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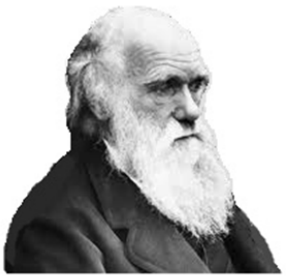

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Distribution and Abundance of Pangolin (*Phataginus tetradactyla)* in Borgu Sector of Kainji Lake National Park, Nigeria

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ABSTRACT

Habitat destruction and poaching has been a major threat to wildlife species. In Kainji Lake National Park, the present population of Pangolin (*Phataginus tetradactyla*) is not certain. Therefore, this study documents the distribution and abundance of Pangolin in Borgu Sector of Kainji Lake National Park. Data were collected using the line transect method for a period of five (5) months. The data were analyzed using descriptive statistics, and displayed in the form of tables, chart and graphs. The findings show that Awwal Ibrahim tract had the highest percentage (29.7%) of observation of pangolin during the five month period of study (March– July, 2018), and the least observation was sighted in Gilbert child and Mamud Lapai tracks - with 16.2%, respectively. The month of March had the highest number of observation (10) and the month of June had the least number of observations (5). The Population structure of pangolin (*P. tetradactyla*) revealed that adult recorded the highest observation (26) and the least observation was recorded among young individuals (11). The vegetation distribution of pangolin revealed that riparian forest recorded the highest percentage (29.7%) of sightings, followed by *Isoberlina doka* woodland and Acacia complex (18.9%, respectively) while the least was *Detarium microcapum* areas - with (16.2%). Our study also revealed that in the different activities carried out by pangolin, running recorded the highest observation (14), followed by feeding (11) and the least was resting (4). The study recommended that, the park authority should intensify anti-poaching patrols so as to stop humans from entering the park and to minimize indiscriminate deforestation, bush burning and farming activities in the area, so as to allow wildlife to have enough cover and feed for survival.

***Keywords*:** Pangolin, Distribution, Kainji Lake National Park, Borgu Sector, *Phataginus tetradactyla*

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1. INTRODUCTION

The concept of wildlife distribution and abundance is very important in biodiversity conservation (Adeyemo *et al.*, 2006). The distribution and abundance are dependent on many abiotic factors of continuous interaction of vegetation, and also includes the effects of continuous interaction of different species of wildlife (Adeyemo *et al.*, 2006). Populations of all species are naturally dynamic and fluctuate over time. The degree to which they change depends on a complex interaction between the biology of the species and the ecosystem in which they live. Some changes in environmental conditions can be beneficial and lead to an increase in population size (Roots, 2007).

At the other end of the spectrum, extreme circumstances can result in a catastrophic decrease in numbers leading to a species becoming locally extinct (Dannenfeldt, 1985). Both species abundance and species distribution are closely linked to measures of factors that affect the status of species, whether positively or negatively (Dannenfeldt, 1985). These include changes in the extent of habitat, habitat fragmentation, water quality, invasions by alien species, coverage of protected areas and harvesting by humans. By tracking trends in population size, indicators based on species population therefore not only display the trends within those species but also changes in the ecosystems in which they live. A benefit of these indicators is that they produce a clear picture of changes in biodiversity over time which can be easily explained to different audiences. Applying these indicators to a national scale is dependent on the availability of long term population datasets where abundance has been measured on at least two points in time.

Pangolins, also known as scaly anteaters, are eutherians, and unique placental mammals. Despite fulfilling a similar ecological niche as anteaters and armadillos of the order Xenarthra, they are taxonomically distinct. There are eight existing species of pangolins in the world, and all are the class Mammalia, order Pholidota, family Manidae, and genus *Manis*. Pangolins mainly distribute in Eastern, Southeastern and Southern Asia, as well as most of Africa. Four species of pangolins are native to Africa, including the Cape Pangolin (*Manis temmincki*), Giant Pangolin (*Manis gigantean*), Long-tailed or Black-bellied Pangolin (*Manis tetradactyla*) and Tree or African White-bellied Pangolin (*Manis tricuspis*). The other four pangolins are native to Asia, including the Chinese Pangolin (*Manis pentadactyla*), Indian Pangolin (*Manis crassicaudata*), Malayan Pangolin (*Manis javanica*) and Palawan Pangolin (*Manis culionensis*), a new species identified in 2005 (Gaubert and Antunes 2005). All eight pangolin species have been recently included in the Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, where international trading for commercial purposes of listed species is strictly prohibited.

As predators preying on ants and termites, pangolins have a specialized diet and perform an important ecological role in regulating insect populations. It has been estimated that an adult pangolin can consume more than 70 million insects annually, and has a significant impact on the control of forest termites (Shi and Wang, 1985). Besides its ecological values, pangolins are extremely important economic animals, valued for both medicine and food.

