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The effects of deforestation on rural women and children in Mhangura, Zimbabwe.

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIRENTS OF THE BACHELOR OF SCIENCE (HONOURS) DEGREE IN NATURAL RESOURCES MANAGEMENT.

DEDICATION

It is with genuine gratitude and warm regard that I would like to dedicate this dissertation to my family.

Student:

Signature…… Date…….

Supervisor: Dr. L Mujuru

Signature……. Date…….

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I would like to express my gratitude and appreciation to my supervisors Dr. Mujuru for her assistance in coordinating my project. I would also want to appreciate the guidance given by my family and friends throughout this research.

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Abstract

An assessment on the effects of deforestation on rural women and children in Mhangura, Zimbabwe was carried out. The aim of the study was to carry out a study into people's knowledge about deforestation in Mhangura. A total of 300 respondents inclusive of man, women, children, Environmental Management Agency (EMA) and Forestry Commission officials were interviewed through the use of questionnaires and interview guide and analysed using descriptive statistics and logistic regression in SPSS statistical version 20.0. Deforestation had negative effects on economic, social and environmental impacts on villagers. The main causes of deforestation in Mhangura are agriculture activities, collection of firewood, unemployment and illegal mining. The social impacts were malnutrition (19.5%), domestic violence (22.5%), shortage of herbs for medicine (14.5%), hunger and famine (15.3%), change in lifestyle of people (12.5%) and poverty (15.8%) in the area. The women and children are socially affected at a higher rate as they are the ones left in the area. The economic changes such as the changes in the sources of income and the environmental changes in the Mhangura area included the deformation of the land leading to soil erosion, climate change, drought and extinction of flora and fauna which all had the significance level of 0.05. Therefore, the government through Forestry Commission and Environmental Management Agency should strengthen the measures against those who cut down trees. EMA should also work with Forestry Commission and the Ministry of Agriculture to make sure that every tobacco grower practice air curing for tobacco and save forests.

Contents

Chapter 1 Introduction

Forests play a significant role in ecology by providing habitat and essentials for a variety of processes supporting wildlife species, assisting in the regulation and management of the climate, and preventing soil erosion and flooding (Tiainen, 2019). Forest and forest resources are also essential ingredients for the socio-political and economic survival of any social system. This is attributed to the role of forests and forest resources in the advancement of the society and the environment. More than 1.6 billion people worldwide rely heavily on forest resources for their livelihood, making the significance of forests to become clear. Forest provides vital ecological functions, their capacity to absorb carbon-dioxide and release of energy through photosynthesis helps to control the level of greenhouse gases in the atmosphere (Weje and Nwabueze, 2019).

According to Bensch and Peters (2013), forests are destroyed due to inadequate land tenure policies, incompatible forest proclamations and other laws, as well as the expansion of agricultural on marginal lands. The main drivers of deforestation, according to are intricately related to a vicious cycle of elements that all reinforce one another, including poverty, population expansion, slow economic growth, and environmental conditions (Bailis et al. 2015). The destruction of natural forests has negative repercussions on the environment, including the loss of several forest products, drought, flooding, interruption of water flow, decreased land production, and worsened suffering and poverty among rural populations (Harcourt 2016). It is estimated that, overgrazing and inefficient farming methods caused a sixth of the world's land area, or about two billion hectares, to become degraded (Tiainen, 2019).

The majority of people in Africa depend on agriculture for their livelihood, with 75 percent of agricultural output coming from smallholder farming, the majority of which is rain-fed agriculture. The main natural hazard that affects rain-fed agriculture most severely in Africa is drought (Harcourt and Nelson, 2015).

In other cases, rural communities are forced into unsustainable farming practices as a result of population growth, including burning and destroying tropical forests for crops, planting on steep slopes, moving into vulnerable marginal eco-systems, overcrowding and overgrazing, which leads to the degradation of arable land, and excessive use of ground water resources.

In Zimbabwe, mining, fuel wood extraction, legal and illegal logging, cutting trees to make more space for crops, and clearing for arable land are the main contributors to deforestation. However,

in the Mashonaland provinces, timber extraction, mining, and agricultural development have been recognised as the main culprits and impacts are differentiated across the country's diverse forest zones (Zvobgo and Tsoka, 2021). These activities and the resulting deforestation are likely to continue and even intensify if there are no practical mitigation policies and nationwide coordination, because Zimbabwe's expanding population needs more forest products and land for settlements, construction, energy production, and food production (Harcourt, 2016).

Deforestation has detrimental consequences, posing a variety of problems to humans including exacerbating recurrent droughts, soil infertility, poverty, and climate change, which have impacted negatively on rural women and children than other parts of society. Women are the foundation of the family, and if they suffer harm, the rest of the house will not run well (Tiainen, 2019). It is now more difficult and time-consuming for rural women and children to fulfill the gender-specific responsibilities that they were socialised to do, such as fetching water, gathering firewood, practicing agriculture in adverse climates and different soil types, or getting involved in high-risk scenarios. They are now more susceptible to societal tyranny and maltreatment as a result. Simply expressed, both the core causes of these issues—human interferences—and their impacts, including drought and soil erosion, are investigated. These interferences include improper land and forest management, over-harvesting of timber, gathering of fuel wood, and tenancy of land and trees.

