

The Effect of Deforestation on Agriculture Production

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Abstract

The main objectives of this research were to identify the effect of deforestation on agriculture production and to examine the relationship between deforestation and agricultural production as a case study of Kismayo, lower Jubba, Somalia. The Study employs questionnaire survey and utilizes descriptive research methods. The survey respondents were asked to rate ten questions developed from the study's two main variables. The findings indicate that deforestation has a negative impact on agriculture production such as reduced yield, destruction and conversion of forest, reduction rainfall and increase temperature. These results align with the findings of Deborah Lawrence and Karen Vandecar (2015) investigated the effects of tropical deforestation on climate and agriculture. Their study found that deforestation causes less rainfall and declines Future agricultural productivity, what is more, deforestation-induced increase in mean temperature and the associated heat extremes and from a decline in mean rainfall or rainfall frequency. Through teleconnections, negative impacts on agriculture production could extend well beyond the tropics.

Keywords: deforestation, agricultural- production, lower Jubba, Somalia.

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I. Introduction

Deforestation has been an age-old activity of humankind. The Mediterranean was deforested before the 5th century, and Europe also went through a series of deforestation and regeneration prior to the 16th century (Thomas, 1956, Thirdgood, 1981). The bulk of Haiti's rainforest much earlier (Eckholm, 1976). While deforestation has slowed down in the industrialized countries in recent times, it has accelerated in the developing economies. According to FAO (1982), about 37 000 km² of forested areas in tropical Africa are cleared per annum. Recent was already destroyed by the end of the 19th century (Lewis and Coffey, 1985), and in Ethiopia, India and Lebanon; forest had been depleted estimates by Salih (1992) shows that the rate of deforestation in tropical Africa outstrips the rate of tree planting by 29 to 1. If the present trend of deforestation continues, all tropical Africa's 4 closed and open, productive forests are expected to be tube depleted within nine decades.

Charcoal, In Somalia, charcoal production is not only triggered by domestic consumption, which accounts for only a fifth of the total production and is the main source of energy in urban areas such as Mogadishu and Hargeisa, but mostly by foreign demand, which accounts for the remaining 80% (UNEP, 2005), estimated that 4.4 million trees are logged annually to produce the 250,000 tonnes of charcoal that is exported every year from Somalia to Saudi Arabia, Yemen and the United Arab Emirates. While part of the charcoal exported from Somalia may originate from neighboring countries like Ethiopia, the bulk of the exported charcoal is produced in Somalia itself (Belward et al., 2011). little quantitative information on tree cover loss in Somalia during the past two decades is available. Moreover, Somalia is predicted to be one of the nine African countries that will face water scarcity by 2025 (Boko et al., 2007), and therefore land degradation will worsen the water scarcity effects by increasing the population's vulnerability to drought (Holleman, 2003). Despite high exports of charcoal from Somalia, and its contribution to tree cover loss, consequent land degradation (Omuto et

al, 2009; Richardson et al., 2010).

Ogallo, et al (2018), The objective of the paper focused on evaluating the changes in land cover in Lower Jubba for possible impacts of human activity. The results from the study revealed that Lower Jubba has experienced significant deforestation of up to 50% reduction in forest cover between 1993 and 2014. The region has further experienced significant degradation in the same period with up to 17% reduction in woodlands. The classification of woodlands reported a user accuracy of 80%. Bare land/artificial land increased to 315%, which could also be associated to an increase in settlement. An increase in grassland and shrubland was seen as well.

The worldwide forest area is around 4 billion hectares, approximately 30% of the Earth's land surface, but it is declining by 13 million hectares a year— an “alarming rate” (FAO, 2010). Deforestation is highest in the tropical regions of South America, central West Africa and South and Southeast Asia. Forests provide ecosystem services that include the regulation of weather and climate at local, regional and global levels. Therefore, deforestation not only causes direct loss of forest habitat but also leads to indirect impacts as ecosystem services fail. It is well known that deforestation emits carbon dioxide that contributes to global climate change, less well known are the projected impacts on weather patterns. This report reviews published studies on these indirect impacts of deforestation and their potential impact on agriculture. (Clare miller, October 2013)

Regional impacts of regional deforestation. Studies using GCMs agree overwhelmingly that continental-scale deforestation in Amazonia, Africa or Southeast Asia leads to a warmer, drier climate over the deforested area. Many factors, including soil type, vegetation, topography, climatology, and distribution of land and water, determine the sensitivity of regional climate to land-cover change. (Mahmood, R. et al 2013).

