



Woody Species Composition of Doma Forest Reserve in Nasarawa State, Nigeria

Moussa Soule^{1*}, G. N. Nsofor² and A. A. Okhimamhe¹

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

²Department of Geography, Federal University of Technology Minna, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author MS designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors MS and GNN managed the literature searches and analyses of the study performed the spectroscopy analysis. Author AAO identified the species of plant. All authors read and approved the final manuscript.

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ABSTRACT

Woody floristic data plays an important role in forest management and forest biodiversity conservation. This study attempted to determine the woody flora of Doma forest reserve in Nasarawa State of Nigeria. We used a systematic sampling approach to inventory forest reserve. We used quadrat method for the floristic data collection. The size of each plot was 30 m x 30 m. In total 10 plots were installed for forest inventory. Within each plot, woody species were directly counted. The fruits, leaves and inflorescence of the unknown woody species were collected for their determination. We recorded 36 woody species belonging to 16 families and 36 genera. The family Fabaceae is presented the highest number of species (7) followed by Mimosaceae (4). Anacardiaceae, Caesalpiniaceae and Rubiaceae were represented by 3 species respectively. Arecaceae, Lamiaceae and Myrtaceae were represented by species each family. The rest of seven botanical families were monospecific. The exotic species like *Tectona grandis*, *Gmelina arborea*, *Mangifera indica* and *Eucalyptus camaldulensis* were found within forest reserve. This is an

*Corresponding author: E-mail: moussa_soulesama@yahoo.fr;

indication of anthropogenic activities within the forest reserve. The study revealed that Doma forest reserve is diverse and requires forest management practices by the local community in the conservation and sustainable use of woody plants in the area. The study revealed also that the Doma forest reserve is under threat due to inappropriate land use practices and requires appropriate forest management practices by the local community for the conservation and sustainable use of woody plants in the area. We recommend further study that examines at the impact of human activities on Doma forest reserve dynamics in order to curb these human activities.

Keywords: Forest; Nigeria; management; woody; species composition.

1. INTRODUCTION

In Nigeria, forests provide many products and services to rural people which expose them to high anthropogenic pressure leading to the forests degradation [1]. As a result, many of trees are cut for fuel wood by Nigerians [2,3]. Furthermore, Nigeria loses a cumulative of 47.5% of its natural forests between 1990 and 2010 [4] due to human activities such as agriculture, logging and fuel wood collection. For instance, the main causes of deforestation in Nigeria are logging and conversion to agriculture or grazing [5]. Agriculture is the major economic activity in the Doma local government area which is rainfed.

Forest degradation has a lot of consequences on the society such as the greenhouse gas emissions, loss of biodiversity. For example, about 65 of 560 species of trees now face extinction while many others are at different stages of risk in Nigeria forest [6].

Botanical assessments such as floristic composition plays in major role in understanding the phytodiversity in forest environment [7]. Information on species composition permits to monitor vegetation changes and conservation [8]. Knowledge of floristic list of a forest reserve is also useful in forest sustainable management. However, to our knowledge few studies have dealt with Doma forest reserve analysis in relation to woody floristic composition in Nasarawa State of Nigeria. Further, vegetation studies on the forest woody species composition in Doma forest reserve have not been done. Therefore, this study was conducted to provide a data floristic that could be useful for the conservation of woody species through a floristic inventory and field observation.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Doma forest reserve in Doma local government area of Nasarawa

State of Nigeria (Fig. 1). The study area lies between latitude 8° 29' – 8° 30' North and longitude 8° 29' – 8° 30' East. Doma local government has an area of 2,714 km²a population of 139,607 [9]. Agriculture and mining constitute the major dominant economic activities. It is in the Guinea Savanna eco-vegetation. Doma forest reserve covers 86,374.40 hectares. The mean annual rainfall of Doma local government is about 1550mm and mean annual temperature is 27°C. The major soil units of Nasarawa State belong to the category of oxisols or tropical ferruginous soils [10]. Doma forest reserve is under threat due to anthropogenic activities. As a result, most woody plants have been destroyed due to agricultural practices such as the use of fire of land clearance, illegal logging and grazing. For instance, from field observations, the images of some of the practices are inappropriate in the sense that it allows the loss of woody plant biodiversity in Doma forest reserve.

