Diversity and Proximate Composition of Herbaceous Components of Old Oyo National Park, Nigeria in Relation to Wildlife Conservation

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Abstract

The diversity of wildlife in Parks depends on availability and distribution of flora feeding resources. Abundance and proximate relationships between wild plants and wildlife may determine conservation potentials of a Park. The composition and diversity of species in three wetlands (Ibuya, Ipade-Aya and Ajaku) in Old Oyo National Park, Nigeria were studied in dry (February-March) and wet (September-October) seasons of 2004-2006. Herbaceous flora of the three wetlands were systematically assessed using 5000 m^2 plots on which two 100 m diagonal transects were superimposed to enumerate all low–growing plants that rooted within thirty randomly selected 1 m^2 quadrats. Four most abundant plant species in two families were selected for proximate analyses. Three topsoil samples of each site were randomly collected and analysed for physicochemical properties. *Hyparrhenia involucrata* Stapf. and *Andropogon tectorum* Schumach were the most abundant herbs in the wetlands. Ipade-Aya had the highest Shannon-Weiner (H') and evenness (J) values of 1.6 and 0.7 respectively. Ibuya had H`=1.0 and J=0.5; while Ajaku had H`=1.0 and J=0.5. The protein contents of the forage grasses significantly ($P<0.05$) ranked in the order: *Andropogon tectorum* > *Andropogon gayanus* Kunth > *Hyparrhenia involucrata* > *Hyparrhenia rufa* (Nees) Stapf. Soils of the wetlands were mostly similar, except Ajaku which was sandy loam. Fauna populations at the three sites were low. The highest detected faunal populations were nine at Ibuya, and three each at Ipade-Aya and Ajaku. Available nutritious grasses may not continue to sustain wildlife populations. Further research should consider increasing forage for faunal conservation.

Introduction

Old Oyo National Park is the first National Park to be constituted in Nigeria (EC-FAO, 2003). It is the fourth largest of eight national parks in Nigeria, and a major preservation formation for wild plant and animal representatives of the derived savanna and the southern fringes of the Guinea savanna, close to the middle belt (Afolayan, 1980; Olubode, 2007). The National Park was created by Decree 36 of 1991 from Upper Ogun and Oyo Ile Forest Reserves that were gazetted in 1936 and 1941 respectively. Its functions, among others, are to protect, preserve, conserve and manage representative samples of indigenous flora and fauna of the South-West geographical region of Nigeria, to encourage and promote sustainable abundance and growth of biological materials for botanical and zoological specimens for scientific research and to encourage the public to visit the National Park in order to enjoy and appreciate the aesthetic,

Keywords: Fauna population, floristic assessment, National Park, proximate analysis, species dominance.

spiritual and ecological values of nature in the maintenance of a healthy environment. The park is located between 8° 15` and 9° N; longitude 3° 45`and 4° 42`, and covering a total land area of 2,512 km^2 (Fadare, 1989). The park is composed mostly of lowland plains, undulating from 308 m to 508 m above the sea level. It is drained by two main river systems: River Ogun flowing southwards to the Atlantic Ocean and River Tessi flowing northwards to the River Niger. Several tributaries flow southwestwards, eastwards, and northwestwards and northeastwards to Rivers Ogun and Tessi respectively (Ayodele, 1988). It is a unique formation for ecotourism in the region.

Wetlands usually support a rich assemblage of plants and animals because they and such ecotones perform various functions through their biological, chemical and physical attributes such as nutrient transformation, ground water recharge, surface water retention or detention, food chain support, and flora and wild fauna habitat (Johnston, 1993; DeBusk, 1999; Woltemade, 2000; Bai *et al,* 2004; Traut, 2005). They are known to provide valuable grazing land for herbivores. During droughts, wetlands provide feeding areas when other areas are depleted. However, fauna populations are endangered by many environmental factors, such as habitat destruction (Fox and Madsen, 1997), hunting and poaching, environmental pollution (Afolayan, 1993), pests and diseases and decline in food supply. Different animals use different plants and parts for food. A study of wildlife utilization of some browse species in the Guinea savanna zone of Nigeria by Onadeko *et al* (1999) revealed that ten species of wildlife were associated with browsing activities, and utilizing twenty one browse species. The parts of plants utilized include foliage, flowers, fruits and barks. This means that population of wildlife will be more in areas where there are many utilizable plant species than areas where they are fewer or non-existent. Adeyemo (1997) reported that food availability influenced the green monkeys' (*Cercopithecus aethiops*) daily activities in the guinea savanna forest of Old Oyo National Park over an 18-month study period. The plants eaten by animals have various properties like antibacterial activity, sweetness and as feedstuff (Ibewuike *et al* 1997; Lovett and Haq 2000; Abu, 2002).

