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SURVEY OF FREE-RANGE ANIMALS WITHIN FEDERAL UNIVERSITY OF AGRICULTURE, ABEOKUTA ZOO PARK, NIGERIA

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ABSTRACT

The study examined the abundance of free-range natural inhabitants of Federal University of Agriculture, Abeokuta (FUNAAB) Zoo Park. A baseline data of free ranging inhabitants of the Park is essential to monitor trends and institute conservation plans through unsustainable natural resources exploitation and habitat destruction. Four transects were selected across the study area. Each transect was traversed for the period of four months and observations were carried out twice a day. The Four existing tracks explored during the study were the aviary, reptile, carnivore and primate tracks. Data were analyzed using descriptive statistic. The findings from this study revealed that 8 species of natural inhabitants were identified which were Chlorocebus pygerythrus,Philantomba maxwellii, Herpestidae spp, Tragelaphus scriptus, Naja naja, Marmotini spp, Centropus senegalensis and Milvus migrans. The result further showed that a total of 115 animals were encountered in the primate transect, 77 animals in carnivores transect, 46 animals in aviary transect and 34 animals in ungulates transect by representative of 43.3%, 28.3%, 15.8% and 12.5% respectively. Human activities and level of disturbance was observed to have affected the abundance and distribution of animals at FUNAAB Zoo Park. Continuous field inventory is recommended to ascertain the dynamics of animals observed as free- range inhabitants in this study.

Keywords: Abundance, Ecosystem, Extinction, Free Range

INTRODUCTION

Conservation of wildlife species is an essential part of wildlife management, and where species have been exploited; protection of these animals in National Parks or other rigidly controlled areas may be the only practical solution to ensure survival. The global human population is increasing and was recently estimated to be 7 billion (UNFPA, 2011), which in turn is placing tremendous strain on the planet's natural resources. As the world's human population increases, there is an increased demand for space and resources resulting in increased transformation of natural habitat. Such landscape modification and the resultant human-dominated environments are the primary drivers of species extinction on a global scale (Dale and Polasky 2007; Didham *et al.,* 2007; Bellard *et al.,* 2012). Five mass extinction events have been documented throughout the history of the Earth, resulting in the extinction of over 90% of all species. The causes of these events are believed to be largely due to a change in global climate or extra-terrestrial impact (Erwin 2001). Consequently, many species have been reported in decline (Craigie *et al.,* 2010, Woinarski *et al.,* 2011). In addition, the current mass extinction is very different from all others so far as human activity is directly

implicated in the continuous adverse impacts on biodiversity (Wood and Pullin 2002).

The main drivers of biodiversity loss today include overexploitation by humans (Mora *et al.,* 2007, Butchart *et al.,* 2010, Nuwer and Bell 2014), resource consumption (the rise in non-renewable resource use by the growing human population) (Liu *et al.,* 2003, Golden *et al.,* 2011), habitat destruction/disturbance (Brooks *et al.,* 2002, Titeux *et al.,* 2016), pollution and the impact of climate change (Bickham *et al.,* 2000) all of which are due to anthropogenic factors. Consequently, conservation effort is targeted towards protecting diversity of threatened species within the world's protected area network, particularly in tropical regions and other species-rich Eco regions, where large numbers of species face extinction (Butchart, *et al.,* 2010). However, conservation often tends to focus on conserving remnant or fragmented habitat patches without separating the biodiversity from the processes that threaten its existence. Hence, Protected Areas often fail in achieving the conservation goals as the threats are still present (Margules and Pressey 2000, Hoekstra *et al*., 2005).

Generally, biodiversity loss is threatened by multiple and interrelated factors that includes pressures that are mostly human-induced disturbance to ecosystems, socio-economic effects, failure in governance, poor decision making and policy (Failing and Gregory 2003, Slingenberg, *et al.*, 2009, Craigie *et al.*, 2010). The cause of biodiversity loss differs and depends on the biome, geography, climate, and type of pressure, biodiversity host country economy, trade patterns, type of governance structure, and other factors.

MATERIALS AND METHODS

Study Area

The study was carried out at Federal University of Agriculture Abeokuta Zoo Park, Ogun state, Nigeria (FUNAAB Zoo Park), and situated North East of Abeokuta along Alabata road. The site is located between the latitude 7° and 7°58¹N and longitude 3°30¹ and 3°37E. FUNAAB Zoo Park was commissioned for use on the 23rd May 2012. It is the first of its kind in the annals of zoological gardens in academic institutions in Nigeria. Sites designated as "Zoo Parks" greatly vary with respects to the size of land area covered which gives the park inmates the sense of being in their natural environments. The FUNAAB Zoo Park covers an area of about 62 hectares of land and situated within the rolling ridges, to the left at the entrance of FUNAAB Alabata campus.

