

## **Climate Change Perception And Drivers Of Forest Reserve Degradation In Nigeria: Experience From Doma forest Reserve Communities In Nasarawa State Nigeria.**

**Soulé Moussa\*<sup>1</sup>, Nsofor, G. N<sup>2</sup>, Okhimamhe, A.A<sup>1</sup>,**

<sup>1</sup>West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL), Federal University of Technology Minna Nigeria

<sup>2</sup>Department of Geography, Federal University of Technology Minna

**Corresponding Author: email: [s.moussa@futminna.edu.ng](mailto:s.moussa@futminna.edu.ng)**

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### **Abstract**

Nigeria' forest reserves are under threat in Nigeria due to climate change and human disturbances. This study determined the climate change perception and drivers of Doma forest reserve degradation in Doma Local Government Areas of Nasarawa State in Nigeria. Community Forest Reserve (Yelwa and Ohina Mada) based on the fact two villages were involved in the taungya system in the forest reserve. Two main methods, questionnaires and field observations were used in the data collection. The questionnaire was used to solicit their views and perceptions about climate change and the drivers of Doma forest reserve degradation. While the field observations were used to highlight the practices that may lead to the degradation of the forest reserve. Data were collected from 100 respondents in the study area. Data were analyzed with descriptive statistics. About 69% of the respondents were aware of climate change. The respondents perceived climate change as an increase in air temperature, a decrease in rainfall and the delayed onset of rainfall. Further, 30% of the respondents perceived the dryness of Doma forest reserve as due to the long-delayed onset of rainfall and the long presence of herdsmen within the reserve due to long-delayed onset of rainfall. Their feeling is that the visible effects of climate change on Doma forest reserve were dryness of the reserve and the long presence of herdsmen within the forest. However, the majority of respondents (70%) did not perceive any impacts of climate change on Doma forest reserve. According to them and the field observations, farming activities, illegal logging, and grazing are the key drivers of Doma forest reserve degradation. The study shows that the community forest reserve was aware of climate change and drivers of forest degradation. The study recommends the use of the forest community knowledge for climate policy and sustainable forest management.

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**Keywords:** Forest Reserve Degradation, Land Use, Traditional Knowledge.

## 1. Introduction

West Africa rural communities rely on forests resources for their socioeconomic development (Amusa et al., 2010; Appiah et al., 2009; Moussa, 2013; Oriola, 2009). The contribution of forest products to the rural communities in Nigeria cannot be overemphasized. For instance, forest ecosystems provide the materials for construction, medicines, food, forage, energy, and environmental services, income, etc. to the rural communities in Nigeria (Bisong and Ajake, 2000; Larinde and Olasupo, 2011). Nigeria has the world highest deforestation rate according to the Food and Agriculture Organization of the United Nations (FAO, 2005). One of the drivers of the deforestation and forest degradation is the wood collection for energy. For instance, 76% of the Nigerian population used wood as the main source of cooking energy (Babanyara and Saleh, 2010). In addition to that, vegetation is under menace in Nigeria due to human activities (Mba, 2018) and climate change (Olaniyi et al., 2014). For instance, Nigeria's forest reserves are under threat due to the anthropogenic activities (Adedeji et al., 2015; Dagba et al., 2017; Mmom and Mbee, 2013) such as agricultural expansion, illegal logging, unsustainable farming practices, illegal grazing and urbanization (Adedeji et al., 2015; Mba, 2018). This is aggravated by the high population growth, extreme rural poverty and lack of environmental education (Mba, 2018; Usman and Adefalu, 2011). Such pressure is one of the drivers of forest degradation and deforestation in Nigeria, which can lead to biodiversity loss and climate change.

West Africa rural community is one of the most vulnerable to climate change (Zougmore et al., 2016). This is due to its dependence on rainfed agriculture, on natural resources exploitation and low adaptive capacity (Adesina and Odekunle, 2011). Climate change is affecting the rural community in Nigeria (Adesina and Odekunle, 2011; Idowu et al., 2011) by influencing negatively on agricultural production (Abaje et al., 2016; Res and Adejuwon, 2006). However, rural community exploits forest resources to adapt to climate change even though their pressure

such as the use of fire and others unsustainable land use practices can lead to forest degradation and deforestation Nigeria exposing the rural people to the severity of climate change(Adesina and Odekunle, 2011).

