

# THE PERCEPTION OF TIMBER SAWYERS AND CHARCOAL MAKERS ON THE EFFECTS OF DEFORESTATION ON CLIMATE CHANGE

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## Abstract

Climate change and its devastating effects to human existence and environmental biodiversity have for some time now been a major challenge all round the globe. The study focuses on the perception of timber Sawyers and charcoal makers in north Central Zone of Nigeria, on the factors responsible for deforestation and their effects on climate change. A descriptive survey design was adopted for the study while three research questions were posed to guide the study. A 37-item structured questionnaire was used for data collection. The instrument was validated by three experts and had a reliability coefficient of 0.89 using Cronbach Alpha. The research questions were answered using the mean and standard deviation. The results revealed that logging for timber production, production of charcoal and firewood for cooking, bush burning and bush clearing for farming activities are the greatest factors for deforestation. Air pollution, excessive gully erosion, desertification, excessive floods, depletion of the ozone layer and global warming were found to be the effects of deforestation activities. Timber sawyers and charcoal makers agreed that advocacy on the dangers of deforestation activities on climate change, the use of alternative safe sources of clean energy, afforestation and climate adaptation programmes are some solutions for deforestation and climate change. The study recommended that reforestation programme be revitalized, households be encouraged to switch to renewable source of energy for their cooking, trees should be planted in both residential and industrial areas to absorb polluted gases, NYSC participants to plant one tree each as part of their graduation activities and stiffer penalties for bush burning and illegal logging activities.

**Keywords:** Deforestation, Timber Sawyers, Global Warming, Climate Change, Charcoal Makers.

## Introduction

Climate change inarguably remains the front burner of environmental challenges of the 21<sup>st</sup> century around the globe. According to the national climate change policy of the Federal Republic of Nigeria (FRN, (2011)), climate change is a change in average weather conditions which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and in addition to natural climate variability observed over comparable time period. When there is increased concentrations of greenhouse gases in the atmosphere and changes in the use of land especially deforestation activities, greenhouse effect is enhanced beyond the normal range resulting in global warming which invariably leads to climate change. Stephen (2012) also defined climate change as, changes in weather conditions caused by global warming. Global warming is a phenomenon where there is increase in the average temperature of the earth as a result of continuous emission of gases that trap heat to the earth's atmosphere. Rising global temperatures have also been accompanied by other changes in weather and climate (EPA, 2015). The decade from 2000 to 2010 was the warmest on record, and 2010 was tied with 2005 as the warmest year on record. A major consequence of global warming is the increase in rainfall, melting of ice in

the Arctic and Antarctic circles that result in an increase in the volume of water in the oceans and rivers leading to flooding that submerge cities/towns around the globe with thousands of lives and property destroyed (Chavez & Corpus, 2008). Flooding has devastating effects on the environment and its biodiversity especially forests and its many resources.

The flood that overwhelmed Nigeria in 2012 may be attributable to the global warming phenomenon caused by misuse of the environment particularly in the area of widespread deforestation. No success will be achieved in reducing the effects of global warming if we do not preserve our forests and sustainably use the many resources they offer us (da Silva 2015). Report of the United Nations Food and Agriculture Organization (FAO, 2015) showed that Nigeria ranked fourth among 234 countries and territories and highest in deforestation in Africa. Nigeria had lost 410, 000 hectares which is 4.5% of its primary forests between 2010 and 2015; logging, subsistence agriculture, and charcoal are major causes.

The production of firewood and charcoal remains problematic in the West African sub-region. Charcoal is a product obtained from wood gutted by fire and a source of energy for cooking in Nigeria. The world has continued to witness sharp decrease in the area of natural forest due to human activity of which charcoal making is one. An average forest area of 50 million hectares was burned between 2003 and 2012 (FAO, 2015). Nigerians in urban cities had in the past decades relied more on natural coal, kerosene and gas, but with the disappearance of coal in the Nigerian market and scarcity of kerosene and gas, wood fuel which includes firewood and charcoal is widely used as a substitute to the natural coal, the kerosene and gas. Wood contains a very high amount of fuel in gas form, such that even when burned, the resulting charcoal retains substantial amount of the fuel enough to continue to burn until it turns to ashes. Much of the carbon in the wood is trapped during processing, making it volatile to fire. This recent development has added a new dimension to the already souring forest depletion and may result in a more devastating consequence on the ozone layer.