Habitat destruction and poaching has been a major threat to wildlife species in the study area and this has a negative impact on wildlife species, despite the government's warnings and efforts to preserve the wildlife species. In Kainji Lake National Park the present population number of Pangolin is not certain. The population dynamics and sex ratios are also unknown, also their behaviour and general ecology present a matter of speculations.

The lack of information on the general ecology of Pangolin in the study area makes their conservation and management very difficult. Adequate understanding of overall habitat ecology, habitat preferences and the current distribution of Pangolin are immensely important for long-term conservation of this endangered species. Therefore, this study will document the distribution and abundance of Pangolin in the study area.

2. METHODOLOGY

2. 1. Description of the Study Area

Kainji Lake National Park (KLNP) was established in 1979 by the unification of two official game reserves Borgu and Zugurma under decree 46 of 29th July 1997, thereby making Kainji Lake National Park the premier National Park in Nigeria.

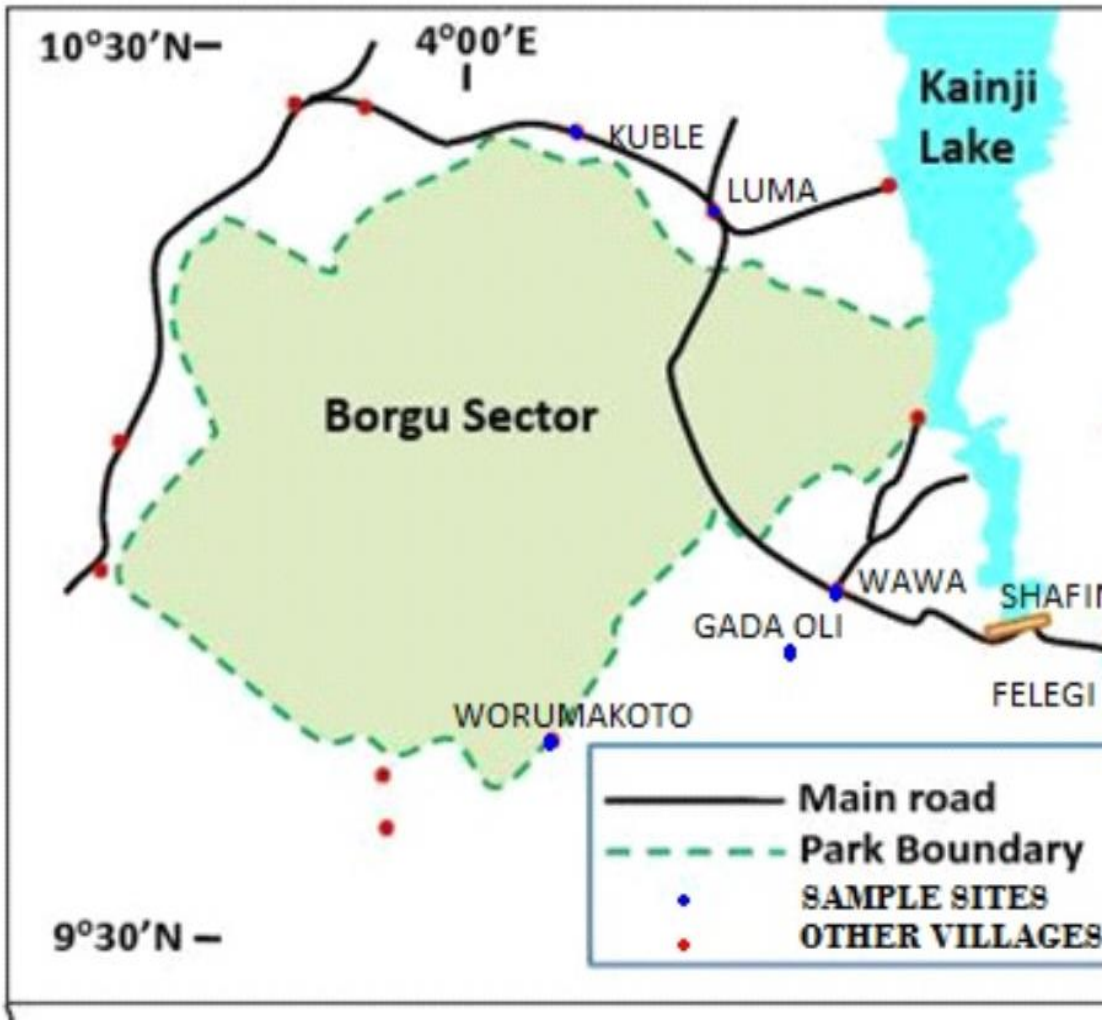

Figure 1. Map of Kainji Lake National Park (Borgu Sector)

2. 1. 1. Location

Kainji Lake National Park is situated in the North West central part of the country between latitude 9º45'N and 10º23'N and longitude 3º40'E and 5º47'E. It is made up of two sectors (Borgu and Zugurma) situated in Borgu and Kaima/Baruten Local Government Areas of Niger and Kwara State respectively. It covers a total land area of 5,340.825q.

