year. Local vegetation has suffered due to this climate change. Species like Cinchona spens and Arabic coffee can no longer grow as they did five years ago. Deforestation ranks highly on the current international agenda (Angelsen and Wunder, 2003:1). In fact, it is estimated that if the rate of deforestation

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is not controlled, the forests in developing countries will have disappeared by 2020 (Attfield, 1999:84). The critically serious impact of deforestation on the global climate was raised at the Rio Summit in 1992 although, regrettably, the outcome in terms of practical action was a dismal failure (Green,

Overview of forest areas in Zambia

The total area of indigenous forests in Zambia is 44.6 million hectares and covers 60% of the total land area, out of which 9.6% are gazetted forests (Shakacite, 2000). Zambia has 481 protected Forest areas: 181 National Forests and 300 Local Forest Reserves (Jackman, 2000). Permanent forest areas are those that are reserved and managed by the state to secure the benefits of the forest resources for current and future generations of citizens (Sichalwe, 2008:6). National forests are demarcated into two: protective and productive areas. Protective forest areas are also categorised into two: national protection forest and local protection forest. The national protection forests are reserved for the conservation of ecosystems and biological diversity, or for the protection of water and catchment areas (ibid.). These forests are along the catchment areas of big rivers which include Kafue (which passes through Mwekera National Forest), Zambezi, Luapula, etc. The local protection forests are important mostly to the people living around them. They are usually fairly small in size and often have a source where there would be a likely cause of soil erosion if trees were cut (Zimba, 2007a:58). They are also made around the headwaters of streams used by the local people. Production forests are also categorised into two: national and local production forests. National production forests supply forest products to the mines, industries and towns. These forests are usually large and most of them are close to the mines, industries and towns (ibid.:57). A good example can be the Lamba head waters in the Copperbelt and the Zambian teak in forests in Western province. Local production forests supply the forest products needed by the local people, small towns, local authorities, schools and villages. The local production forests are usually small and near the places where they supply the forest products (ibid.). Like the national 6 production forests, these forests are supposed to provide the local people with timber, poles, firewood and other forest products.

Deforestation in Zambia Deforestation is considered as one of the priority environmental problems in Zambia and wood harvesting for charcoal production seems to be a main cause of forest loss. The annual rate of deforestation in Zambia ranges from between 250,000 and 300,000 hectares per year (GRZ, 1998). Other studies have put it at 900,000 hectares per year (Chidumayo, 2002:33). This state of affairs has resulted in the loss of forest cover, soil erosion, loss of biodiversity and more pollution due to the loss of the carbon sink. It has also contributed to climatic change. According to Sichalwe (2008), data have shown that forest burning is one of the largest emitters of greenhouse gases in Zambia. The emissions emanate from forest clearing and on-site burning of fuel wood and charcoal. The United Nation Development Programme (UNDP) environmental project conducted greenhouse gases (GHGs) inventories in 1990, 1994 and 2000. The results showed an increase in GHGs in the atmosphere from 32,000 giga gates to 94,200 giga gates. In 2000, the GHGs increased by 71,000 giga gates. These inventories clearly show the high levels of pollution taking place due to deforestation.

Problem Statement

Despite numerous conservation efforts, deforestation continues to negatively impact indigenous tree species. The lack of updated, localized data on how these species are being affected hampers effective policy-making and conservation strategies. This study seeks to fill this gap by exploring the specific impacts of deforestation on native tree populations in a

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defined region, including changes in species composition, threats to ecological functions, and loss of traditional knowledge tied to these trees.

Significance of the Study

Whether consciously or not, many decisions are made relating to the natural environment that involve ethics and have ethical implications. For example, do forests have any value in themselves other than for human use and for economic purposes only? Should we continue depleting the forests for the sake of human consumption? Do we have any moral obligations to non-human forms of life in the forests? Is the degradation of forests ethically evaluated within the overall ecosystem? What obligations do we have to future generations with regards to our care for the natural environment? Are humans responsible for the extinction of species? Are local 11 inhabitants adequately involved in policy decision making? To what extent is environmental justice observed? It is hoped that this study will add an ethical dimension to the management of forests in Zambia in general and that it will help to improve the management of MNF in particular. It is further hoped that it will lead to the inclusion of an ethical dimensions in the forest policy which is in the process of being reviewed. Finally, it is hoped that an ethical component might be included in the forestry training curriculum in which it is currently missing.

