WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

An Assessment on the Effect of Environmental Degradation on Agricultural Productivity. A Case Study of Sesheke District

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ABSTRACT

Changing climatic conditions have had devastating effects on Zambia with impacts to physical and biological systems already being felt. The Climate induced changes are exerting considerable stress on the Zambia's already vulnerable sectors mostly the agriculture and food security others being the human health, water, energy, wildlife, and forestry. It is significantly affecting the economic, social and environmental dimensions of national development. With a potential of making the current agricultural practices used to be unsustainable in the face of the limitations imposed by climate change, and a situation calling for an urgent need for adaptation to avoid worsened food insecurity, malnutrition diseases and worsening poverty situation.

This study aimed at assessing the effect of environmental degradation on agricultural productivity. Participants were asked how severe the problem of land degradation is and the study discovered that 58 (72%) said severe, 16 (20%) said moderate and 6 (8%) said minor. Participants were also asked what sort of changes in land degradation was observed over the past 15 years and study revealed 55 (69%) said it has become more severe, 16 (20%) said it has become less severe and 9 (11%) said no change. Participants were asked what the causes of land degradation and the study established that17 (21%) said land holdings too small, 19 (24%) said slopes very steep, 23 (29%) said rainfall too high 9 (11%) said soil being too erodible and 12(15%) said runoff from upslope areas. Participants were asked how severe is the impact of land degradation on crop productivity and the study discovered that 43 (54%) said severe, 29 (36%) said moderate and 8 (10%) said has no effect. Participants were asked if land degradation can be controlled and the study revealed that 24 (30%) said no and 56 (70%) said yes. Participants were asked the measures that have been put in place to mitigate environmental degradation on agricultural productivity and the study discovered that 32(40%) said to stop deforestation, 12 (15%) said stricter government regulations, 9 (11%) said nature reserves and biotopes should be protected and 27 (34%) said to reduce waste production

Keywords: Environmental Degradation, Agricultural Productivity, Participants and Climatic

1. Introduction

Agriculture plays a critical role in achieving the Sustainable Development Goals (SDGs). The reason is that an enhanced agricultural sector has the potential to promote food security, boost income generation and employment creation, which improves the economic growth and development (Ayinde, 2021). Agriculture employs over half of Africa's population and is the largest contributor to the total gross domestic product (GDP) (AGRA, 2018). This suggests that agricultural development can be a significant way out of poverty and economic development in Africa.

Over the years, several attempts have been made by governments and major developmental partners in Africa to enhance agricultural productivity. This includes the Maputo Declaration in 2003, which aims to encourage governments to contribute at least 10% of national budgetary expenditure to the agricultural sector to increase agricultural output to at least 6% and enhance food security (NEPAD, 2003). There is also the Malabo Declaration (2014) that seeks to promote accelerated agricultural growth and end hunger in Africa by 2025 (AGRA, 2018).

In Zambia, several policies and programmes have been adopted to propel agricultural development. They include the Agricultural Growth and Development Strategy, Food and Agriculture Sector Development Policy (FASDEP I and FASDEP II). In spite of these efforts and attempts, growth in agricultural productivity in Zambia remains low (Food and Agricultural Organization (FAO), 2015; Zambia Statistical Service (GSS), Rahaman et al., 2021). Among other factors, the slow growth in agricultural productivity is attributed to environmental degradation such as poor soil quality, nutrient depletion and climate change (Salvo et al., 2013). For instance, changes in climate affect crop and livestock production, hydrological balance, input supplies and other components of the agricultural system. It is also evident that climate change, mainly driven by carbon dioxide emission (Kwakwa, 2021), has increased pest infestation, reduced soil fertility and irrigation resources, and agricultural opportunities (Malhi, 2021). The increasing extreme weather events like irregularities in rainfall affect food production and distribution (Salvo, 2013).

Indeed, a sustained natural environment is critical for the economy because it provides resource inputs such as land and water for agricultural production. The environment also provides environmental goods and assimilate waste products from production and consumption and coverts them into harmless

and useful by-products (Lewis, 2021). Recognising the effect of the environment on agricultural development, scholars have conducted studies to investigate the nexus between agriculture and the environment (Khan et 2021).