The forest reserves and wildlife sanctuaries are under severe illegal exploitation in Nigeria. Cooking fuel remains one of the major reasons for deforestation in Nigeria. A survey showed 90% of the population sampled preferred gasoline as the main energy source for cooking but because it is often unavailable and expensive, therefore 60% of the population said they instead use firewood and charcoal (Gutti, Aji and Magaji, 2012). The National Bureau of Statistics (NBS, 2009) found that 73.4% of the households in Nigeria use wood or charcoal as sources of energy for cooking. The report according to the geopolitical zones showed that 96.5%, 92.9%, 83.2%, 76%, 41.7% and 63% of the households in North East, North West, North Central, South East, South West and South-South respectively use wood fuel for their cooking. Notably the three Northern zones ranked highest in the use of tree products for cooking. Faleyimu and Agbeja (2012) noted that illegal logging also accounts for the high level of forest depletion in Nigeria.

Illegal logging activities of timber sawyers' and charcoal makers contribute to the depletion of forest resources and the subsequent collapse of the timber industries. The rate at which forests are destroyed according to Gutti, Aji and Magaji (2012) has led to soil erosion in many states, loss of biodiversity, land degradation, desertification, drought and flooding. Forests are key components in the world's ability to provide natural environmental services, such as clean air and water, biodiversity conservation and climate change mitigation (da Silva, 2015). In order to check the excesses of deforestation and its devastating effects, the perception of timber sawyers and charcoal producers on deforestation and their effects on global warming/climate change must be clearly understood.

### **Statement of the Problem**

Climate change had produced adverse effects on the land and its biodiversity over the years. A major consequence of climate change with its associated effects on human existence is the deforestation activities that are being experienced globally. It will appear however that timber sawyers and charcoal makers whose practices demand the use of wood and its products impact tremendously to increase deforestation and the consequent climate change phenomenon. Timber sawyers and charcoal makers both have important role to play in curtailing deforestation activities particularly in North Central Nigeria where the effects of deforestation activities appear to have increased dramatically over the last decade. Understanding the perception of timber sawyers and charcoal makers on factors that lead to deforestation and their effects on climate change would provide a better view of the problem and its solution.

### **Purpose of the Study**

The purpose of the study was to determine the perception of timber sawyers and charcoal makers on the factors responsible for deforestation and their effects on climate change in Nigeria. Specifically, the study sought to find out:

1. The factors responsible for deforestation in North Central Nigeria
2. The effects of deforestation in North Central Nigeria.
3. The solutions for deforestation and climate change in North Central Nigeria.

### **Research Questions**

The following research questions guided the study:

1. What are the factors responsible for deforestation in North Central Nigeria?
2. What are the effects of deforestation in North Central Nigeria?
3. What are the solutions for deforestation and climate Change in North Central Nigeria?

### **Methodology**

The study was basically a survey research, which employed the use of a 37- item structured questionnaire titled Deforestation and Climate change (DEFOCLIM) to collect research data. The population for the study comprised all the unascertained number of timber sawyers and charcoal makers in Benue, Kogi, Nasarawa and Niger States in North Central geographical zone of Nigeria. Purposive sampling was used to draw a total of 120 respondents from the accessible population comprising of 60 timber sawyers and 60 charcoal makers (15 subjects from each state) that were used for the study. The researcher and three research assistants (interpreters) administered the DEFOCLIM questionnaire on 120 respondents in order to illicit information. The instrument is based on a five point Likert-type scale of Strongly Agree (5), Agree (4), Undecided (3), Disagree (2) and Strongly Disagree (1) to illicit information based on the items in the instrument. All the 120 copies of the questionnaire were completed and returned.

The DEFOCLIM instrument had three clusters based on the purpose of the study and research questions. The instrument was subjected to face validation by three woodwork teachers from Federal University of Technology, Minna and one senior staff of Ministry of Agriculture and Forestry, Niger State. The instrument was found to have a Cronbach Alpha reliability co-efficient value of 0.89. Mean and standard deviation were used to answer the research questions. The items on the instrument with mean score of 3.5 and above were accepted as agreed for the three clusters of the instrument, while items with mean score below 3.5 were returned as disagreed. This decision rule was based on the real limits of numbers on the five point scale used where 3.50 is the lower limit of agree.

### **Results**

The results are presented according to the research questions.