Climate change is affecting rural community in Nigeria (Abaje et al., 2016; Adesina and Odekunle, 2011; Amos et al., 2014; Odjugo, 2010).Climate change perception studies are important tools to climate change education in order to help rural community to adapt and mitigate climate change (UNESCO, 2019). For instance, several studies assessed the rural communities 'perception of climate change in Nigeria. For instance (Abaje, 2008; Owombo et al., 2018; Samuel and Adeola, 2009) highlighted that the farmers perceived the impacts of climate change on agricultural production, on fish production(Aphunu and Nwabeze, 2012), on pastoral production(Medugu and Majid, 2014). Forests communities as farmers are facing the impacts of climate change in Nigeria. Forests communities exploit the forests products in order to adapt to climate change in Nigeria. However, few studies attempted to determine the climate change perception of community forest reserve and its perception about the drivers of forests reserve degradation in Nigeria. Assessment of the climate change perception and drivers of forest reserve degradation from Doma community forest reserve in Nasarawa State in Nigeria can provide data that fills this information gap. This study aimed at:

- I. Assessing the perception of climate change of Doma community forest reserve;
- II. Determining the drivers of Doma forest reserve degradation as perceived by the communities

## **2. Study area**

The study area is located between latitude 8°16'59" N to latitude 8°23'61"N and Longitude 8°18'53" E to longitude 8°20'80"E in Doma local government of Nasarawa State of Nigeria. Agriculture is the dominant occupation for the people of Doma. The mean annual rainfall of the area is 1550mm, while the mean annual temperature of 27°C.

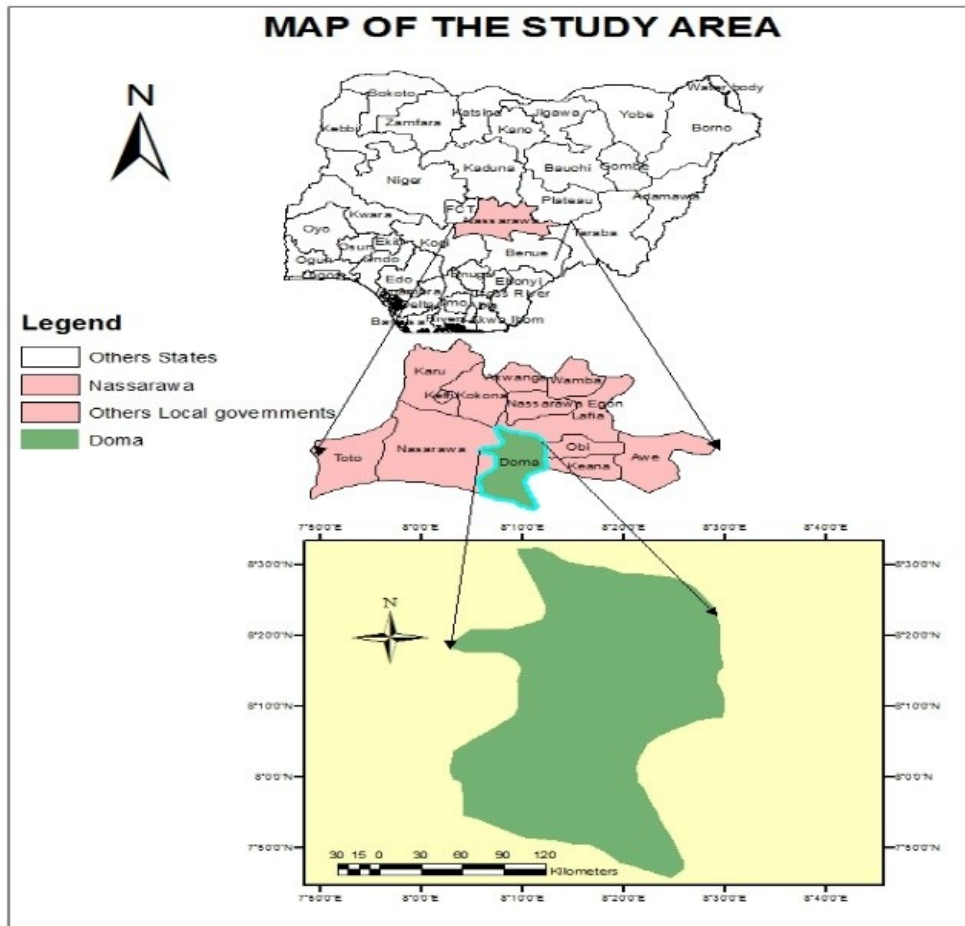


Figure 1: Study area

## DATA COLLECTION

Two (2) Doma forest villages (Yelwa and Ohina Mada) were randomly selected among the Doma forest reserve community. A total of one hundred (100) Doma forest users were randomly selected, from the list of the farmers who were practicing taungya farming system in forest plantation part of the reserve. Primary data was collected through an interview method using a structured questionnaire. The questionnaire was translated into the local languages by interviewers especially for the respondents that could neither read nor write. Field observation such as photos of human activities in the reserve data was also collected. The photos of unsustainable practices such as the use of fire for land clearance, illegal logging, illegal grazing activities such as uncontrolled pruning and anarchic

installation of herdsmen within Doma forest reserve were collected. A descriptive statistics was used to analyze the data obtained from the questionnaire. The use of field observations data such as the pictures of unsustainable land uses practices were used to support the view of the respondents about the drivers of Doma forest reserve degradation.