For instance, Falco (2011) established a negative impact of climate change on agriculture. Employing an autoregressive distributed lag (ARDL) approach; Chandio (2020) established that carbon emission has an adverse effect on the agricultural output in China. Rehman (2020) also employed the ARDL bound test and revealed that carbon dioxide emission has a negative effect on maize production in Pakistan. In a related study, Khan et al. (2021) reported that urbanisation and increased carbon dioxide emission decrease agricultural products export in Pakistan.

In Zambia, Chanda (2015) found higher carbon emissions reduce crop yields. Carbon dioxide, nitrogen oxide, methane and total greenhouse gas emissions contribute to the global output volatility, with the volatility been more in agrarian economies. In an empirical study of 53 countries on the environmental degradation effect on food production, Ching et al. (2021) found that carbon emission negatively affects food production. Titilola (2008) found that about 850,000 ha of land in Zambia is negatively affected annually or rendered useless for agricultural purposes as a result of soil erosion and deforestation. Sundström (2014) assessed among others the future threats of environmental degradation and climate change on food security for 2012–2050 period and found that food security is threatened by climate change and environment degradation, although with some varying degree based on climate zone, public stewardship and economic strength of countries.

1.1 Literature Review

Different factors are responsible for environmental degradation, researchers have used several variables to quantify the degradation, and numerous studies have been conducted to determine the effect of environmental deterioration on agriculture. For example, Ayinde et al. (2011) examined the effect of climate change on agriculture productivity in Nigeria from 1981 to 2000 by using the Co-integration approach. The findings revealed that the temperature change has a detrimental impact on agriculture production, while rainfall has a positive effect. The studies propose agriculture-sensitive technologies to boost agricultural production. Sulumbe et al. (2016) found that in Nigeria deforestation negatively affects agricultural production in both the short and long run, primarily due to soil erosion and the conversion of converting the arable land to less productive land.

Climate change is a well-recognised issue among policymakers in the current world. A lot of Thus, many studies have concentrated on the effect of climate change on agriculture. For example, Amponsah et al. (2015) they examined the effect of CO2 concentration on cereal output of Ghana from 1962-2010 by using the autoregressive distributive lag model (ARDL) bounds test approach to co-integration. The findings revealed that CO2 emissions have a significant negative effect on cereal output. Edoja et al. (2016) investigate the dynamic relationship between CO2 emissions and agriculture productivity in the case of Nigeria. They have found no any long-run relationship between these two variables in the Johanson cointegration test. However, they found a significant short-run negative relationship between CO2 emissions and agriculture productivity in the VAR estimation.

Also for In the case of Ghana, Asumadu-Sarkodie & Owusu (2016) examined the relationship between CO2 and agriculture from 1961 to 2012 by using vector error correction and autoregressive distributive lag models. In this study, they did not consider the production of a particular crop as a variable but rather instead included various factors representative of the agriculture sector. The estimated result revealed the existence of a causal relationship between CO2 emission and agriculture in both the short and long term. However, the intensity of this relationship gradually decreases. Akomolafe et al. (2021) incorporated various agriculture subsectors into the model to examine the effects of CO2 emissions on agriculture production in Nigeria from 1981 to 2014. Using VECM, the result shows that CO2 positively impacts total agriculture production and other agriculture subsectors. For the particular agricultural yield, Rehman et al. (2020) attempted to explore the effect of CO2 emission on maise crop production in Pakistan using the autoregressive distributive lag approach for the period of 1988 - 2017. They found a long-run positive association between CO2 emission and maise production.

On the other hand, Salinger et al. (2005) examine the impact of climate change on agriculture productivity in the United States and Canada. According to their findings, an increase in CO2 emissions can positively and negatively affect agricultural productivity, primarily due to the geographic variation of arable land in these two countries. In both cases, however, extreme weather changes adversely affect agricultural yield. Similarly, in the case of Tunesia, cereal and date production also decreased due to a rise in annual temperature (Ben Zaied & Ben Cheikh, 2015). However, they found the opposite result in the highland area.