Habitat characteristics, such as vegetation structure and changes in food supply affect survival and population densities of faunal species (Durell *et al,* 2000; 2001; Atkinson *et al,* 2003), just as there are threats to survival of plants in terms of local extinction. The health of animals and hence, their diversity are dependent on the nutritional status of plants. The diversity, changes in plant species composition and plant life forms are likewise associated with gradients in soil fertility (Keddy, 2000). The fertility of a soil plays an important role in proximate composition of nutrients in plant species, and deficiency of some nutrients in both soil and plants can be responsible for a comparable nutrient deficiency in animals utilizing such plants; because, plants are a basic source of these nutrients to animals (Raven and Johnson, 2002). Thus, the status of a wetland in terms of available nutrient will determine to a large extent, the nutritional value of wetland plants and animal health and residency (Keddy, 2000). This study assessed the floral composition, diversity and quality of three wetlands in Old Oyo National Park with a view to identifying their effects on the abundance of associated wildlife species.

Materials and Methods

Study Sites

The study was conducted in the Marguba Range of Old Oyo National Park, Sepeteri in a derived savanna zone; Three wetlands selected after a reconnaissance survey of the Park included Ibuya (08°27 N, 03°46 E), Ipade-Aya (08°29 N, 03°45 E) and Ajaku (08°29 N, 03°43 E. The three sites were geographically widely separated(Figure1). Their distances as the crow flies are: Ibuya-Ipade-Aya (3.94 Km), Ipade-Aya-Ajaku (3.62 Km). All the three wetlands were located in the core of the Range.

Assessment of floral abundance and diversity

Floristic abundance of herbaceous species at the study sites were assessed using the method of Kent and Coker (1992) for frequency, density and relative importance value (RIV). The diversity of the plant communities was assessed using Shannon-Wiener diversity (H') and evenness

$$\text{Relative Importance Value (RIV) (\%)} = \frac{\text{Relative Density} + \text{Relative Frequency}}{2}$$

Where:

$$\text{Relative density (\%)} = \frac{\text{Absolute Density of individuals of species} \times 100}{\text{Total density of all species}}$$

Absolute Density
= Number of individuals of a species per unit area.

$$\text{Relative frequency (\%)} = \frac{\text{Absolute Frequency of a species} \times 100}{\text{Total Frequency of all species}}$$

Absolute frequency
= the chance of occurrence of a species in a quadrat;

Shannon-Wiener index (H^1) $= -\sum(\rho i).(\ln \rho i)$

where $\rho i =$ the proportion of individuals or the abundance of the i^{th} species expressed as a proportion of total abundance of all species $[\rho i = n_i/N]$

$n_i =$ number of individuals in the i^{th} species,

$N =$ total number of individuals in the sample.

$\ln =$ log base $_n$

$$\text{Evenness index (J)} = \frac{H^1}{\ln S}$$

where S = Number of species.

Proximate Analysis of Selected Plants for Conservation

Four grass species were selected for proximate analysis based on their Relative Importance Values. Equal weights of *Andropogon gayanus, Andropogon tectorum, Hyparrhenia involucrata* and *Hyparrhenia rufa* shoots were randomly and separately collected from each of the three wetlands. Each of the forage species was collected and mixed with others of its kind from the three wetlands before dividing into three coded replicates. They were analysed for crude protein composition, crude fat/ether extract composition, dry matter content, moisture content, ash content, fibre content, and for phosphorus and potassium concentration at the Central Laboratory of the Institute of Agricultural Research and Training, Moor Plantation, Ibadan according to the official methods of analysis described by Association of Official Analytical Chemists (1984). All values were subjected to Analysis of variance (ANOVA) following the procedure for completely randomized design (Gomez and Gomez, 1984).