Despite the benefits obtained from forest ecosystem goods and services, the clearing of forests has contributed to the continued decline of forest resources in Zimbabwe (Muzirikazi, 2016). Fakarayi (2018) investigated how tobacco farming affected local forests in Ward 1 of the Makonde District, Zimbabwe, and found that growing of tobacco was more profitable than growing any other crops, as farmers were making significant incomes from it. The use of local forests as a source of energy for curing tobacco has increased the rate of deforestation, which has led to an increase in soil erosion, a change in rainfall patterns, an increase in the incidence of strong winds, and other disasters, not only locally but also globally (Muzirikazi 2016). The main factors influencing the use of indigenous woods for curing tobacco include a lack of financial resources or other resources to use other alternative curing processes, such as coal and electricity, as well as a lack of irrigation facilities required for expanding tree plantations (Tiainen 2019). In the Mhangura area of Zimbabwe, agricultural and mining activities contribute greatly to

deforestation. This study therefore assesses the impacts of deforestation on women and children in Zimbabwe, and its impact.

1.2 Statement of the problem

Deforestation has impacted negatively on the socio-economic activities of rural women and children especially agricultural activities in upper Manyame Sub-Catchment, Zimbabwe (Zvobgo and Tsoka, 2021). Causes of deforestation in Zimbabwean rural communities have been studied (Mabasa and Makhubele, 2016), including rate of deforestation and its causes (Zvobgo and Tsoka, 2021) and effect of deforestation on biodiversity (Harcourt, 2016). However, effects of deforestation on rural women and children has not been well documented. Moreover, no studies have been done to determine the causes, extent and effects of deforestation in Mhangura. This research will therefore, assess challenges that are associated with deforestation in Mhangura, and its extent on women and children.

1.4 Objectives

Main objective

To assess the effects of deforestation on women and children in Mhangura, Zimbabwe.

Specific objectives

1. To determine the causes of deforestation in Mhangura, Zimbabwe.
2. To identify social effects of deforestation on rural women and children in Mhangura, Zimbabwe.
3. To determine economic effects of deforestation on women and children in Mhangura.
4. To determine the environmental effect of deforestation in Mhangura

1.5 Research questions

1. What are the causes of deforestation in Mhangura, Zimbabwe?
2. What are the social effects of deforestation on rural women and children in Mhangura, Zimbabwe?
3. What are the economic effects of deforestation on women and children in Mhangura?
4. What the environmental effect of deforestation in Mhangura?

1.6 Significance of the study

The research will benefit different stakeholders in the following ways;

- **The government:** the study will benefit the government by raising alarm or awareness on the extent and effect of deforestation in Zimbabwean rural areas. It also helps the board of directors of environmental agency (EMA) and their respective stakeholders in coming up with framework and management control and monitoring mechanisms.
- **The private sector and other stakeholders:** it will also benefit from the research in addressing their challenges that are associated with deforestation in the rural areas. These includes local NGOs, agriculture companies and other private stakeholders in coming up with management strategies to cop up with deforestation as well as management strategies.
- **The academia:** the information gathered in this research can be used by scholars or academics as secondary data through the literature reveal and the findings.

Chapter 2 Literature Review

2.1 Causes of Deforestation

Deforestation is the term used to describe the clearing or removal of a forest, which involves the removal of all trees, primary for agricultural or urban uses (Nagle and Guinness 2011). In this sense, deforestation causes a long term or permanent loss of forest to other land uses, whether naturally occurring or caused by human activity (Feresu, 2010).

Agriculture is one of the highest cause of deforestation in both the present and prehistoric periods, with some people blaming agricultural methods for the massive destruction of forests that once spanned the globe being cut and burned destroyed (Mabasa and Makhubele 2016). Even when agricultural land is restored by nature, according to, it generally loses the rich biodiversity that was previously there and is instead mostly replaced by quickly growing plants and weeds that thrive in poor soil (Zvobgo and Tsoka 2021). As a result, unless fertiliser is utilised to help increase the soil's nutrient level, even the most effective agricultural techniques and practices will always cause nutrient loss. And this adds even more to the long-term soil erosion and desertification that seem to unavoidably follow deforestation, along with the soil erosion that comes after the loss of large plants (Harcourt 2016).

Given that Zimbabwe's economy is historically agro-based, Zvobgo and Tsoka (2021) identified agriculture as a primary cause of deforestation. In Zimbabwe, the large and small scale commercial, communal, and resettlement agricultural sectors support the livelihoods of about nine million people, of whom 7.5 million are directly dependent on agriculture and 1.5 million are employed in industries and services that use agriculture as a source of raw materials or as a market for the goods they produce. According to Chenje et al. (1998), 69 percent of Zimbabwe's population resides in rural areas and earns a living through subsistence or commercial farming.

Deforestation is caused by a lack of feasible alternatives for enhancing one's living in rural areas other than agriculture (Tiainen, 2019). Since the beginning of time, the majority of rural residents have depended heavily on agriculture for a living. As the world's population and level of poverty have grown, over-exploitation of the environment has been necessary to maintain a balance between the supply and demand for agricultural products. As a result, forests have been destroyed to make way for farming land (Feresu, 2010).

According to Feresu (2010), active groups from rural areas have moved to urban areas as a result of the rapid urbanisation of Zimbabwe over the past ten years. Illegal colonies in peri-urban areas have also exploded, resulting in metropolitan towns and cities. These illegal settlers are forced to clear land to provide a suitable habitat for settlement, and in other cases, they take advantage of energy shortages in city areas to clear bushes for firewood sales to increase their income.