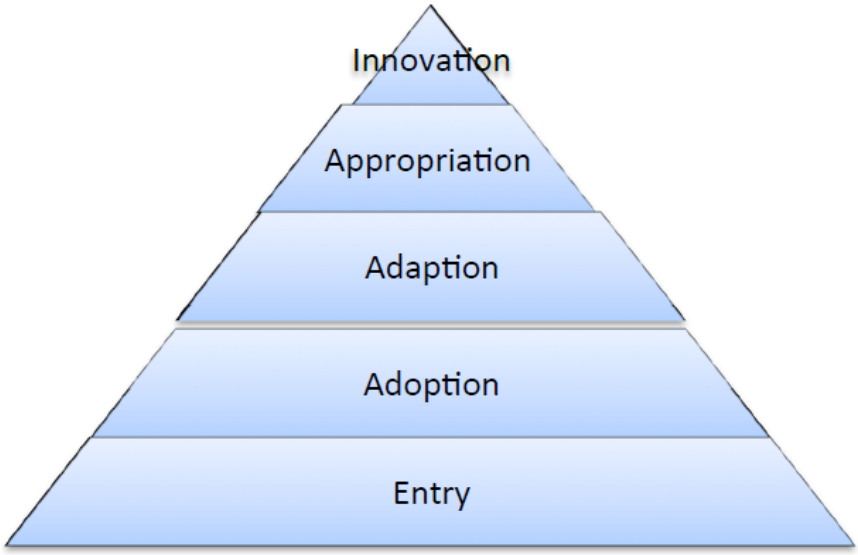
Chandio et al. (2019) investigate the long-run effects of macroeconomic, energy, and demographic factors on the environmental quality in Pakistan by using the Co-integration and autoregressive distributive lag model (ARDL) approach. Their results indicate that environmental quality improves due to the increase in financial development and foreign direct investment, whereas increased economic growth and energy consumption in agriculture degrade the environmental quality. They argued for shift fossil fuels to renewable energy in order to improve the quality of the environment.

1.2. Theoretical Framework

This section details the theory of Educational Technology which attempt to explain how teachers' perceptions and experiences may affect the teaching of ICTs. The theory will look at this from three different perspectives. Firstly, the Teaching Development Framework (TDF) explained the importance of ICTs in education. Secondly, how this determines the quality and effectiveness of education. Thirdly, the way teachers perceive ICTs and how this determines their effectiveness in improving the quality of their teaching.

2.1.1 The Teacher Development Framework (TDF)

Figure 1: ***The Teacher Development Framework***



Source:(Ndlovu, N. and Donovan Lawrence, D., 2012)

The TDF is a framework that represents the relationship between ICT as a learning subject and the quality use to improve learner performance. The adoption of ICTs as a mainstream subject highly depends on the teacher's capacity to fully comprehend ICT as their teaching subject. The TDF presents five teacher capacity levels to illustrate the development of ICT as a mainstream subject. Furthermore, this framework describes the highest level as the innovation stage, where a teacher is able to comprehend and utilize ICTs to the level where they can use ICT as a flexible tool, so that learning becomes collaborative and interactive (DoE, 2007).

Stage One: Entry

According to the study conducted by Katz (1975), it was found out that at the Entry stage of Teacher Development Framework is the survival stage which lasts through the first year of teaching. At this stage, teachers realise that what they had expected from their training work was not what they were finding in the actual classroom or teaching experience. Although they had felt prepared to teach and anticipated success upon entering the profession, teachers in this first stage lost these feelings, and simply wished to survive each day. Katz describes this wish for survival as a preoccupation. The differences between college work and actual teaching which caused this wish for simple survival also led to feelings of inadequacy and unpreparedness in some teachers (Katz, 1975). In line with current study, the first stage of the framework depicts a situation where secondary school teachers who do not have adequate skills and knowledge in ICTs were given the task to teach ICTs. This could lead to them feeling inadequate and unprepared. Therefore, they are not confident, sure and comfortable on the subject.

Stage Two: Adoption

The second stage, the Adoption stage, saw teachers figuring out what gains they actually made in the entry stage and consolidating them. Teachers began to focus more on teaching the pupils rather than the subjects. Katz states that by this stage, the teacher was beginning to identify individual children whose behaviour departs from the pattern of most of the children they know. The teacher began to recognize specific goals for students, and organize specific tasks and skills on which individual students should work. Katz found that this stage may take place through the second year of teaching and continue into the third (Katz, 1975). As regards current study, this stage shows that teachers are able to understand the different interests of the pupils. At this stage, teachers have gained ground hence they are a bit comfortable, sure and confident.

Stage Three: Adaption

According to Katz, the adaption stage brings a desire to learn new methods of teaching, to escape from the routine things (Katz, 1975). Teachers in her study sought to renew their teaching styles, and thus were concerned with the new materials, techniques, approaches and ideas. However, this concern was not necessarily because the teacher felt that his or her present teaching was not competent, nor was it always student-centered. Students may be learning well and be quite happy with the teacher's methods in this stage. The teachers' search for renewal was often a personal one, undertaken to refresh the teachers' own views of teaching (Katz, 1975). In relation to current study, this stage shows that teachers who do not have the necessary skills are now exhibiting the interest to acquire skills and knowledge in ICTs.