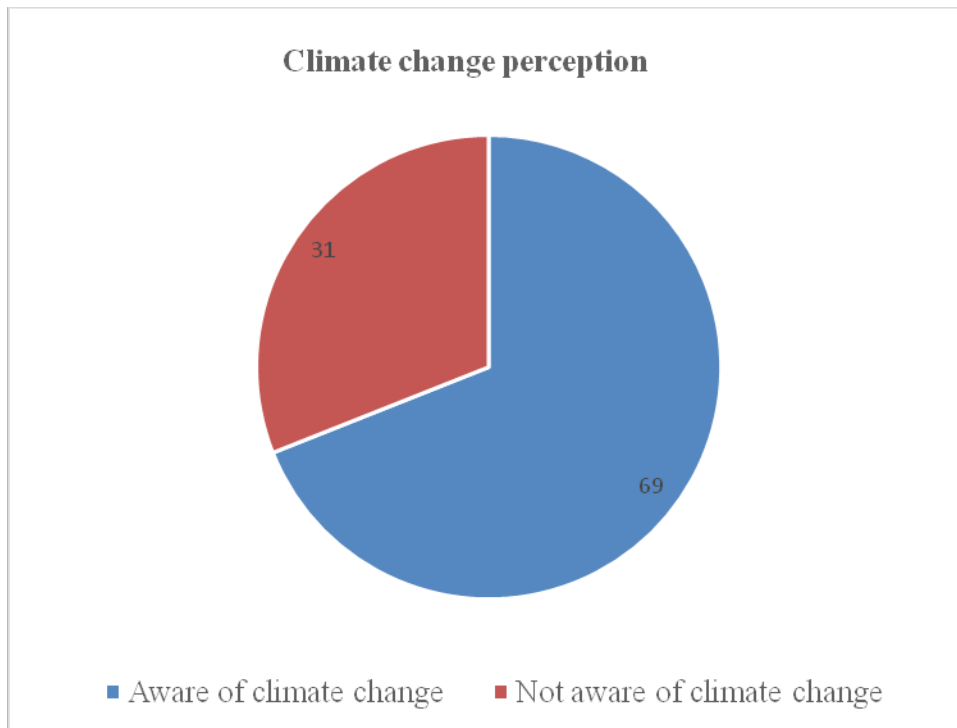
### **3. Results and Discussion**

#### **3.1 Climate Change Perception**

Figure 2 reveals that about 69% of the respondents were aware of climate change. The respondents perceived climate change as an increase in air temperature, a decrease in rainfall and the delayed onset of rainfall. About 31% of the respondents were not aware of climate change. Further, 30% of the respondents perceived that the dryness of Doma forest reserve was due to the long delayed onset of rainfall and the pastoral activities in the forest, which is associated according to them with the absence of the herbaceous vegetation. Our results revealed that Doma community forest reserve are aware of climate change, which confirmed the findings of (Ishaya and Abaje, 2008; Owombo et al., 2018; Samuel and Adeola, 2009) who reported that rural communities in Nigeria are aware of climate change. One of the implications of the perception of Doma community forest reserve is that this could help them to adapt and mitigate to climate change. Climate change awareness is an important tool for the global response to climate change (UNESCO, 2019). This can increase the climate literacy of the Doma forest reserve community. The knowledge about climate change among the forest community could be because of their ability to access local and international radios, which play an important role in climate change education (Mannar, 2014). This may enhance their ability to adapt and mitigate climate change. The percentage aware of climate change found by this study was smaller than the percentage revealed by (Bidoli et al., 2012). One of the differences between the findings could be due

to Bidoli et al., (2012) assessed the climate change perception of nomads communities which are reported to be the most affected by climate change(Thornton et al., 2009).