2.2 Effect of population increase on deforestation

In most places, excessive usage of forest resources as a result of population pressure has caused their rapid depletion. According to Landguiden (2018), population increase is typically the driver of deforestation, even though agriculture is frequently the direct cause. Tiainen (2019), stated that there are seven billion people on Earth. Most of these people are extremely dependent on agriculture for survival, as well as, more significant expansion, due to such enormous population numbers and densities. Increased population means more urbanisation, which fuels deforestation while also having negative effects on the environment through pollution. Large populations need expansion through creation of infrastructure and exhaustion of the resources available to them (Sola et al, 2017).

Using the assumption that permanent residents have a bigger impact on forest loss than migrants, Zvobgo and Tsoka (2021) confirmed that population density was a statistically significant driver of deforestation in every place. Flannery (2016), however, stated that wood collection for fuel and timber export, gradually speed up deforestation over time, have long-term implications on deforestation and forest degradation. Population growth and agriculture, he claimed, only have short-term effects on deforestation.

2.3 Effect of collection of Fuel wood on deforestation

Because of its accessibility and affordability, most developing countries use firewood as their primary energy source. In the realm of energy, these countries have recently been confronted with a double-edged sword in the field of energy (Hargrave and Kis-Katos, 2013). The demand for wood poles and firewood has amplified the rates of deforestation in rural zones, where most houses and fences are made of wood, and population growth has increased the need for construction of more houses and where there are no alternative energy sources such as electricity and gas, deforestation rates have increased.

In addition, increased tobacco planting and the requirement for firewood for brick moulding has resulted in the extinction of most indigenous trees and the necessity for vast piles of firewood for example in Malawi. The lack of energy in the country has been identified as a major accelerator for deforestation, which is on the verge of reaching unprecedented dimensions if the situation is not addressed (Anonymous, 2005). Gota (2016) challenged the notion that gathering firewood has significantly contributed to deforestation by making the assumption that women and children in rural communities who gather firewood are unable to cut down large trees but instead try to destroy dry trees with dead cells and primarily take the lighter branches rather than the whole trunk.

2.4 Effects of Deforestation on women and children

Women and men perform different roles in forestry and activities connected to forestry, which is now fully acknowledged by the international forestry community (Zaitunah et al, 2018). As a result, findings from earlier case studies conducted in numerous regions of the world demonstrate that rural women and men play significant but distinctive roles in the management and use of natural resources. These shifts can be seen in the work they do, how people spend their time and earn a living, how they use forest and tree resources, and how much control they have over resources (Liping et al., 2018). These contrasts can be found in opportunities, constraints, and barriers, among other locations. Additionally, these distinctions exist inside cultures, groups, and families in addition to existing between cultures. These inequities will intensify as male migration and female poverty increase (Grassi et al., 2017).

2.5 Effects of deforestation on livelihoods of rural societies

Deforestation undermines the woods that act as a water resource buffer, a vital source of livelihood for those living in forests (Sola et al, 2017). This exposes the water resources to the weather, which causes important water bodies to dry up. Forest communities are more vulnerable to erosion and flooding as a result of deforestation. Soil deterioration is a significant environmental concern that deforestation poses to Zimbabwe's forest fringe populations' ability to survive (Muzirikazi, 2016). That is, deforestation exposes the surface of productive lands to the harsh elements of the atmosphere, such as the sun's UV radiation and the wind-blown topsoil, making the lands' surfaces hard and devoid of plant nutrients. Farmlands in many forest

ecosystems are vulnerable and easily rendered unusable by modest changes in their ecology (Liping et al, 2018).

These activities and the resulting deforestation are likely to continue and even intensify without practical mitigation policies and nationwide coordination, given that Zimbabwe's expanding population needs more forest products and land for settlements, construction, energy production, and food production (Muzirikazi, 2016). In this study, all these issues will be assessed if they are contributing to deforestation in Mhangura.

2.6 Environmental effects of deforestation

2.6.1 Effects of deforestation on climate change

Deforestation impacts the sequestration of carbon and releases greenhouse gases into the atmosphere, notably carbon dioxide. When evaluating the effects of forest on climate, particularly the impact of tropical deforestation on climate, it is crucial to distinguish between microclimates, regional climate, and the global climate (Gupta et al, 2005). Deforestation can affect the global energy cycle through micrometeorological processes as well as by raising the atmospheric concentration of carbon dioxide, which absorbs thermal infrared radiation (Pinker, 1980). Additionally, deforestation can increase the albedo of the land surface, which affects the radiation budget of the area (Rowntree, 1988; Gupta et al, 2005).

As forests are the main terrestrial sink of carbon, deforestation contributes to global warming, which results from higher atmospheric concentrations of greenhouse gases (GHG). This causes a net increase in the global mean temperature. Deforestation thus interferes with the global carbon cycle, causing the atmospheric carbon dioxide concentration to rise. Two billion tons of carbon (as CO_2) are emitted into the atmosphere each year as a result of tropical deforestation (Houghton, 2005). Global deforestation is responsible for the release of carbon dioxide that is comparable to 25% of the emissions from burning fossil fuels (Asdrasko, 1990).

