

Original Research Article

**FEEDING ECOLOGY OF PRIMATES IN SOUTHERN SECTOR OF
GASHAKA-GUMTI NATIONAL PARK (FILINGA RANGE), TARABA
STATE, NIGERIA.**

Abstract:-

Feeding ecology of primates in Gashaka-Gumti National park particularly in Filinga range was designed to identify the species, their feeding behaviour, type and part of plant feed on and the percentage utilization of the plant species by each primate in the study area. Method adopted was direct observation. All trials were walked from 7 to 11am for six weeks. Data obtained were analysed using descriptive statistics. Five species of primates were identified (Papio Anubis, Cercopithecus aethiops tantalus, Colobus gureza, Cercopithecus nictans and Cercopithecus mona. Diurnal, arboreal and grouping were observed as feeding behaviour exhibited by the identified primates. Fifteen plants species were utilized as food by the primates, with preference for Landolphia owariensis followed by Anogeissus leiocarpus respectively. Each primate displayed a level of selectivity and utilization of the plant species used as food source. Both Baboon and Tantalus monkey utilized Elaeis guineensis most (34.9%, 26.7%) respectively, with Vitex doniana and Brachystegia eurycoma being least (5.8%, 5.0%) utilizes. Mona monkey, Black and White Colobus both utilizes Anogeissus leiocarpus most (51.4%, 15.7%) respectively, the least was Landolphia owariensis (10.8%) and parkia biglobosa (5.1%) respectively. Putty-nosed monkey utilized Landolphia owariensis most (49.2%) and Erythrophleum suaveolens least (34.3%). Black and White Colobus showed a wide selection of food sources, feeding on ten out of fifteen plant species identified, including (Landolphia owariensis) fruits. Mona monkey on the other hand showed a high selectivity, feeding on four out of the total plants species utilized. Primatea's species were observed to feed mostly on leaves and fruits.

30 Key Word:- Feeding, ecology, primate, Gashaka-Gumti National park, filinga
31 range

33 INTRODUCTION

34
35 Feeding ecology is a central component of a species' biology, relating to its survival,
36 reproduction, population dynamics, habitat requirement and pattern of sociality [1]. Food is
37 extremely important to all living organisms. 'It provides nutrients for growth, maintenance,
38 reproduction and is the source of energy that drives the chemical reaction occurring in every
39 cell' [2].

40 According to Kate [3] understanding the diet of an animal helps to interpret its ranging
41 behavior in relation to food availability, decide if a protected area provides sufficient
42 resources, and indicates some of the ecological relationships between plants and animals that
43 are crucial to the survival of both. .

44 Primates are made up of animals like the chimpanzees, gorillas, and monkeys, lemurs, lorises,
45 galagos, pottos, sifakas, indris, aye-ayes, and tarsiers. However, the smallest living primate is
46 the pygmy mouse lemur, which weighs around 30 g. and the largest is the gorilla, weighing
47 up to around 175 kg [4].

48 Primates use variety of food sources such as leaf, fruit, seed and animal which gives their
49 body basic elements like carbohydrates, fats, proteins, vitamins, and minerals. Di Bitetti and
50 Janson [5] revealed that food availability is the most important ultimate cause of seasonality
51 and its availability dictates the daily movement patterns of groups of primates [2]. Gottfried
52 and Martha [6] observed that the environment and the primate itself play an important role in
53 determining the type of food sources, and that additional food availability will influence the
54 density of primates that an area can support as well as modulate the population dynamics [7].

55 Primates were observed to be leaf eaters, fruit eaters, seed eaters, insect eaters in Gashaka-

56 Gumti National Park.

57 According to Volker and Yianna, [8] Baboons consumed African black plum (*Vitex donaina*)
 58 which has a contraceptive effect and potentially reduces mortality during the raining session,
 59 and Chimpanzees are highly frugivorous and usually relay on few important food species yet
 60 as omnivorous, also incorporate animal prey in their diet [9]. The Gashaka-Gumti
 61 Chimpanzees use a varied toolkit for extractive foraging, for example they harvest insects
 62 throughout the year via digging sticks and probes, to obtain honey from stingless-bee and
 63 honey bee nests, dipping wands to prey on army ants and fishing rods to eat arboreal ants
 64 [10].