**Table 1: Mean and Standard Deviation of the Responses of Timber Sawyers and Charcoal Makers on the Factors Responsible for Deforestation in North Central Nigeria**  
N=12

| S/No | Factors Responsible for Deforestation  | 1           |                 | 2           |                 | T           |                 | Rem |
|------|--|-------------|-----------------|-------------|-----------------|-------------|-----------------|-----|
|      |  | $\bar{x}_1$ | SD <sub>1</sub> | $\bar{x}_2$ | SD <sub>2</sub> | $\bar{x}_T$ | SD <sub>T</sub> |     |
| 1    | Felling of trees to meet economic needs  | 4.13        | 0.87            | 4.61        | 0.64            | 4.37        | 0.76            | A   |
| 2    | Grazing over under grown trees   | 3.54        | 1.54            | 3.83        | 1.35            | 3.69        | 1.45            | A   |
| 3    | Use of wood as cooking fuel  | 4.39        | 0.50            | 4.70        | 0.34            | 4.55        | 0.42            | A   |
| 4    | Making of charcoal for cooking   | 4.44        | 0.91            | 4.56        | 0.87            | 4.50        | 0.89            | A   |
| 5    | Uprooting young plants for herbal medicinal purposes                                       | 3.96        | 1.01            | 3.92        | 1.04            | 3.94        | 1.03            | A   |
| 6    | Clearing and burning forests for farming activities  | 4.21        | 0.30            | 4.10        | 0.19            | 4.16        | 0.25            | A   |
| 7    | Forest fire  | 3.93        | 0.91            | 3.97        | 0.89            | 3.95        | 0.90            | A   |
| 8    | Construction activities  | 3.94        | 1.03            | 3.86        | 1.07            | 3.90        | 1.05            | A   |
| 9    | Population explosion   | 3.69        | 1.30            | 3.90        | 1.14            | 3.80        | 1.22            | A   |
| 10   | Lack of effective afforestation programme to build new forests and replenish depleted ones | 4.51        | 0.33            | 4.81        | 0.19            | 4.66        | 0.26            | A   |
| 11   | Demand by wood related industries  | 4.54        | 0.35            | 4.35        | 0.89            | 4.45        | 0.62            | A   |
| 12   | Desert encroachment  | 3.93        | 1.45            | 3.81        | 1.01            | 3.87        | 1.23            | A   |
| 13   | Flooding   | 3.56        | 1.09            | 3.69        | 0.91            | 3.63        | 1.00            | A   |
| 14   | Harsh weather conditions such as excessive heat and high winds                             | 4.23        | 0.73            | 4.82        | 0.09            | 4.53        | 0.41            | A   |
| 15   | Industrial pollution from waste products and chemicals                                     | 3.77        | 1.73            | 3.99        | 1.21            | 3.88        | 1.47            | A   |

A = Agreed

1 = Timber Sawyers; 2 = Charcoal Makers;  $\bar{x}$  = Average mean, SD<sub>T</sub> = Average standard deviations

**Table 2: Mean and Standard Deviation of the Responses of Timber Sawyers and Charcoal Makers on the Effects of Deforestation in North Central Nigeria** N=120

| S/No | Effects of Deforestation                        | 1           |                 | 2           |                 | T           |                 | Rem |
|------|---|-------------|-----------------|-------------|-----------------|-------------|-----------------|-----|
|      |   | $\bar{x}_1$ | SD <sub>1</sub> | $\bar{x}_2$ | SD <sub>2</sub> | $\bar{x}_T$ | SD <sub>T</sub> |     |
| 16   | Pollution of clean air                          | 3.84        | 1.02            | 3.78        | 1.07            | 3.81        | 1.05            | A   |
| 17   | Excessive gully erosion                         | 4.03        | 0.99            | 4.01        | 1.00            | 4.02        | 1.00            | A   |
| 18   | Desertification                                 | 4.67        | 0.05            | 4.91        | 0.03            | 4.79        | 0.04            | A   |
| 19   | Excessive floods                                | 4.50        | 0.91            | 4.71        | 0.85            | 4.61        | 0.88            | A   |
| 20   | Depletion of the ecosystem (land & sea animals) | 3.88        | 1.03            | 3.73        | 1.07            | 3.81        | 1.05            | A   |
| 21   | Increase in high wind                           | 4.00        | 0.98            | 3.92        | 1.02            | 3.96        | 1.00            | A   |
| 22   | Land degradation                                | 3.94        | 1.4             | 3.96        | 1.03            | 3.95        | 1.23            | A   |
| 23   | Domestic supply for wood industries is depleted | 4.17        | 0.77            | 4.31        | 0.57            | 4.24        | 0.39            | A   |
| 24   | The ozone layer is depleted                     | 3.92        | 1.10            | 3.67        | 1.32            | 3.80        | 0.97            | A   |
| 25   | Excess heat wave in the environment             | 3.95        | 0.96            | 4.18        | 0.83            | 4.07        | 0.90            | A   |
| 26   | Destruction of homes                            | 3.98        | 1.01            | 3.86        | 1.09            | 3.92        | 1.05            | A   |
| 27   | Destruction of crops                            | 3.91        | 1.10            | 3.89        | 1.03            | 3.90        | 1.07            | A   |