2.2 Data Collection

One day reconnaissance survey was done within the Doma forest reserve. The purpose was to look at the different habitats within the forest reserve as plant distribution can vary from habitats to habitats. The survey was also done to establish the list of Doma forest reserve woody flora. To collect Doma forest woody floristic data, systematic sampling method was employed because of the need to ensure sufficient chance to meet maximum of woody species from all the habitats gradients. Doma forest reserve data were collected systematically only from 10 plots of 30 m x 30 m. Within each plot the presence of the woody plant was recorded. The direction of transect was from the periphery to the center of the forest in order to capture all the species. During the inventory new woody species outside of the direction of the transect line were recorded. All the plots were contiguous and latitude and longitude of each plot were collected with GPS and recorded on each slip of the forest



Picture 1. Human activities in Doma forest reserve

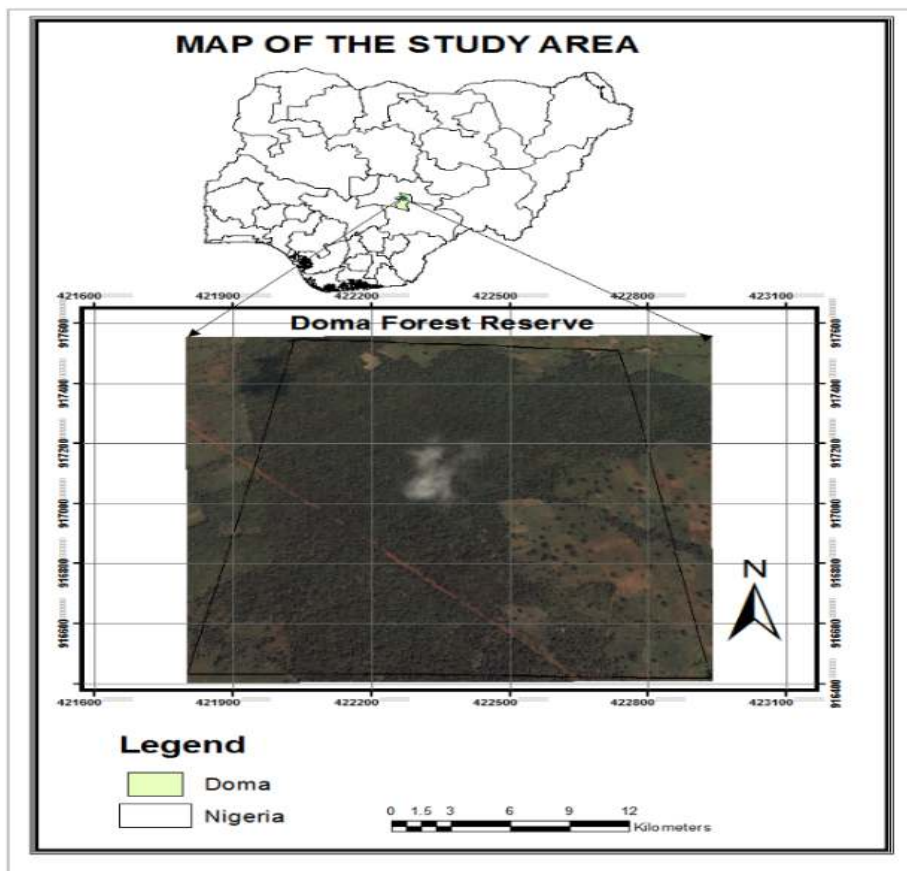


Fig. 1. Location of the study area

inventory. All woody plants within the plots were identified and recorded by their vernacular names. For unknown woody species, the photos of leaves, fruits and the entire photo of the woody

plants were taken with digital camera for identification. The unknown woody species were identified by experts of West African Plants Facebook page.

