

Habitat Utilization and the Conservation status of the Cross River Gorilla (*Gorilla gorilla diehli*) in Afi Mountain Wildlife Sanctuary, Cross River State, Nigeria.

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## ABSTRACT

*The Cross River gorilla is one of Africa's most critically endangered species of primates. There is scanty information on the conservation status of this population of gorillas. Afi Mountain Wildlife Sanctuary (AMWS) lies between latitudes 6°25' and 6°30' north and between longitudes 8°45' and 9° 15' east. It covers an area of about 100 square kilometers. Annual rainfall is about 3,500mm. The mountain was stratified into north and south. Two patrol teams each consisting of twelve (12) rangers were used in the study. Six sample plots (240×5km each, totaling 7.2km<sup>2</sup>) were selected and used simultaneously in the northern and southern parts of the sanctuary in the rainy season and repeated in the dry season in 2006 and 2007. Data collected included the number of sites of gorilla nests, number of nests per site and plant species utilized for food by the gorillas. Student's t-test and  $\chi^2$  test were used to analyse data. Results indicated that the total number of nests and therefore the population of gorillas decreased significantly ( $P < 0.05$  student's t-test) from 616 ±138 in 2006 to 405 ±131 in 2007 while the mean number of gorilla nests per site also decreased significantly ( $P < 0.05$ ) from 10.14 ± 2.6 in 2006 to 6.6 ± 2.14 in 2007 (95% confidence intervals). There was no significant reduction ( $P > 0.05$ , t-test) in the number of poachers apprehended nor their activities. Thirteen poachers were apprehended in 2006 as against 12 in 2007. The gorillas migrated to the northern part of the sanctuary in the dry season and moved to the south in the rainy season. A total of 32 plant species were found to have been utilized by the gorillas for food. The gorillas were found to be frugivorous but resorted to herbaceous plants when fruits were scarce. It was recommended that consultations be held with the members of the surrounding villages to dissuade them from gorilla hunting and habitat destruction.*

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**Key words:** Habitat Utilization, Conservation status, Cross River gorilla, Afi Mountain, Nigeria.

### Introduction

The Cross River gorilla (*Gorilla, gorilla diehli*) inhabits the forests of Nigeria – Cameroun border region. This gorilla population was thought to be extinct until they were rediscovered by science in the early 1980s (Oates, 1999). This species has been identified as a distinct subspecies (Sarmiento and Oates, 2000; Grooves, 2001). The Cross River gorilla is one of Africa's most critically endangered species of primates (IUCN, 2005). The growth of human populations in Africa has increased the endangerment of primates by accelerating deforestation and intensifying hunting of wildlife for food (Wilkie and Finn, 1988; Oates, 1999; Plumptre *et al.*, 2006). As human population continue to grow, as new roads are developed, and the demand for farmlands, construction materials and forest products (including bush meat) increase, the gorilla status has become critical. There is scanty

information on the conservation status of this population of gorillas. Information on their seasonal migration pattern is also not available. This data is necessary for adequate conservation strategies to be evolved. This work was undertaken to ascertain the seasonal migration pattern, their feeding habits and the population status of this species of gorilla with a view to recommending the best strategies for their conservation.

### **Methodology**

Afi Mountain Wildlife Sanctuary (AMWS) lies between (latitude  $6^{\circ} 25'$  and  $6^{\circ} 30'$  north and between longitudes  $8^{\circ} 45'$  and  $9^{\circ} 15'$  east. The mountain is a rocky massif containing several distinct rocky peaks, the highest of which is 1,300m separated by deep valleys. It covers an area of about 100 square kilometers, but the study was concentrated within  $40\text{km}^2$  core area in which the gorillas are found (Inaoyom, pers. Comm.). The sanctuary is endowed with a high primary rainforest and is the sole watershed for 16 surrounding communities. Annual rainfall is about 3,500mm Oates (1999). The mountain was stratified into two sections – North and South. The two sections are separated by a mountainous ridge.

Two teams consisting of twelve (12) rangers were used in the study. One team covered the northern part while the other team covered the southern part simultaneously. Each team patrolled the area for a period of two weeks at a time. Radio communication was used to manage rangers in the field. Six plots measuring 240m by 5000m each (totaling  $7.2\text{km}^2$ ) were randomly selected from each of the sections. The plots were sampled in the dry season and the sampling was repeated in the rainy season with new plots for two years (2006 and 2007). Each ranger looked 10 metres to his right and 10 metres to his left and walked along a transect of 5km in length. On the return journey, the rangers moved freely in a random manner over

the area. The gorillas were also tracked from a safe distance of about 200m when encountered.