2.6.2 Effects of deforestation on water and soil resources

The continuing destruction of tropical forests is disrupting the global water cycle (Bruijnzeel, 2004). With a portion of the forest gone, the region can no longer hold as much water, leading to a dryer environment. Drinking water, fisheries and aquatic habitats, the ability to control floods and droughts, the siltation of waterways and dams, the appeal of water-related recreation, and crop and irrigation system damage from erosion and turbidity are all affected by deforestation (

Bruijnzeel et al, 2005). Potentially one of the most significant services a forest offers is the preservation of urban water sources (Chomitz et al, 2007). The cost of purifying and filtering water is high. By filtering runoff, forests can actively lower expenses while also acting as a substitute for runoff-producing structures and crops (Dudley and Stolton, 2003).

Deforestation can also leave watersheds unable to sustain and control river and stream water flows. Once they are gone, excess water can create flooding downstream, many of which have resulted in catastrophes around the world. This downstream flow contaminates lakes, dams, and waterways due to soil erosion. For two key reasons, deforestation makes flooding worse. First, soils are more likely to be completely saturated with water when the "tree fountain" effect is reduced. In the wet season, the "sponge" fills up earlier, allowing more precipitation to flow off and raising the risk of flooding. Second, soil compaction brought on by deforestation frequently prevents it from absorbing rain. Locally, this causes a faster response of stream flows to rainfall and thus potential flash flooding (Chomitz, 2007).

Deforestation can have serious long-term effects on the soil resource. The soil is exposed to the intensity of the tropical sun and torrential rains when the vegetation is cleared away for slash-and-burn farming. With their leaf litter and porous soils, forest floors can easily withstand heavy rain. The competing forces of infiltration and evapotranspiration - the sponge vs the fountain - determine how deforestation affects water availability, flash floods, and dry season flows (Bruijnzeel, 2004). In the long run, siltation has been made worse by deforestation and other land use changes since they have increased the amount of the basin exposed to erosion. Heavy siltation has raised the river bed increasing the risk of flooding especially in Yangtze river basin in China, the major river basins of humid tropics in East Asia and the Amazonian basin (Bruijnzeel et al, 2005) who stated the that deforestation causes soil erosion leading to the rise of siltation of rivers.

2.6.3 Effects of deforestation on biodiversity and habitat loss

Deforestation, fragmentation, and degradation of forests, particularly those in the tropics, harm biodiversity as a whole and the habitat for migratory species, including many that are endangered and some of which have yet to be cataloged. Two-thirds of all known species are found in tropical forests, which also house six-fifths of the world's 10,000 threatened species (Myers and Mittermeier, 2000). Up till additional research can determine the relative relevance of different

plant and animal species, maintaining the biodiversity of the forested areas is similar to maintaining a sort of capital. The loss of biodiversity and the considerable changes in forest cover that are associated with it could lead to an abrupt, irreversible, and harmful transformation. These include the introduction of novel infections as the rising trade in bush meat increases human-animal contact, regional climate change, including feedback effects that theoretically may convert rainforests to savannas.

Deforestation, on the other hand, is sharply increasing the number of human-animal conflicts, which has the effect of discouraging people from taking an active role in conservation. In India's northern West Bengal, there is an elephant habitat that is a part of the highly fragmented Eastern Himalaya Biodiversity Hotspot. Due to the severe habitat fragmentation, there has been a severe human-elephant conflict that has resulted in the loss of both human and elephant lives as well as agricultural products. Every year from this hotspot area, catastrophic human-elephant confrontations resulted in the deaths of roughly 50 people and 20 elephants (Sukumar et al, 2003; Mangave, 2004). The largest free-ranging population of elephants (5000) coexists with locals in Caprivi, Namibia.

2.7 Social effects of deforestation

Deforestation is a manifestation of social inequality (Colchester and Lohmann, 1993). Deforestation has several social repercussions, many of which have grave long-term effects. When indigenous communities are forced to leave their home territory, the arrival of civilization frequently results in the loss or alteration of their traditional way of life and the collapse of their social institutions. Infrastructure development, like road construction, which results in the extension of the boundary and frequently leads to social and land conflicts, exacerbates the disintegration of traditional living practices, customs, and religious beliefs (Schmink and Wood, 1992).

The most direct societal impact of deforestation is the loss of natural services provided by the woods at the local level. The essential services offered by forests, such as erosion prevention, flood control, water treatment, fisheries protection, and pollination, are especially important for the world's poorest people, who rely on natural resources for their daily needs. By destroying the forests, we imperil other species, regional weather patterns, and climate stability, as well as our

own quality of life. We also reduce the benefits that biological diversity provides (Mangave, 2004).

2.8 Economic effects of deforestation

It is an undeniable fact that the reliance of millions of people on forests results in degradation and deforestation. However, there are numerous advantages to this loss (in terms of livelihoods, revenue, and jobs) for the subsistence of indigenous people (Tunde, 2017). According to the World Bank (2011), roughly 1.2 billion people depend on agro-forestry farming systems, while 350 million people depend on forests to a large extent for subsistence and income. Approximately 60 million indigenous people are nearly entirely dependent on forests. Sustainable livelihoods ensure access and right to a variety of resources and opportunities that are necessary for achieving human well-being, according to the United Nations Environmental Programme (UNEP) (2006).