65 David *et al.*, [11] revealed that the Howlers monkey used 16 plants species as sources of
 66 leaves, fruits and flowers when foraging in a Cacao plantation in Comalcalco, Mexico, and
 67 for Grey-checked mangabeys (*Lophocebus albigena*), however, they have omnivorous
 68 feeding habits, consuming the fruits, seeds, leaves and flowers [12]. Tamarin feed on plant
 69 exudates; claw-like nails enable this primate to exploit food resource that otherwise be
 70 inaccessible by other species [13]. The buff sakis (*Pithecia albicans*) were primarily seed
 71 predators, relying heavily on young seeds of certain key plant families, such as the Spotaceae
 72 and Leguminosae ripe fruits, ripe seeds, young leaves, flowers and nectar [14]. Gorillas fed
 73 largely on fruits in the forest; their basic diet is fibrous parts of plant including shoots, young
 74 leaves and bark, however, they selected fruits as their alternative food resources in the
 75 fruiting season [15]. Black howler monkey (*Alouatta pigra*) feeds on fruit, foliage, flowers
 76 i.e. folivores, frugivores [16] while the Proboscis Monkey are selective feeders; use of tree
 77 species as food sources is not based simply on relative density, given their high biomass and
 78 predilection for consuming seeds of dominant species [17], they may help to maintain and
 79 increase vegetation diversity. The pithecline monkey (*Cacayao calvus* and *Chiropites*
 80 *albinasus*) have frugivorous feeding habits [18]. Wolly monkeys are primarily frugivorous

[19]. The distribution and abundance of food resources will determine the strength of competitive interactions for access to food resources [6] and when there is abundance of food, competition is less and selectivity becomes very high. However, during scarcity primates Species increased the amount of time spent feeding [20].

Primate feeding ecology is examined on the level of the organism, stating the level at which one can quantify the diet, the proportion of diet involved which consists of each type of plant parts (e.g. fruit, seed, pith, leaf and flower) of each species of plant consumed and the time spent. Feeding ecology is based on each resource of the micronutrient feed on (e.g. protein, sugar etc.) or of total calorie intake” [1]. The objective of this study therefore was to determine the feeding ecology of primates at the southern sector of Gashaka-Gumti National park, whilst seeking specifically to:

Identify the primate species present and their feeding behaviour, determine the plant part consumed (leaf, fruit, seed, flower,) by each primate species and utilization of food sources.

MATERIALS AND METHODS

Study area:

This study was carried out in Gashaka-Gumti National Park (GGNP), located between $6^{\circ}55'1''$ - $8^{\circ}05'1''$ N and $11^{\circ}11'12''$ - $12^{\circ}13'1''$ E in North-Eastern Nigeria as shown in fig 1. GGNP was established in 1991 and represents Nigeria’s largest National Park covering 6600km^2 [21], it was created by Federal Decree (now Act) in 1991 by the merging of Gashaka Game Reserve with Gumti Game Reserve [22]. The mean annual rainfall varies from 1200mm in the northern part to about 3000mm in the Southern part of the park [23] while the relative humidity is about 15.7%. The major vegetation type of the park consists of woodland. Some distinctive fauna species found in GGNP include Buffalo (*Syncerus caffer*), Roan antelope (*Hippotragus equinus*), Senegal kob (*Adenota kob*), Lion (*Panthera leo*), Leopard (*Panthera pardus*), Mona monkey (*Cercopithecus mona*), Hunting dog (*Lycaon pitctus*), Giant eland

(*Taurotragus debianus*), Oribi (*Ourebia ourebi*), Guinea fowl (*Numida meligris*) and Monitor lizards (*Veranus niloticus*) among others [24].