Data collected included the number of sites of gorilla nests, number of nests per site, location of nests, plant species and parts utilized by the gorilla. Gorilla dung was carefully scattered with a stick and whole seeds in them were used to identify the plant species utilized for food by the gorillas. Left-over plants parts were also examined to identify plant species utilized. Ages of nests and dung were also noted. Student's t-test and  $\chi^2$  test were used to analyse data. 95% confidence intervals were attached to the population estimates. The population of gorillas was estimated from the mean number of gorilla nests per site and the mean number of sites. These were extrapolated to obtain the figures for 40km<sup>2</sup> which is the area the gorillas concentrate (Inaoyom pers. Comm.).

### **Results and Discussion:**

The number of gorilla nests found per site in the study area in 2006 and 2007 is given in table 1. Results indicated that the number of nests and therefore the number of gorillas decreased significantly ( $P < 0.05$ , student's t-test) from  $616 \pm 138$  in 2006 to  $405 \pm 131$  in 2007 while the mean number of gorilla nests per site also decreased significantly ( $P < 0.05$ ) from  $10.14 \pm 2.6$  in 2006 to  $6.6 \pm 2.14$  in 2007 (95% confidence intervals). This could be attributed to the sustained poaching activities in the area. There was no significant reduction ( $P > 0.05$ , t-test) in the number of poachers apprehended nor their activities between 2006 and 2007 (see table 2). A total of 580 snares were removed in the sanctuary in 2006 while 401 snares were removed from the area in 2007. Thirteen poachers were apprehended in 2006 as against 12 in 2007 and 3 hunters' sheds were destroyed in 2007. Wilkie *et al.*, (1998) attributed the

increase in hunting activities in Africa to population increase and the introduction of modern hunting implements such

Table 1: Number of Gorilla nests found per site in Northern and Southern parts of Afi Mountain Wildlife Sanctuary in 2006 and 2007

	2006		2007	
	North	South	North	South
	13	1	6	2
	10	15	1	9
	8	8	1	12
	11	8	11	4
	1	15	1	11
	14	15	1	4
	1	15	5	13
	8	3	4	6
	6	15	-	8
	15	16	-	10
	-	15	-	17
<b>Total</b>	<b>87</b>	<b>126</b>	<b>30</b>	<b>90</b>
Mean	8.7	11.45	3.75	8.72
Mean of means	10.14		6.63	

Note : (1) 2006 vrs. 2007, t-calculated = 7.16, t-tabulated = 2.09 (sig.,  $P < 0.05$ )

(2) North vrs. South, t-calculated = 2.19, t-tabulated = 1.73 (not sig.  $P > 0.05$ ).

(3) Extrapolation of data from sample size of 6 x 240 x 5000 (7.2km<sup>2</sup>) to 40km<sup>2</sup> gave 616±138 nest for 2006 and 405±131 for 2007.

Table 2. Total number of poachers apprehended, snares removed and hunting sheds destroyed in 2006 and 2007.

	Year		Total
	2006	2007	
Snare	580	401	981
Poachers	13	12	25
Sheds	3	8	11
Total	596	421	1017

$\chi^2$  Calculated =5.02  
 $\chi^2$  tabulated =12.83

as shotguns and high powered rifles that make hunting both easier and less dangerous than the traditional hunting methods.

Nest sites varied widely in the number of nests present (1 to 17). This indicated that the Cross River gorillas are found in a range of social group sizes with 8 or fewer nests being the most common. This was also observed by Grooves and Maisels (1999), Oates *et al.* (2003); and Grooves *et al.* (2003).

The gorillas showed a distinct migration pattern as can be seen from the figures in table 3. One hundred and seventeen nests were found in the south in the wet season with no nests found in the north in the same period. On the other hand, 222 nests were found in the north in the dry season with no nest found in the south in the same period. Thus the gorillas stay in the northern part of the sanctuary in the dry season and move to the southern part in the rainy (wet) season. This could be attributed to the fact that the

Table 3. Total Number of gorilla nests found in the dry and wet seasons in the study area.

