*Journal of Research in Forestry, Wildlife & Environment Vol. 13(1) March, 2021*
***E-mail:*** *jrfwe2019@gmail.com; jfewr@yahoo.com*
***http://www.ajol.info/index.php/jrfwe***
***jfewr ©2020 - jfewr Publications***
***ISBN: 2141 – 1778***
***Turshak et al., 2021***





# BIRDS AND MAMMALS IN SOME PROTECTED AND COMMUNITY FORESTS IN CENTRAL NIGERIA

**[*1]Turshak, L. G., [2]Chaskda, A. A., [3]Namo, O.A.T., [3]Dawang, S. N. [3]Agyeno, O. E., [2]Da'an,, S.A. and [4]Jidangkat, M. and [2]Pam, G.A.**

[1]Biological Sciences Unit, Department of Science Laboratory Technology, University of Jos.
[2]A.P. Leventis Ornithological Research Institute, Department of Zoology, University of Jos
[3]Department of Plant Science and Biotechnology, University of Jos, Nigeria.
[4]College of Arts and Science, Kurgwi, Plateau State
***Correspondent Author:** *longtee2008@gmail.com;*

## *ABSTRACT*

***Nigeria is losing so fast its forest resources with high deforestation and decline in both flora and fauna. Some protected and community forest areas in Plateau State were visited to carry out survey of birds and mammals. The protected sites include the Jos Wildlife Park, Amurum Forest Reserve, and the Pandam Game Reserves while the community forests were Naraguta Mountain Forest, Lugor Community Forest and the Janta Community Forest all in Plateau State, Nigeria. Three transects of five hundred metres (500 m) were placed in each protected and community forest reserve randomly to generate data. Control for effort was carried out to make adjustment for size of forests. The commonest mammals recorded were Tantalus Monkey Chlorocebus tantalus, and Ground Squirrel Xerus spp. The least recorded was Red-flanked Duiker Cephalopus rufilatus. More bird species abundance was recorded in the community forests compared with the protected forests. Higher bird species richness was recorded in the protected forests compared with the community forests. Base on the outcome of this study, the protected forests are still serving the role of an ecological laboratory for the protection of the typical Jos Plateau flora and fauna. The community forests have shown complementarity to the protected forests especially the Lugor Community Forest and the Naraguta Mountain Forest which are rich sites for indigenous species of plants and animals.***

**Keywords**: Biodiversity, Forests, Reserves, Woody Plants, Mammals, Birds and Insects

## INTRODUCTION

Nigeria's forest resources are being lost at an alarming rate (Okonkwo *et al*., 2009). Currently, Nigeria ranks highest among countries with high deforestation rate. Between 2000 and 2005, the country is reported to have lost about 55.7 % of its primary forest. Logging, fuel wood collection and subsistence farming are adjudged the leading cause of forest clearance in the country. Savannah and rainforest vegetation zones are regarded as the major ecosystems supplying the country's wood demand. Poverty, weak and obsolete legislation such as the forestry ordinance act of 1938, lack of enlightenment, poor law enforcement, policy strategies and governance are the major factors influencing forest degradation in Nigeria (Onoja and Emodi, 2012).

The weather of Plateau State is unique and so are its biological resources. To sustainably conserve this unique ecosystem,

an investigation such as this will draw attention from the anthropogenic (human) activities currently bedevilling the ecology. Thus, this project sets out to conduct a preliminary assessment of some floral and faunal composition of protected and community forest reserves in Plateau State with the view to identifying threats and prioritising areas that require sustainable management efforts, enlightenment and enforcement.

From review of relevant literature, little or no record of evaluation and assessment of the flora and fauna status of the protected and community forest areas in Plateau State has been done. This is in addition to weak capacity of key administrators/policy makers, researchers and forest guards of biodiversity conservation in protected areas. There is also poor knowledge and weak appreciation of the role and importance of biodiversity in the functioning of a healthy ecology by individuals of communities including weak enforcement of relevant laws on forest and biodiversity resources. The rationale for conducting this research is borne out of; firstly, the assessment of floral and faunal (biodiversity) composition in protected and community forest reserves in order to establish the biodiversity status of the community and protected forest reserves in Plateau State. This will be a baseline information by which future ecological investigations could be carried out.
Secondly, the capacity building aspects of Research Officers and Forest Guards in a long term will provide basic biodiversity monitoring skills, boost appreciation and legislation on biodiversity by relevant stake holders and lead to enforcement of protected areas. This will in turn enhance the conservation of native species and mitigate anthropogenic effects on the environment which if unchecked could increase the risk of climate change. This study was aimed at assessing aspects of bird and small mammal species abundance and richness between protected and community forest reserves in Plateau State with the view to identifying complementarity and priority areas that require sustainable management efforts.

