FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 2 No. 4, December, 2018, pp 200 - 206

COMPOSITION AND TAXONOMIC DIVERSITY OF PLANTS IN GARKI VILLAGE, BAURE LOCAL GOVERNMENT, NIGERIA

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ABSTRACT

The importance of plants to man cannot be overemphasized. Beyond their value for food, energy and fiber, plants act as cleanser by filtering pollutants such as oxides of carbon, toxic gases and heavy metals. This study assessed the composition and taxonomic distribution of plants with a view to providing information for the development of sustainable production options in the study area. Vegetation sampling was employed in this study to count, list and identify plants. A $50m^2$ quadrat was used based on the information obtained about the floristic composition of the study during reconnaissance. Result of the study showed that a total of thirty plants comprising of trees, shrubs and herbs were recorded in the area. These plants belong to 20 families. The Caesalpiniaceae, Fabaceae and Palmae were represented by the highest number of species while Convolvulaceae, Solanaceae, Eurphobiaceae, Asteraceae, Meliceae and Bombaceae have only one member respectively. The study area was composed of twenty two trees (65%), five shrubs (20%) and seven herbs (15%) hence it is woody in nature. This study recommended participatory management of species composition and diversity by strengthening local communities' abilities to develop sense of ownership and responsibility for the management and conservation of species in areas. This can be achieved through the expos, exhibitions and use electronic media and ICT (mobile devices).

***Keywords**: floristic composition, biodiversity, conservation, sustainable production*

INTRODUCTION

Plants are very crucial to ecosystems and local livelihood security. They serve several critical functions in the biosphere at all possible spatial scales. Perhaps most importantly, global vegetation (including algal communities) has been the primary source of oxygen in the atmosphere, enabling the aerobic metabolism systems to evolve and persist (Sherratt, 2013).

Nigeria is endowed with diverse ecosystems, plants and other bio-resources that provide various livelihood products and services. As of 2010, there are about 7,895 plant species identified in 338 families and 2,215 genera in the country (Federal Government of Nigeria, 2010). Plants occur in different numbers within the country from the mangrove in the south to the Sahel in the north (Adeyinka, 2012). Despite huge bio-resources in the country, anthropogenic activities that lead to depletion forest resources, forest conversion to farmland, exploitation through selective harvest, seasonally set forest fires (Mu'azu, 2010), fuelwood removal (Naibbi, 2013), and charcoal production, woodland grazing of cattle (Angassa, Oba and Stenth, 2012) and even hunting of native herbivores are posing serious concern to its biodiversity (David, 2008).

In the face of these problems, several studies have been conducted on vegetation and wildlife in northwestern Nigeria. Some examples are Nichol (1989), Mortimore *et al.* (2006), Daura (2011), Mohammed (2013), Yusuf (2013) and Ezeobi (2014) and Danjuma (2017). Commonly assessed attributes in those studies are: density, diversity, frequency, percentage cover, structure, and composition of plants. These widespread small scale plant surveys were able to show how changing pattern of agricultural production occasioned by population and/or market driven intensification had affected vegetation communities in various parts of northern Nigeria. Human disturbances are often leading drivers of disequilibrium of plant composition because they influence the process that both augment and erode species. The intrusion of human populations into natural ecosystems such as forest and bush land for fuelwood (Naibbi, 2013), slash and burn system of agriculture (Ndah et al., 2012) are main causes of loss of biodiversity in Nigeria (FGN, 2012) as well as Cameroun respectively. It also increases the concentration of greenhouse gas (GHG) into the atmosphere (Simula, 2009) among other effects.

Given the high rate of species loss in northern Nigeria (Federal Government of Nigeria, 2013), there is a need for a detailed assessment of plant composition at the village scale and farming communities. This becomes more imperative in the face of ever increasing threat to the natural ecosystems. The objective of this work is to assess the composition of flora of the study area and describe their taxonomy with a view to providing preventive measures to prevent possible consequences of anthropogenic activities on biodiversity and the ecosystems in the area. The

present environmental conditions in the Sudano-Sahelian zones (a lack of rainfall and overexploitation) are unfavourable for maintenance of the natural vegetation. This applies particularly to woody vegetation, which plays a major socio-economic role (fuelwood, grazing, medicines, etc.). Better knowledge of the floristic composition, structure and environmental distribution of this vegetation is thus needed in order to draw up development and/or conservation proposals (FAO, 2005).