Stage Four: Appropriation

Katz found that when teachers reach this stage they will have learnt the basics of teaching and felt comfortable, secure, confident and sure about their profession This could occur within three years, but in some cases took up to take up to five. Teachers in this stage had learned the basics of teaching, and felt secure in their profession. Such teachers have strong pedagogical and content knowledge and are able to transform learning process into an exciting and rich knowledge generation for learners. It is not so much the tools they use, but their ability to structure content using suitable teaching methods that can stimulate the advancement of learner thinking processes and draw the best out of learners (Fallows, S. & Bhanot, R., 2002; DoE, 2007). Therefore, in line with the current study, through the use of ICTs teachers are able to equip learners with what it takes to develop their thinking skills to such an extent that they are able to independently search, analyze and synthesize information to help them solve authentic problems using available technology.

Stage Five: Innovation

The highest level in the framework denotes teacher abilities to using ICTs for generation or interaction with knowledge. It is therefore expected at this stage that teachers are fully confident, sure and comfortable to teach ICTs.

Most teachers in African schools and in particular Zambia have limited ICTs knowledge and skills therefore are at the entry and adoption stages. Their use of ICTs is not at a level where they are confident with the new tools to use them to enhance learning (Wilson-Strydom, M. and Thomson,J., 2005). The reasons range from the teacher not having skills to tailor and make learning activities that will promote advancement in learning abilities with the new teaching tools or simply not having appropriate knowledge to integrate them into their teaching. As the levels ascend, teachers are able to adapt ICT use to suit learner educational needs and thus be able to extend their thinking skills.

In general, the TDF discussed in this chapter describe how teachers change over time. Teachers begin with concerns about themselves and their own adequacy. As they become sure of their own subject knowledge, they worry about developing teaching knowledge. Once teachers feel comfortable with basic teaching methods, they become more concerned about meeting the needs of their students, possibly through developing other methods of instruction. Teacher concerns move from the self, to the teaching situation and finally to the pupils as teachers develop (Burden, 1990).

Therefore, in relation to the current study, this theory demonstrates the ability to show how teachers develop from one level to another and how this development affects their experiences and perceptions. The key to quality use of ICTs hugely depends on the teacher's capacity to teach effectively with or without the technologies. There is no doubt that teachers are critical in facilitating learning and in making it more efficient and effective, they hold the key to the success of any educational reform. ICT as a mainstream subject on its own, no matter what it is or how many of it we have in a classroom or computer laboratory cannot enhance learning on its own. It takes teachers' effort to utilize it in a way that will help enhance the quality of education in Zambian classrooms.

In addition, teachers' attitudes, expertise, lack of autonomy and lack of knowledge to evaluate the use and role of ICT in teaching are prominent factors hindering teachers' readiness and confidence in using ICTs. It is therefore expected that quality use would be a challenge if the teacher is not in a position to make decisions on what and how content should be taught as the teaching tools are not maximized. Hence the current study attempted to evaluate how teachers' experiences and perceptions on the introduction of ICTs as a teaching subject in secondary schools.

2. Material and method

A plan of how and where data was collected and analysed. To investigate the causes of absenteeism among primary school learners and a descriptive research design was employed. Hale (2018) defines descriptive research design as explaining the characteristics of a sample taken from the population and generalizing their conclusions to represent the entire population. This study used a survey method of descriptive research design as participants were meant to provide answers from questionnaires. The survey method of descriptive research design is suitable for this study as it helps in getting data that describe occasions thereafter, arranges, tabulates, portrays, and defines the data that assisted in responding to research questions

The study population is defined as all the individuals interested in studying who have specific characteristics in common (Macnee, 2008). The study will target 90 small scale farmers and purposive sampling will be used in the study to select farmers.

The sample size is a collection of items from the population or a subset of a group of interest that is studied in research (Macnee & McCabe, 2008). To select the number of small scale farmers to be part of the study, the researcher established the total number of small scale farmers to be 150. Therefore, the following formula by Cochran, (1963) was used to come up with the sample size for small scale farmers

The formula: $n = \frac{N}{1 + N(e)^2}$.