Survey of wildlife

Survey for wild fauna at the three wetlands was conducted in the wetlands of Ibuya river, Ipade-Aya and Ajaku river between 2004 and 2006 by following known trails or other paths (reconnaissance sampling) that were used for tourism at an average speed of between 3-4 km/h^{-1} as recommended by Walsh and White (1999). The surveys were conducted at the early hours of the day (7.30am – 9.30 and early evening period (4.30pm – 6.30 pm) when diurnal animals are most active. Whenever a wildlife was detected, the following data were recorded, geo-coordinates, species, abundance and mode of observation (visual or by index of recent presence – fresh foot print, fresh dung, or bush displacement/trail). The survey was conducted such that the closest wetland to Ajaku gate (on the border of core and buffer zones) was surveyed first, consecutively followed by the Ipade-Aya and Ibuya in the order of distance, in order to avoid double counting, Double counting is unlikely because of the wide gap between any two sites, well beyond the daily range of the wildlife enumerated, except avifauna.

Soil analysis

Three soil samples were randomly collected from each wetland with soil auger to a soil depth of 0-15 cm for routine soil analysis to determine soil texture, cation exchange capacity, soil organic matter, Exchangeable acidity, pH, and extractable elements (me/100 g): total nitrogen, average phosphorus, calcium, magnesium sodium and

potassium. The soil analysis was conducted following the methods of Udo and Ogunwale (1986) at Soil laboratory, Department of Agronomy, University of Ibadan. Nigeria.

Results

Diversity of Herbs in the three wetlands

The floristic assessment revealed Ibuya and Ipade-Aya to have nearly similar species composition (Table 1). In terms of number of species, Ibuya and Ipade-Aya sites had 24 and 17 species, respectively. Ajaku site had relatively few (10) plant species. *Hyparrhenia involucrata* and *Andropogon tectorum* were the most prominent in overall herbaceous species composition with RIV for *Hyparrhenia* ranging from 17.47-31.71% and RIV for *A. tectorum* ranging from 11.08-20.40%. Generally, *H. involucrata* had higher RIV than *H. rufa*. *A. gayanus* had low prevalence with RIV ranging from 0.98-3-34% (Table 1).

The diversity indices of the three wetlands at the end of the dry season (March, 2005) indicated Ipade-Aya to be most diverse (H'=1.43, J=0.62; while Ibuya was second in the rank (H'=0.80, J=0.50), and Ajaku was least diverse (H'=0.52, J=0.32) (Figure 2). The diversity indices of the flora of the wetlands followed a different pattern by the end of the following wet season (September, 2005). The indices indicated the wetland of Ipade-Aya as the most diverse and containing most evenly distributed species (H'=1.34, J=0.42) (Figure 2). The wetland of Ibuya ranked second with H'=1.30, J=0.41. The Ajaku river wetland was the least diverse with H'=1.21, J=0.45.

Soil analysis

Physicochemical analyses of the soils of the three wetlands indicated Ibuya and Ipade-Aya to be loamy sand, while Ajaku soil was sandy loam (Table 2). The three soils were slightly acidic (pH ranging from 6.19 to 6.64) with relatively high base saturation (83.9% - 84.6%).

Figure 1: Map of Old Oyo National Park showing location of study site (8°27'N; 3°46'E). © 2012 Google earth.

Table 1: Floristic composition and relative importance values of all plant species in the wetland of Ibuya River, Old Oyo National Park in 2004-2005 (n=270).

