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Farmers' Perception on the Impact of Deforestation Influencing Climate Change

Flomo L. Gbawoquiya[1*], Makissa P. Cherif [1]

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ABSTRACT

Farmers' perceptions on the effect of deforestation on climate change differ, from conceptual, practical, and information barriers all acting as limitations to pro-environmental behavior. The study's overall objective was to assess the farmers' perception of deforestation and its effect on climatic change. Field questionnaire surveys, focus group discussions (FGD), and field observations were considered for this study conducted in Suakoko District. Results reviled that 75% of the respondents believed that deforestation and human activities are the main drivers of climate change while 23% of the respondents had no idea about the drivers of climate change. About 90 % of the respondents in the study area indicated that deforestation is a cause of climate change. The respondents were asked if deforestation could be tackled and 73% of them perceived that it was possible to do something to halt it, while 22% of the respondents didn't know if it was possible to stop it. Therefore, it is t recommended that the government create more awareness on the effect of deforestation and has to put some measures in place to mitigate or stop it because, deforestation is a driver of climate change.

INTRODUCTION

Forests have a crucial role in the lifestyles of billions of people around the world (Sidiq, 2018), providing wood fuel as energy for everyday cooking and warming, hosting diverse types of wildlife habitats, safeguarding biodiversity, and preserving the full functioning of ecosystem services (Ochenje *et al.*, 2016). Unfortunately, overexploitation and clearance of forest resources to meet the fundamental requirements of an expanding population and sustain economic growth has resulted in fast forest loss, particularly in the tropics, which contain more than two-thirds of the world's biodiversity (Asrat & Simane, 2018). Forest removal and degradation result in major biodiversity loss and release 10% to 25% of global carbon emissions. In fact, between 2014 and 2018, the world lost around 26 million hectares (ha) of forest every year, with the tropics accounting for nearly all of it. To avoid further distraction and its direct effect on human lives and economic development, it is crucially important to take a swift solution to reduce or divert the trend of forest resource loss at every level (Saguye, 2018). Loss of tropical forests (deforestation) is caused by various drivers, which occur at different scales (Falaki *et al.*, 2013). The main drivers of deforestation may include commercial and subsistence agriculture followed by settlement expansion and infrastructure development (Woods *et al.*, 2017). Climate change one of the biggest environmental threats to food production, water availability, forest biodiversity and livelihoods for many countries in the world (Sidiq, 2018). Moreover, it is widely believed that developing countries in tropical regions of the world, sub-Saharan countries, will be impacted more severely than developed ones (Chen *et al.*, 2018).

Despite climate change being a global issue, developing countries need to adapts its effects. It is expected that Africa's agricultural production will be greatly affected by climate change (Ken *et al.*, 2020). Considering that the agricultural sector is a source of livelihood for many people especially the poor in rural communities, it becomes imperative to protect the livelihoods of farmers to sustain food security (Uddin *et al.*, 2019). Surprisingly, a system's ability to adapt is determined by its vulnerability to climate change, which is impacted by its level of exposure and sensitivity to the effects of climate change. Flood threats, for example, can cause significant output losses, raising risk awareness and the need for adaptation measures such as increased insurance demand among farmers. It appears that assess to insurance and financing have been regarded as critical for independent adaptation (Ochenje *et al.*, 2016). However, studies have revealed that farmers have a variety of adaption options.

Although there are subtle differences between the two, climate change and weather are inextricably linked. Weather is a climate-related event that occurs at any one time, whereas climate is described as average weather conditions over a long period of time that might affect cropping area and intensity. However, climate and weather (specific atmospheric conditions) have varied effects on cropping area, intensity, and yield (Hyland *et al.*, 2016).

Farmers' opinions of climate change differ conceptually, practically, and in terms of information, all of these factors operate as impediments to pro-environmental conduct. As a result, understanding farmers' self-identity, their awareness of an environmental issue, and their views of its danger is critical in personalizing activities aimed at improving agriculture's environmental performance. These constructs may influence the likelihood of farmers' voluntary uptake of climate change measures, and their participation in programs that focus on reducing the sector's GHG emissions (Chen *et al.*, 2018).