Whereas: N= Target population

n=Total sample size

e = Desired margin error

N=150 desired margin error (0.05)

n = 150/1+150(0.05) 2 = 90 small scale farmers

In the study, out of the 90 small scale farmers as the population size, 90 participants were sampled using the formula above; this is because there were limited resources and time for the researcher to collect data from a sample size bigger than the one

DATA ANALYSIS AND FINDINGS

4.0. Overview

In the previous chapter, detailed procedure involved in conducting data collection was discussed in detail. Now that research data had been collected, its' imperative that chapter five gives an insights of data findings and presentations based on the questionnaires collected from respondents. The chapter also looks at analysis of responses involving their characteristics, correlational results based on Chi-square T-test and hypothesis of the study. All the findings were centred on the effect of environmental degradation on agricultural productivity.

4.1 Analysis of Responses

The analysis was presented in line with the three research objectives outlined in chapter one of the dissertation. These research objectives were:

1. To establish the causes of environmental degradation on agricultural productivity
2. To assess the effects of environmental degradation on agricultural productivity
3. To identify the measures that has been put in place to mitigate environmental degradation on agricultural productivity

In this study, 90 participants from Sesheke District that were sampled giving a total of 90 questionnaires that were distributed. A total of 80 (88%) were fully completed and returned. This gave a response rate of 88% as illustrated in Table 1 below.

Table 1: Questionnaire Return Rate

Respondent category	Sampled	Returned	Percentage
Small Scale Farmers	90	80	88
Total	**90**	**80**	**88**

Source: Formulated by Author (2022)

4.2 Demographic Characteristics of the Respondents

To analyse the demographical data of this study, frequency tables and charts were produced using the software programme Statistical Package for Social Sciences (SPSS version 21) and it covered information concerning the respondents' education level, and work experience. The background information is necessary for understanding the dynamics of respondents.

4.2.1 Gender Distribution

To assess the proportion of male and female respondents, the frequency for gender was calculated, Tables 2 gives a summary of the findings.

Table 2: Gender of respondents

Gender of respondents		
Gender	**Frequency**	**Percentage**
Male	37	46
Female	43	54
Total	**80**	**100**

Source: Formulated by Author (2022)

The data in Table 2 above shows 43 (55%) were females compared to male 37 (46%) who took part in the study. This shows that the majority of the small scale farmers are females.

4.2.2 Level of education

In Table 3 below, small scale farmers were asked to state their highest level of qualifications, out of the total number of participants. 27 (33.8%) ended in primary level, 38 (47.5%) ended in secondary level and 15 (18.8) ended at tertiary level.

Table 3: Participants' Level of Education

Variables	**Distribution of Academic Qualification**	
	Frequency	**Percentage**
Primary	27	34
Secondary	38	48
Tertiary	15	19
Total	**80**	**100**

Source: Formulated by Author (2022)

4.2.3 Living in Sesheke District

Participants were asked for how many years have they been living in Sesheke District and the study established that 7 (8.8%) have stayed for 1 year, 15 (18.8%) said that they having being living for 1-4 years, 24 (30%) said 5-8 years, 29 (36.3%) said 9-12 years and 5 (6.3%) said 12 years and above.

Table 4: Living in Chawama Compound

Variables	**Living in Chawama Compound**	
	Frequency	**Percentage**
1 year	7	8.8
1-4 years	15	18.8
5-8 years	24	30
9-12 years	29	36.3
12 years and above	5	6.3
Total	80	100

Source: Formulated by Author (2022)

4.2.4 Marital status

Figure 1 below shows that the marital status of the correspondents was dominated by married people. Out of the total number of 80 respondents sampled, 25 respondents representing 31% were not married, 37 respondents representing 46% were married, 10 respondents representing 13% were divorced, 6 respondents representing 8% were widows and 2 of the respondents representing 3% were widowers.