	North	South	Total
Wet season	0	117	117
Dry season	222	0	222
Total	222	117	339

Note:  $\chi^2$  tabulated = 9.348

$\chi^2$  calculated = 339. Sig. (P < 0.05)

northern part with a high human population is frequently burnt in the dry season which gives rise to a number of herbaceous plants like *Afromonium* and *Custus afa* which the gorillas utilize for food. Food and safety are the major determinants of the gorilla's movement. Plant species and plant parts eaten by the gorillas are given in table 4. Result show that the cross River gorilla is frugivorous as the fruits of all the 32 plant species listed were utilized for food by the gorillas. The high diversity of plant species eaten by the gorillas over 90% of fecal samples were found to contain fruit remains. The high diversity of plant species eaten by the gorillas and their frugivorous suggests that the gorillas require a relatively undisturbed forest to thrive with Oates *et al.*, (2003) and Ogers *et al.*, (2004) also observed this high diversity of food species in the Western lowland gorillas. The gorilla's diet also reflects the seasonal nature of their habitat showing marked shift in composition between seasons of the year. When fruits are scarce, the gorillas appear to rely on herbaceous vegetation. Two herb species most frequently eaten are *Amorphophallus difomis* and *Afromonum* species. This habit was also reported by Mcfarland (2001).

Table 4. Plant species utilized by the cross River gorilla in Afi Mountain Wildlife Sanctuary in 2006 and 2007

SPECIES	FAMILY	COMMON AME	PART EATEN				
			BARK	ROOT	LEAVES	FRUIT	PITH
<i>Antrocanryon micraster</i>	ANACARDIACEA	Ojif				*	
<i>Dennettia tripetala</i>	ANNONACEAE	Mmimi				*	
<i>Landolphia oweriensis</i> P	APOCYNACEAE	White rubber vine				*	*
<i>Landolphia sp. #</i>	APOCYNACEAE					*	
<i>Canarium schweinfurthii</i>	BURSERACEAE	Bushu-basong				*	
<i>Dacryodes edulis</i>	BURSERACEAE	Bushu				*	
<i>Santria trimera</i> #	BURSERACEAE	Komon				*	
<i>Diallum guineense</i> #	CAESALPINIODE E	Icheku			*	*	
<i>Guibourtia ehie</i>	CAESALPINIODE E					*	
<i>Caloncoba giauca</i>	FLACOURTIACEA	Udala enwe				*	
<i>Garcinia kola</i>	GUTTIFERAE	Bitter kola				*	
<i>Irvingia gabonensis</i>	IRVINGIACEAE	Bush mango				*	
<i>Napoleona vogeli</i>	LECYTHIDACEAE	Mkpodu				*	
<i>Cedrela odorata</i>	MELIACEAE	Otia onio			*	*	
<i>Trichillia tessmanni</i> #	MELIACEAE	Ubenwene				*	
<i>Parkia bicolor</i>	MIMOSOIDEAE	Kakpaja				*	
<i>Ficus mucoso</i> #	MORACEAE	Okimkem				*	
<i>Ficus umbelata</i>	MORACEAE					*	*
<i>Millicia exceisa</i>	MORACEAE	Iroko		*		*	*
<i>Myrianthus arboreus</i>	MORACEAE	Ujuju				*	
<i>Treculia africana</i>	MORACEAE	African breadfruit				*	
<i>Treculia obovoidea</i>	MORACEAE	Oken				*	
<i>Ongokea gore</i>	OLACACEAE	Okufuo				*	*
<i>Elaeis guineensis</i>	PALMAE	Oil plam				*	
<i>Pavetta sp.</i>	RUBIACEAE					*	
<i>Chrysophyllum sp.</i>	SAPOTACEAE	Udala				*	
<i>Synsepium stipulatum</i>	SAPOTACEAE	Udala enwe				*	
<i>Cola acuminata</i>	STERCULIACEAE	Kola				*	
<i>Cola pachycarpa</i>	STERCULIACEAE	Monkey kola				*	
<i>Vitex grandifolia</i>	VERBENACEAE	Kinangkwo				*	
<i>Aframomum sp.</i>	ZINGIBERACEAE	Alligator pepper				*	*
<i>Costus afa</i>	ZINGIBERACEAE	Okpete				*	*



## CONCLUSIONS AND RECOMMENDATIONS

The gorillas in Afi Mountain Wildlife Sanctuary migrate to the northern part of the sanctuary in the dry season and move to the southern part in the rainy season.

The gorillas are mainly frugivorous and utilize a high diversity of plant species for food. They resort to herbaceous plant spp. especially in the dry season when fruits are scarce. The gorillas exist mostly in small social groups of numbering between 2 and 17.

Poaching activities have not been reduced over the years and the population of the gorillas may be decreasing.

It was recommended that more consultations be held with the members of the surrounding villages to dissuade them from hunting the gorillas. Regular population census be carried out to ascertain the trend of the population of gorillas in the sanctuary.

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