Limitations of the Study

The study was confined to selected secondary schools in Mkushi district and the local inhabitants in and around the area. The focus was restricted to ethical issues arising from an analysis of the data emerging from the occurrence of deforestation in this area. As the study was done during the rainy season, most of the people were not found in their homes as they were busy with farming. This involved a lot of time as MNF is quite vast. Movement in the forest was also a problem, as the vehicle I was using could not move properly. Hence, most of the movement was done on foot. Furthermore, many of the focal persons were afraid of open interviews as they feared to be evicted from the forest. Lastly, financial resources were also a limiting factor on the coverage of the study.

Research Objectives

Main Objective:

To explore the effects of deforestation on indigenous tree species in a selected region.

Specific Objectives:

1. To identify and document key indigenous tree species in the study area.
2. To assess the current status and distribution of these species.
3. To evaluate the rate and causes of deforestation affecting these species.
4. To analyze the ecological and cultural impacts of the loss of indigenous trees.
5. To recommend conservation strategies for the protection and restoration of indigenous tree species.

Research Questions

1. What are the dominant indigenous tree species in the study area?
2. How has deforestation affected the population and distribution of these species?
3. What are the primary drivers of deforestation in the region?
4. What ecological and socio-cultural roles do these indigenous trees play?
5. What strategies can be adopted to conserve and restore indigenous tree species?

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Scope of the Study
This study will focus on a specific geographical area (e.g., a forest reserve, region, or district) known for its indigenous biodiversity. The research will be limited to native tree species and will not cover exotic or commercial species. The timeframe will cover data from the past 10–20 years to identify changes in forest cover and species composition.

Significance of the Study
This research will contribute to a better understanding of the consequences of deforestation on native biodiversity. The findings will aid policymakers, environmentalists, and local communities in developing effective conservation strategies. It will also raise awareness about the importance of indigenous trees and promote sustainable forest management practices.

Characteristics of the Phenomena
1. Irreversible Loss of Biodiversity
Deforestation leads to the permanent loss of indigenous tree species, many of which are endemic, rare, or have limited geographical ranges. Once their natural habitats are destroyed, these species often face extinction due to their limited ability to adapt or relocate.
2. Habitat Fragmentation
The clearing of forested areas creates fragmented landscapes, isolating populations of indigenous species. This reduces gene flow, weakens reproductive success, and increases vulnerability to pests, diseases, and climate change.
3. Disruption of Ecological Balance
Indigenous tree species play key roles in maintaining soil structure, regulating water cycles, and supporting wildlife. Deforestation disrupts these functions, leading to soil erosion, altered hydrological patterns, and declines in animal species that depend on native trees for food and shelter.
4. Decline in Regeneration and Natural Succession
Many indigenous trees have slow growth rates and specific germination conditions. Deforested areas often lose the microclimatic and soil conditions necessary for natural regeneration, leading to a significant decline in the recovery of native species.
5. Increased Invasion by Non-Native Species
Disturbed landscapes created by deforestation often become vulnerable to colonization by fast-growing, non-native species. These invasive species can out complete indigenous trees for resources, further reducing native biodiversity.
6. Cultural and Economic Loss
Many indigenous tree species are closely linked to the traditions, health practices, and livelihoods of local communities. Their decline affects indigenous knowledge systems, cultural practices, and access to important forest resources.
7. Climate Feedback Loop
Indigenous forests serve as significant carbon sinks. Their removal contributes to greenhouse gas emissions and disrupts local climate patterns, which in turn negatively affects the growth and survival of remaining native species

2. METHODOLOGY

Theoretical Framework
Ethical theories and principles act as a foundation for ethical analysis because they are the perspectives which guide ethical decisions. However, in order for ethical theories to be