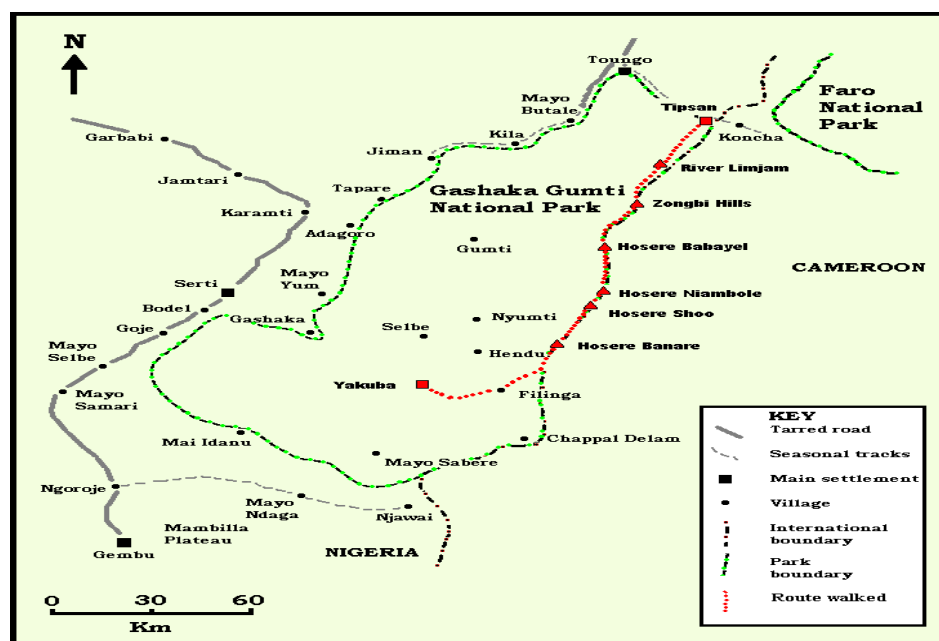


Figure 1- Map of Gashaka-Gumti National Park

Data Collection

Data were collected from predetermined transects, made up of existing trails in the following four locations:

Gashaka Base Camp 1: 5Km trail from Mayo Gashaka (River) through the village to Base camp where the Rangers reside, across Mayo Gamgam (river). Habitat type, rainforest (N:07.3711, E:011.49202).

Gashaka Base Camp 2: 6Km trail after Mayo Gashaka (river) on the road to Mayo paa. Habitat type, Guinea savanna (N: 07.36.597, E: 011.48847).

Putty nosed site: 5Km trail across Mayo Gamgam River on your way to Kwano research station. Habitat type, rainforest (N: 07.354141, E: 011.52826).

Kwano site: 12Km trails at Kwano research station. Habitat type, rainforest (N: 07 32 917, E: 011 58 458).

Purposive sampling method was used to select these sites. Data were collected from June-July, eight days for each location, using direct observation method [25]. The trails were walked from the morning 06.00h – 11.00h and the evening 15.00h – 18.00h by the author and 3 game guards who were familiar with wildlife species. Activities such as type of primate sighted, plant species fed on, part of plant eaten, and behaviour was recorded on the data sheet. A guide book was used where possible. The study sites were observed to cover two types of vegetation Guinea savannah and rainforest.

Materials used during data collection were; a Pen for recording information, a Data sheet for data recording information, Global Positioning System (Germin GPSMAP 78S) for taking coordinates of the study sites, a digital photo camera (Sony cyber shot DSC-HX200V) for taking pictures and a Binocular (Crown field 7.5*) for proper identification of species.

Data Analysis

Data were analyzed using simple descriptive analysis such as bar chart, tables and percentage utilization using this formula by [26] as follows.

% utilization of plant species was determined as follows:

$$\frac{\text{Total number of sightings feeding on a particular plant species}}{\text{Total number of sighting for all species eaten.}} \times 100$$