STUDY AREA

The study area is Garki Village, a predominantly farming community in Baure LGA, northern Katsina State, Nigeria. The village is among the localities of the Baure LGA that shares border with Magaria department of Zinder Region in Niger Republic hence very dry. Garki village is located on latitude 12º50 '' and 12º52'' and longitude 8º48'' and 8º51''. Being a fringe village, Garki village is located at about 5.76 km to the border with Niger Republic and 21.40 km to Magaria department, an important socio-economic centre of Zinder Region. To the northeast and northwest the village is about 70.97 km and 57.29 km away from Maigatari, Jigawa State and Daura, Katsina State respectively.

The climate of the study area is generally hot and is termed tropical continental climate with a mean annual temperature of about 25^{0}C (Daura, 2011). The climatic of the area is determined by the movement of the Inter Tropical Discontinuity Zone (ITDZ) which brings about two main seasons which are the dry season, which starts from November to March and the wet season which starts from April to October.

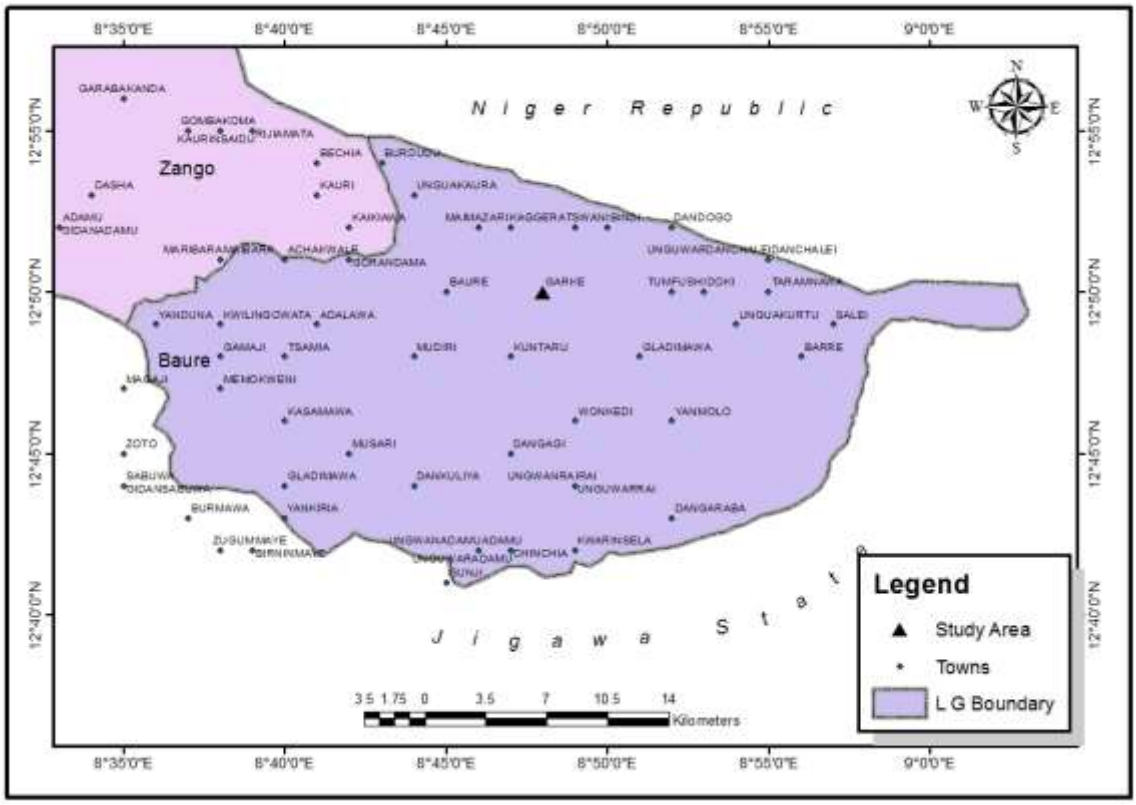

Fig. 1: Garki Village, Katsina State, Nigeria

Vegetation of the study area is fundamentally a sparse type which is influenced by array of biotic and abiotic processes. It is made up of grasses 1 to 2 m high and often stunted trees. As a result of low rainfall and poor soil fertility, the natural vegetation of the study area is made up of mainly thorn shrubs and trees dominated by grasses. Some of the most frequent tree species in this environment are: *Hyphaene thebaica*, *Parkia biglobosa*, *Adansonia digitata*, *Faidherbia albida*, *Tamarindus indica*, *Borassus aethiopum*, *Prosopis africana*, *Balanite aegyptiaca* and *Acacia nilotica.* Exotic species include *Acacia senegalensis*, *Azadirachta indica*, and *Eucalyptus camaldulensis.*

The area has no population figure in the 2006 national census. Estimated figure showed that the population of Baure LGA is 197,425 and an average population density of 297 persons/km^2 (National Population Commission of Nigeria, 2006).

MATERIALS AND METHODS

Reconnaissance was carried out to observe variations in vegetation forms and its physiognomic characteristics as well as livelihood activities of people of the study area. Various key informants and vegetation user (both men and women) who have the knowledge of local plants conservation were identified and engaged informally. This was with a view to collecting first hand information that was used in drawing up detailed study plans in the subsequent phases.

Data collection was done using quadrat. A 50m x 50m quadrat was employed to conduct vegetation survey based on the understanding that this size is suitable for inventorying vegetation in the dry ecosystems (Adejuwon *et al.*, 1989). In line with Fidelibus and Mac Aller (1993) who suggested that quadrats can be established regularly, subjectively or randomly in a given site, the tools were established subjectively in each study location based on observation and consultation with key informants.

