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## FEEDING AND HABITAT PREFERENCE OF GROUND HORNBILL (*BUCORVUS ABYSSINCUS*) IN BORGU SECTOR OF KAINJI LAKE NATIONAL PARK, NIGERIA

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### ABSTRACT

Ground hornbill has been classified as a vulnerable species, as its dwindling and fragmented population are threatened by habitat destruction. Therefore, this study examine the feeding and habitat preference of Ground hornbill in Kainji Lake National Park (Borgu sector). Line transects method; number marker (station number) were placed at 50 meters intervals along the transect line so that observation position was known at all times. The transect length was between 2km and 3.5km and transect were traversed twice daily. The findings of the study revealed that that vegetation distribution of Ground Hornbill in the study area show that *Isolberlinia* woodland recorded the highest with 25.0%, followed by *Detarium macrocarpum/Burkea africana* and *Acacia nilotica* was 18.8% each. The least observation was found in *Diospyros mespiliformis* and *Complex burkea* vegetation which both recorded 12.5% each. The table further revealed that Ground hornbill consume both plants and animal species but the feed consist mainly plants seed. The frequency of the trees species in the habitat of Ground Hornbill revealed that *Isolberlinia tomentosa* recorded the highest with 24 observation with relative density of 15.2% while *Maytenussenegalensis* recorded the least observation of 3 individuals with relative density of 1.9%. *Daniella oliveri* recorded the highest mean DBH of 2.04cm, followed by *Isolberlinia tomentosa* with 1.95cm while *Maranthes polyandra* and *Maytenus senegalensis* recorded 0.20cm each which are the least. This study concludes that Ground hornbill fed on wide varieties of plants and animals and they are mostly found in *Isolberlinia* woodland vegetation.

**Keywords:** Feeding, Habitat, Preference, Ground Hornbill

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### Introduction

Habitat quality and quantity have been identified as the primary limiting factors that influence animal population dynamics (Jansen *et al.*, 2001). Habitat influences the presence, abundance, distribution, movement and behavior of game animals (Musila *et al.*, 2001). A major problem facing wildlife conservation is increasing rate of habitat loss due to human activities through the destruction of their natural habitats leading to

the reduction in wildlife population (John and Skorupa, 2007). Current and adequate information on bird's species richness of Kainji Lake National Park is Limited. Also there is relatively little information on the population distribution, abundance and trends of Ground Hornbill in Kainji Lake National Park. The conservation status of feeding and habits, studies on the habitat preference of this vulnerable and threaten species is scanty. There is no record of such study in Kaniji Lake National Park. Hornbills are one of the



most (distinct) noteworthy groups of birds in the Old World tropics (Kemp, 1995). They are among the largest birds in tropical lowland forests (Kinnaird and O'Brien, 2007), and occupy extremes of habitat, from moist evergreen forests that measure their rainfall in meters to arid steppes where every millimetre of rain is precious (Kemp, 1995). They are boldly coloured, utter distinctive loud calls, and are noisy in flight, making them very noticeable to human observers as compared to other birds (Delacour and Mayr, 2006; Kemp, 1995; Kinnaird and O'Brien, 2007).

They are prominently unusual in appearance, having peculiar features like a disproportionate form and shape, jerking of the head when making loud, distinctive calls, and nesting in the natural cavities of trees (Poonswad, 1991). Hornbills differ from other birds species because different species of Hornbills have a number of common characteristics which serve as an evidence that they evolved from the same ancestry (Kinnaird and O'Brien, 2007). The most prominent of these characteristics is the development of a casque on the upper mandible of the bill, not found in other bird species. From this prominent and unique structure of decurved bill and casque, hornbills derived their names, and were assigned to the avian order Bucerotiformes, known as Bucerotidae (Kemp, 1995). All Hornbills are omnivorous birds, consuming at least 60 species of fruits and 70 species of animals (Tsuji, 1996), except Bucorvus ground hornbills, which are entirely carnivorous, and wattled Ceratogymna hornbills of Africa or Wreathed Aceros hornbills of Asia, which are largely frugivorous (Kemp, 1995). Their favourite food is figs but when raising the young, they prey on insects and small animals, putting the hornbill's number one in the food chain

(Poonswad, 1991). The wide range of vertebrates and invertebrates, delivered to nests and the lack of any obvious specialized adaptations for predation suggest hornbills are opportunistic omnivores rather than dedicated or even clever carnivores (Kinnaird and O'Brien, 2007).