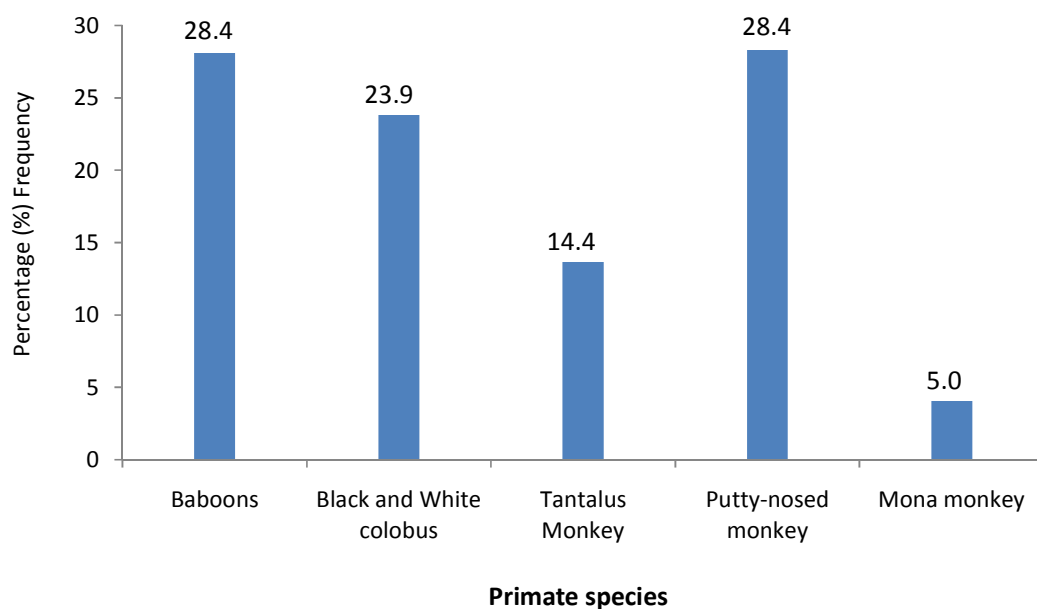
RESULTS

The results of the different species of primates observed during the study are shown in figure 2. The results showed that five (5) primates were identified. They were the Baboons, Tantalus monkey, Putty-nosed monkey, Black and White colobus monkey and Mona monkey. The most frequently sighted primates species were the Baboons and Putty-nosed monkeys which constituted 28.4% each while the least sighted was Mona monkey, accounting for 5.0%. The presence of primate species in the Southern sector of GGNP as shown in Table 1, revealed

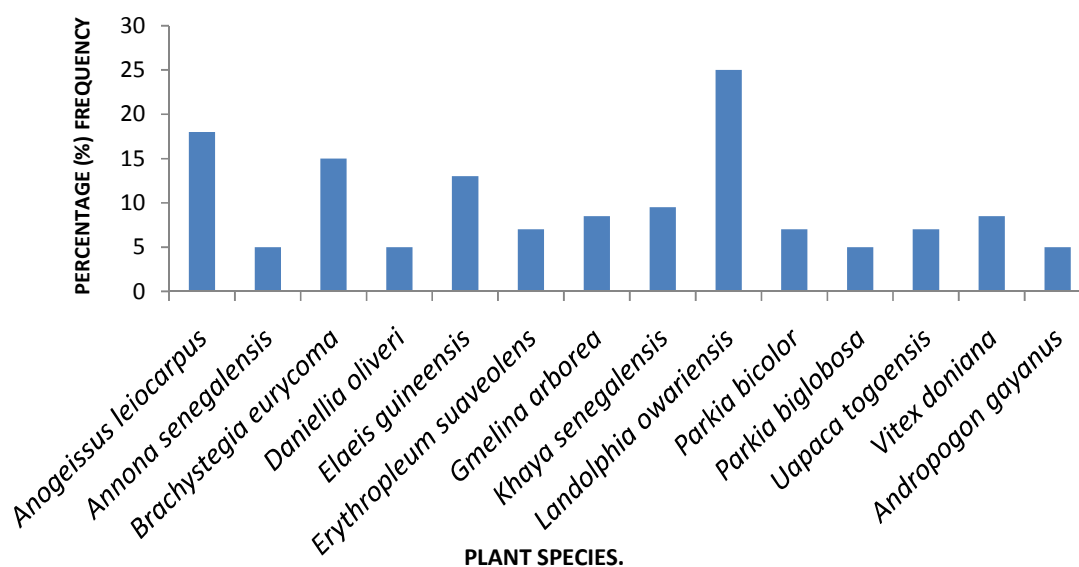
148 that all the primates were observed to feed in groups, exhibited diurnal and arboreal feeding
149 behaviours.