After successful quadrats layout, species were identified and counted. Vegetation record form was used to collect data of each quadrat. Samples of species that were not directly identified on the field were collected on pressers and transported to herbarium of Department of Biological Sciences of Bayero University Kano for identification. Photographs were also taken with a digital camera at the time of sampling. Instruments used for data collection are:100m measuring tape, gunter's chain, four ranging poles and a digital camera (Samsung) for taking photographs.

Data of collected from quadrat sampling was arranged in spreadsheet software (EXCEL) and analysed using formulae below in line with (Curtis and McIntosh, 1951):

Diversity entails variety of organism in a particular area (Kindt, and Coe, 2005). Species diversity was determined using Shannon –Weiner index (Shannon and Weiner, 1963) as:

$$H=-\Sigma\ (Ni/N)\ \log_2\ (Ni/N)\ I=1$$

Where; **Ni**= Total number of individuals of a species
N= Total number of individuals of all species.

Shannon index (written as H') is particularly used in this assessment for its sensitivity to the number of rare species in a community. Shannon index measures species order within a community. The index is good when a random sample from a larger community such as the current area.

RESULT AND DISCUSSION

Floristic Composition of Plants in the Study Area

This study area is naturally endowed with many species despite natural and anthropogenic perturbations. The vegetation type of the area is secondary or degraded woodland comprising of widely spaced trees, shrubs and continuous cover of herbs and few grasses. With the exception of some exotic species (*Azadirachta indica* and *Magnifera indica*) planted as on farms, vegetation in the area is predominantly indigenous.

A total of 34 varieties of plants were encountered in the study area. These comprised on trees, few shrubs and herbs belonging to 20 families. The Caesalpiniaceae, Fabaceae and Palmae has the highest species while Convolvulaceae, Solanaceae, Eurphobiaceae, Asteraceae, Meliceae and Bombaceae were represented by only one plants each (Table 1). Some important multipurpose tree species found in the study locations are *Piliostigma reticulatum, Azadirachta indica*, *Anogeissus leiocarpus, Adansonia digitata*, *Diospyros mespiliformis* as well as *Parkia biglobosa*. Findings of this study revealed that *Tamarindus indica*, *Sclerocarya birrea* and *Ficus iteophylla* as well as those that provides fodder e.g *Faidherbia albida* are rare and possibly threatened in the area due to over exploitation. However, shrubs such as *Hyphaene thebaica, Guiera senegalensis* and *Lawsomia inermis* are common on farmed parklands in the area. This is due their resilience to trampling and over exploitation as well as because they are planted by farmers as hedges on farm boundaries (Plate 1).