[1] Emmet A. Dennis College of Natural Sciences, Department of Environmental Sciences, Cuttington University, Liberia
[*] Corresponding author's e-mail: lebekugeh@gmail.com

METHODOLOGY

In this study, survey research was conducted. Both qualitative and quantitative data types were collected. More specifically, a descriptive research design which is theory-based design method was performed to collect, analyze, and present the collected data. From an approximate population of 2000 which are perceived to be farmers, the required sample size was determined as follow:

$N/1+N (e^2)$

$2000/ (1+2000*0.05^2) = 2000/6 = 333$

Where: N is the total number of populations; e is the margin sampling error. Despite the actual determined sample size was 333, only 100 individuals were considered for the study because of financial and time constraints.

Among the four administrative towns, two towns were selected randomly. Then a structured questionnaire survey was used for collecting the primary data to assess the farmers' perception on the effect of deforestation on climate change. It also included details of primary data on the respondents' socio-economic characteristics, forest products consumption pattern, income-expenditure scenario, perceptions of deforestation, factors determining deforestation, strategies to minimize or stop deforestation and strategies to cope with climate change and its effects. A purposive sampling technique was used to obtain a survey population in the study area. Then, a random sampling approach was conducted to select representative participants to participate in the study. For the accuracy and reliability of the data, participants were asked for their willingness to participate in the survey before administering the questionnaires to them. Up on their agreement, they were given the detailed information on how to respond on each of the provided questions.

After the required sample size was determined, field questionnaire surveys, focus group discussions, and field observations were conducted in seven communities within the selected District and the required data was collected.

Data on Farmers' perception on the effect of deforestation on climate change was measured using the 5-point Likert scale. Statements were selected and each respondent was asked to indicate his/her perception of agreement or disagreement against each statement as "strongly agree," "agree," "neutral," "disagree," or "strongly disagree." Weights were assigned to responses as 5, 4, 3, 2, and 1, respectively. Total weighted score (TWS) of a statement was determined by summing up the weighted responses of the 5-point scale. The TWS of a statement was divided by the sample size (i.e., 100) to obtain weighted average score (WAS). Thus, the possible range of TWS for each statement was determined, and possible range of WAS for a statement could range from 0 to 5. A Likert scale for each selected statement was computed using the following formula:

Weighted average score = Total weighted score (5 x SA + 4 x A + 3 x N + 2 x DA + 1 x SDA) ÷ Total number of respondents (Uddin *et al.*, 2019).

Where SA is the total number of respondents expressing the preference "strongly agree" for the statement, A is the total number of respondents expressing the preference "agree" for the statement, N is the total number of respondents expressing the preference "neutral" for the statement, DA is the total number of respondents expressing the preference "disagree" for the statement, and SDA is the total number of respondents expressing the preference "strongly disagree" for the statement.

Generally, an analysis with frequency distribution was used. It was then presented using a pie/bar chart and tables. Inferential analysis was done using Chi-square test to finally agree/accept and disagree/reject. All data analysis was done using SPSS Version 25 and was tested at $p<0.05$ significance level

RESULTS

Among the 100 interviewed participants, 45 respondents were female while 55 of them were male. The results show that farmers in the study area were predominately

Table 1: Gender and educational background of the respondents

		Education				Total
		BSc	Elementary	High school	Illiterate	
Gender	Female	7	2	22	13	45
	Male	6	5	40	4	55
Total		13	7	62	17	100

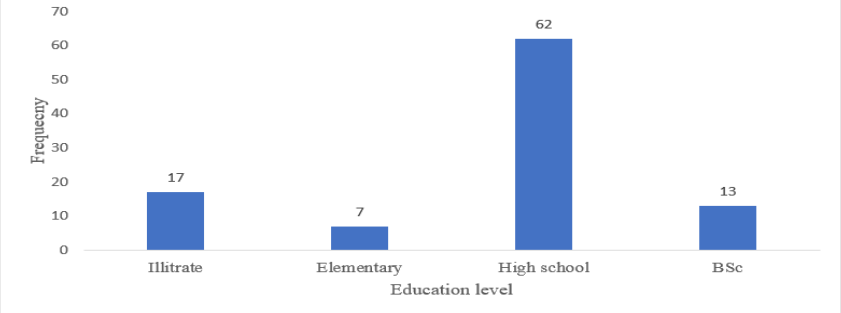

Figure 1: Education level of the respondents: Source: field data, 2021

Table 2: The respondents' religion distribution and their gender

		Religion		Total
		Christian	Muslim	
Gender	Female	39	4	45
	Male	44	5	55
Total		83	9	100

high school graduates (62) while 17 of the respondents were illiterate (Table 1).