150 The identified species of primates exploit variety of food sources, in Table 2, fifteen (15)
151 different species of plant were utilized by the Primates as food, fourteen (14) of which were
152 tree species and one (1) grass species, bark of tree, insect were also used as food by the
153 Primates. The frequently used plant species in the Park by all Primates as showed in figure 3
154 are *Landolphia owariensis*, *Anogeissus leiocarpus* respectively. Each Primate species
155 exhibited pattern in their feeding by showing level of utilization of the plant species. The
156 most utilized plant species by the Baboon in (Table 3) was *Elaeis guineensis* accounting for
157 34.9% and the least utilized plant species was *Vitex doniana* (5.8%). Similarly, Tantalus
158 monkey most utilized plant species was *Elaeis guineensis* which made up 26.7% and the least
159 utilized plant species was *Brachystegia eurycoma* constituting 5.0% (Table 4). Mona monkey
160 as shown in Table 5 utilized *Anogeissus leiocarpus* (51.4%) plant species most and
161 *Landolphia owariensis* (10.8%) was least utilized. Mona monkey however used only four
162 plant species out of the total number of fifteen plant species identified. This could be a
163 display of selectivity, which may have direct effect on habitat selection. It was observed from
164 the research conducted that Mona monkeys were identified only in the rainforest of Kwano
165 location.

166 Black and White Colobus on the other hand has the highest number of plants species used as
167 food in the study area, accounting for ten out of fifteen plant species identified as shown in
168 Table 6, the most utilized plant species was *Anogeissus leiocarpus* which made up 15.7% and
169 the least utilized plant species was *Parkia biglobosa* accounting for 5.1%. Finally, the plant
170 species utilized by Putty-nosed monkey as indicated in Table 7 with the most utilized plant
171 species as *Landolphia owariensis* which constituted 49.2% and *Erythrophleum suaveolens*
172 constituted just 3.3%.



173 **Figure 2-** A Bar chart showing the relative % frequency of the types of primate species
 174 identified in the study area.
 175



176 **Figure 3 -** The most frequently used plant species by all the Primates in the study area.
 177
 178 Field work, 2014

179 **Table 1: Primate Species Sighted and their Feeding Behaviour at GGNP**

Common name	Scientific name	Diurnal	Group	Arboreal
Baboons	<i>Papio anubis</i>	+	+	+
Tantulus Monkey	<i>Cercopithecus aethiops tantalus</i>	+	+	+
BlackandWhite Colobus	<i>Colobus gureza</i>	+	+	+
Putty-Nosed Monkey	<i>Cercopithecus nictans</i>	+	+	+
Mona Monkey	<i>Cercopithecus mona</i>	+	+	+

180
181 Key: + Presence of the feeding activity.
182 Field work, 2014

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184
185 **Table 2: Plant Species Utilized as Food by Primates at GGNP**

S/no	Plant Specie	Family	Local name	Common name
1	<i>Anogeissus leiocarpus</i>	Combretaceae	Marke	Dye
2	<i>Annona senegalensis</i>	Annonaceae	Gwandar daji	Senegal annona
3	<i>Brachystegia eurycoma</i>	Leguminosae	Wombo	-
4	<i>Daniellia oliveri</i>	Leguminosae	Maje	West African copal
5	<i>Elaeis guineensis</i>	Palmae	Kwara manja	Oil palm
6	<i>Erythrophleum suaveolens</i>	Caesalpinodeae	Gwaska	-
7	<i>Gmelina arborea</i>	Laminaceae	-	-
8	<i>Khaya senegalensis</i>	Meliaceae	-	Mahogany
9	<i>Landolphia owariensis</i>	Apocynaceae	-	-
10	<i>Parkia bicolor</i>	Mimosaceae	-	-
11	<i>Parkia biglobosa</i>	Mimosaceae	Dorowa	Locust bean
12	<i>Parinari excels</i>	Rosaceae	Tuwon biri	Rough skinned plum
13	<i>Uapaca togoensis</i>	Euphorbiaceae	Wawa kurmi	-
14	<i>Vitex doniana</i>	Verbaseae	Dinyar	Sweet
15	<i>Andropogon gayanus</i>	Poaceae	-	-

