

Full Length Research Paper

## Habitat structure of flat-headed cusimanse (*Crossarchus platycephalus*) in Futa Wildlife Park, Ondo state, Nigeria

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The study explored the habitat structure of flat-headed cusimanse (*Crossarchus platycephalus*) in Federal University of Technology, Akure (FUTA) Wildlife Park, Ondo State. It was undertaken during both wet and dry seasons of the year 2012. In assessing the habitat, ten plots (10 x 10 m<sup>2</sup> each) were marked out of the total land area of the Park. A total of fifteen (15) different species were identified with diameter at breast height values ranging from 4 to 130 cm. The frequency of tree species contained in the plots revealed *Funtumia elastica* to be of the highest frequency. *Elaeis guineensis* emerged as the highest dominating woody plant. The habitat evaluation revealed that, the species of the flat-headed cusimanse are adapted to fairly dense vegetation and preferred to utilize fallen logs, thicket of bush, environments with considerable wetness with pond or stream and crevices formed by fallen logs and rock outcrops as habitats. The study has given a base line information on where flat-headed cusimanses are likely to be seen, places and features they utilize as habitat in order to ensure easier ecological studies on them and to see these features not as useless and nuisance especially the fallen, dead logs, the thickets and the crevices, but as principal components of some animal's habitat.

**Key words:** Crevice, dominance, diversity, dwarf mongoose, requirements, patrol.

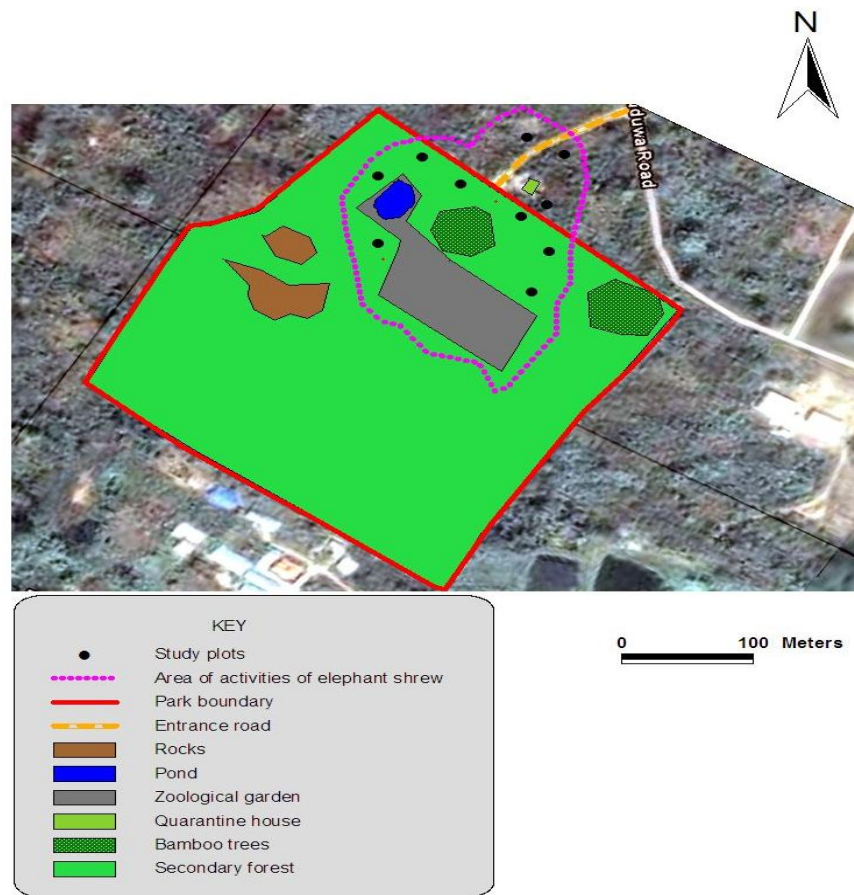
### INTRODUCTION

Very little information is given on flat-headed cusimanse in Nigeria. Nigeria is one of the African countries to which this specie is endemic and FUTA Wildlife Park is one of the areas where this animal is found in about three different colonies with no documentation, whatsoever, on their habitat in this park. Therefore, baseline knowledge is very much needed on the habitat of the animal for further ecological studies.