The average age of the farmers interviewed was 31 (±11). 85% of the respondents were single while only 12% were married. Farmers' main activity was agriculture, business, and services respectively, and 88% of the respondents live in rural area (Table 1).

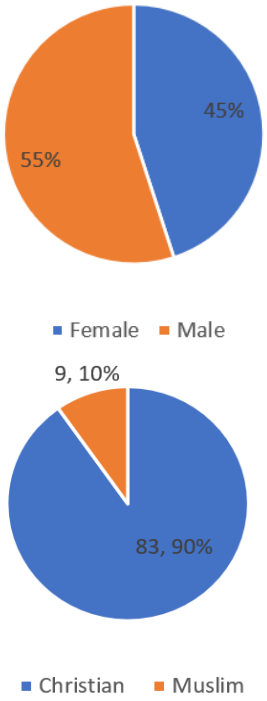

Figure 2: Religion classes of the Respondents; Source: Field Data, 2021

DISCUSSION

About 90 % of the respondents in the study area indicated that deforestation is a cause for climate change. In addition, a greater proportion of farmers perceived that their activities highly depended on the forest and forest products. Thus, they pointed out that formerly strong covered with forest are now becoming scares. A total of 60% of the respondents in Suakoko between the aged between of 25 and 35 thought deforestation was perceived as the main cause of climate change. This indicates that the younger farmers had more awareness than the older farmers. This is mainly attributed to the availability of radio and smart phones. However, it is usually assumed that older farmers more exposed to changes in the climate than the younger farmers (Damodar & Nibal, 2020)

Variables such as age, education level, and gender

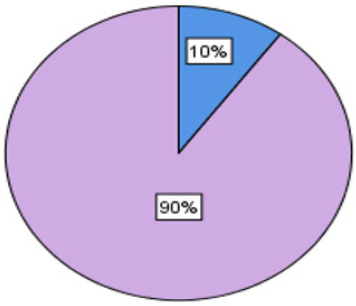

Figure 3: Perception of the respondents towards the deforestation as a main cause for Climate Change

are said to be among the main factors significantly influencing farmers' perception of climate change. Among these variables, deforestation in the study area was due to a range of factors, including but not limited to expansion of agricultural and residential lands, fuel wood harvest and charcoal production. Even though 23% of the respondents had no idea about the drivers of climate change, 75% of the respondents believed that deforestation and human activities as being the main drivers of climate change in Suakoko. In other studies, deforestation was associated with the loss of forest climate related indigenous knowledge (Deressa *et al.*, 2011).

Gender perception on the effect of deforestation on climate changes was significantly different between male and female respondents. Male farmers were more likely to perceive the deforestation effects on climate change compared to female farmers. This is due to the fact that men are the primary actors in rainfed agriculture, therefore they are more involved in developing climate change and variability adaptation measures than women in the agricultural sector. Women, on the other hand, are particularly vulnerable because they rely on non-wood forest products, such as trees, for food and money.

The respondents were asked if deforestation could be tackled and 73% of them perceived that it was possible to do something to halt it. While 22% of the respondents didn't know if it was possible to stop it. According to Ahmad & Afzal, (2020) high temperatures are often associated with climate change while increase in temperature is expected to reduce crop yields and

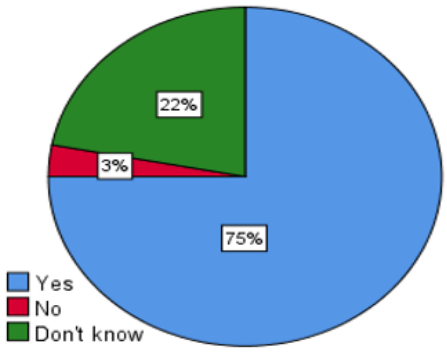

Figure 4: The response of the respondents after they were asked if it was possible to tackle deforestation

increase levels of food insecurity.

Some researchers indicated that aged farmers could observe an increase in drought severity, temperature, strong wind and dust, and decrease in rainfall pattern as a result of climate change. Furthermore, when the farmers' ages are taken into account, the results suggest that older farmers were better able to detect changes in meteorological variables than younger farmers. The farmer's educational level increases the likelihood of spotting changes in climatic occurrences. As a result, farmers with a higher level of education saw an increase in the following meteorological variables (Abubakar *et al.*, 2020).