2.3 Data Analysis

Data generated on Doma woody flora were analyzed by determining the number of species and genera. Specially, floristic analysis was used to determine the percentage of each botanical families. The number of genus, and floristic diversity were determined with Excel.

3. RESULTS AND DISCUSSION

3.1 Woody Species Composition

In this study, a total of 36 woody plant species, representing 16 families were recorded in the study area (Fig. 2). The genera recorded were monospecific (One specie by genius). Among identified plants, Fabaceae family represented by 7 woody species (19.4%) followed by

Mimosaceae represented by 4 woody species. Anacardiaceae, Caesalpinaceae, Combretaceae and Rubiaceae were represented by 8.3%, (3 woody species each family). Arecaceae, Lamiaceae and Myrtaceae were represented by 5.6% (2 woody species each family). The rest of seven botanical families were represented by one woody specie. This result was similar to some studies done in Nigeria. For instance, [11] found out in derived savanna ecosystem of Adamawa State that Fabaceae was the richest families in terms of woody flora. Furthermore, this result was also similar to the result found by [12] in Akoka campus of the University of Lagos. But within Akoka campus, they found 13 species of Fabaceae. Moreover, our result differs from the result of [13] who found that Caesalpinaceae is the richest family in Oban forest reserve of Nigeria. Other exotic species were found within Doma forest reserve such as *Mangifera indica* *Tectona grandis*, *Gmelina arborea* and *Eucalyptus camaldulensis* indicating the human activities within the forest.

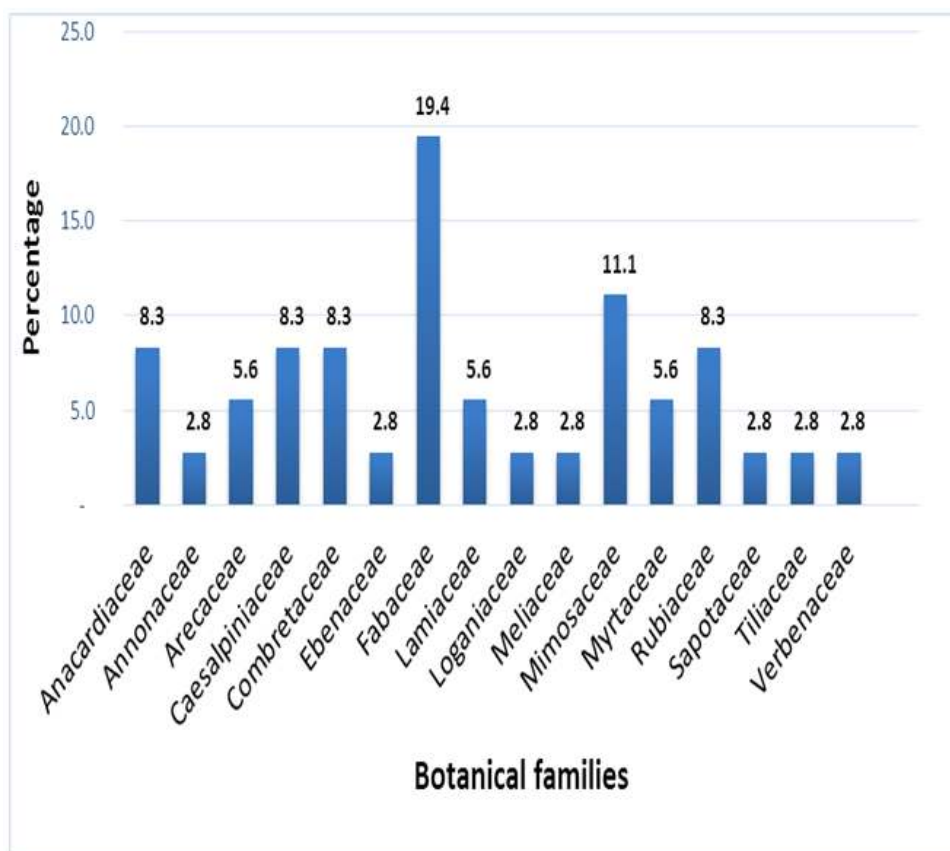


Fig. 2. Distribution of woody species of Doma forest reserve by botanical families