The flat-headed cusimanse (*Crossarchus platycephalus*) is a dwarf mongoose endemic to Benin, Cameroon and Nigeria. This species was once regarded as a subspecies of the common cusimanse (*Crossarchus*

*obscurus*) (Goldman and Hoffmann, 2008). It occurs in rainforests of Benin, Nigeria, Cameroon, Equatorial Guinea, Congo Republic and Central African Republic (Wilson and Reeder, 2005). The specific locality of a specimen collected in Benin is uncertain and given as "Agouagou" which is well beyond the rainforest zone (Goldman in press). Habitat ecology is an important aspect of ecology, dealing with the study of organism in relation to its environment. Habitat is defined as an area that provides the food, water, cover and space that a living thing needs to survive and reproduce. The quality and quantity of a particular type of habitat determines the

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**Figure 1.** Map of FUTA Wildlife Park, showing the studied plots and the distribution of the animal.

number and variety of its inhabitants (Esbjorn-Hargens, 2005).

Every wildlife species requires a general environment to live. To properly manage land for the benefit of wildlife, there is a need to understand those things in the environment that wild animal need to survive and reproduce, the environment or natural home where a wild animal lives is called its habitat, just like humans, wild animals have specific requirements that they have at home. Habitat for any wild animal must provide: cover (shelter) from weather and predators; food and water for nourishment and space to obtain food, water and to attract a mate (Greg, 2009). While shelter, food and water are basic requirements, how wildlife obtain these requirements varies (Greg, 2009). The habitat of a species describes the environment over which a species is known to occur and the type of community that is formed as a result (Whittaker et al., 1973).

More specifically, habitats can be defined as regions in environmental space that are composed of multiple dimensions, each representing a biotic or abiotic environmental variable; that is, any component or

characteristic of the environment related directly (forage biomass and quality) or indirectly (elevation) to the use of a location by the animal (Beyer, 2010).

## MATERIALS AND METHODS

### Study area

This study was carried out in the Wildlife Park of The Federal University of Technology, Akure. The Wildlife Park is located at Akure, the state capital of Ondo State, Nigeria. The state lies between latitudes 50 45' and 70 52'N and longitudes 4020' and 60 05'E. Its land area is about 15,500 km<sup>2</sup> (UNAAB-IFSERAR, 2010).

### FUTA Wildlife Park

The park covers a total area of 89,100 m<sup>2</sup> (8.91 ha), it is a lowland tropical rainforest found on longitude 7°C, 21 min north and latitude 5°C, 20 min with an average rainfall of 1650 to 1700 mm annually. Study area is located on elevation 1200 m above sea level (Afolayan and Agbelusi, 1987). The study area is under laid with crystalline basement rock which imposes a partially rugged topographic relief on the area (Figure 1). The lower elevation is

**Table 1.** The GPS readings and other features of each plot.

Plot	GPS reading	Other features
Plot 1	07.29627°N, 005.14332°E	Thicket of bush, fallen logs
Plot 2	07.29628°N, 005.14350°E	Fallen logs
Plot 3	07.29584°N, 005.14366°E	Small rocks, fallen log
Plot 4	07.29551°N, 005.14281°E	Fallen logs, termite hill and small rocks
Plot 5	07.29607°N, 005.14234°E	<i>Aspilia africana</i> , stream
Plot 6	07.29627°N, 005.14332°E	-
Plot 7	07.29638°N, 005.14305°E	Small scattered rocks
Plot 8	7.29695°N, 005.14330°E	Small rocks
Plot 9	07.29693°N, 005.14335°E	Small rocks
Plot 10	07.29656°N, 005.14353°E	Fallen logs, small rocks