The feeding and breeding requirements are driving forces that determine how hornbill species locate and consume preferred food, and where to place their nests. The dynamic nature of resources such as fruiting and nest tree availability for a variety of hornbill species determine the movements, social structure, breeding season, productivity, and moult (Kemp, 1995). The feeding can take place at any time of the day and depends on habit and foraging abilities of species and individual. The feeding method includes from a simple picking up a food item to more complex and energetic feeding like levering over object, digging into the ground, snatching, swooping, plucking and hawking. Food items are manipulated in different ways.

They are simply swallowed whole by tossing a food item back from the bill tip into the throat. Some items are stripped of extraneous parts before being swallowed, such as fruits of their skins or insects of their wings and legs; some are softened before swallowing by passing them through and crushing them in the bill or cleaned of unwanted covering by being wiped back and forth over a perch or along the ground (Kinnaird and O'Brien, 2007). IUCN (2015), classified ground hornbill as vulnerable species, as its dwindling and fragmented population are threatened by habitat destruction. Finding from this study will enhance effective conservation and management of ground hornbill. Data collected on this threaten species of the bird will likely be beneficial to

the management of Kainji Lake National Park.

## Materials and Methods

### Study area

Kainji Lake National Park was established in 1979 by the amalgamation of two formal game reserves Borgu and Zugurma under decree 46 of 29<sup>th</sup> July 1997, thereby making Kainji Lake National Park the premier National Park in Nigeria (Ayeni, 2007). Kainji Lake National Park is in the North West central part of the country between latitude 9°45'N and 10°23'N and longitude 3°40'E and

5°47'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 (Figure 1). It covers a total land area of 5,340.825q (Ayeni, 2007). The major features of the climate of the park are the wet and dry seasons which varies from the year to year. The wet season extends from May to November while the dry season extends from December to April. The mean annual rainfall of the Borgu Sector varies from 1,100mm-1,800mm.

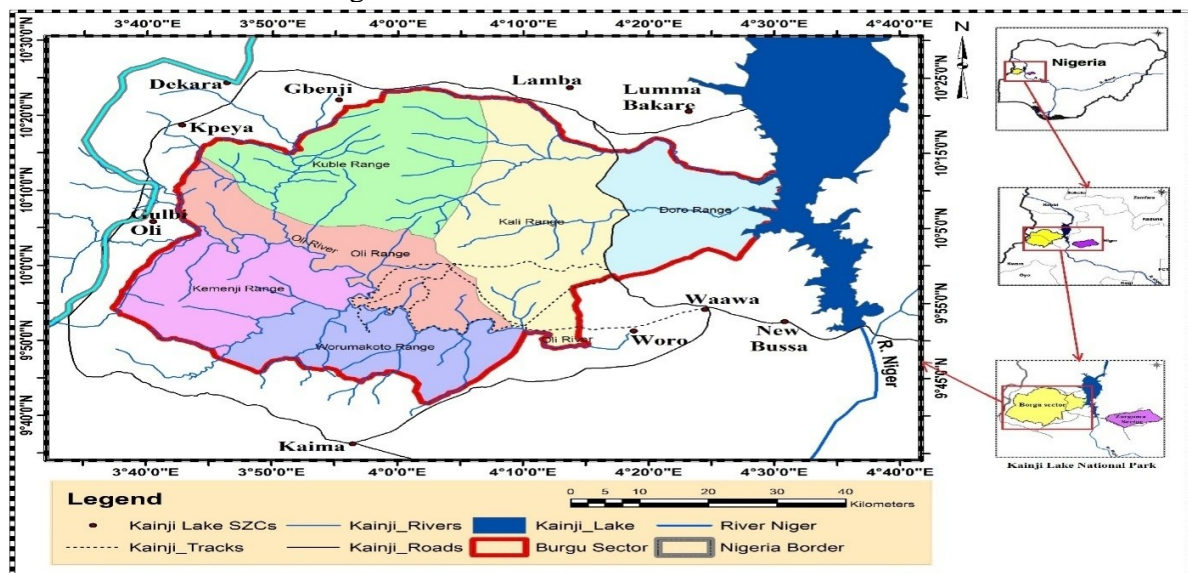


FIG 1: Map of Kainji Lake National Park (Borgu Sector)

### Methods of Data Collection

A reconnaissance survey was carried out in the park and a vegetation survey was conducted in the selected tracks. Six (6) were selected for the study, the tracks are Abubakar Shuaib, Awwal Ibrahim, Gilbert Child, Hussain Mashi, Kemenji and Olusegun Obasanjo tracks. Line transect methods were used; number marker (station number) were placed at 50 meters intervals along the transect line so that observation position was

known at all times. The transect length was between 2km and 3.5km and transect were traversed twice daily. Direct and indirect methods of animal inventory was use. Identification and enumeration of plant species was done using Key (1989).