For the majority of indigenous people, especially in communities on the periphery of the forest, this is crucial because they frequently lack the necessities for a decent standard of living, including enough food and nutritious food, adequate shelter, access to health services, energy sources, safe drinking water, education, and a healthy environment (Wajim, 2020). The trade of wood products is an obvious source of substantial income for national and local governments as well as traditional rulers and individuals. This often comes in the form of export earnings, taxes, royalties and personal income for those engaged either directly or indirectly in the exploitation of these forest products (Tunde, 2017).

Chapter 3 Materials and methods

3.1 Description of the study area

The study was done in Mhangura, a small town in northern Zimbabwe's Mashonaland West Province that was formerly home to a mining population. With a latitude of 16°54′S and a longitude of 30°09′E, Mhangura is situated 188 kilometers northwest of Harare. The mean annual temperature of Mhangura is 24.5 ^{o}c. The total average annual precipitation is about 764 mm. The soils are loams and red clays ideal for the growth of grasses, forbs, shrubs, trees and domesticated plant species. Mhangura is now characterised by spaced vegetation which is mainly composed of indigenous trees. Some of the dominant trees include: Mopani *(Colophospermum mopane* (Benth.), Musasa *(Brachystegia spiciformis)* and Munhondo *(Julbernardia globiflora)*. Long grasses such as *Anthistiria* species. and *Themeda* species are now common in Mhangura. These grasses are not ideal for livestock production. The study area covers 45 villages with a population of approximately 6000 of which 1000 are men, 2300 women and 2700 children. The main agricultural activities practiced are cotton, coffee, maize and tobacco production.

3.2 Research design

In this study, a survey was used to gather data in order to address the research questions and problem statement. This study design was employed because it makes use of a variety of research tools, including interviews, questionnaires, and observations.

3.3 Target population and sample size

The target population includes Mhangura community, Agriculture and Rural Extension employees, Makonde Rural District Council, Environmental Management Agency (EMA) employees and workers of the Forestry Commission. The sample size was guided by a proportional selection of the representatives among all the villagers in the area. The sample size of 371 was used, 2 employees from the EMA in the Doma district, and 2 employees from Forestry Commission were interviewed. Table 1 shows the number of people that were interviewed:

Table 1: Source: Research Data 2021

Strata	**Targeted number of interviews**	**Number of those interviewed**	**Position held by the interviewee**
Environmental Management	2	2	• Education and publicity officer

Agency employees			• EIA and EQM
Forestry Commission	2	2	• District forest officer • Forest extension officer Chinhoyi
Agriculture and Rural Extension employees	1	1	• Agricultural extension officer
Makonde Rural District Council heads of department	2	2	• HOD of Social services • Planning and Projects officer
Makonde Rural District Council employees	3	2	• Cashier • Clerk
Total	10	9	

10 personnel from the EMA, Forestry Commission, AREX, and Makonde RDC were interviewed. However, 9 out of 10 employees were able to participate in the interviews, giving a response rate of 90% of the intended sample. Due to some of their employees being out in the field, the student was unable to interview the tenth member of the Makonde rural district.

The Yamane's formula was used to determine sample size (Amisah et al., 2009). The computation of the formula is shown in equation;

$$n = \frac{N}{1+N\varepsilon^2}$$

Where: n = minimum return sample size

N= the population size

ε= adjust margin of error $[\varepsilon = (\frac{pe}{t})]$

e= the degree of accuracy expressed as a proportion

p= the number of standard deviations that would include all possible

t= t-value for the selected alpha level of confidence level

$\varepsilon = (2*0.05/1.96) = 0.051$

$n = 6000/ 1+6000(0.051)^2 = 371$

3.4 Sampling procedures

Data was gathered using simple random sampling for probability sampling and purposeful sampling for non-probability sampling.

Random sampling was used to select 361 households for questionnaire administration.

The names of interested participants were placed in a hat, and after vigorous shaking, the names were pulled out. The names that fell out of the hat automatically qualified for the surveys, and this process continued until the desired number of participants was attained. As a result, the authenticity of the results must be thoroughly cross-checked, which takes time.

To select 10 significant informants for interviews with representatives of the EMA, Makonde Rural District Council, AREX, and the Forestry Commission who provide pertinent and accurate information for the study, a purposeful sampling technique was adopted.

The data collection method was a structured questionnaire (Appendix 1). The questionnaires were hand delivered to the respondents following the covid-19 regulations. Those that needed assistance to answer research questions were assisted to respond to the questions. An interview guide was used by the key interviewees the head of departments and field officers in the EMA, Makonde Rural District Council, AREX and Forestry Commission officials in answering the structured questions on effects of deforestation on rural women and children.

3.5 Data analysis

The responses gathered using the questionnaires was analysed using SPSS statistical package version 20.0 to generate frequencies and charts. Mean, standard deviation and regression analysis will be used to analyze quantitative data analysis tools with the aid of SPSS statistical package. A Chi-square test was used in data analysis. Data analysed was presented in form of graphs, charts and tables.

A logistic regression model in which deforestation was the dependent variable and gender, agricultural activities, unemployment and illegal mining were the independent variables, was run in Statistical Package for the Social Sciences.