## MATERIALS AND METHODS

### Study Areas

the Jos Plateau of Plateau State (Figure 2), North-central Nigeria (09°53'N and 08°58'E), which has the largest landmass of approximately 250 km by 150 km above 1000 m in Nigeria. This forms a unique vegetation unit, within the Guineo-Congolian/Sudanian Regional Transition Zone. It comprises high plains with scattered rock outcrops ranging from 1120 to 1450 m above sea level and a number of granite hill ranges that rise to 1,781 m. The average rainfall of the Jos-Plateau is 1,411 mm per year (Payne, 1998). Much of the vegetation of the Jos Plateau has been devastated by tin-mining activities (Hadejia *et al* 2000). A high human population (200-300 people per $km^2$) has resulted in continued, large-scale deforestation and conversion of grassland and scrub to agriculture and the few remaining patches of forest and woodland are fast being depleted by unsustainable fuel wood collection (Lodewijik and Were, 2001; Chaskda, 2007; Molokwu, 2009). Only a few areas of natural grasslands, savanna-woodlands and forest remain on the Jos Plateau and one of such areas is the Jos Wildlife Park.

Selected protected areas in Plateau State namely, the Jos Wildlife Park (N09° 52' E08° 53') Pandam Game Reserve (N08°40’ E 09°03’), Amurum Forest Reserve (N9°53', E8°59') were visited to carry out survey of insects, birds and mammals. The Jos Wildlife Park and the Pandam Game Reserves are owned and manage by the Government of Plateau State. Generally, the Jos Wildlife Park, Amurum Forest Reserve, the Naraguta Mountain Forest and the Lugor community forests are located on the Jos Plateau essentially characterized by savanna woodlands, gallery forests with seasonal streams, gentle hills and rocky outcrops and some exotic plants. The sites holds some of

the best remaining areas of natural vegetation of the Jos-Plateau with representatives of plants such as: *Daniella oliveri, Parkia clapertoniana, Lophira lanceolata, Khaya senegalensis, Vitex doniana, Piliostigma thonnigii* and different species of Ficus (Ezealor 2002).

In the southern part of Plateau are Pandam Game Reserve and Janta Community forest all located in Quanpan Local Government Area. The general vegetation of the southern Plateau State is Sudan-Guinea Savanna with gallery forest in riparian areas. Trees in the savanna include *Burkea Africana-Combretum* woodlands in the south, *Detarium microcarpum-combretum* woodlands in the central area and *Isoberlinia doka* woodlands to the north. Other trees include *Parkia biglobosa, Daniella oliveri and Butyrospermun paradoxum*. Tree species of the gallery forests include *Afzelia africana*, *Ceiba pentandra* and *Rafia sudanica* (Ezealor, 2002; Akosim *et al.*, 2007)

Line transects (Bibby *et al.* 2002) was used to generate field data on mammals, birds and insects. Three transects of five hundred metres (500 m) were placed in each protected and community forest reserve randomly to generate all biodiversity data. Control for effort was carried out to make adjustment for size of forests.

**Bird and Mammal Survey Design**

Three (3) five hundred metre (500 m) line transects were randomly selected and placed for the survey. The transects were walked slowly looking for and recording birds and mammals seen or heard. Field sessions for biodiversity surveys were carried out during the morning hours between 7:00 and 11:00 hours. All data on mammals and birds were collected during the dry seasons.

## RESULTS

**Mammalian Species Abundance**

There were seven different species of mammals recorded during this survey. The common mammals recorded during the study include Tantalus Monkey *Chlorocebus tantalus*, Ground Squirrel *Xerus spp* and African Yellow Bat *Schotophilus dinganii*. The least recorded was Red-flanked Duiker *Cephalopus rufilatus* (Figure 1). Table1 shows presence and absence of mammals across the protected and community forest reserves.