### Data analysis

Data collected was subjected to descriptive statistic and the relative density was calculated using



$$A = \frac{n}{N} \times 100$$

Where;

A= Relative density

n = total number of individual plant species

N= total number of all plant specie

## Results and Discussion

### Results

The vegetation distribution of Ground Hornbill is shown in Table1, in which *Isolberlinia* woodland recorded the highest with 25.0%, followed by *Detarium macrocarpum/Burkea africana* and *Acacia nilotica* was 18.8% each. The least observation was found in *Diospyros mespiliformis* and *Complex burkea* vegetation which both recorded 12.5% each. The plant species and other food consume by Ground

Hornbill is revealed in table 2 and table 3, in which the food of Ground Hornbill consist mainly plants species and little animal are utilized as food. The part of the food consume most is the seed and the least utilized is the fruit of plants. Table4 shows the frequency, relative density and mean DBH of the trees in the habitat of Ground Hornbill, The frequency of the trees species in the habitat of Ground Hornbill revealed that *Isolberlinia tomentosa* recorded the highest with 24 observation with relative density of 15.2% while *Maytenussenegalensis* recorded the least observation of 3 individuals with relative density of 1.9%. The mean DBH of *Daniella oliveri* and *Isolberlinia tomentosa* recorded 2.04 and 1.95cm, respectively while *Maranthes polyandra* and *Maytenus senegalensis* recorded 0.20cm each which are the least.

**Table 1: Vegetation Distribution of Ground Hornbill in the Study Area**

TRACK	VEGETATION	TOTAL NO. OF BIRD SIGHTED	Percentage (%)
AbubakarShuaib	<i>Isolberlinia woodland</i>	4	25.0
Awwal Ibrahim	Open woodland	3	18.8
Gilbert Child	<i>Acacia spp woodland</i>	3	18.8
Hussainmashi	<i>Diospyros mespiliformis</i>	2	12.5
Kemenji	<i>Isolberlinia woodland</i>	4	25.0
OlusegunObasanjo	<i>Diospyros mespiliformis</i>	2	12.5
<b>Total</b>		<b>16</b>	



**Table 2: Plants Species and Other Food Consume by Ground Hornbill in the Study Area**

Plants	Family	Part Utilized
<i>Vitellaria paradoxa</i>	Sapotaceae	Seed
<i>Parkia biglobosa</i>	Leguminosae	Seed
	Mimosaceae	
<i>Daniella oliveri</i>	Leguminosae	Seed
	Caesalpiniaceae	
<i>Pterocarpus erinaceus</i>	Leguminosae	Seed
	Mimosaceae	
<i>Tamarindus indica</i>	Leguminosae	Seed
	Caesalpiniaceae	
<i>Khaya senegalensis</i>	Meliaceae	Seed
<i>Diospyros mespiliformis</i>	Ebenaceae	Seed
<i>Maytenus senegalensis</i>	Celastaceae	Seed
<i>Maranthes polyandra</i>	Chrysobalanaceae	Seed
<i>Isolberlinia tomentosa</i>	Leguminosae	Seed
	Caesalpiniaceae	
<i>Detarium macrocarpum</i>	Leguminosae	Seed
	Caesalpiniaceae	

**Table 3: Animal Species Eaten By Ground Horn Bill in the Study Area**

Animal	Family
Millipede	Eurymerodesmidae
Centipede	Lithobilidae
Cricket	Gryllidae
Grasshoppers	Acrididae
Beetles	Curculionidae
Butterflies Caterpillars	Papilionoidae
Termites	Blattodae
Earthworm	Lumbricidae