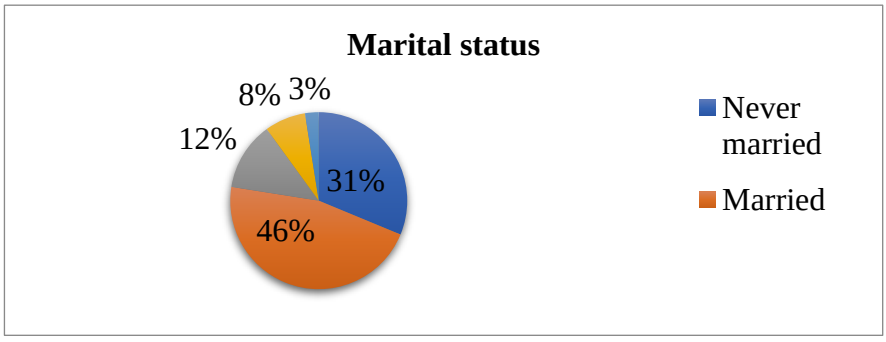


Figure 1: Marital status

4.2.5 Age of Respondents

Age in some of the researches plays a vital role in determining the outcome or influencing the findings. Figure 2 below shows the distribution of respondents by age. The results show that out of the 80 participants, 12 (15%) were aged between 15-20 years, 18 (23%) were aged between 21-25 years, 29 (36%) were aged 26-30 years and 21 (26%) were age 31 years and above.

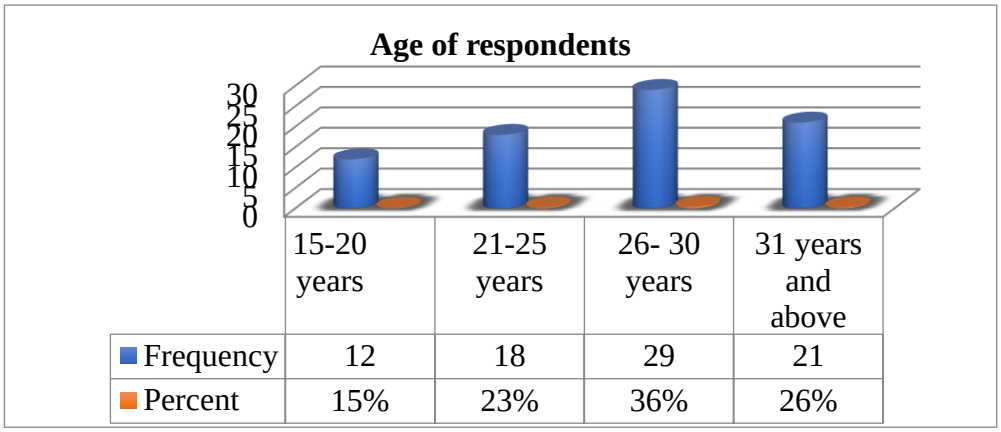


Figure 2: Age of Respondents

4.3 Causes of environmental degradation on agricultural productivity

4.3.1 Small scale farmers see land degradation as a problem

Respondents were asked if they see land degradation as a problem and the study discovered that 63 (79%) said yes and 17 (28%) said no

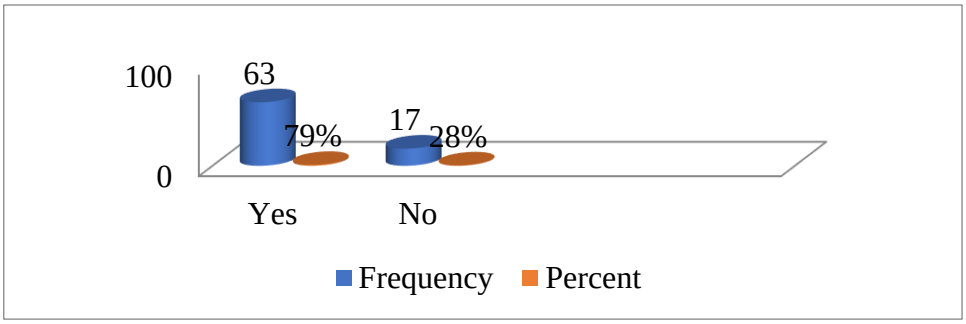


Figure 3: scale farmers seeing land degradation as a problem

4.3.2 Severe of land degradation

Participants were asked how severe the problem of land degradation is and the study discovered that 58 (72%) said severe, 16 (20%) said moderate and 6 (8%) said minor.

Figure 4: Severe of land degradation

4.3.3 Changes in land degradation was observed over the past 15 years

Participants were asked what sort of changes in land degradation was observed over the past 15 years and study revealed 55 (69%) said it has become more severe, 16 (20%) said it has become less severe and 9 (11%) said no change.