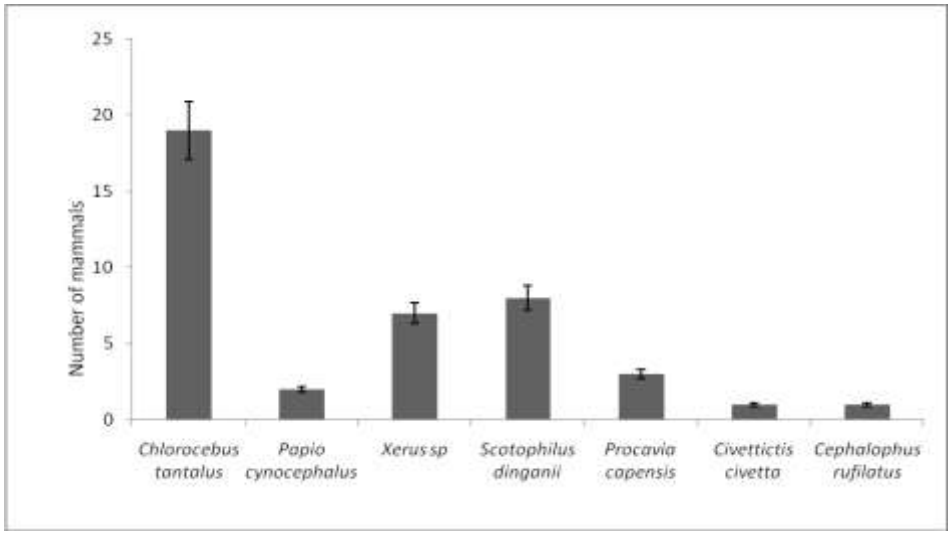


Figure 1. Mean number of mammals identified across community and protected forests in Plateau State**.**

**Table 1: Presence and absence of mammals identified across protected and community forests in Plateau State**
***Denotes absence of mammal**.

| S/No | Mammals | Pandam Game Reserve | Jos Wildlife Park | Amurum Forest Reserve | Naraguta Mountain Forest | Lugor Community Forest | Janta Community Forest |
|---|---|---|---|---|---|---|---|
| 1 | Tantalus Monkey (*Chlorocebus tantalus)* | 30 | 6 | 10 | 3 | 3 | * |
| 2 | Ground Squirrel (*Xerus spp)* | 7 | * | 3 | * | * | * |
| 3 | Baboon (*Papio cyanocephalus)* | * | * | * | 2 | * | * |
| 4 | African Yellow Bat (*Schotophilus dinganii)* | * | * | * | * | * | 5 |
| 5 | Rock hyrax (*Procavia capensis)* | * | 3 | * | * | * | * |
| 6 | Civet cat (*Civettictis civetta*) | * | * | * | 1 | * | * |
| 7 | Red-flanked duiker (*Cephalopus rufilatus*) | * | 1 | * | * | * | * |

**Bird Species Abundance and Richness**

There was significantly higher bird species abundance at the Pandam Game Reserve compared with the Jos Wildlife Park, Amurum Forest Reserve, Naraguta Mountain Forest, Lagor Community Forest and Janta Community Forest (Kruskal Wallis; $\chi^2 = 943$, df=5, P<0.001; Figure 5). Higher bird species richness were recorded at the Amurum Forest Reserve compared with the Jos Wildlife Park, Naraguta Mountain Forest, Lagor Community Forest and Janta Community Forest (Figure 2).

There was also a significantly higher bird species abundance recorded in the community forests compared with the protected forests (Mann-Whitney; W=3.45, Z=1.95, P=0.04; Figure 6). On the other hand, there were more bird species richness recorded in the protected forest compared with the community forest (Figure 3).