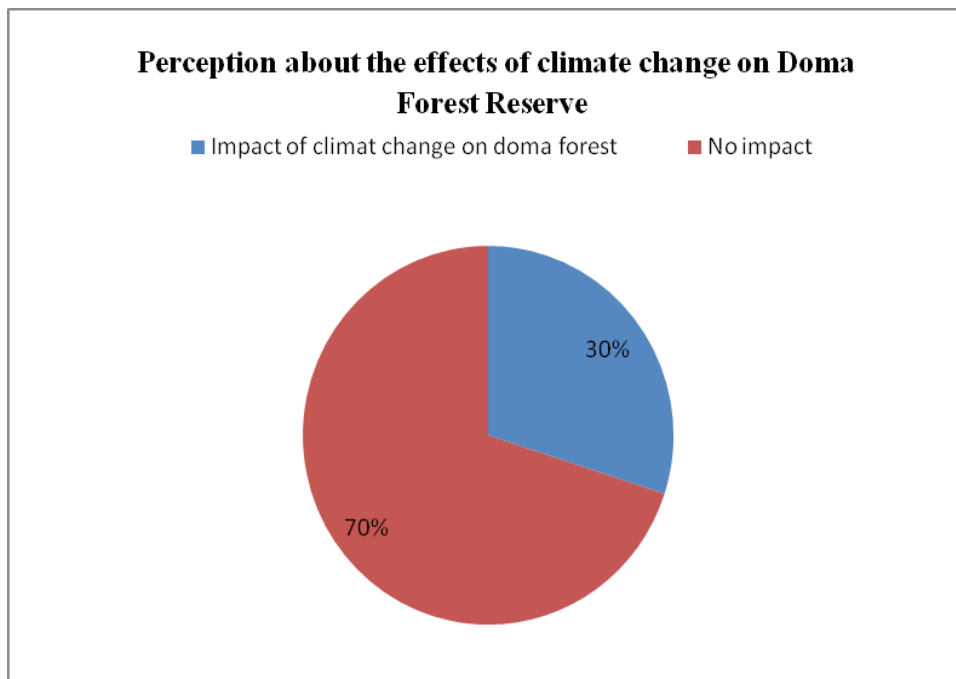
Figure 2: Doma forest reserve community perception of climate change



### 3.2 Effects Of Climate Change On Doma Forest Reserve

Only 30% of the respondents perceived that climate change has effects on Doma Forest reserve (Figure 3). They perceived that changes in both temperature and precipitation had an effect on Doma forest reserve. This finding confirms the results of (Aphunu and Nwabeze, 2012; Ishaya and Abaje, 2008; Ofuoku, 2011) who reported that changes in both temperatures and precipitations were cited by the respondent in Nigeria to have effects on agricultural production. Changes in temperature and precipitation were found to be a driver of forest phenology (March et al., 2014; Roerink et al., 2003) which was confirmed by our results. This finding

shows that the community forest observes the phenology of the Doma forest as due to the effects of climate change. This traditional phenological knowledge was described by Armatas et al., (2016)who reported that it is crucial to forest management. Information from the respondents revealed that the dryness of Doma forest reserve was due to the long-delayed onset of rainfall. In addition to that, the long presence of herdsmen in the forest reserve was perceived by the community forest as due to the lack of herbaceous vegetation. Their feeling is that the visible effects of climate change on Doma forest reserve were dryness of the forest and the long presence of herdsmen due to the long-delayed onset of rainfall.However, the majority (70%) of the respondents did not perceive any effects of climate change on Doma forest reserve dynamics (Figure 3).



**Figure3:People’s perception about the effects of climate change on Doma forest reserve**

### **3.3 Drivers of Doma forest degradation as perceived by the communities**

Figure 4 shows the different land use activities that are drivers of Doma forests degradation according to the communities. About 41% perceived that farming

activities are the drivers of forest reserve degradation. Furthermore, about 33.47% of respondents agreed illegal grazing activities are land use activities that degrade Doma forest reserve. However, 24.27% of Doma forest communities perceived illegal logging is a driver of forest degradation. These findings summarize that agricultural practices, grazing, and logging are the drivers of the Doma forest reserve. These results were similar to the findings of (Ayanlade, 2016; Nzeh et al., 2015; Suleiman et al., 2017)

who reported that the above-enumerated activities are the driver of forest reserve degradation in Nigeria. The agricultural practices that are degrading the forest reserve were the use of fire for land clearance (photo 1) and taungya farming practices in a forest plantation part. The grazing activities were cutting down of tree branches to feed animals and inappropriate pruning of trees by the herdsmen (photo 2), anarchic installation of huts of herdsmen within the forest reserve (photo3). The logging activities were the collection of wood (photo 4) and timber production for commercial purposes by the fraudsters (photo 5). Perception studies about the drivers of forest degradation are useful to promote sustainable forest management.

**Figure 4: Doma Forest community' perception of the land use impacts on the Doma forest reserve dynamics (Source: Author's work, 2015).**



1. Use of the fire for land clearance



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2. Pruning of trees by herdsmen within the reserve



3 Hut of the herdsman within the reserve

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4. Wood collection within the reserve



5. Timber illegally cuts abandoned by fraudsters in the forest reserve.

## CONCLUSIONS

The study highlighted the community forest perception of climate change and drivers of forest reserve degradation. Forest community' perception of climate change in Doma was in line with results of other studies around the world.They perceived the visible effects of climate change on Doma forest reserve as the dryness of the forest and the long-delayed of herdsman within the reserve.The presence of herdsman leads to the uncontrolled cutting and pruning of trees to feed their animal because of the lack of herbaceous pasture.The key drivers of Doma forest reserve degradation are agricultural practices, grazing, and logging. The study recommends further environmental education particularly climate change education in the Doma forest reserve communities.

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