187 Field work, 2014

188

189 **Table 3: Plant Species fed by the Baboons (*Papio anubis*) GGNP**

Plant Species	Part(s) Eaten	Number of Primates sighted Feeding on particular Plant Species.	% Utilization
<i>Vitex doniana</i>	Fruit/leaf	11	5.8
<i>Elaeis guineensis</i>	Fruit	66	34.9
<i>Annona senegalensis</i>	Fruit	18	9.5
<i>Andropogon gayanus</i>	Grass	12	6.4
<i>Parinari excelsa</i>	Fruit	14	7.4
<i>Uapaca togoensis</i>	Leaf	21	11.1
<i>Landolphia owariensis</i>	Fruit	47	24.9

190 Field work, 2014

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194 **Table 4: Plant Species fed by Tantalus monkey (*Cercopithecus aethiops tantalus*) GGNP**

Plant Species	Part(s) Eaten	Number of Primates sighted Feeding on particular Plant Species.	% Utilization
<i>Brachystegia eurycoma</i>	Fruit	6	5.0
<i>Gmelina arborea</i>	Fruit/leaf	28	23.3
<i>Elaeis guineensis</i>	Fruit	32	26.7
<i>Anogeissus leiocarpus</i>	Leaf	22	18.3
<i>Parinari excelsa</i>	Fruit	14	11.7
<i>Uapaca togensis</i>	Fruit/leaf	18	15.0

195 Field work, 2014

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200 **Table 5: Plant Species fed by Mona monkey (*Cercopithecus mona*) GGNP**

Plant Species	Part(s) Eaten	Number of Primates sighted Feeding on particular Plant Species.	% Utilization
<i>Anogeissus leiocarpus</i>	Leaf	19	51.4
<i>Khaya senegalensis</i>	Leaf	7	18.9
<i>Brachystegia eurycoma</i>	Leaf	7	18.9
<i>Landolphia owariensis</i>	Fruit	4	10.8

201 Field work, 2014

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203

204 **Table 6: Plant Species fed by Black and White Colobus (*Colobus gureza*) GGNP**

Plant Species	Part(s) Eaten	Number of Primates sighted Feeding on particular Plant Species.	% Utilization
<i>Vitex doniana</i>	Leaf	30	12.7
<i>Daniellia oliveri</i>	Leaf	30	12.7
<i>Gmelina arborea</i>	Leaf	18	7.6
<i>Landolphia owariensis</i>	Fruit	21	8.9
<i>Anogeissus leiocarpus</i>	Leaf	37	15.7
<i>Erythrophleum suaveolens</i>	Leaf	19	8.1
<i>Parkia biglobosa</i>	Leaf	12	5.1
<i>Parkia bicolor</i>	Leaf	14	5.9
<i>Brachystegia eurycoma</i>	Leaf	28	11.9
<i>Khaya senegalensis</i>	Leaf	27	11.4

205 Field work, 2014

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208 **Table 7: Plant Species fed by Putty-nosed monkey (*Cercopithecus nictans*) GGNP**

Plant Species	Part(s) Eaten	Number of Primates sighted Feeding on particular Plant Species.	% Utilization
<i>Landolphia owariensis</i>	Fruit/leaf	147	49.2
<i>Vitex doniana</i>	Fruit	37	12.4
<i>Khaya senegalensis</i>	Leaf	20	6.7
<i>Brachystegia eurycoma</i>	Leaf	44	14.7
<i>Anogeissus leiocarpus</i>	Leaf	41	13.7
<i>Erythrophleum suaveolens</i>	Leaf	10	3.3