A = Agreed

1 = Timber Sawyers; 2 = Charcoal Makers;  $\bar{x}$  = Average mean, SD<sub>T</sub> = Average standard deviations

**Table 3: Mean and Standard Deviation of the Responses of Timber Sawyers and Charcoal Makers on the Solutions to Deforestation and Depletion of Ozone Layer in North Central Nigeria**

| S/No | Solution to Deforestation  | $\bar{x}_1$ | SD <sub>1</sub> | $\bar{x}_2$ | SD <sub>2</sub> | $\bar{x}_T$ | SD <sub>T</sub> |
|------|--|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| 28   | Advocacy on the dangers of deforestation using the local language                                  | 3.99        | 0.82            | 4.13        | 0.74            | 4.06        | 0.78            |
| 29   | Ensure availability of kerosene and cooking gas at affordable prices                               | 4.57        | 0.16            | 4.93        | 0.05            | 4.75        | 0.11            |
| 30   | Industries should be compelled to plant trees within their premises                                | 3.69        | 1.16            | 3.98        | 1.02            | 3.84        | 1.09            |
| 31   | Introduce yearly re-forestation programmes for civil servants                                      | 3.94        | 0.89            | 3.89        | 1.00            | 3.92        | 0.95            |
| 32   | Every NYSC participant to plant & nurture one tree during service year                             | 3.89        | 1.14            | 3.98        | 1.01            | 3.94        | 1.08            |
| 33   | Climate adaptation programmes should be regularly organized  | 3.90        | 1.02            | 3.79        | 1.08            | 3.85        | 1.05            |
| 34   | Illegal loggers should be prosecuted   | 4.11        | 0.65            | 3.99        | 1.08            | 4.05        | 0.87            |
| 35   | Crop farmers should plant trees at predetermined distances throughout their farm land              | 3.87        | 1.34            | 4.78        | 0.93            | 4.33        | 1.14            |
| 36   | Enact a law prohibiting bush burning   | 4.79        | 0.44            | 4.93        | 0.04            | 4.86        | 0.24            |
| 37   | Communities should be held accountable for human activities that result in environmental pollution | 4.50        | 0.51            | 4.10        | 0.75            | 4.30        | 0.63            |

A = Agreed

1 = Timber Sawyers; 2 = Charcoal Makers;  $\bar{x}$  = Average mean, SD<sub>T</sub> = Average standard deviations

### Discussion

The result in table 1 revealed that income generation; use of wood as cooking fuel, clearing and burning forests for farming activities, lack of effective afforestation programme to build new forests and replenish depleted ones, demand by wood related industries, production of charcoal for cooking, harsh weather conditions such as excessive heat and high winds, clearing and burning forests for farming activities rated very high as factors responsible for deforestation. Results also indicated slight deviations between the mean of timber sawyers to that of charcoal makers. The result agrees with the UN (2015) report that logging, subsistence agriculture, and wood fuel are major causes of deforestation. The Food and Agriculture Organization (FAO) of the United Nations also cited Nigeria as the country with highest rate of deforestation activities with a loss of 55.7% of its primary forests to illegal logging, subsistence agriculture and the demand for wood fuel (UN, 2005). Gu'ti, Aji & Magaji (2012) also revealed in a study they conducted that over 60% of the population of the study relied on wood fuel as their main source of energy. Audu (2013) also lamented that the scarcities of kerosene and cost have made firewood and charcoal the major alternative sources of energy. Faleyimu & Agbeja (2012) found out that fuel wood is a source of income and employment to many. Culprits that engage in this business employ the services of men to cut down trees and these actions contribute to desertification in Nigeria.