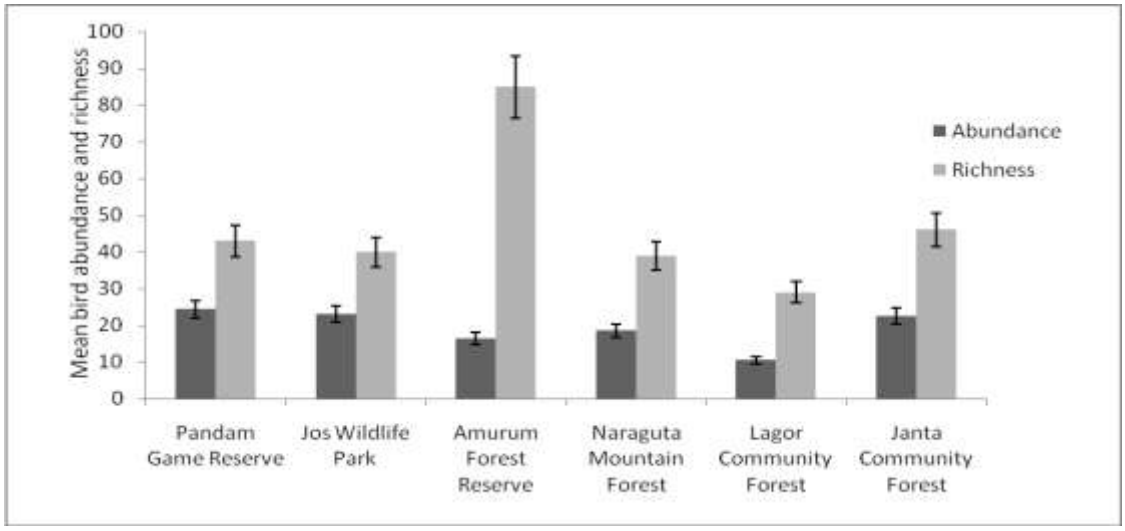


Figure 2. Mean bird species abundance and richness across some community and protected forests in Plateau State.

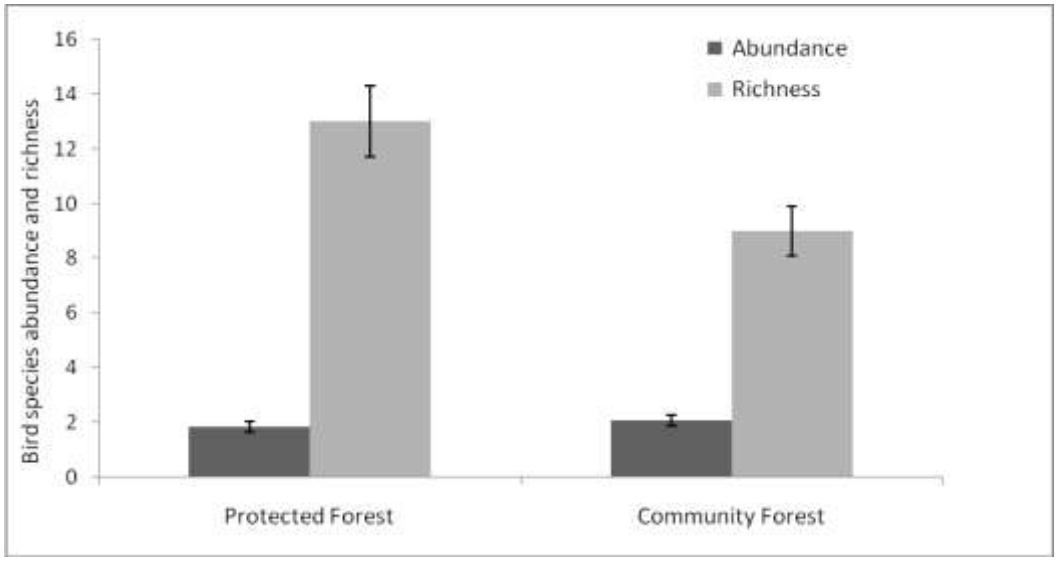


Figure 3. Mean bird species abundance and richness across community and protected forests in Plateau State