209 Field work, 2014

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211 **DISCUSSION**

212 Primates of Gashaka-Gumti National Park constitute part of the rich biodiversity that made
 213 up the ecosystem. Five (5) species of primate were identified, these are Baboons (*Papio*
 214 *anubis*), Tantalus Monkey (*Cercopithecus aethiops tantalus*), Mona Monkey (*Cercopithecus*
 215 *mona*), Black and White Colobus (*Colobus guereza*) and Putty-Nosed Monkey
 216 (*Cercopithecus nictans*).The findings are in line with study on Primates species by [21], who
 217 identified seven species (7) of Primates in the entire Park. However, the present research was
 218 carried out at the southern sector of the park, which probably is the reason of the result
 219 obtained. Secondly Chimpanzee which can be found in rainforest habitat was not identified in
 220 this research work because it needs a longer time of observation (one year or more) to be
 221 sighted.

222

223 All the Primates were observed to feed in groups, exhibited diurnal and arboreal feeding
 224 behaviours, although Baboons and Tantalus monkey sometimes could climb down to pick on

grass then climb up again. Primates species in this study were observed to feed mostly on leave and fruits i.e. folivorous and frugivorous which was similar to the result by [12]. It was observed that Black and White Colobus used a wide range of food sources which indicate easy adaptation and abundance of the species to Gashaka-Gumti National Park. Some research on Black and White Colobus revealed that they feed only on leaves [27], but it is interesting to note that this study revealed that they also feed on fruit (*Landolphia owariensis*) as indicated in Table 6.

The Primates were observed to use fifteen (15) plants species as food sources of leaves, fruits when foraging in the Park. This agrees with David et al [11], that 16 plants species were used by Howlers monkey as sources of leaves, fruits and flowering when foraging in Cacao plantation in Comalcalco, Mexico. The most frequently used plant species by the Primates was observed to be *Landolphia owariensis* and *Anogeissus leiocarpus* respectively. Mona monkeys on the other hand shows a level of selectivity, with fewer plant species used as food sources, this could probably have a direct effect on habitat selection. Mona monkey was seen only in a rainforest habitat. All the Primates identified were observed to exploit a variety of food sources probably due to the season.

CONCLUSION

A good knowledge of what the Primates feed on and its availability will determine maintaining strategies geared towards sustaining the Primate in their present habitat. If their food decreases to a level below the carrying capacity of the habitat, they will be forced to migrate to other area. This study has demonstrated that sustenance of Primates in an ecosystem is vital considering their feeding habit which encourages the regeneration of plants through the activity of seed dispersal. Further studies should try to investigate the relative abundance of the identified plants in the area to determine if the habitat can adequately sustain the Primates for a longer period.

REFERENCES

1. HOHMANN G BOESCH C & ROBBINS M Feeding Ecology in Apes and other Primates. Max Planck-Institute fur Evolutionare Anthropologie, Germany. 2012.
2. LAMBERT JE Primate digestion: interactions among anatomy, physiology, and feeding ecology. *Evolutionary Anthropology issues, News and Reviews*. 1998; 7(1):8-20.
3. KATE A Behavioural ecology data and its relevance for management. Conservation research in the African rainforests, a technical handbook. 2000.
4. MYERS P <http://animaldiversity.ummz.umich.edu/accounts/Primates/>. 2000.
5. Di BITETTI MS & JANSON CH When will the stork arrive? Patterns of birth seasonality in neotropical primates. *American Journal of Primatology*. 2000; 50:109-130.
6. GOTTFRIED V & MARTHA A Feeding Ecology in Apes and other Primates. Max-Planck Institut fur Evolutionaire, Anthropologies, Germany. 2012.
7. HOHMANN G POTTS K N'GUESSAN A Plant foods consumed by Pan: exploring the variation of nutritional ecology across Africa. *American Journal of Physical Anthropology*. 2010; 141:476-485.
8. VOLKER S & YIANNA K The bush as pharmacy and supermarket: Mechanisms and Functions of Plant use by Human and Non-human. *Primates of Gashaka Developments in Primatology* [HYPERLINK "http://link.springer.com/bookseries/5852": Progress and Prospects](http://link.springer.com/bookseries/5852) .2011; 35:135-230.
9. STEPHANIE LB Behavioral ecology of savanna chimpanzees (Pan troglodytes verus) with respect to insectivory at Fongoli, Senegal. *Graduate Theses and Dissertations*.2009;11.
10. ANDREW F & VOLKER S Subsistence Technology of Nigerian Chimpanzees. *International Journal Primatology*. 2007; 28: 997-1023.
11. DAVID M ALEJANDRO E EDUARDO N & SUSANA O Foraging Ecology of Howler Monkeys in a Cacao (Theobroma cacao) plantation in Comalcalco,Mexico. *American Journal of Primatology*. 2006; 68:127-142.
12. POULSEN JR CLARK CJ & SMITH TB Seasonal variation in the feeding ecology of the grey-checked mangabeys (Lophocebus albigena) in Cameroon. *American Journal of Primatology*.2001; 54:91-105.