From table 1 our logistic regression model was;

$$y_i = \beta_0 + \beta_1 + \beta_2 + 0\beta_3 + \beta_4 + \beta_5 \qquad (1)$$

The $\beta_i s$ are the regression coefficients or the parameters of our logistic regression model. The S.Es are the standard errors around the regression coefficient. The Wald are the chi-square test statistics for the individual parameters. The df are the degrees of freedom for the Wald chi-square test. The Sig is the probability of finding the observed or more extreme results when the null hypothesis of a study is true. Exp (B) is the exponentiation of the $\beta_i s$.In linear regression analysis the $\beta_i s$ represent the changes in the depended variable per unit change in the independent variable concerned. For logistic regression the $\beta_i s$ represent the expected changes in the logarithm of odds per unit change in the independent variables of interest.

3.6 Ethical considerations

The study took into account concerns of social responsibility, human rights, animal protection, legal compliance, and health and safety. Work must integrate these norms. This study addressed those issues through the introduction of ethical standards measures.

Prior to the start of the study, approval was received from the university. The design of the study was that discretion is an important ethical consideration as respondents were required to reveal details about effects of deforestation on rural women and children in Mhangura, Zimbabwe. Confidentiality guarantees was guaranteed on the cover letter that was attached to the questionnaire to optimize participation and to obtain the most candid and reliable answers from the respondents. The study purpose was clarified to all the participants before they took part in the research's data collection stage. Additionally, a cover page was attached explaining the nature of the research and information required for voluntary participation by the respondents. In addition, respondents were assured of the independence of the BUSE and assured that the data can only be accessed by the student and the supervisor

Chapter 4 Results

4.1 Drivers of deforestation in Mhangura.

In Mhangura deforestation is caused by agriculture activities (65%), collection of firewood (17%), unemployment (11%) and the least is illegal mining (7%). Farmers have ventured into tobacco farming without the adequate funds for other means of curing, making firewood the only viable source for tobacco curing.

Even at the Cotsworld Farm and Richmond areas, where electricity and solar energy were options, firewood remains the primary source of energy. In 63 percent of dwellings, energy from sources like electricity, solar power, and biogas was used, primarily for lighting. The local community was forced to use outdated energy sources like charcoal, animal manure, and wood for cooking because electricity power, is becoming expensive.

High unemployment rate is causing people, mainly men and youths to cut down trees for firewood to sell either locally or in urban areas where load-shedding is occurring.

Agricultural activities, collection of firewood unemployment and illegal mining were significantly (p< 002) causing deforestation in Mhangura while gender was not important (Table 1).

Table 1: Drivers of deforestation in Mhangura area

	B	S.E.	Wald	Df	Sig	Exp(B)
Agriculture activities	0.149	0.139	16.406	1	0	1.269
Collection of firewood	25.646	9473.57	0	1	0.001	1.40E+11
Unemployment	0	15382.1	0	1	0.001	1
Illegal mining	0	14959.6	0	1	0.002	1
Gender	16.76	5232.68	0	1	0.997	1.90E+07
Constant	-63.609	17974.8	0	1	0.997	0

Table 2 shows the chi-square, $X^2(4) = 174.638, p < .001$ which implies the logistic regression model whose coefficients given in table shows the independent variables or factors linked to agricultural activities, illegal mining, collection of firewood and unemployment cause deforestation in Mhangura.

Table 2 Chi square outcome

	Chi-square	Df	Sig.
Step	174.638	4	<.001
Block	174.638	4	<.001
Model	174.638	4	<.001

A Nagelkerke R Square value was 0.738 suggesting that the model explains 73.8 percent of variation in deforestation categories in Mhangura.

4.2 The effect of gender on deforestation.

Males were more responsible for causing deforestation in Mhangura (54.67%) than females (45.33%). Men are more engaged in the clearing of land for farming (38,3%), agricultural activities (21,9%), illegal mining (30,1%), collection of firewood (41.0%)and are unemployed (32,8%) than females (31.7%), (18.1%), (27.2%), (34.0%) and (27.2%) respectively. Women were more involved in the collection of firewood for domestic activities and also in the agricultural activities than men.

The observed frequencies together with the expected frequencies (in brackets) is the number of male and female respondents who selected the listed activities as one that has great impact on deforestation. A chi square test for association between gender and activity gave a p value less than 0.001 showing an association between gender and activity causing deforestation.

Eleven percent of the women in the Mhangura area, acknowledged that agricultural activities were the main cause of deforestation.

4.3 Social effects of deforestation on rural women and children in Mhangura

Deforestation has resulted in domestic abuse as articulated by 22.5 percent of the respondents (table 3). The social impacts of deforestation on women and children were; change in lifestyle (12.5%), hunger and famine (15.3%), shortage of herbs for medication (14.5%), malnutrition (19.5%) and poverty (15.8%). As deforestation has caused poverty to the people of Mhangura, their lifestyle has also changed to suit the new status. Forest products were an advantage to some people as they could get wild fruits such as *Thespesia garckeana*, *Syzygium cordatum*, and

medicinal plants such as *Ziziphus mucronata*. Deforestation causes an imbalance in social life of some Mhangura people.