Table 5: Changes in land degradation was observed over the past 15 years

Changes in land degradation was observed over the past 15 years		
Variables	**Frequency**	**Percentage**
It has become more severe	55	69
It has become less severe	16	20
No change	9	11
Total	**80**	**100**

Source: Formulated by Author (2022)

4.3.4 The causes of land degradation

Participants were asked what the causes of land degradation and the study established that17 (21%) said land holdings too small, 19 (24%) said slopes very steep, 23 (29%) said rainfall too high 9 (11%) said soil being too erodible and 12 (15%) said runoff from upslope areas.

Table 6: The causes of land degradation

Variables	The causes of land degradation	
	Frequency	Percentage
Land holdings too small	17	21
Slopes very steep	19	24
Rainfall too high	23	29
Soil being too erodible	9	11
Runoff from upslope areas	12	15
Total	80	100

Source: Formulated by Author (2022)

4.4 E ffects of environmental degradation on agricultural productivity

4.3.1 Impact of land degradation on crop productivity

Participants were asked how severe is the impact of land degradation on crop productivity and the study discovered that 43 (54%) said severe, 29 (36%) said moderate and 8 (10%) said has no effect.

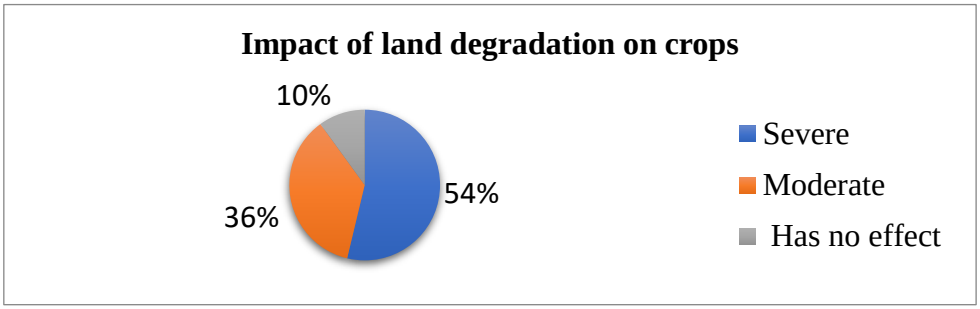


Figure 5: Impact of land degradation on crop productivity

4.3.2 Can land degradation be controlled?

Participants were asked if land degradation can be controlled and the study revealed that 24 (30%) said no and 56 (70%) said yes.

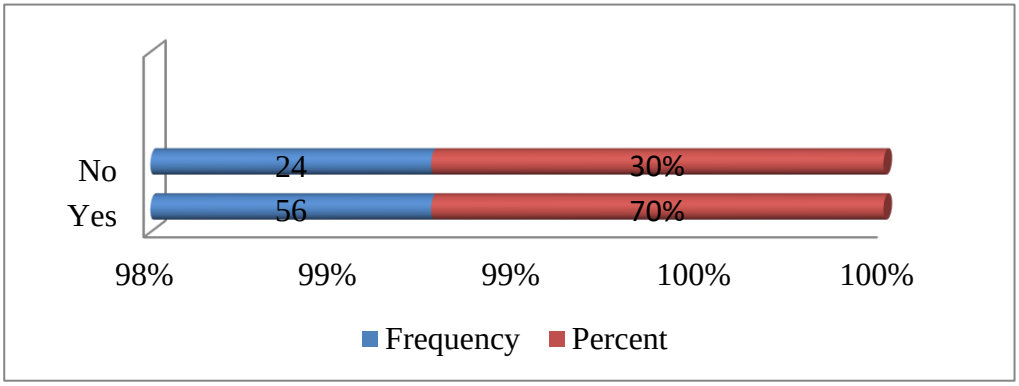


Figure 6: Land degradation can be controlled

4.4 Measures that has been put in place to mitigate environmental degradation on agricultural productivity

Participants were asked the measures that have been put in place to mitigate environmental degradation on agricultural productivity and the study discovered that 32 (40%) said to stop deforestation, 12 (15%) said stricter government regulations, 9 (11%) said nature reserves and biotopes should be protected and 27 (34%) said to reduce waste production

Table 7: Measures that has been put in place to mitigate environmental degradation on agricultural productivity

Variables	**Measures that has been put in place to mitigate environmental degradation on agricultural productivity**	
	Frequency	**Percentage**
Stop deforestation	32	40
Stricter government regulations	12	15
Nature reserves and biotopes should be protectec	9	11
Reduce waste production	27	34
Total	**80**	**100**

Source: Formulated by Author (2022)

3. Results and Discussion

The study aimed at assessing the effect of environmental degradation on agricultural productivity and the findings were summarized as stated below: The data study showed that 43 (55%) were females compared to male 37 (46%) who took part in the study. This shows that the majority of the small scale farmers are females. Out of the total number of participants, the study discovered that 27 (33.8%) ended in primary level, 38 (47.5%) ended in secondary level and 15 (18.8) ended at tertiary level.