In Somalia, the deforestation rate is increasing at an alarming rate. According to a report in Puntland by the FAO/Somali Water and Land Management Information System (SWALIM), it is estimated that the annual rate of Bussei Acacia in Puntland has decreased by about 5%, and this rate appears to be applicable throughout Somalia (Oduori et al., 2009).

Agricultural production plays a significant role in maintaining food security and long-run economic growth in developed and developing countries (Yurtkuran, 2021).

Total production volume loss in Somalia was 50% in sorghum, 34% in corn, 83% in sesame, and 59% in cowpea (World Bank, 2018). Drought reduces crop production by decreasing the amount of cultivated land, resulting in harvest failures. Droughts throughout 2017 cost Somalia \$71 million for the four main crops planted, including \$35 million for maize and sorghum, \$9 million for cowpea, and \$28 million for sesame (World Bank & FAO; 2018).

The discussions conducted over several years have helped to inform a new debate on the causes of the massive degradation of tropical forest ecosystems, and on the specific threat that the expansion of agricultural areas poses and will continue to pose. Recent article (Gibbs et al. 2010) thus showed that between 1980 and 2000, over 55% of new cropland areas in the tropical zone came at the expense of primary forests, while another 28% of this expansion came at the expense of secondary forests. (Romain pirard, 2010) 5 Tropical deforestation is one of the most serious global environmental problems in recent years. It has become an issue of global concern because of the relevance of tropical forests in biodiversity conservation and in limiting the greenhouse effect (FAO, 1992). Tropical rainforests are the richest and the most valuable ecosystem providing habitation for 50% 90% of all species on earth (WCED, 1987). It accounts for about 25% of the heat trapping emissions at global level (Houghton, 1993). And it occurs mostly in developing countries where the level of development and the welfare of the citizens are crucial factors in determining the extent of forest use. (FAYNET, JULY 2011

According to a WSP report, coal production in north-eastern Somalia in 1996 was estimated at 4.8 million sacks [each weighing 25-30 kg] (WSP, 2001). About 2.1 million acacia bussei trees had to be cut down to achieve such a volume. With an average density of 60 trees per hectare, this corresponds to a deforestation rate of 35,000 hectares per year. The production of 10 million sacks of coal [export only] in Southern Somalia in 2011 amounts to the felling of 4,375 million trees or the clearing of 72,916 hectares of land (UNCCD, 2020; Somalia Report, 2011).

Therefore, the researcher's best awareness of Deforestation effects on lower Jubba may have negative impact thus this study investigates the effect of deforestation effect on agriculture production as a case study of lower Juba region.

II. Material And Methods

This study was conducted through descriptive survey research design, which is a common design in the research, under the descriptive research. It describes the effect of deforestation on agriculture production in Kismayo, lower juba region, Somalia. The researchers' purpose is to describe and give details how characteristics vary together. Survey design is “present oriented methodology used to investigate population by selecting samples to analyze and discover occurrences” (Oso and Ones, 2008, p.70). Survey study is used for exploratory and descriptive research (Saunders, et al, 2009). The study selected 60 respondents as the sample

size from the target population of 70 people, As shown in table 1.1, the key respondents comprise Agriculture experienced, University lectures and Workers of charcoals.

Table 1.1 Showing categories of respondents and sample size

Category of Respondents	Population	Sample size
Agriculture experienced	30	20
University lectures	15	13
Workers of charcoal	25	25
Total	70	60

The

researcher was used Slovene’s formula to select the respondents from the population using the following

$$n = \frac{N}{1 + N(e)^2}$$

formula:

Where n is the required sample size, N is the target population size and e is the standard error or level of significance, which is popularly known to be =0.05 or 5%. For this study, N = 100 and so the sample size

$$n = \frac{70}{1 + 70(0.05)^2} \quad n = \frac{70}{1.175} = 60$$

was calculated as follows;

The study processing, and analysis. The data was collected through Descriptive analysis. The data was collected from the study area, edited, collated and tabulated. Data was collected through questionnaire and interview, and A-4-point liker scale was used to measure the output of each item answered by the respondent. SPSS statistical computer software was used to tabulate and cross tabulate the data. Thereafter, the researchers make an interpretation of the frequency tables and accordingly make a summary of findings, conclusions and recommendations.

III. Results And Discussion

Table 1.2 Descriptive analysis of the effect of deforestation on agriculture production.