The result in table 2 shows that all the 15 items are the effects of deforestation activities. However, excessive gully erosion, desertification, excessive floods, domestic

supply for wood industries is depleted and excess heat wave in the environment were found to have greatest effects of deforestation activities. Results also indicated very close deviations between the mean of timber sawyers to that of charcoal makers. The result support the assertions of da Silva (2015) that forests were key components in the world's ability to provide natural environmental services, such as clean air and water, biodiversity conservation and climate change mitigation, and Farukanmi (2012) who attributed the flooding of 2012 that affected 26 states in Nigeria to global warming caused by widespread deforestation activities. Gutti, Aji & Magaji (2012) had identified the destruction of the forest reserves as a major cause for gully erosion in many states, loss of biodiversity, desertification and the depletion of the ozone layer. Butler (2012) lamented that Nigeria has less than 10% of its total land area under constituted forest reserves because of the high rate of deforestation and cautioned that the country is at risk of desert encroachment, destruction of the soil structure, extinction of wild life and global warming.

The result in table 3 suggested advocacy on the dangers of deforestation to the public using the local language; availability of kerosene and cooking gas at affordable prices; Crop farmers should plant trees at predetermined distances throughout their farm land; a law prohibiting bush burning; communities to be held accountable for human activities that result in environmental pollution; compelling the industries to plant trees within their premises; revamping of the yearly re-forestation programmes; one NYSC participant-one tree planted & nurtured; organizing climate adaptation programmes regularly and illegal loggers prosecuted are all agreed to as the solutions to deforestation and the climate change phenomenon. The slight deviations between the mean of timber sawyers to that of charcoal makers indicates that both groups do not differ much in their agreement. Nigeria had championed a yearly re-forestation programmes captioned "tree planting campaigns" In the 1980's to 1990's. Farukanmi (2012) stressed the need for such programmes to be revived to mitigate the effects of deforestation and to reduce the flow of excess gases in the atmosphere especially carbon dioxide thus reducing warming of the earth's surface and invariably stabilizing the climate in North Central Nigeria.

Climate adaptation programmes are vital components of the efforts of reducing the impact of climate change (Chavez & Corpus, 2008). This agrees with the position of timber sawyers and charcoal makers that organizing and sponsorship of adaptation programmes by the government and development agencies will help to reduce the negative impact of climate change. The Federal government has launched a Green Belt Project to check desertification, with the National Council on Afforestation and Shelter Belt to ensure implementation of the green belt project in northern Nigeria. Mailafiya (2013) stated that the step will halt the desertification of 43.3 % of the land area prone to desertification in northern Nigeria and rehabilitate to improve on the ecosystem 225,000 hectares of degraded land.

### **Conclusion**

Evidently the activities of Timber sawyers and charcoal makers of illegal logging has put Nigeria on high percentage rate of primary forest depletion in the world. Timber sawyers and charcoal makers understand the consequences of depletion of forests and the climate change phenomenon because trees that should have absorbed excess carbon dioxide responsible for trapping heat to earth's atmosphere have been chopped down without replenishment. The timber sawyers and charcoal makers solutions to the factors leading to deforestation and climate change seemed vibrant since the solutions are aimed at creating awareness in the community on the dangers of deforestation activities and the resuscitating of re-forestation programmes in Nigeria.

### **Recommendations**

Deforestation and its effects on climate change could be mitigated if the following recommendations are considered and implemented by all stakeholders:

1. Land-fills be developed for most of the urban cities to curb excess gas emissions.
2. Trees should be planted in strategic places within cities to cap near gas emissions due to industrial pollution.
3. Encourage the planting of loams, grasses and trees in courtyards of every home.
4. Nigerian households should be encouraged to switch to renewable and sustainable energy for their domestic needs especially for cooking.
5. Media awareness programmes should be embarked upon by government at various levels on the dangers associated with deforestation and environmental pollution activities.
6. Government should revitalize forest reserves management programmes at different levels.
7. Private forests ownership should be encouraged by government and international donor agencies for development. This is capable of stimulating interest in raising forest reserves and the building of a new economic sub-sector.
8. Every NYSC participate to plant & nurture one tree during service year. Could be included as an activity in the graduation events.
9. The Forest Policy in Nigeria should ascribe punitive measures against anyone caught illegally logging and chopping down trees for fuel wood.
10. Climate adaptation programmes should be encouraged by government and development agencies to help mitigate the impact of climate change.

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