2. 1. 2. Climate

The main characteristics of the climate of the park are the wet and dry seasons which vary from the year to year. The wet season extends from May to November while the dry season extends from December to April. The average annual rainfall of the Borgu Sector varies from 1,100 mm in the trends surface analyses of the mean annual rainfall in the sector, there is a decrease in rain from the south to the north, an increase rainfall towards the west and east, and generally low condition in the central and northern region, stretches from the north through the central regions, to the south.

Major drainage channel is the river oil with its source from republic of Benin running through the park behind oil based camp and coming out of the park in Kali base camp. This river finally drained into Niger River Timo and Monai and main water source as well they serve the eastern parks of the Borgu sector.

2. 2. Data Collection and Analysis

Line transect method was used, using the existing jeep tracks. In each transect, a plot of 100 m × 100 m size was laid every after 100 m distance and a total of three plot was laid out in each transect. Data collection was carried out for a period of 5 months (March to July, 2018), site was visited five days in every month of the study. Period of visit was between 7.00 am-10.00 am in the morning and 4.00 pm to 6.00 pm in the evening. The data collected were analyzed using descriptive statistics (tables, chart, and graphs).

3. RESULT

Table 1 shows the frequency distribution of pangolin (*P. tetradactyla*) in the study area for a period of five months (March– July, 2018). Awwal Ibrahim tract had the highest percentage of 29.7% and the least observation was sighted in Gilbert child and Mamud Lapai with 16.2% respectively. The table also shows that the month of March had the highest number of observation (10) and the month of June had the least number of observations (5). Table 2 shows the Population distribution of pangolin (*Phataginus tetradactyla*) in the study area, Adult recorded the highest observation (26) and the least observation was recorded amongst the young individuals (11).

The vegetation distribution of pangolin in the study area is revealed in Table 3, in which Riparian forest recorded the highest percentage (29.7%), followed by *Isoberlina doka* woodland and Acacia complex (18.9% respectively), while the least was *Detarium microcapum* with (16.2%). Figure 2, shows different activities carried out by pangolin in the study area, it was revealed that running recorded the highest observation (14), followed by feeding (11) and the least is resting (4).

Table 1. Spatial Distribution of Pangolin (*P. tetradactyla*) in the Study Area for a Period of Five Months (March-July, 2018)

Track	March	April	May	June	July	Total	Percentage (%)
Gilbert child	1	1	1	1	2	6	16.2
Husseni Mashi	2	2	1	1	1	7	18.9
Yankari	1	2	2	0	2	7	18.9
Awwal Ibrahim	3	3	1	2	2	11	29.7
Mamud Lapai	3	1	1	1	-	6	16.2
TOTAL	10	9	6	5	8	37	100.0

Source (Field survey, 2018).

Table 2. Population Structure of Pangolin (*Phataginus tetradactyla*) in the study area.

Tracks	Adult	Young	Total
Gilbert child	6	-	6
Husseni Mashi	6	1	7
Yankari	4	3	7
Awwal Ibrahim	5	6	11
Mamud Lapai	5	1	6
TOTAL	26	11	37

Source (Field survey, 2018)

Table 3. Pangolin (*Phataginus tetradactyla*) Vegetation Distribution in the Study Area.

Track	Total Number of Animal Sighted	Percentage (%)	Vegetation Type
Gilbert child	6	16.2	*Detarium microcarpum* woodland
Husseni Mashi	7	18.9	Acacia complex
Yankari	7	18.9	*Isoberlina doka* woodland
Awwal Ibrahim	11	29.7	Riparian forest
Mamud Lapai	6	16.2	Riparian forest
TOTAL	37	100.0	

Source (Field survey, 2018).