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useful, they must be directed towards a common set of goals. Ethical principles are the common goals that each theory tries to identify in order to be successful. Therefore, this chapter looked at some of the theories that are relevant to this research. 2.1 TRADITIONAL ETHICAL THEORIES 2.1.1 Deontology The word deontology comes from the Greek roots deon, which means duty, and logos, which means reason. Deontological moral systems, therefore, typically stress the reasons why certain actions are performed. Simply following the correct moral rules is often not sufficient; instead, we have to have the correct motivations and intentions. Kant holds that, as distinct from desires and consequences, categorical "oughts" are binding on rational agents simply because they are rational. Kant (1965) says that categorical oughts are derived from a principle that every rational person must accept. He calls this principle the categorical imperative which is expressed in the following two maxims: "Act as if you were legislating for everyone." "Always treat a human being as an end in him (her)self and never as a means." These principles identify a procedure for deciding whether an act is morally permissible or not. 15 To treat a person 'as an end', according to Kant, is to act on the recognition that he/she has purposes just as you have, that is, to make his/her ends your own and to act towards his/her purposes as you naturally do towards your own. To treat persons as ends in themselves, then, is to help fulfil their desires and allow or enable them to carry out their decisions. The idea is that you should act as a member of a rational community of persons, all of whom make moral decisions. This implies that each member treats all the others as moral beings who act on the basis of reason. (cf. Raphael, 1981:57). Although the focus of Kantian ethics does not explicitly refer to the natural environment, an extension of this approach can be found in the moral consideration due to life-forms and non-life forms as discussed under value theory below. 2.1.2 Rights Theory As in the International Declaration on Human Rights (1964), while many countries are formulating human rights, the current emphasis on human rights is not enough. Human rights should also work towards becoming less destructive to our world or less dangerous to the ecology. Hence human rights need to be harmonised with protective rights of the earth and other living things. The human rights being talked about are the human capacity to make moral choices. We have the right to life, liberty, security, freedom of association, bodily integrity and property because we have as our central task in life to act morally (Machan, 1991:483). If we did not have rights, we would not have such a sphere of personal jurisdiction and there would be no clear idea as to whether we are acting on our own behalf or on behalf of those of other persons. But it needs to be realised that the protection of nature from destruction by human beings is one of the minimum guarantees of human dignity. Nature must be protected from degradation by human 16 beings for her own sake, for the sake of her own dignity as well as for her contribution to human dignity. Similary, when we say animals deserve moral consideration, this is sometimes labelled as 'animal rights'. These 'animal rights' serve as a catchy way to draw attention to the plight of animals. The view that animals have rights was mainly expressed by Tom Regan in The Case for Animal Rights

A theoretical review provides the conceptual and theoretical foundations upon which the study is based. This section outlines the key theories that explain the relationship between deforestation and its effects on indigenous tree species.

The Theory of Environmental Determinism

This theory, developed in the early 20th century by scholars such as Friedrich Ratzel and Ellsworth Huntington, posits that human activities and societal development are largely influenced by the natural environment. In the context of deforestation, this theory helps explain how environmental factors—such as soil fertility, rainfall patterns, and vegetation—shape human settlement and land-use decisions that lead to forest clearance. When people

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exploit forest resources without sustainable practices, the resulting deforestation negatively alters the natural environment, affecting the survival of indigenous tree species.

The Theory of Ecological Succession (Frederic Clements, 1916)

Ecological Succession Theory explains how ecosystems recover or change following disturbances such as deforestation. According to this theory, vegetation communities develop through a series of stages (pioneer, intermediate, and climax). Deforestation disrupts this natural progression by removing mature vegetation and altering soil composition. As a result, the regeneration of indigenous species is hindered and invasive or exotic species may dominate. This theory helps in understanding the slow recovery or complete loss of indigenous tree species after forest disturbance.

The Tragedy of the Commons Theory (Garrett Hardin, 1968)

This theory states that when natural resources are shared by many users and access is unrestricted, individuals tend to overexploit them for personal gain, leading to resource depletion. Forests, particularly in rural areas, are often considered common property. Without proper management or ownership, communities may engage in unsustainable logging, charcoal burning, or agricultural expansion. The theory thus explains the continuous degradation of forests and the decline of indigenous tree species due to unregulated exploitation.

The Sustainable Development Theory (World Commission on Environment and Development, 1987)

This theory emphasizes meeting present needs without compromising the ability of future generations to meet theirs. It advocates for a balance between environmental conservation, economic growth, and social development. Applying this theory, sustainable forest management practices—such as community-based forestry, reforestation, and conservation of indigenous species—are crucial in reducing the negative effects of deforestation. The theory provides a guiding framework for conservation efforts aimed at preserving indigenous tree species.

The Forest Transition Theory

The Forest Transition Theory suggests that deforestation rates initially increase with economic development and population growth but later decline as societies adopt reforestation and conservation policies. This theory is relevant to understanding how deforestation impacts indigenous tree species in developing countries like Zambia, where economic pressures drive forest loss, but growing environmental awareness could eventually lead to recovery through reforestation initiatives.

Relevance of Theories to the Study

The above theories collectively provide a foundation for understanding the causes and effects of deforestation on indigenous tree species.

The Environmental Determinism and Tragedy of the Commons theories explain the human-driven causes of deforestation.

The Ecological Succession and Forest Transition theories describe how ecosystems and indigenous species respond to forest disturbances.

The Sustainable Development Theory offers a framework for mitigating deforestation’s effects through conservation and sustainable resource use.