N0	Statement	Mean	Standard deviation	Interpretation
Q1	Deforestation refers to the destruction and conversion of forest land.	1.6333	.86292	Very High
Q2	Deforestation reduces the number of species that can be found in the deforest land.	1.9000	.87721	Very High
Q3	Deforestation has negative impact on agriculture production..	2.0833	1.06232	Very High
Q4	Deforestation can occur as a result of direct and indirect	2.0667	1.07146	Very High
Q5	Deforestation encourages food insecurity	2.0500	1.12634	Very High
Mean index		1.94	0.99	Very High

The first objective of the study was to identify the effect of deforestation on agriculture production. The questions of the objective were five and were based on four liker scales, Strongly Agree, Agree, Disagree and Strongly Disagree.

The table 1.2 indicates that the respondents agreed that deforestation contributes reduction of agriculture production as judged by the respondents of the study, in linking to the mean scored 1.94 whereas the standard deviation reflected to 0.99, As shows the Table above.

Relevant results were found by Deborah Lawrence and Karen Vandecar (2015), that deforestation can lead to reduced rainfall, higher temperatures, and more extreme heat events, all of which can negatively impact agricultural productivity. Brandão Jr. A., et al. (2020) found that deforestation leads to a 10-20% decline in crop yields, largely due to reductions in rainfall and soil fertility.

Delire, C., et al. (2020), Explored that deforestation-induced changes in temperature, precipitation, and extreme weather events can significantly undermine agricultural production.

Table 1.3 Descriptive analysis of relationship between Deforestation and Agriculture Production

N0	Statement	Mean	Standard deviation	Interpretation
Q1	Agriculture production contributes poverty reduction.	1.6000	.80675	Very High
Q2	Agriculture production reduces unemployment.	2.0667	1.00620	Very High
Q3	Agriculture production promotes economic development.	1.7333	.95432	Very High
Q4	Agriculture production increases income of the farmers	1.8167	.98276	Very High
Q5	Agriculture production changes the standard of living	1.8667	.96492	Very High
Mean index		1.81	0.94	Very High

The second objective of the study was to examine the relationship between Deforestation and Agriculture Production judging on the respondent’s responses. It contained five questions which were based on

four liker scale.

Table 1.3 indicates that most of the respondents strongly agreed that both variables correlate negatively as shown by the mean (1.81) and the standard deviation (0.94) respectively.

Related results were found Gustavo Oliveira et al. (2021), that deforestation leads to declines in rainfall and increases in temperature, which in turn reduce crop yields and livestock productivity.

Jingfeng Wang et al. (2009) Reported that deforestation can lead to significant reductions in rainfall, with potential implications for agricultural production in the region. Herold, D., et al. (2019) found that deforestation can reduce crop yields by up to 30% through changes in microclimate, soil degradation, and loss of ecosystem services.

IV. Discussion

The results indicated that deforestation has negative impact on agriculture production, the findings are in line with (Lawrence, D. et al 2015) investigated the Effects of tropical deforestation on climate and agriculture. Their study found that deforestation causes less rainfall and declines Future agricultural productivity, what is more, deforestation-induced increase in mean temperature and the associated heat extremes and from a decline in mean rainfall or rainfall frequency. Through teleconnections, negative impacts on agriculture production could extend well beyond the tropics.

Similarly, while total rainfall is important, the seasonal pattern of rainfall is also critical to agricultural productivity. A delay in the onset of the rainy season (Butt, et al 2011), an increase in the length of the dry season and decreased precipitation during the transition from dry to wet season (Senna, et al 2009), (Costa et al 2009), could limit productivity.

(Faynet, A, M., (2011) studied Perception of local community towards deforestation:the case of edigetber and selamber kebele aroundwolkite town, gurage zone, snnprs, his study findings indicated that according to the local community perception the majorcauses of deforestation in the study area includes: agricultural expansion, urbanization, fuelwood consumption, and others drivers like population growth, land scarcity problem, informalsettlement, lack of awareness creation and accident fires on forests resource. These resulted in gullies formation and soil erosion, loss of productivity, loss of biodiversity especially plants, animals, interruption of water flows, and climate changes. To alleviate such problems, governments should create job opportunities for the communities to reduce their dependency on forests, there should be a promotion of environmental education and awareness, and the expansion of alternative energy sources, training, fuel saving technology diffusion should be facilitated to reduce their dependency on fuel wood.

V. Conclusions

The main objectives of the study were to explore the impact of deforestation on agriculture production as well as examining deforestation and agriculture production as a case of Kismayo”, Lower Jubba, Somalia. The study found that deforestation has a negative impact on agricultural production.

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