## DISCUSSION

Few mammals were generally recorded during this study. Tantalus Monkey *Chlorocebus tantalus* was the commonest mammal recorded in the protected and community forest reserves compared with other groups of mammals. Similar trend was observed for avian species richness. Higher bird species richness in the protected forest reserves as compared with community forest was recorded. This could be explained by the protection status of three protected forest namely the Pandam Game Reserve, Jos Wildlife Park and the Amurum Forest Reserve (Ben-Shahar, 1998; Canterbury *et al.*, 2000; Erickson, 2007). The protected forest reserves are given some forms of restriction from anthropogenic activities such as prohibition on grazing, hunting, logging, collection of fuel-wood and non-timber products, bush burning, fishing etc. could assist in maintaining the biological diversity of a forest reserve (Ben-Shahar, 1998; Canterbury *et al.*, 2000**).** The management of the community forest is however different from the protected forest reserves, where community members could freely collect timber and non-timber products without much restriction. Findings from this study indicate that although some anthropogenic activities currently being carried out in these protected forest reserves, they still retain more biodiversity compared with the community forests. Many studies (Ben-Shahar, 1998; S´anchez-azofeifa, 2007; Turshak *et al.* 2011) have shown the negative effects of anthropogenic activities on biodiversity.

Out of the three protected forest reserves where surveys were conducted, observation pointed out that the Amurum Forest Reserve enjoys better protection effort than Pandam Game Reserve and Jos Wildlife Park. The better protection for the Amurum Forest Reserves may be as a result of the direct public-private partnership entered into for the management of the reserve. The two government owned forest reserves namely the Pandam Game Reserve and Jos Wildlife Park suffers neglect from policing, with consequent decline in species in biodiversity. At the time of this study, there was no ranger sighted in these two reserves, rather, herds of cattle were observed freely grazing and women collecting and transporting fuel wood out of the reserves without restriction. One of the worrisome concerns observed during this study was the preliminary discussion entered into by the Plateau State government and a Chinese private firm to log an indigenous tree species known African Rose Wood (*Pterocarpus erinaceous*). This tree species is suitable for production of guns and furniture. Report indicates that the Chinese firm have gone ahead to logged the African Rose Wood from the Pandam Game Reserve. The immediate and long term effects of removal of African Rose Wood is not known, however, it is known that removal of indigenous woody plant species from a habitat could lead to serious consequences for ecological processes. This may include disruption of ecosystem functioning and networking, possible extinction of species that depend on the tree for food and shelter, destruction of species habitat such as birds, reptiles, small mammals insects **(**S´anchez-azofeifa, 2007**)**

Avian species abundance may be higher in the community forest reserves against the protected forest reserves edge effects. Generalist species tend to survive in habitat with difficult conditions compared with specialist species (Canterbury *et al.*, 2000; Erickson, 2007; Turshak e*t al.* 2011). In addition to this, disturbed habitat supports higher species abundance compared with undisturbed habitat. Undisturbed habitat supports higher diversity and species richness than disturbed habitat types

This study shows that the protected areas in Plateau State have relatively high tree

species richness and abundance considering that more tree species were identified in protected areas than in community forests which are unprotected. Generally more tree species richness and abundance were recorded at the protected forests within the gallery forests.

Base on the outcome of this study, the protected forests still remain an ecological laboratory for the protection of the typical Plateau flora and fauna. The community forests have shown complimentarity to the protected forests especially the Lagor Community Forest and the Naraguta Mountain Forest which are rich sites for indigenous species of plants and animals. Such community forests could further be protected to increase the size of the protected area system of Plateau State.

**Acknowledgement**

We are sincerely grateful to the Tetfund through the University of Jos Sanate for awarding us the Senate Research Grant which enabled us carry out this research. We are grateful to the Office of Research and Development (ORD) University of Jos for facilitating the smooth running of our research. We acknowledge with gratitude the Park Managers of the Jos Wildlife Park, Pandam Wildlife Park and Amurum Forest Reserve. We thank the community chiefs of Lagor, Janta and Naraguta Mountain Forest for their support to this project.

**REFERENCES**

Akosim, C., Kwaga, B.T., Ali. and Mamman,G.S. (2007). Flora Resources and structure in Pandam Wildlife Park Plateau State, Nigeria. *Agricultural Journal* 2 (6): 740-747.

Arbonnier, M. (2002). Trees, shrubs and lianas of West Africa's dry zones. London, Margaraf. 507 pp.

Begon M., Harper J. L. and Townsend C. R. (2003). *Ecology of Individuals, Populations and Communities*. (4th edition) Blackwell Science Ltd. pp 884-912.