These plants are the backbone of the economy as well as the life support system of people in the study area. Their uses include food, medicines, household tools, fuelwood, furniture and building materials. Other products provided by species include fruits and nuts, and rattan. Some of the plants are used for subsistence, income and jobs in the area.

Table 1: Types of Plants encountered in the Study Locations

SN	Botanical Names	Local Names (Hausa)	Life form	Families

1	*Cassia tori*	Tafasar masar	Herb	Fabaceae
2	*Hyphaene thebaica*	Kaba	Herb	Palmae
3	*Ipomoea repens*	Duman kada	Herb	Convolvulaceae
4	*Senna occidentalis*	Tafasa	Herb	Fabaceae
5	*Solanum incanum*	Gautar kura	Herb	Solanaceae
6	*Euphorbia convolvuloides*	Nonon kurciya	Herb	Euphorbiaceae
7	*Centaurea perrottetii*	Farar kaba	Herb	Asteraceae
8	*Acacia ataxacantha*	Sarkakiya	Shrub	Fabaceae
9	*Combrethum micranthum*	Geza	Shrub	Combretaceae
10	*Lawsomia inermis*	Lalle	Shrub	Lytharaceae
11	*Ziziphus Mauritania*	Magarya	Shrub	Rhamnaceae
12	*Gueira senegalensis*	Sabara	Shrub	Combretaceae
13	*Acacia nilotica*	Bagaruwa	Tree	Mimosaceae
14	*Acacia senegalensis*	Dinshe	Tree	Mimosaceae
15	*Adansonia digitata*	Kuka	Tree	Bombaceae
16	*Azadirachta indica*	Bedi	Tree	Meliceae
17	*Balanite aegytiaca*	Aduwa	Tree	Balanitaceae
18	*Borassus aethiopum*	Giginya	Tree	Palmae
19	*Cassia arereh*	Malga	Tree	Caesalpiniaceae
20	*Cassia singueana*	Runhu	Tree	Caesalpiniaceae
21	*Disophyros mespiliformis*	Kanya	Tree	Ebenaceae
22	*Faidherbia albida*	Gawo	Tree	Mimosoideae
23	*Ficus iteophylla*	Shiriya	Tree	Moraceae
24	*Ficus thonningii*	Gamji	Tree	Moraceae
25	*Hyphaene thebaica*	Goriba	Tree	Palmae
26	*Lannea acida*	Faru	Tree	Anacardiceae
27	*Maerua crassifolia*	Jiga	Tree	Caesalpiniaceae
28	*Parkia biglobosa*	Dorowa	Tree	Mimosaceae
29	*Phoenix dacylifera*	Dabino	Tree	Palmae
30	*Piliostigma reticulatum*	Kalgo	Tree	Caesalpiniaceae
31	*Tamarindus indica*	Tsamiya	Tree	Caesalpiniaceae
32	*Ziziphus spina-christii*	Kurna	Tree	Rhamnaceae
33	*Sclerocarya birrea*	Danya	Tree	Anacardiceae
34	*Magnifera indica*	Magwaro	Tree	Anacardiceae

In line with von Maydell (1990) and Danjuma (2010) notable species of valuable importance for insect bites, fever, coughs, colds, diarrhea and malaria: *Acacia nilotica, Azadirachta indica, Cassia singueana,Gueira senegalensis, Tamarindus indica*. While *Adansonia digitata, Parkia biglobosa, Phoenix dacylifera, Lannea acida* and *Tamarindus indica* produce fruits and leaves that are appreciated by both local people and industries. *Lawsomia inermis* is used to produce cosmetics while *Faidherbia albida* and *Combrethum micranthum* are fodder species.

Plate 1: A Farmed Parkland at Garki village showing *Adansonia digitata*. This is a typical savanna that has been derived by human activities.