Table 3: Social effects of deforestation

		Responses		Percent of Cases
		N	Percent	
EFFECTS	Domestic violence	270	22.5	100
	Malnutrition	234	19.5	86.7
	shortage of herbs for medicine	174	14.5	64.4
	Hunger and famine	183	15.3	67.8
	Change in lifestyle of people	150	12.5	55.6
	Poverty	189	15.8	70
Total		1200	100	444.4

The social effects of deforestation significantly affected social life in Mhangura ($p<0.05$) with 12.5 percent of the respondents indicating that deforestation caused women and young girls to go into prostitution especially the widows who have to find means to earn a living.

4.4 Economic effects of deforestation on women and children

Figure 1 shows that agriculture is the main source of income (40%) followed by mining (35%) and selling of firewood (25%). Some families are into agriculture activities so that they will sell the products in towns and subsistence.

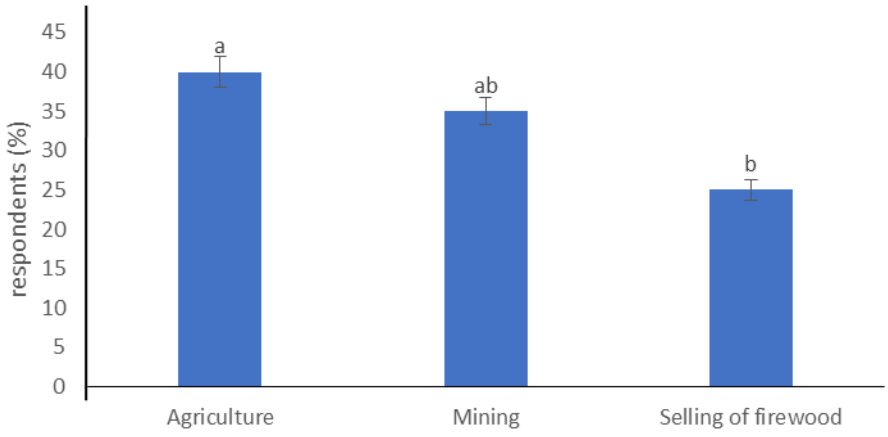

Figure 1 Sources of income for some of the Mhangura residents. Different letters indicate significant differences ($p<0.002$) among responses at the significance level of 0.05.

4.5 Environmental effects of deforestation in Mhangura

Mhangura area has been affected by land degradation due to the practices such as cutting down trees, agriculture and mining performed by people for a very long time. Deforestation has caused climate change, soil erosion, and drought, extinction of flora and fauna and have contributed to land degradation. The terrain is destructed as a result of gullies visible in Cotsworld farm area, Nakaswa area and Richmond area in Mhangura. From the data obtained from respondents there is now limited tree cover and firewood needs to be accessed from various resettlement farms that are far from reach for some villages, however this increases the hours of women and children walking in search of firewood. The respondents indicated that there are notable environmental and livelihoods patterns due to the deforestation trends and patterns.

Deforestation significantly causes soil erosion ($p<.001$). Similar tests were carried out for gully formation, agriculture yields and siltation of water bodies, with deforestation showed that gully formation, agriculture yields and siltation of water bodies were significant effects of deforestation ($p<0,05$).

Chapter 5 Discussions

5.1 Drivers of deforestation in Mhangura area

Results show that deforestation is caused by the expansion of agricultural activities, need for fire wood, illegal mining and unemployment (table 1). Agriculture was identified as one of the main causes of deforestation in Zimbabwe where 69 percent of the population living in rural areas relies on subsistence or commercial farming for a living (Chenje et al, 1998). The destruction of forests is exacerbated by poor legislation to protect the forests from over exploitation by farmers. The results also agree with the findings of Tiainen (2019) who stated that human activities cause deforestation more than natural phenomena.

The logistic regression model's coefficients are shown in table 1, and they indicate that agricultural activities, illegal mining, the collection of firewood, and unemployment are the independent variables or factors that cause deforestation in the Mhangura area. Table 2 shows the chi-square, X^2 (4) =174.638, p.001 where X^2 is deforestation, meaning that deforestation is caused by the mentioned independent variables.

It is worth noting that it is mostly man who engage in activities that cause deforestation. Men who are the heads of families typically work hard to make a living through a variety of occupations, such as farming, mining, and felling trees for fuel and selling it. In this study, some males were cutting down trees for firewood to sell in nearby villages and towns such as Alaska and Chinhoyi while others were cutting down trees for firewood to make bricks that are later sold in and around Mhangura. Tiainen (2019) also added that the interaction of human activities with the environment accelerates the process of deforestation in developing countries whilst in developed countries natural factors such as veld fires and diseases cause deforestation.

5.2 Socio-economic effects of deforestation on rural women and children in Mhangura

Results suggest that deforestation caused some social imbalances in the families hence an increase in domestic violence (Table 4) and has been aligned to misunderstandings within the families. The results agree with the findings of Fakarayi (2018) who reported increased domestic violence cases associated with deforestation in rural areas. The domestic violence that results from the effects of deforestation may lead to divorce hence changes in the social status of many people.

Results also suggest social changes within the past years due to deforestation. The results agree with the findings of Muzirikazi (2016) who reported serious family breakdowns with divorce being one such problem in most rural areas where deforestation was been a serious problem.