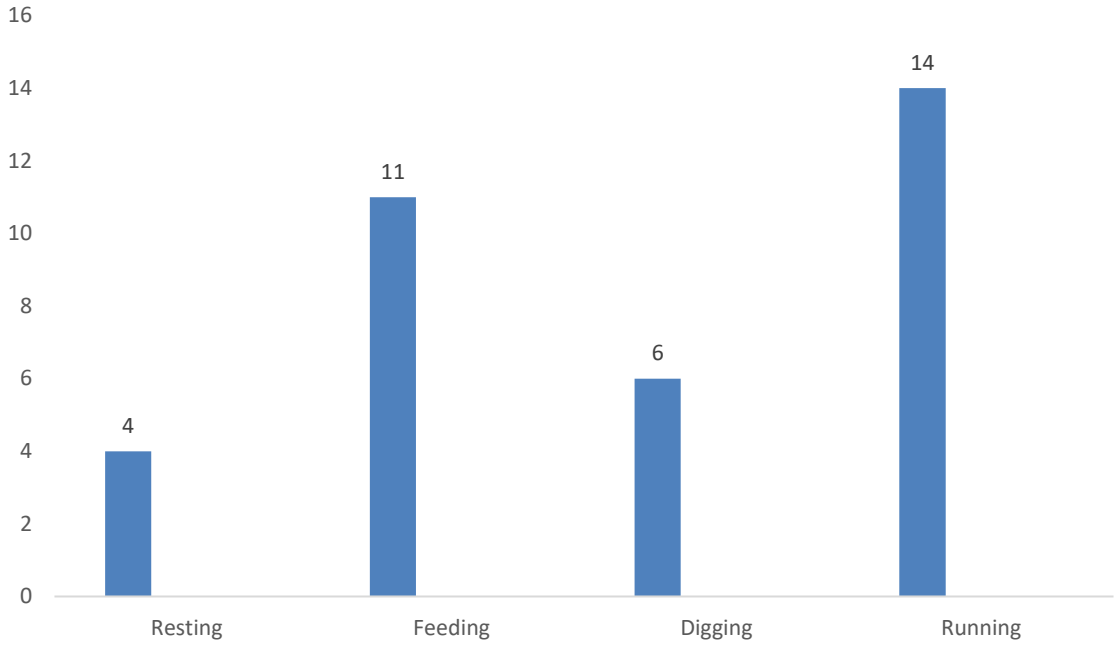

Figure 2. Different activities of Pangolin (*Phataginus tetradactyla*) with their frequency

4. DISCUSSION

The study shows that most of the animal were sighted in Riparian forest (29.7%), followed by *Isoberlina doka* woodland (18.9%), while the least was *Detarium microcarpum* woodland with (16.2%). This is in agreement with Fretwell and Luca (1970) who described a habitat as an area which is homogeneous with regard to factors important to its inhabitants. Determining the relevant factors may be difficult since one is constrained to define habitats according to features which can be recognized and measured. Habitat types are, however, usually taken to correspond to vegetation communities. Secondly, utilization of smaller patches differing only in relative productivity may be investigated. Arditi and Dacoragna (1988) also revealed utilization of several habitat types may be influenced by factors other than food availability. Despite the high incidence of debarked trees in rocky outcrop savanna this habitat type was never preferred by the study animals.

DeVilliers and Roux (1992) stated that other uncollared pangolin may have monopolized this area, or this habitat type may be unsuitable for feeding on important subterranean food items such as tubers and tree roots, because of the rocky substratum. Majority of the animals were sighted in month of March. This correlate with findings of IUCN (2008) which confirms that the animal is more sighted during the dry season, the distribution pattern of pangolins in the park indicates that the animal could be found in all parts of the park but predominantly at Awwal Ibrahim track that recorded highest animal population density. The highest population of pangolins was found in Awwal Ibrahim which is in Riparian forest that comprises mostly grasses in the Borgu sector of the park. This relatively high population percentage of the animal in this track might be attributed to the grasses that grow there.

The type of grasses that grows there are mostly the preferred grasses of the animal. Moreover the track is far from the water sources in the park such as Oli River. Gilbert child track had the least record of the pangolins population density with 16.2%. Gilbert child track that is in *Detarium mircocarpum* woodland in the park had the least record of population of pangolins probably due to few grasses in the track, thus confirming the characteristics of the animal inhabiting grassy plain than forest trees as ascertained by John (2008). Sex distribution of pangolins population in Borgu sector of KLNP indicating the presence of both sexes at adult and young stages for continuous reproduction of the animal species in the park. The relationship of the adult and young pangolins in the park shows a balance and presence of matured and young ones for immediate and future needs of the population growth of the animal in the park.

5. CONCLUSIONS

This study has confirmed the presence of Pangolin in Kainji Lake National park (Borgu sector), the important factors that were identified as affecting the abundance and distribution of pangolins in the park were: source of perennial water, food, cover, and illegal hunting. Future prospects for tourism, and consequent benefits to management, seem favorable if the present methods of protection can be improved upon. One method of ameliorating the present condition might be to increase the number of patrol men in the area. Also, more patrol posts and stations should be established.

Every effort should be made to encourage the participation of the local communities in every step taken by the government to conserve wildlife in the area. Some of the revenues realized from the management of the reserve should be used to develop the local communities, in order to ensure their confidence and cooperation, as well as the success of the whole program.

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