S/N	Species	Family	RIV Ibuya	RIV Ipade-Aya	RIV Ajaku
1	*Hyparrhenia involucrata*	*Poaceae*	28.61	21.25	31.71
2	*Hyparrhenia rufa*	*Poaceae*	22.757	17.47	22.44
3	*Andropogon tectorum*	*Poaceae*	20.10	16.54	11.08
4	*Melanthera scandens*	*Asteraceae*	5.04	19.84	5.07
5	*Lophira alata*	*Ochnaceae*	3.98	1.12	-
6	*Vitellaria paradoxa*	*Sapotaceae*	3.94	-	-
7	*Terminalia schimperiana*	*Combretaceae*	3.92	2.24	-
8	*Grewia mollis*	*Tiliaceae*	1.96	1.58	3.15
9	*Annona senegalensis*	*Sapotaceae*	1.47	1.11	1.85
10	*Burkea africana*	*Caesalpinaceae*	1.47	0.62	-
11	*Entada americana*	*Mimosaceae*	0.98	0.56	-
12	*Andropogum gayanus*	*Poaceae*	0.98	3.34	-
13	*Calopogonum mucunoides*	*Fabaceae*	0.92	-	-
14	*Bombax*	*Bombaceae*	0.49	-	-
15	*Combretum collinum*	*Combretaceae*	0.49	-	0.62
16	*Crossopteryx febrifuga*	*Rubiaceae*	0.49	-	-
17	*Detarium microcarpum*	*Caesalpinaceae*	0.49	1.67	0.62
18	*Gardenia spp*	*Rubiaceae*	0.49	0.56	-
19	*Hymenocardia acida*	*Hymenocardiaceae*	0.49	0.56	-
20	*Maytenus senegalensis*	*Celastraceae*	0.49	-	-
21	*Prosopis africana*	*Mimosaceae*	0.49	-	-
22	*Rytugyna nigerica*	*Rubiaceae*	0.49	-	-
23	*Spondias mombin*	*Anacardiaceae*	0.49	-	-
24	*Strychnosspinosa*	*Loganiaceae*	0.49	-	-
25	*Daniellia oliveri*	*Caesalpiniaceae*	-	1.11	0.62
26	*Pterocarpus erinaceus*	*Papilionaceae*	-	1.11	1.85
27	*Aedesia baumannii*	*Asteraceae*	-	0.56	-
28	*Anogessius leiocarpa*	*Combretaceae*	-	0.56	2.47
29	*Ficus natalensis*	*Moraceae*	-	0.56	-
30	*Malacantha alnifolia*	*Sapotaceae*	-	0.56	-
31	*Vitex doniana*	*Verbanaceae*	-	0.56	-
32	*Piliostigma thoninngii*	*Caesalpiniaceae*	-	2.82	1.87
33	*Schiwenkia americana*	*Solanaceae*	-	1.67	0.62
34	*Aframomum septrum*	*Zingiberaceae*	-	0.62	5.64
35	*Terminalia macroptera*	*Combretaceae*	-	-	3.74

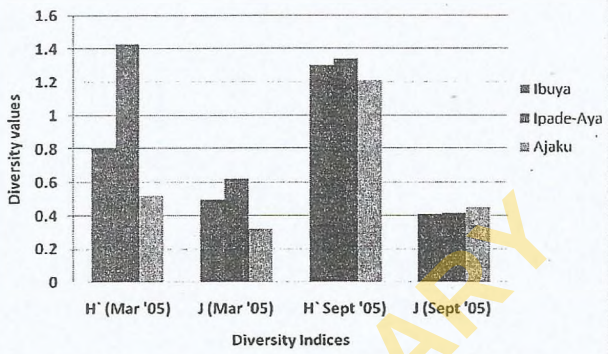

Figure 2: Variation in Shannon-Weiner Equitability (H`) and Evenness indices for the flora of wetlands of Ibuya, Ipade-Aya and Ajaku rivers in Old Oyo National Park in two successive seasons.

Proximate, Nutrients and Vitamin Analyses on Plant Samples

The proximate composition of the four grass species showed that *Andropogon tectorum* had significantly higher proximate composition than any of the plants analysed at $P \leq 0.05$ except in the dry matter yield/plant where it was the least. The mean crude fibre composition of *Andropogon tectorum* was only less than that of *Hyparrhenia involucrata.* It had the least extractable ether (crude fat). In the tree wetlands, *Hyparrhenia involucrata* had significantly higher dry matter but lower moisture content than any other forb, whereas *Hyparrhenia rufa* had the highest crude fat content. The protein contents of *Andropogon tectorum* and *Andropogon gayanus* were higher than the other two, and that of *Andropogon tectorum* was significantly higher than that in *Andropogon gayanus* (Table 3).