Figure 1 shows that there are economic changes in Mhangura associated with deforestation as rural people rely on forest for food, medicine from medicinal plants or fuel. Therefore, deforestation means lost income, lost subsistence and lost homes. Some of the people of Mhangura rely on mining, agriculture and selling firewood to earn money. The results are supported by Mabasa and Makhubele (2016) who stated that most rural people they rely on agriculture as their main source of income. Ibrahim (2016) stated that the rate at which fuel wood consumption and forests are converted to agricultural land is vast, as farmers cultivate land to support themselves. Deforestation affects economic activity and threatens the livelihood of forest-dependent people by reducing the supply of forest products and soil nutrient, desertification and soil erosion.

5.3 The environmental effects of deforestation in the Mhangura area.

Deforestation has contributed to land degradation, drought, soil erosion, climate change, and flora and animal extinction. The excessive cutting down of trees results in the soil becoming bare, hence exposing it to soil erosion which leads to formation of gullies. Soil erosion will also result in siltation in rivers and thereby affecting the availability of water to livestock in dry spells. This is supported by the findings of Bruijnzeel et al. (2005) who stated that deforestation has resulted in erosion, leading to the siltation of rivers such as Yangtze river basin in China.

Chapter 6 Conclusion

6.1 Conclusion

The study's findings show that people's agricultural practices in Mhangura, which are leading to increasing land clearing, are the main cause of deforestation. Deforestation has had a negative effect on peoples' socioeconomic circumstances. Due to the lack of rigorous rules requiring people to preserve their forests for future use, deforestation has resulted in the extinction of numerous tree species. This extinction of tree species has a negative impact on the environment. According to the research, everyone in the community is impacted by deforestation because of

6.2 Recommendations

The following are recommendations based on the research findings:

1. The government, through forestry commission and EMA should strengthen the measures against those who cut down trees.
2. The EMA should work hand in hand with forestry commission and the ministry of agriculture to encourage tobacco farmers to use coal to cure their tobacco.
3. The forestry commission should promote the afforestation program. In order to try and replace the trees that have been destroyed over the past years.
4. In order to control the social, economic and environmental effects of deforestation, there is need to address the root causes of deforestation in Mhangura. There is poor legislation that discourages deforestation and promoting afforestation in Mhangura.

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List of appendices

Appendix 1: interview guide

Interwiew guide for environmental management agency and forest commission on the effects of deforestation on rural women and children in Mhangura, Zimbabwe.

Questions;

1. What do you understand by deforestation?

2. What are the challenges brought by deforestation?

3. Do these challenges affect women more in comparison to men? How?

4. What measures have been put in place by your organisation in reducing deforestation?

5. Do you think women and children are involved in environmental activities and to what extent?

6.What do you think should be done to control the situation of excessive deforestation in rural areas?

7.Are environmental policies and statutory instruments gender sensitive?

8.What measures can be put in place to minimise or eradicate the effects of deforestation?

Thank you for taking your time.

Appendix 2: questionnaire

Questionnaire for the effects of deforestation on rural women and children in Mhangura, Zimbabwe.

I am Tafadzwanashe Kamanga a student at Bindura University of Science Education studying Natural Resources Management.I'm carrying out a research on "The effects of deforestation on rural women and children in Mhangura." It is hoped that the responses you give in this research will be used only for academic purposes and can be used for police making to improve the lives of the community as well as management of the forests. The objectives of the research are as follows:

1. To determine the drivers of deforestation in Mhangura, Zimbabwe.
2. To identify social effects of deforestation on rural women and children in Mhangura, Zimbabwe.
3. To determine economic effects of deforestation on women and children in Mhangura.

PART I BACKGROUND INFORMATION

Please tick [√] the appropriate box that suits your responses.

1. Gender

Male [ ] Female [ ]

2. Age range

15-30[ ] 31-45[ ] 46+[ ]

3. Level of education

Primary level [ ] Secondary level [ ] A level [ ] Diploma [ ] Bachelor's degree [ ] Masters [ ] PhD [ ]

4. Was this whole area covered with trees before?

Yes [ ] No [ ]

5.Do you know what deforestation is?

Yes [ ] no [ ]

If yes, what might be the possible drivers of deforestation in your area?

Fire wood [ ] search for building material [ ] tobacco curing [ ] illegal mining [ ] expansion of agricultural land [ ] other (please specify)…….

6.Whom do you blame to be the main cause of deforestation in the community? And why?

Cause	Men	Women	Youth
Agriculture activities			
Clearing land for farming			
Collecting fire wood			
Illegal mining			
Unemployment			

Please explain your answer here

……

……

……

PART II SOCIAL ISSUES RELATED TO DEFORESTATION

7.What are some of the social effects of deforestation do you observe in your area?

Social effects	Yes	No
Poverty		
Domestic violence		
Malnutrition		
Shortage of herbs for medication		
Hunger and famine		
Change in lifestyle of people		

8.Do you observe social changes in your community from what it was 10 years ago? If yes, who is mainly affected and how are they affected?

Yes [ ] no [ ]

……

……

……

9.PART III ECONOMIC EFFECTS OF DEFORESTATION

What is your main source of income?

Agriculture [ ] mining [ ] sell of firewood[ ] other……

Is there a change in your income as a result of deforestation?

Yes [ ] no [ ]

10.Do you observe economic instability as a result of deforestation?

Yes [ ] no [ ]

11. Do you observe economic changes in your community from what has been 10 years ago?

Yes [ ] no [ ]

12. If there are any changes in relation with your environment and livelihood patterns can you explain?

.....

.....

THANK YOU FOR YOUR TIME

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