Table 1. List of woody species of Doma forest reserve source

Species	Botanical families	Hausa names
<i>Lannea acida</i> A. Rich.	Anacardiaceae	Faru
<i>Mangifera indica</i> L.	Anacardiaceae	Mangoro
<i>Anacardium occidentale</i> L.	Anacardiaceae	Cashew (English)
<i>Annona senegalensis</i> Pers.	Annonaceae	Gwandan Daji
<i>Elaeis guineensis</i> Jacq.	Arecaceae	Kwara
<i>Borassus aethiopum</i> Mart.	Arecaceae	Giginya
<i>Piliostigma reticulatum</i> (DC) Hochst.	Caesalpiniaceae	Kalgo
<i>cassia singueana</i> Del.	Caesalpiniaceae	Runhu
<i>Detarium microcarpum</i> Guill & Perr.	Caesalpiniaceae	Taura
<i>Combretum molle</i> R. Br. ex G. Don.	Combretaceae	Wuyan damo
<i>Anogeissus leiocarpus</i> (DC) Guill & Perr.	Combretaceae	Marke
<i>Terminalia avicenniodes</i> Guill.& Perr.	Combretaceae	Baushe
<i>Diospyros mespiliformis</i> Hotcht ex A. DC	Ebenaceae	Kanya
<i>Azelia africana</i> Sm. ex Pers.	Fabaceae	Kawo
<i>Isobertinia doka</i> Craib & Stapf.	Fabaceae	Doka
<i>Pterocarpus erinaceus</i> Poir .	Fabaceae	Madobiya
<i>Tamarindus indica</i> L.	Fabaceae	Tsamiya
<i>Albizia zygia</i> Macbride.	Fabaceae	Madobiya rafi
<i>Dialium guineense</i> Willd.	Fabaceae	Tsamia Biri
<i>Daniella oliveri</i> Hutch & Dalziel.	Fabaceae	Maje
<i>Tectona grandis</i> L.f.	Lamiaceae	Teak(English)
<i>Gmelina arborea</i> Roxb. ex Sm.	Lamiaceae	Malina
<i>Strychnos spinosa</i> Lam.	Loganiaceae	Kokiya
<i>Khaya senegalensis</i> (Desr) A. Juss.	Meliaceae	Madaci
<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don.	Mimosaceae	Dorowa
<i>Prosopis africana</i> (Guill & Perr)	Mimosaceae	Kiriya
<i>Acacia siebieriana</i> DC.	Mimosaceae	Farar Kaya
<i>Entada africana</i> Guill & Perr.	Mimosaceae	Tawatsa
<i>Eucalyptus camaldulensis</i> Dehnh.	Myrtaceae	Turare
<i>Syzygium guineense</i> wall.	Myrtaceae	Malmo
<i>Crossopteryx febrifuga</i> (Afzel. ex G. Don) Benth	Rubiaceae	Kashi Awaki
<i>Sarcocephalus latifolius</i> Sm.	Rubiaceae	Tafashia kurm/ Tuwon Biri
<i>Gardenia erubescens</i> Stapf & Hutch.	Rubiaceae	Gaude
<i>Vitellaria paradoxa</i> Happer	Sapotaceae	Kade
<i>Grewia bicolor</i> Juss.	Tiliaceae	Dargaza
<i>Vitex doniana</i> Sweet	Verbenaceae	Dunya

4. CONCLUSION

The study has determined Doma forest reserve floristic composition. The study revealed that 36 woody plants were recorded in Doma forest reserve. Further the study revealed that Doma forest reserve is under land use pressure such as the use of fire for agricultural land clearance, illegal logging and illegal grazing. Doma forest reserve management practices are required by the local community for the sustainable use and conservation of the woody species. Therefore, the study recommends further inventory so that a complete woody flora of Doma forest reserve will be established.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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