Table 2: Soil chemistry and particle size distribution in the rooting layers of plants in the wetlands of Ibuya river, Ipade-Aya and Ajaku River in Old Oyo National Park. (Values are mean±SE; n=3).

Site	Mechanical Analyses			Physicochemical Analyses						
						Extractable Elements (me $100g^{-1}$)				
	Sand (%)	Silt (%)	Clay (%)	pH (1N in H_2O)	CEC (mol/kg)	Org. C.	Total N	Av. P	K	Textural Class
Ibuya	79.80 ±1.41	14.07 ±0.82	6.13 ±1.63	6.38 ±0.09	2.83 ±0.35	2.11 ±0.12	0.45 ±0.13	28.06 ±1.67	0.67 ±0.16	Loamy sand
Ipade -Aya	80.47 ±1.65	14.06 ±2.16	5.47 ±0.82	6.64 ±0.08	3.53 ±0.35	1.07 ±0.07	0.22 ±0.01	31.81 ±2.89	1.16 ±0.13	Loamy sand
Ajaku	59.13 ±4.32	22.07 ±6.38	18.80 ±2.45	6.19 ±0.07	3.15 ±0.15	1.56 ±0.10	0.30 ±0.05	8.41 ±1.25	0.85 ±0.13	Sandy loam

Table 3: Proximate composition of four grass species in the wetlands of Ibuya River, Ipade-Aya and Ajaku River in Old Oyo National Park in 2005. (Values are means with n=3).

Grass species	% Ash	% D.M	% M.C	% C.P	% C.F	% E.E
Andropogon gayanus	9.14^{b}	71.29^{c}	28.71^{b}	13.81^{b}	2.87^{c}	18.11^{c}
Hyparrhenia involucrata	8.72^{c}	72.71^{a}	27.29^{d}	13.11^{c}	3.30^{a}	18.42^{b}
Hyparrhenia rufa	7.30^{d}	71.51^{b}	28.49^{c}	11.73^{d}	1.88^{d}	21.41^{a}
Andropogon tectorum	9.29^{a}	68.79^{d}	31.21^{a}	14.29^{a}	3.0^{b}	17.61^{d}
LSD(P<0.05)	0.05	0.05	0.05	0.05	0.05	0.05

Values in the same column with the same superscript were not significantly different at P<0.05.
Key: C.P. = Crude Protein; E.E. = Ether Extract; C.F. = Crude Fibre; D.M. = Dry Matter; M.C. = Moisture Content

Table 4: Nutrients (N.P.K.) composition and Vitamins A and C contents of four common grass species in the wetlands of Ibuya River, Ipade-Aya and Ajaku River in Old Oyo National Park in 2005. (Values are means with n=3).

Grass species	% N	% P	% K	VIT. A (µg/100g)	VIT. C (mg/100g)
Andropogon gayanus	2.21^{b}	0.37^{b}	2.25^{b}	127.36^{b}	9.77c
Hyparrhenia involucrata	2.10^{c}	0.29^{c}	2.08^{c}	125.38^{c}	8.66^{b}
Hyparrhenia rufa	1.88^{d}	0.12^{d}	1.43^{d}	118.83^{d}	2.33^{d}
Andropogon tectorum	2.29^{a}	0.50^{a}	3.96^{a}	132.53^{a}	11.39^{a}
LSD (P<00.5)	0.06	0.03	0.03	0.13	0.15

* = ***Carotene equivalent.***
Values in the same column with the same subscript were not significantly different at P<0.05.

Nutrient (N. P. K.) Content:
Andropogon tectorum was the richest of all the plants examined for the macro nutrient contents. The amount of nitrogen, phosphorus and potassium (2.29%, 0.50% and 3.96% respectively) in it were significantly higher than the remaining three (P<0.05). *Andropogon gayanus* was next to it in the nutrients content (2.21% N, 0.37% P and 2.25% K), followed by *Hyparrhenia involucrata* with 2.10% N, 0.29% P and 2.08% K. *H. rufa* was the most impoverished of the four with 1.88% N, 0.12%P and 1.43% K. Their mean compositions were significantly different from one another at P < 0.05 (Table 4).