**Table 2.** Tree species composition of the randomly selected plots.

Scientific name	Common name	Local name (Yoruba)	Average DBH (cm)
<i>Ficus capensis</i>	African Mustard tree	Opoto	25
<i>Antiaris africana</i>	Antiaris	Oriro	14
<i>Funtumia elastica</i>	Wild rubber	Ire	17
<i>Newbouldia laevis</i>	Tree of life	Akoko	6.75
<i>Elaeis guineensis</i>	Red oil Palm	Igi ope	72
<i>Alchornea laxiflora</i>	Three-veined bead string	Pepe	8
<i>Zanthoxylum zanthoxyloides</i>	Lecaniodiscus	Ata	56
<i>Lecaniodiscus cupanioides</i>	Sapindaceae	Aka	6.8
<i>Ficus exasperata</i>	Sand paper tree	Epin	15.5
<i>Milicia excelsa</i>	Iroko	Iroko	14
<i>Ceiba pentandra</i>	White silk cotton	Araba	130
<i>Alchornea cordiflora</i>	Christmas bush	Esin	5.25
<i>Piper guineensis</i>	Piper	Ayere	51
<i>Spondias mombin</i>	Hog plum/yellow mombin	Ekikan	11.8

about 95 m above sea level while the higher elevation is above 140 m above sea level. The terrain of Federal University of Technology Akure, Wildlife Park can be described as undulating with small outcrop scattered about. The elevation of the park varies between 215 and 320 m (Afolayan and Agbelusi, 1987).

### Flora and fauna

The study site is one of the vegetation typical of secondary forest with herbaceous undergrowth. The vegetation is a combination of tropical trees, shrubs and herbaceous plants in great diversity such as: *Tetrapleura tetraptera*, *Trichilia emetic*, *Newbouldia laevis*, *Jatropha gossypifolia*, *Aframomum melegueta*, *Elaeis guineensis*, *Diospyros* spp., *Khaya ivorensis*, *Milicia excelsa*, *Aspilia Africana* among others (Abu, 2010).

The park is dominated with a large diversity of rodents, though other families of animal do exist. The fauna resources in general include: bush buck, duicker, grasscutter, giant rat, squirrel and rock python (Idowu, 2010).

### Selection of site and sampling

In assessing the habitat of flat-headed cusimanse in FUTA Wildlife

Park, ten different points were marked out, the GPS readings and other features of the selected plots are given in Table 1. The ten locations were sampled following the procedure of Barbour et al. (1999) using area sampling after it has been modified by designing the quadrat in such a way that it considered the scenes of activities of the animal, for this study, 10 × 10 m square quadrat was used, in this way, the activities of the animal was noticed, and possible routes of considerable distances were well accommodated within the quadrats.

Total enumeration of the tree species in each location was assessed. The diameter at breast height (DBH) of individual tree was taken using measuring tape and recorded; as well as the occurrence of each species. From the data obtained, density, relative density, frequency and dominance were calculated. Other features of importance in the plots such as: rock outcrops, fallen logs, termite hills and bush thickets were carefully observed. The plants utilized by the animal in each plot were assessed.

### Direct/indirect observation of the animal

Direct and indirect observation of the animal was done concurrently. The animals were directly observed thrice in a week for a period of 4 months each during the wet and dry season of the

year. This was done by quietly moving around the selected plots, and intermittently waiting and listening, for any available sign, this was done to determine their presence and activities. The animals were observed from 08:00 to 12:00 h in the morning and 16:00 to 19:00 h in the evening. Flat-headed cusimanse were indirectly observed in FUTA Wildlife Park by looking out for activities of the animals in the plots earlier marked out. Traces of movement, habitation, foot prints and droppings among others were carefully looked out for and observed.