Ben-Shahar, R. (1998). Changes in structure of savanna woodlands in northern Botswana following the impacts of elephants and fire. *Plant Ecology* 136: 189–194, 1998

Bibby, C.J., Burgess, N.D. and Hill, D.A. (2000). *Bird Census Techniq*ues. Second Edition. Academic Press London. Pp 65-227.

Blackett, H. and Gardette, E. (2008). Cross-border flows of timber and wood products in West Africa. HTSPE Ltd.

Canterbury, G.E., Martin, T.E., Petit, D.R., Petit, L.J. and Bradford, D.F. (2000). Bird communities and habitat as ecological indicators of forest condition in regional monitoring. *Conservation Biology* 14(20): 544-558.

Castner, J.L. (2000). *Photographic Atlas of Entomology and Guide to Insect Identification*, Feline Press Inc. 174 pp.

Catterall, C.P, Kingston, M.B., Park, K. and Sewell, S. (1998). Deforestation, urbanisation and seasonality: Interacting effects of bird assemblage. *Biological Conservation*, 84: 65-81.

Dami,F.D and Manu,S.A (2008). The bird species at Pandam wildlife Park and the surrounding farmlands. *Science World Journal*, 3 (1): 7-11.

Da'an, S.A. (2016). Anthropogenic activities in Pandam Wildlife Park: Do Breeding Birds Benefit from Cattle Grazing and Poaching? Detialed final report. The Rufford Foundation. http://www.rufford.org/projects/samson_andrew_da%E2%80%99

Donald, P.F. (2004) Biodiversity impacts of some agricultural commodity production systems. *Conservation Biology*, 18: 17-38.

Clay, J. (2004) World agriculture and the environment: A commodity-by-commodity guide impacts and practices. Washington, D.C: Island Press. pp. 11-46.

Cody, M. L. (1985). Habitat selection in birds. New York. Academic Press. pp 195-220.

Erickson , C (2007). Why do they burn the bush? Fire, rural livelihood and conservation in Zambia. *The Geographical Journal* 173(3): 242-256.

Ezealor, A. U. (2002). *Critical Sites for biodiversity conservation in Nigeria.* Nigerian Conservation Foundation (NCF)., Lagos. 110 pp.

Gaston, K.J., Blackburn, T.M. and Goldewijk, K.K. (2003). Habitat conservation and global avian biodiversity loss. *Proceedings of the Royal Society of London Series B-Biological Sciences,* 270, 1293-1300.

Hutchinson, J. and Dalziel, J. M. (1972). Flora of West Tropical Africa. Keay, R. W. J. and Hepper, F. N. (VOL II 1963; VOL III 1968, 1972). Millbank, London, S.W.1

Kent, C. and Coker, P. (1992). *Vegetation description and analysis: A practical approach*. pp 28-161.

Khemani, S. (2004). Local Government accountability for service delivery in Nigeria. World Bank Development Research Group, Washington DC, USA.

Mwansat, G.S. and Turshak, L.G. (2010). Preliminary investigation of insect community of Ologbo Forest Edo State, Nigeria. *African Journal of Natural Sciences*, 13: 1-10.

Mortberg, U.M. (2001). Resident bird species in urban forest remnants; Landscape and habitat perspectives. *Landscape Ecology*, 16: 193-203.

Okonkwo, M. C., Salaudeen, A. B. and Okonkwo, C. N. (2009). An Overview of Community Forestry Practices in Nigeria: The need for Participatory Strategies. *Nigerian Journal of Botany*, 22 (1): 43-47.

Onoja, A.O. and Emodi, A.I. (2012). Economic analysis of fuelwood production and consumption: evidence from a Nigerian State. *British Journal of Management and Economics*, 2 (1): 13-23.

Shattuck, S.O. (2000). *Australian ants their biology and identification*. CSIRO Publishing. 226 pp.

Skaife, S.H. (1979). *African Insect Life.* Struik Publishers. 354 pp.

S´anchez-azofeifa, G.A., Pfaff, A. Robalino, J.A. and Boomhower, J.P. (2007). Costa Rica's Payment for Environmental Services Program: Intention, Implementation, and Impact. *Conservation Biology* 21(5): 1165–1173.

Turshak, G.S. Mwansat, G.S. and Manu, S.A. (2011). Effects of habitat structure and altitudinal gradients on avian species diversity at kurra falls forest, Nigeria. *The Zoologist,* 9:31-37.