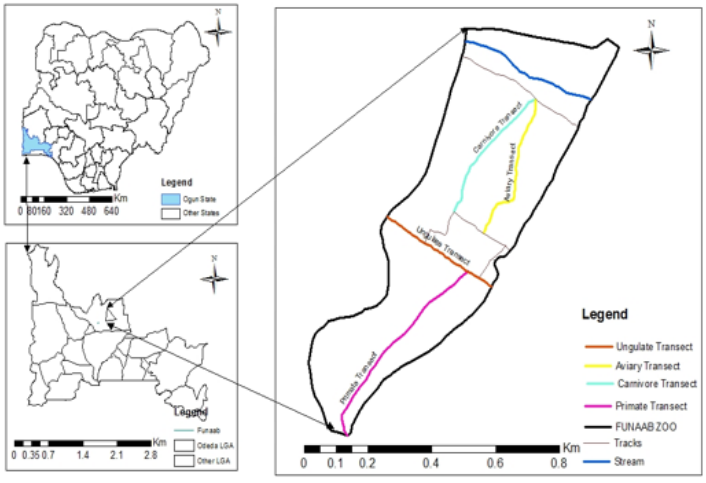

Figure 1: Map of FUNAAB Zoo Park
Source: FUNAAB Zoo Park

Experimental Design

Reconnaissance survey was carried out in the study area to identify the likely routes and habitats where the natural inhabitants could be found. Four (4) existing tracks in the Park were selected for the survey. The existing tracks in the Zoo premises were used as transects to identify and record animals observed shrubs, grasses or forages around them. The Four existing tracks explored during the study were the A, B, C and D tracks. The A track covers from the African Grey Parrot cage to the Crocodile pool by the boundary of the zoo about 1 Km distance. The B track starts from the crocodile pool to porcupine cage and covers about 1 kilometre. The C track covers from the Teak/Gmelina plantation on the "professional mistake" to the fence toward the International Conference Centre a stretch of (about) 0.8 Km. The D track starts from the Baboon cage to temporary site of the Zoo covering a distance of about 1.5 Km.

Data Collection

The study was carried out for five months (August to December, 2017). Direct sighting method was adopted using the four (4) existing tracks. Each transects were combed twice a day. The location was transverse in the morning between (6:30 am – 8:30 am) and in the evening (5 pm-7pm.), binocular was used for viewing of animals and the activity during sighting was recorded.

Data Analysis

Data was analyzed using descriptive statistics. Heterogeneity of the site in terms of wildlife species was explored using Simpson diversity indices (Simpson, 1949) and Sorensen in PAST Model version 3.0.

Simpson diversity indices and Sorensen indices

Simpson Diversity Index

$$SDI = \frac{\sum n(n-1)}{N(N-1)} \quad \ldots\ldots (1)$$

Where:
SDI = Simpson Diversity Index
n = total number of animals
N = total number of all animals

Sorensen Similarity indices

$$SSI = \frac{a}{a+b+c} x100 \ldots (2)$$

Where:
SSI = Sorensen Similarity Indices
a = number of species common to all animals
b = number of animal species present in first track but not in another track
c = number of animal present in second track but not in the first track

RESULTS

Abundance of Wildlife Species in Federal University of Agriculture, Abeokuta Zoo Park

Table 1 shows the list of wild animals encountered in FUNAAB Zoo Park during the period of the survey across the tracks. A, B, C and D tracks. A total of 272 animals were encountered. The highest populations were encountered along the A track 115 (43.3%), followed by B 77 (28.3%), C46 (15.8%) while the least were encountered along the D track 34 (12.5%).

Distribution of Animals Population recorded between August and December, 2017

Table 2, shows the distribution of wild animals from August to December, 2017. In August, A Total of 38 animals were encountered making 13.97%, while in September a total of 52 animals were encountered making 19.11%, In October a total of 68 animals were encountered making 25% ,in November a total of 85 animals were encountered making 31.25% and a total of 29 animals were encountered making 10.66%. The highest number of animals were recorded in November 85, followed by October 68, September 52, August 38 and December with the least 29.

Table 1: Population ofAnimals encountered at Different sections within FUNAABZoo Park

Name of Animals	Scientific names	Classification	Different Sections/Tracks within FUNAAB Zoo Park						
			A	B	C	D	Total	Mean	SD
Vervet Monkey	*Chlorocebus pygerythrus*	Primate	84	49	35	29	197	49.25[a]	24.68
Maxwell Duiker	*Philantomba maxwellii*	Herbivore	4	0	2	4	10	2.5[bc]	1.19
Short-tailed Mongoose	*Herpestes brachyurus*	Carnivore	18	18	6	0	42	10.5[ab]	9.00
Bushbuck	*Tragelaphus scriptus*	Herbivore	4	6	2	0	12	3.0[bc]	2.58
Black tree Cobra	*Pseudohaje nigraus*	Reptile	0	2	1	0	3	0.8[c]	0.95
Ground squirrel	*Xerus erythropus*	Omnivore	1	1	0	0	2	0.5[c]	0.58
Senegal coucal	*Centropus senegalensis*	Avian	2	1	0	1	4	1.0[c]	0.82
Black kite	*Milvus migrans*	Avian	2	0	0	0	2	0.5[c]	1.00
Total			**115**	**77**	**46**	**34**	**272**		