### Data analysis

The analysis of data was done using the methods described by Brower et al. (1998) as follows:

Density (Individual/M<sup>2</sup>): The number of individuals within a chosen area (m<sup>2</sup> ha):

$$\text{Density} = \frac{\text{Number of individuals of a species}}{\text{Area sampled}}$$

Relative density: The density of one species as a percentage of total density:

$$\text{R.D} = \frac{\text{Density for a species}}{\text{Total density for all species}}$$

Frequency: The percentage of total quadrats or points that contains at least one individual of a given species:

$$\text{Frequency} = \frac{\text{No. of quadrats in which species occur}}{\text{Total number of quadrat sampled}}$$

Relative frequency: The frequency of one species as a percentage of total frequency:

$$\text{R.F} = \frac{\text{Frequency value for a species}}{\text{Total frequency value for all species}}$$

$$\text{Dominance} = \frac{\text{Total basal area value for a species}}{\text{Area sampled}}$$

### RESULTS

The studied plots contained fifteen different species of plant as shown in Table 2. In all the plots studied, *Funtumia elastica* had the highest occurrence, while *Ceiba pentandra*, *Ficus exasperata* and *Milicia excelsa* had the lowest occurrence as shown in Table 3.

Table 1 gives the global positioning system readings of each plot and shows other features of importance being utilized by the animal such as: thick blanket of bush, fallen logs of wood, decaying logs, small rock outcrops, *A. africana* vegetation, small pond/stream and termite hill. The density and the relative density of the plots studied as shown in Figure 2 revealed plot 8 as the most dense with the value of 0.12 tree/m<sup>2</sup>, followed by plot 4 with the

value of 0.10 tree/m<sup>2</sup> and plot 7 with the value of 0.08 tree/m<sup>2</sup>. The plots were sparsely vegetated with tree species, though in some plots, the vegetation cover was enough to give limited light penetration. Apart from the tree cover, herbaceous plants also gave the kind of dense vegetation required by the animal most especially for dashing away from threat. Table 3 also shows the dominant species of each plot. *F. elastica* and *E. guineensis* are the most dominant species of the total plots studied.

### DISCUSSION

The habitat of flat-headed cusimanse as described by Angelici et al. (1999) is similar to the habitat of the animal in FUTA Wildlife Park which is characterized by certain plant species which are typical of rain forest zone such as: *Ficus capensis*, *Antiaris africana*, *F. elastica*, *Newbouldia laevis*, *Milicia excelsa* and *C. pentandra*. These tree species have their DBH ranging from 1.5 to about 115 cm with *C. pentandra* being of the highest DBH. Most of which have good percentage of canopy cover and give a dense and cool environment as required by the animal. The habitat utilized by the animal also include: thickets, rocky outcrops, fallen and dead logs, hollows, burrows and crevices for protection, resting and mating; and fruiting plants such as *E. guineensis*, *Alchornea cordiflora* and non- fruiting plant, such as *A. africana* utilized as food. The density and relative density of the studied plots showed and described the preferred habitat of the animal, which means that the animal utilizes areas with considerable wood density in the primary forest region as studied in FUTA Wildlife Park. These areas are so preferred by the animal probably because some of the woody plants apart from providing cool environment also possess fruits on which the animal feeds, and the non-woody vegetation protects against predators, so also are crevices and fallen logs of wood which make the animal prefers these selected areas to the rest of the park. Their activities are limited to these areas as shown in Figure 1.

In all the ten plots selected for study, as the animal's habitat, *E. guineensis* dominated 3 plots thereby emerging as the best indicator of the animal's habitat. This animal has its activities pronounced in those plots where *E. guineensis* are present. The distribution of the animal is restricted to the areas where their requirement for food, water and protection are met.