Composition of Vegetation in the Area

Composition here entails plant form as grass, herb, shrub or tree. Accordingly, three plant forms were surveyed in this study because of the complexity of sampling grasses. The study area is composed of thirty four plants including twenty two trees (65%), five shrubs (20%) and seven herbs (15%) (Figure 1). This indicated that the area is woody in nature.

The dominance of woody plants could be as a result of habitat adaptation and ability to withstand harsh environmental conditions such as drought in the area. Some shrubs are such as *Combrethum micranthum* are noted with poor root establishment, useful for the acquisition of nutrients. This is similar to Chauhan et al. (2008) who reported that poor growth of tree species can be attributed to poor efficiency of some species in absorbing nutrients in the ecosystem. Again, the systematic cutting of shrubs for fodder and fuel and browsing by animals increase their vulnerability thereby threatened them to local extinction.

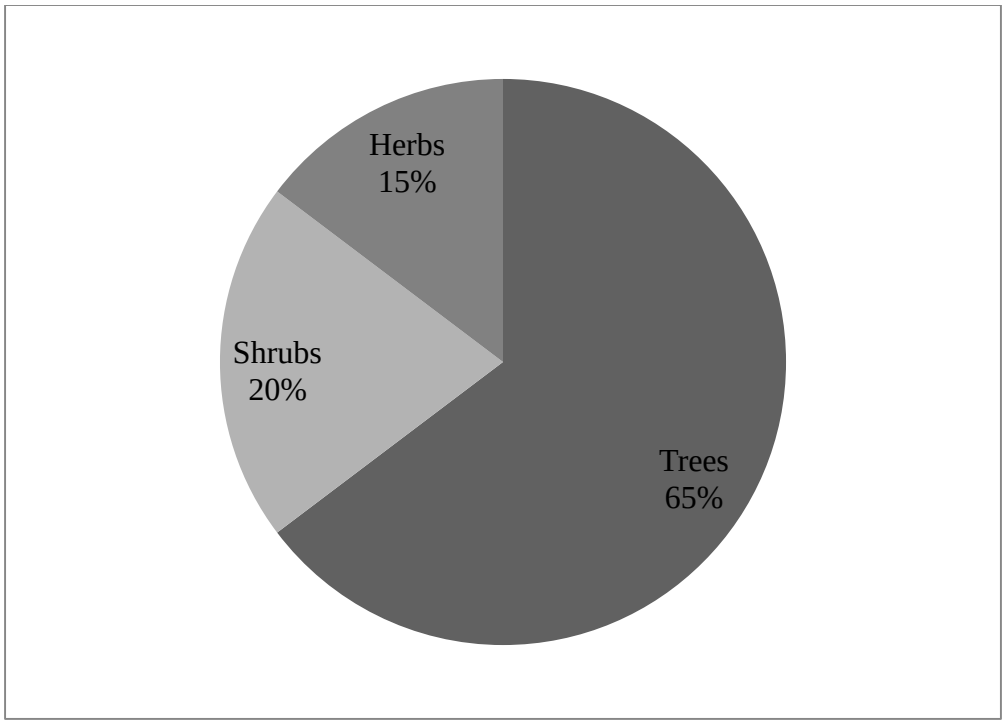

Fig. 1: Species Composition in the Area

CONCLUSION AND RECOMMENDATIONS

This study found that changes in plants composition as well as species loss have occurred in the study location. The high composition of woody plants in the study area suggested the extent to which herbs and shrubs were relatively declining with increasing disturbance and nearness to the farms. Nonetheless, the study area is dominated by *Piliostigma reticulatum, Azadirachta indica,Gueira senegalensis* and saplings of *Adansonia digitata* and *Diospyros mespiliformis*. This study recommended that:

1. participatory forest management programmes should focus on local communities' abilities to develop sense of ownership and responsibility for the management and conservation of species in areas. This can be achieved through exhibitions, use of electronic media and ICT (mobile devices).

2. the existing forest conservation laws in the states should be strengthened to ensure protection of the remaining species and repositories. The laws should be backed by adequate commitment as well as appropriate and uniformed rangers and appropriate penalties.

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