13. GARBER PA The ecology of seed dispersal in two species of Callitrichid primates (*Saguinus mystax* and *Saguinus fuscicollis*). *American Journal of Primatology*. 1986; **10**:155-170.
14. CARLOS AP Notes on the Ecology of Buffy Saki Monkey (*Pithecia albicans*, Gray 1860): A canopy seed-predator *American Journal of Primatology*. 1993; **31**:129-140.
15. TAMOAKI N Feeding Ecology of Western Lowland Gorillas in the Nouabale-Ndoki National Park, Congo. *Primates*. 1995; **36**(2):151-168.
16. SILVER SC TOSTRO LE YAEGER CP & HORWICH R Feeding Ecology of the Black Howler Monkey (*Alouatta pigra*) in Northern Beliza. *American Journal of Primatology*. 1998; **45**:263-279.
17. CAREY PY Feeding Ecology of the Proboscis monkey (*Nasali larvatus*). *International journal of Primatology*. 1989; **10**(6):497-530.
18. AYRES JM Comparative feeding ecology of the Uakari and Bearded Saki, Cacajao and Chiropotes. *Journal of Human Evolution*. 1989; **18**(7):697-716.
19. CARLOS AP Diet and Feeding Ecology of Gray Wolly Monkeys (*Lagothrix lagotricha cana*) in Central Amazonia: Comparisons with other Atelines. *International Journal of Primatology*. 1994; **15**(3):333-372.
20. OVERDORFF DJ. Ecological correlates to activity and habitat use of two prosimian primates: *Eulemur rubriventer* and *Eulemur fulvus rufus* in Madagascar. *American Journal of Primatology*. 1996; **40**:327-342.
21. DUNN A Gashaka Gumti National Park: A guide book. 1999; 2- 10.
22. GASHAKA GUMTI NATIONAL PARK (GGNP). A Management Plan for Developing the Park and its Support Zone. Prepared by the Nigerian Conservation foundation and World Wide Fund for Nature with Support for Department for International Development for the Federal ministry of Agriculture and Natural Resources. 1998.
23. BARNWELL RP Gashaka-Gumti Game Reserve, Gongola State, Nigeria. An indicative proposal for developing Gashaka-Gumti National park, a report for WWF-UK and NCF, the Gongola State government and Federal government of Nigeria. 1990.
24. Mubi AM & Tukur AL. Species Density and Diversity along Geomorphic. grad In Gashaka- Gumti National Park, Nigeria; *Ethiopian Journal of Environmental Studies and Management* (EJESM). 2012; **5**. (4) 513 – 518.

- 348 25. SOMMER V & CASPER S Ant-dipping and food abundance in Nigeria
349 Chimpanzees. Report to Leakey foundation USA.2006.
350
- 351 26. AKOSIM C JOSEPH J EGWUMAH PO. Assessment of Feeding Behaviour of
352 Baboons (*Papio anubis*) in Hong Hills, Adamawa State. *Journal of Research in*
353 *Forestry, Wildlife and Environment*.2010; **2**(1): 60-72.
354
- 355 27. DAVID AG OATES JF Conclusions, the past, present and future of the colobines: In:
356 davies, A.G, Oates, J. J (eds). Colobine monkeys: their ecology, behavior and
357 evolution Cambridge (UK: Cambridge). 1994.
358
359
360