**Table 4: Relative Density and Mean D.B.H of Tree Species in Habitat of Ground Hornbill**

PLANTS	F	RD (%)	DBH (CM)
<i>Vitellaria paradoxa</i>	12	7.5	1.90
<i>Terminalia glaucescens</i>	16	10.1	1.53
<i>Parkia biglobosa</i>	8	5.1	1.75
<i>Piliostigma thonningii</i>	6	3.8	0.25



<i>Gardenia spp</i>	6	3.8	0.20
<i>Daniella oliveri</i>	13	8.2	2.04
<i>Pterocarpus erinaceus</i>	6	3.8	1.75
<i>Lanneas chimperi</i>	4	2.5	1.50
<i>Terminalia macroptera</i>	8	5.1	0.65
<i>Tamarindus indica</i>	12	7.6	0.80
<i>Khaya senegalensis</i>	6	3.8	0.40
<i>Combretum nigericans</i>	10	6.3	0.25
<i>Crossopteryx febrifuga</i>	7	4.4	0.65
<i>Diospyros mespiliformis</i>	4	2.5	1.85
<i>Maytenus senegalensis</i>	3	1.9	0.20
<i>Maranthes polyandra</i>	4	2.5	0.20
<i>Isolberlinia tomentosa</i>	24	15.2	1.95
<i>Detarium macrocarpum</i>	19	12.0	0.65
<b>Total</b>	<b>158</b>	<b>99.99</b>	

## Discussion

There have been relatively few studies conducted on feeding and habitat preference of this species. The population of this species is declining due to the destruction of their habitat. Habitat plays a great roles in the survival of wild animal species because the distribution and abundance of animals depends on availability of food, when availability of food item declines, animals may migrate to other localities in search of food and cover (Adedoyin, 2013). The habitat of an animal is extremely important as it provides that animal with the necessary resources for fulfilling its life-history requirements (Beyer *et al.* 2010). A habitat is defined as a region in environmental space which comprises of multiple abiotic and biotic variables influencing an animal's location (Beyer *et al.* 2010). Animals tend to utilize discrete areas within a habitat, constituting part of their home range. Home range analysis helps to delineate the area used by an animal habitually and areas of concentrated use. Whether finding mates, rearing offspring, acquiring food or defending

territories, all require a spatial adjustment in location by the animal.

Ground-Hornbills (*Bucorvus abyssincus*) have experienced a significant reduction (65%) in their numbers and area of occupancy over the past century (Kemp and Webster, 2008). With a current global threat listing as Vulnerable(IUCN, 2001), they are the focus of many conservation. In general terms, vegetation characteristics and physiognomy contribute to determining the range of occupancy of a particular species (Beyer *et al.* 2010). Along with other environmental factors, vegetation attributes are likely to have a direct influence on how a Ground-Hornbill perceives its environment. Perception of the landscape is likely to cycle on a seasonal basis, as Southern Ground-Hornbills are subject to competing demands and motivations (Beyer *et al.* 2010). In general, animals move between habitats to satisfy these demands and motivations (Beyer *et al.* 2010; Kieet *al.* 2010; Tomkiewicz *et al.* 2010). For ground hornbills, identifying and quantifying the seasonal changes in space utilisation within their home ranges is fundamental to developing and understanding



of how their home range contributes to fulfilling the diversity of life-history requirements.

Ground hornbill mostly in pairs are found in the heart of the woodland, relatively undisturbed areas of the park like the *Isolberlinia* and *diospyrosspp* woodland dry forest. They are rarely found in an easily exposed to human interference like logging, grazing and poaching.

### Conclusion

It can be concluded from this studies that Ground hornbill fed on wide varieties of plants and animals which includes *Detarium macrocarpium*, *Vitallaria paradoxa*, *Isolberlinia tomentosa*, *Gardenia spp*, *Daniella oliveri* and many more and animal's food such as Millipedes, Centipedes, Snakes and insects. Their vegetation zone includes *Isolberlinia woodland*, *Detarium macrocarpum*, *burkea africana*, *Acacia spp* woodland, *Diospyros mespiliformis*, *Isolberlinia woodland* and *Complex burkea*. They prefer seed of this plants species. Food availability or vegetation cover determines their distribution and diversity. Destruction or loss of wildlife habitats reduces their potential utility. This study recommends that detail studies on the distribution and its food resources are needed for conservation of their habitats and there is a need to develop a management and action plan for long term monitoring of Ground hornbill by the conservation biologist.

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