Farmers' Perception on Climate Change

More than 89% of the respondents in the study area have heard about climate change on different occasions and have observed that climate is gradually changing. They stated that an increase in climate change is making them more vulnerable as a result of crop failure and occurrence of many plant pathogens. Majority of the respondents indicated that the occurrence of floods was mainly due to climate change. Even though floods can cause some agricultural damage, farmers prefer floods to drought because the latter is more damaging to crop productivity. Temperatures and the number of hot days has increased, according to a larger percentage of farmers in Liberia's central region.

The rainy season, according to the majority of respondents, begins late and finishes sooner in the year. Rainfall length has decreased from 6 months between May and October to 4 months, according to the majority of responses. The responders also noticed a decrease in the amount of rainfall. A small proportion of farmers across all sites did not notice any changes in rainfall patterns, but they claimed that rainfall distribution has become more erratic recent decades.

Farmers are well aware of climate change and its repercussions, such as frequent droughts and floods, rising temperatures and the number of hot days, stronger winds, and changing rainfall patterns, according to the findings of this study (late start and early cessation of the rainy season). The interviewees ascribed the observed rise in temperature to a reduction in plant cover. Indeed, some farmers recall that when they were younger, the vegetation cover was heavier and the temperature was lower than it is today. Farmers have seen an increase in the frequency of hot days in tandem with the rise in temperature, echoing the findings of earlier workers in West Africa (Fahad & Wang, 2020).

Similarly, the perception that deforestation affects climate change is significantly impacted by education of respondents. Therefore, a farmer who has a higher level of education considers his education in deciding whether deforestation affects climate change. For instance, a farmer with a high level of education will have a different perception if he had a low level of education. Abid *et al.*, (2019), studies associated higher education level with access to information on improved technologies and thus better perception. Similarly with age, farmers can better identify the receding shoreline of forest and its decreasing depth over the years. Because deforestation affect this, it may require experience based on age to identify that the forest do not return to their previous levels and density.

Farmers' perception on the Impact of Deforestation on Climate Change

Farmers perceived that the amount and intensity of the rainfall has been changing from time to time in the last two decades. The erratic rainfall and its variable distribution negatively impact on ecosystem services. Most respondents know that climate change impacts negatively on the delivery of the ecosystem services. According to most of the farmers, forest is directly related to water availability. The respondents enumerated major climate hazards (rainfall and temperature) which could reduce the ecosystem services provided by forest.

The majority of farmers stated that total rainfall was higher in the past because vegetation was denser, but that vegetation has become scarce as a result of deforestation, and that rainfall is decreasing every year. More than 82 percent of farmers polled believe that an early end to the rainy season, as well as high/low intensity rainfall, leads in low agricultural productivity. Furthermore, due to decreased rainfall in Suakoko, more than half of the respondents noted a decline in the delivery of forest ecosystem services.

Table 3: Summary Chi-square analysis of the comparison of female and mare in relation to deforestation as a cause for climate change

Chi-Square Tests					
	Value	**df**	**Asymptotic Significance (2-sided)**	**Exact Sig. (2-sided)**	**Exact Sig. (1-sided)**
Pearson Chi-Square	0.112a	1	0.738		
Continuity Correctionb	0.000	1	1.000		
Likelihood Ratio	0.112	1	0.738		
Fisher's Exact Test				0.750	0.496
N of Valid Cases	100				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.50.					
b. Computed only for a 2x2 table					

Despite the fact that male farmers were more likely to perceive the deforestation effects on climate change compared to female farmers, a Chi square analysis revealed no significant difference in gender of the farmers' perceptions about climate change due to deforestation indicating that their knowledge might be similar (Table 3). This agrees with (Sujakhu *et al*., 2016) who observed no significant difference in farmers' perceptions of climate change.

CONCLUSIONS

Farmers' opinions of the impact of deforestation on climate change, as well as their concordance with temperature and rainfall patterns were investigated in this study. The relationship between deforestation and climate change was also investigated. Understanding local perspectives of climate change is critical for developing successful support mechanisms for implementing adaptive measures on farms.

Farmers do not see climate change as a single process, according to the findings, and they distinguish between the components of the climate system. In particular, farmers' impressions of temperature fluctuations are highly compatible with the hypothesized data. Farmers' views on climate change were consistent independent of their educational level, religious affiliation, or gender. Both personal and environmental factors influence perceptions. According to the respondents, there is a direct link between deforestation and climate change.

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