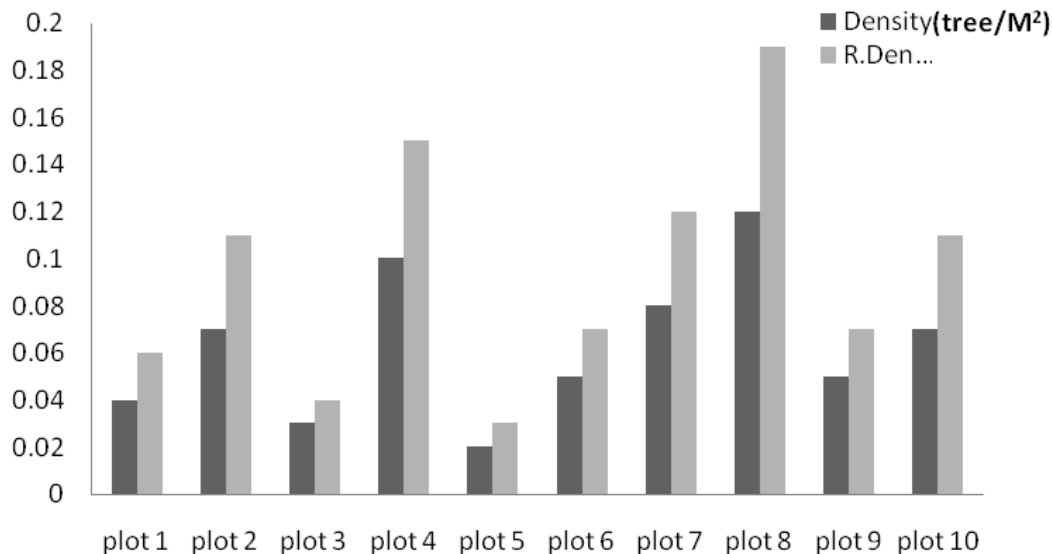
### Conclusion

Flat-headed cusimanse based on this study are known to utilize areas with considerable wetness, cool dense environment with limited light penetration as habitat.

**Table 3.** Tree species contained in individual studied plot.

Tree species	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10
<i>Ficus capensis</i>	+	-	+	-	-	-	-	+	+	-
<i>Antiaris africana</i>	+	-	-	-	-	+	-	-	+	+
<i>Funtumia elastica</i>	++(60)	+	+	+	-	-	++(64)	+	++(59)	+
<i>Newbouldia laevis</i>	-	+	-	+	-	-	-	-	-	-
<i>Elaeis guineensis</i>	-	++(98)	-	+	++(98)	-	-	++(82)	-	+
<i>Alchornea laxiflora</i>	-	+	-	-	-	-	+	-	-	+
<i>Zanthoxylum zanthoxyloides</i>	-	+	-	-	-	-	+	-	-	-
<i>Lecaniodiscus cupanioides</i>	-	-	++(78)	-	-	-	-	-	-	++(53)
<i>Ficus exasperata</i>	-	-	-	+	-	-	-	-	-	-
<i>Melicia excels</i>	-	-	-	+	-	-	-	-	-	-
<i>Ceiba pentandra</i>	-	-	-	++(52)	-	-	-	-	-	-
<i>Alchornea cordiflora</i>	-	-	-	-	+	+	-	-	-	-
<i>Piper guineenseis</i>	-	-	-	-	-	++(84)	+	+	-	-
<i>Spondias mombin</i>	-	-	-	-	-	-	+	+	-	+

+: Present; ++: dominant with rate (%) in parenthesis; -: absent.

**Figure 2.** Density (tree/m<sup>2</sup>) and relative density of the studied plots.

Certain species of tree that might probably be indices of the animal's habitat include: *E. guineensis*, *A.laxiflora*, *F. elastica*, *N. laevis*, *F. exasperata*, *M. excelsa*, *C. pentandra*, *Piper guineensis*, *Spondias mombin*, *Ficus* spp. and *A. Africana*, while the presence of *E. guineensis* will most probably indicate the presence of the animal anywhere. Some of these tree species are fruiting plants desired by the animal while some provide the canopy cover and escape route required by the animal.

This study has given base line information on the habitat of flat-headed cusimanse in a secondary forest of FUTA Wildlife Park.

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