Means with the same letter are not significantly different (p>0.05)

Table 2: Population of animals recorded within the four tracks in FUNAAB Zoo Park from August – December, 2017

Animals	Scientific names	Months					Total	Mean	SD
		August	September	October	November	December			
Vervet Monkey	*Chlorocebus pygerythrus*	28	39	53	77	0	197	39.4[a]	28.64
Maxwell Duiker	*Philantomba maxwellii*	2	1	2	1	4	10	2.0[bc]	1.22
Short-tailed Mongoose	*Herpestes brachyurus*	6	9	5	5	17	42	8.4[b]	5.08
Bushbuck	*Tragelaphus scriptus*	0	0	4	2	6	12	2.4[bc]	2.61
Black tree Cobra	*Pseudohaje nigraus*	0	1	1	0	1	3	0.6[c]	0.55
Ground squirrel	*Xerus erythropus*	2	1	0	0	1	4	0.8[c]	0.84
Senegal coucal	*Centropus senegalensis*	0	0	2	0	0	2	0.4[c]	0.89
Black kite	*Milvus migrans*	0	1	1	0	0	2	0.4[c]	0.55
		38	**52**	**68**	**85**	**29**	**272**		

Means with the same letter are not significantly different (p>0.05)

Diversity Indices

Species diversity was moderate as it is reflected in Four (4) tracks, high Simpson diversity index of animals' track was (0.6097) in Track A, and low Simpson diversity value of (0.376) was recorded for track D (0.2578)

Similarity Indices

Table (4) present the Simpsons similarity between paired tracks which varied from 0.67 to 0.83 for all the tracks. High similarities values were observed between tracks A and B (0.83), while track A and C, Band C has 0.80 and the least similarity was recorded for B and D, C and D (0.67) respectively. Compared within the tracks, there were generally high similarity values that are above 50%.

Table 3: Simpson Diversity Indices of Animal Species in the Study Area

Transects	N(N-1)/ Eni(ni – 1)
Track A	0.6097
Track B	0.5333
Track C	0.3998
Track D	0.2578

Table 4: Simpson Similarities Index of Animal Species Between Paired Tracks in the Study Area

Tracks	A	B	C	D
A	1	0.83	0.80	1
B	0.83	1	0.80	0.67
C	0.80	0.80	1	0.67
D	1	0.67	0.67	1

DISCUSSION

The findings from the study revealed that a total of 272 animals were encountered in the four tracks within FUNAAB Zoo Park. In track A total 115 animals were encountered. 77 animals in track B, 46 in track C and 34 animals in D track by representative of 43.3%, 28.3%, 15.8% and 12.5% respectively. The high abundance of animals encountered in the A track is as a result of high animal activities and this is due to the fact that this portion of the Zoo Park experience fewer human activities except in the case of staff on special surveillance. Lowest animal population was encountered in the D track. This is as a result of its closeness to the centre of the Zoo Park where the vegetation is open and human activities of both staff and visitors are more pronounced. Similar observation was made by Margules and Pressy (2000) who identified social activities as one the factors that contributed to abundance and distribution of animals.

The result further revealed that, a total of 8 species of natural inhabitants were identified which were Vervet Monkey, Maxwell Duiker, short tailed Mongoose, Bushbuck, Black Tree Cobra, Ground squirrel, Senegal coucal *and* Black-kite. This result can be compared with similar studies by Afolayan and Salami (1983) in the abundance and distribution of Large Mammals in the Upper Ogun Game Reserve, Oyo State, Nigeria where similar line transects techniques was used and the number of species recorded is considered. This is also in accordance with the findings of Kasso *et al.,* (2010) and Girma *et al.,* (2012).

In August, the highest populations of the animals were encountered along the C track. In September, B Track had the highest population of animals' species, while in October; C track was the most populated with animals. In November, B Track was the most populated with animal's species and in December, C Track had the highest population of animals. This shows that animals are visible in this sections (C and B) compared to other tracks, this is due to the fact that the two tracks contains different fruits species such as *Ficus fur, Cola mellinii, Morinda lucida* and many more which serves as food for the animals and also these sections are free of disturbances from human activities.

CONCLUSION

In terms of population of different species, the Vervet monkey maintain the lead as is the most abundant species in the study area. No animal species were restricted to a specific track but were evenly distributed across all the tracks. The study also confirms that an animal has the tendency to learn how to cohabitate with intense human activities and presence. The result obtained indicates that animals had the highest population density in the B and C tracks in FUNAAB Zoo Park.

RECOMMENDATION

i. This study recommends that additional field inventories of biodiversity are needed in the study area.
ii. It is also recommended that trap cameras should be mounted in strategic locations within the Zoo Park to monitor the activities of the free-range species devoid of illegal incursion by man.
iii. Furthermore, afforestation and re-afforestation programs should be timely carried out in the area.

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