Participants were asked for how many years have they been living in Sesheke District and the study established that 7 (8.8%) have stayed for 1 year, 15 (18.8%) said that they having being living for 1-4 years, 24 (30%) said 5-8 years, 29 (36.3%) said 9-12 years and 5 (6.3%) said 12 years and above. Out of the total number of 80 respondents sampled, 25 respondents representing 31% were not married, 37 respondents representing 46% were married, 10 respondents representing 13% were divorced, 6 respondents representing 8% were widows and 2 of the respondents representing 3% were widowers. Age in some of the researches plays a vital role in determining the outcome or influencing the findings. Figure 2 below shows the distribution of respondents by age. The results show that out of the 80 participants, 12 (15%) were aged between 15-20 years, 18 (23%) were aged between 21-25 years, 29 (36%) were aged 26-30 years and 21 (26%) were age 31 years and above.

5.2 Causes of environmental degradation on agricultural productivity

Respondents were asked if they see land degradation as a problem and the study discovered that 63 (79%) said yes and 17 (28%) said no Participants were asked how severe the problem of land degradation is and the study discovered that 58 (72%) said severe, 16 (20%) said moderate and 6 (8%) said minor.

Participants were asked what sort of changes in land degradation was observed over the past 15 years and study revealed 55 (69%) said it has become more severe, 16 (20%) said it has become less severe and 9 (11%) said no change. Participants were asked what the causes of land degradation and the study established that17 (21%) said land holdings too small, 19 (24%) said slopes very steep, 23 (29%) said rainfall too high 9 (11%) said soil being too erodible and 12(15%) said runoff from upslope areas.

5.3 Effects of environmental degradation on agricultural productivity

Participants were asked how severe is the impact of land degradation on crop productivity and the study discovered that 43 (54%) said severe, 29 (36%) said moderate and 8 (10%) said has no effect. Participants were asked if land degradation can be controlled and the study revealed that 24 (30%) said no and 56 (70%) said yes. Land degradation has negative implications and reveals the loss of something valuable within ecology and the economic system. The lost value is directly linked to the productivity of land for farming. Agricultural land degradation is associated with damage to the biological productivity of the land and the usefulness of the land as a resource (Gretton and Salma, 1996).

Maintenance of the quality of land quality is essential for the sustainable development of the agriculture sector. It enhances agricultural productivity and thereby, improves the livelihood in rural areas and food security in Somalia. On the contrary overuse and the exploitation of the ecosystem in quest of higher agricultural production leads to unintended land degradation. Appalling agronomic practices, such as the burning of the animal manure, and the

lack of soil and water conservation are major causes of the poor agricultural productivity in Somalia (Omuto et al., 2011). There is a severe scarcity of the literature on the Agri-environmental issues that are hindering the agricultural development in Somalia.

Determining the effect of land degradation and environmental changes on agricultural productivity in the country helps to understand the precise circumstances in agricultural development (Ahrorov and Niyazov, 2015). The purpose of this study is to measure the effect of land degradation and the environmental changes on agricultural productivity in Somalia, as well as the other factors that affect crop production in Somalia. This study examines the structure of the time-series and specifies the break periods to determine when and where significant and sudden changes occurred within land degradation and agricultural production. The study employs advanced econometric methods, namely, Ng-Perron method and the Lee-Strazicich method to test the unit root property of the breaks. It also examines the long-run relationship between the variables using Gregory and Hanssen's approach. The rest of this paper is structured as follows: second section reviews the related literature; the third section presents the theoretical framework and the methodology; the fourth section presents the results

5.4 Measures that has been put in place to mitigate environmental degradation on agricultural productivity

Participants were asked the measures that have been put in place to mitigate environmental degradation on agricultural productivity and the study discovered that 32 (40%) said to stop deforestation, 12 (15%) said stricter government regulations, 9 (11%) said nature reserves and biotopes should be protected and 27 (34%) said to reduce waste production

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