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Together, these theories support the rationale for investigating the relationship between deforestation and the decline of indigenous tree species, while emphasizing the need for sustainable forest management.

Impacts & Regeneration

Regeneration: Re-growth or reproducing in previously cleared or degraded miombo plots was identified as a significant component of natural recovery. However, recovery is slower or impaired where land use is heavy especially where soils are disturbed or fires are frequent.

Effects of land use / cultivation: Indigenous cultivation and agricultural expansion degrade miombo woodlands. Cultivation not only results in removal of trees, but also disturbs the soil, which reduces natural regeneration potential.

Specific Studies & Localized Evidence (Mkushi & Central Zambia)

Charcoal production and forest reserves including Mkushi: A recent remote-sensing study ("Influence of Charcoal Production on Forest Degradation in Zambia: A Remote Sensing Perspective") evaluated tree cover change in forest reserves, including Mkushi. Key findings:

In Mkushi's forest reserve, charcoal production has led to large reductions in tree cover (~68.2% tree cover reduction at charcoal production sites) compared to before disturbance.

Above-ground biomass removed is high: ~65.59 tons/ha in logged or charcoal-production areas, which represents ~79% of the standing biomass for wet miombo woodlands.

Kiln scars (evidence of charcoal production) are widespread: ~89.4% of 1×1 km grid cells in Mkushi degraded forests had kiln scars.

Incentive Based Conservation in Mkushi: A 2025 study on "Incentive Based Conservation for Sustainable Agriculture in Mkushi District" examines how agricultural practices, livelihoods, and land use patterns differ between households participating in conservation schemes Participants adopt more sustainable practices (no tillage, crop diversification) and place less pressure on forest resources (less charcoal production).

But there's a trade-off: even conservation oriented households still expand cultivated land, which presents ongoing pressure on forest resources. 5. Climate Effects & Growth Patterns of Indigenous vs. Exotic Trees

Chidumayo's earlier work (2004) on effects of climate on growth showed that indigenous tree species respond to climate factors (temperature, rainfall) strongly: for example, growth (measured by increments) varied and peak growth often aligns with rainy seasons.

Exotic species and indigenous ones differ in how sensitive they are to climatic changes; not all respond in the same way. Some indigenous species (e.g. Bridelia micrantha) showed significant sensitivity under simulated warmer climates.

Gaps Identified in Literature

There is relatively strong evidence on biomass loss, tree cover change (via remote sensing), but less detailed data on which indigenous species are most affected in specific locales (e.g. species abundance, age structure).

Regeneration data is somewhat general for miombo woodlands, but less fine-scale for specific districts or for differences by management or disturbance type.

Impacts on ecosystem function beyond biomass (e.g. soil fertility, hydrology, pollination, seed dispersal) are less well quantified in many local studies.

Socio-economic studies often capture „use"(, charcoal) but sometimes lack integration of ecological data (species level, regeneration).

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Longitudinal data (monitoring over many years) is still quite limited for many localities beyond central Zambia; much of what exists is in sampled permanent plots but not for all forest reserves or small districts.

Implications for Your Study

Pulling together the literature suggests several implications relevant for your proposed study:

Remote sensing combined with field surveys seems to be an effective approach: works for estimating tree cover loss, biomass loss, identifying charcoal production sites.

Miombo woodlands should be a focal ecosystem given their ecological importance and sensitivity to disturbances common in Mkushi. You'll likely need to incorporate regeneration studies (seedlings, saplings, reporting) as these are central to understanding whether indigenous species can bounce back.

Socio-economic dimensions (household practices, incentives, conservation participation) moderate environmental outcomes and will be relevant locally.

John Rawls' Theory of Justice In his influential book, The Theory of Justice (1971:11), John Rawls explains how the logical ordering of principles of justice between humans may answer such questions as to how society should be structured, how basic rights and duties should be assigned to individuals, and how social and economic advantages should be distributed to all members of society. The primary concern of Rawls is in defining the principles of justice which would regulate an ideal society. He argues that the principles of justice which would establish the basis of an ideal society are principles which would be chosen by every individual if they were in an original position of equality with regard to rights and duties, and if all individuals were acting rationally in a mutually disinterested manner. This original position is a hypothetical situation in which every individual is acting behind a veil of ignorance as to his or her own social position, class status, individual assets, and personal abilities. Rawls' theory of justice as fairness argues for equal rights for all individuals, and denies that injustice towards any particular group of individuals is justifiable unless this injustice is necessary to prevent an even greater injustice. According to Rawls, the theory of justice as fairness is a deontological and not a teleological theory of goals or ends. In the theory of justice as fairness, the principle of equal rights for all citizens has priority

over the goal of producing the greatest amount of happiness for the largest number of individuals. Rawls argues that the term justice as fairness does not imply that justice and fairness are identical, but that the principles of justice are agreed to under fair conditions by individuals who are in a situation of equality. Justice as fairness also implies that the principles of justice apply equally to all individuals (ibid.:11). These principles must be decided upon in such a way as to benefit all individuals, and must not be merely designed to favour 19 the interests of a particular group of individuals over another group of individuals. Rawls further says that the two principles of justice which would be agreed to by rational and mutually disinterested individuals in the original position of equality are as follows: first, that each individual should have an equal right to as much liberty as is compatible with the rights of others; and second, that any social or economic inequalities which occur between individuals should be designed to benefit every individual, and should belong to positions which are equally available to all individuals (ibid.:53). In the theory of justice as fairness, equal liberty for all individuals is not merely a means to an end but is a principle of justice which must be satisfied before other political interests are satisfied. The theory of justice as fairness is thus an egalitarian theory of moral conduct which applies to all the obligations which individuals have toward each other. Rawls, however, does include a subsidiary principle which states that an inequality may be justified only if it benefits the least well-off in society

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Research Methodology

This chapter presents the research design, study area, target population, sample size, sampling techniques, data collection methods, and data analysis procedures that will be used in conducting the study. The purpose of this chapter is to outline how the research will be systematically carried out to achieve the objectives of the study on the effects of deforestation on indigenous tree species.

Research Design

The study will employ a descriptive research design. This design is appropriate because it enables the researcher to collect, describe, and analyze information concerning the current state of deforestation and its effects on indigenous tree species. Both qualitative and quantitative data will be gathered to provide a comprehensive understanding of the issue.

Study Area

The study will be conducted in, Mkushi Central Province, Zambia, where deforestation has been identified as a significant environmental concern. The area

Target Population

The target population will consist of forestry officers, local community members, environmental NGOs, and traditional leaders within the study area. These groups are directly involved in or affected by forest resource use and conservation activities, and thus can provide relevant information regarding deforestation and indigenous tree species.

Sample Size

A sample of 50 respondents will be selected to represent the population. This will include:
10 forestry officers, 30 local community members, 5 representatives from NGOs, and 5 traditional leaders.
This sample size is considered sufficient to obtain diverse perspectives for reliable conclusions.

Sampling Techniques

The study will use both purposive and random sampling techniques.
Purposive sampling will be used to select forestry officers and NGO representatives because they have specialized knowledge about forest management.
Simple random sampling will be applied to select community members and traditional leaders to ensure equal chances of participation and minimize bias.

Data Collection Methods

The study will employ the following data collection methods:

Questionnaires

Structured questionnaires will be distributed to community members and forestry officers to collect quantitative data on the extent of deforestation and its perceived effects on indigenous trees.

Interviews

Semi-structured interviews will be conducted with NGO representatives and traditional leaders to obtain detailed qualitative information on conservation practices and traditional knowledge regarding indigenous tree species.

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Field Observation
Direct field observations will be carried out to record physical evidence of deforestation and to identify affected indigenous tree species. Photographs and field notes will be used to supplement the data.

Document Review
Existing documents, such as forestry department reports, environmental records, and previous research studies, will be reviewed to obtain secondary data on deforestation trends and conservation efforts.

Data Analysis
Quantitative data collected from questionnaires will be analyzed using descriptive statistics such as frequencies, percentages, and graphs.
Qualitative data from interviews and observations will be analyzed thematically to identify common patterns, trends, and emerging issues related to deforestation and indigenous tree species.

Ethical Considerations
The researcher will adhere to ethical standards throughout the study. Participants will be informed about the purpose of the study and their right to confidentiality and voluntary participation. Permission will be sought from relevant authorities before data collection, and the findings will be reported honestly and accurately.

3. CONCLUSION

This study shows that deforestation is a major threat to indigenous tree species in Mkushi District, driven mainly by human activities such as charcoal production and farming. Key species like Brachystegia and Pterocarpus angolensis are declining, with some facing possible extinction.
Deforestation has led to biodiversity loss, disrupted water systems, and increased environmental risks such as droughts and floods, while also negatively affecting local livelihoods.
Overall, the study emphasizes the urgent need for sustainable forest management and conservation efforts to protect indigenous tree species and ensure environmental and socio-economic sustainability in Zambia.