Vitamin Concentration
Two vitamins (Vitamins A and C) were analysed for in the four forage species selected. The result of the analysis showed that *Andropogon tectorum* contained highest mean concentration of vitamins A and C in its tissues – 132.53µg/100g and 11.39µg/100g respectively, followed by *Andropogon gayanus* which had 127.36µg/100g of Vitamin A and 9.77 µg/100g of Vitamin C. *Hyparrhenia involucrata* was next in the order of vitamin concentrations (125.38 µg/10 of vit. A and 8.66 µg/100g of vit. C). *Hyparrhenia rufa* contained the least with 118.83µg/100g and 2.33µg/100g of vitamins A and C respectively. All concentrations were significantly different from one another at P<0.05 (Table 4).

Abundance and distribution of wildlife species
A total of 13 species of wildlife was sighted in the three wetlands during the study period. Five of these (grasscutter – *Thryonomys swinderianus,* buffalo –*Bos taurus* , Roan antelope – *Hippotragus equinus*, and bush pig – *Potamochoerus porus*) were only confirmed by indices. Others were two primates (Patas monkey – *Cercopithecus aethiops* and Baboons – *Papio spp*); three reptiles (West African Dwarf Crocodile – *Osteolaemus tetraspis,* Python – *Python spp.* and Monitor lizard – *Veranus* sp.); three ungulates (Kob – *Kobus kobus,* Red-flanked duiker –*Cephalophus rufilatus* and Bush buck–*Tragelaphus scriptus*) and one monogastric small mammal (Ground squirrel – *Xerus erythropus*).

Ibuya
The wetland of Ibuya River contained the highest number of faunal species. Nine species were enumerated in the wetland. They were utilizing the wetland for feeding or shelter, or both (Table

Table 5: Types and locations of faunal species detected and sighted in the wetlands of Ibuya River, Ipade-aya and Ajaku in 2004-2006.

Site	Actual Sighting			Detection by indices		
	2004	2005	2006	2004	2005	2006
Ibuya	Nil	1) Patas Monkey [5+] UTM :0585201/0934617 Kob (Kobus kobus) [1] (0584552/0934597)	1)Patas Monkey [6+] UTM: 0585134/0934495 2) Bush Buck [1] UTM: 0585174/0934495 3) Bush Buck [1] UTM: 0585402/0934699 4) Baboons [33+] UTM: 0585205/0934426 5) Baboons – 2nd group[7+] UTM: 0585418/0934044 6) Ground Squirrel [1] UTM: 0585277/0938131 7) Monitor lizar d Lizard [1]UTM: 0585630/0934805	1) Grass cutter (cut grass) UTM:?	1) Baboons (Dung) Crocodile(Dung)	1) Grass cutter (Dung) UTM: 585369/0934715 B) Buffalo (Footprint) UTM: 0586038/0934553 C) Baboons (Prints) UTM: 0585760/0934925 D) Crocodile (Dung) UTM: 0585331/0934314
Ipade-Aya	1) Baboons [5+] UTM: 0583049/0938533	1) Baboons [5+] UTM: (same as 2004) 0583049/0938533	1) Unidentified [?] UTM: 0583262/0938131	1)Python (Trail) UTM: 0583500/0938085	1) Baboons (Trail) UTM: 0583526/0938101 2) Roan Antelope (Dung) UTM: Unavailable	1) Baboons (Trail) UTM: 0583526/0938101 2) Roan Antelope (Footprint/Trail) UTM: 0583586/0938113 3) Roan Antelope (Dung) UTM: 0583534/0938128
Ajaku	Nil	Nil	1) Unidentified [?] UTM: 0581749/0939738 2) Red Duiker [1] UTM:0580770/0939980 3) Kob [2+] UTM: 0581335/0939980	1) Python (Trail) UTM: 0580257/0939676	1) Bush pig (Footprint). UTM: 0580152/0939575 2) Kob (Foot Prints) UTM: 0580224/0939623	Nil

6). Two ungulates (kobs and bush buck), a small population of baboons, a grass cutter, a ground squirrel and two reptiles (monitor lizard and crocodile) were enumerated. Hoof prints of buffalo were identified as well (Table 7). Baboons were the most numerous of the wildlife sighted (two groups of 33+ and 7+). This is followed by the Patas monkeys (*Cercopithecus aethiops*) sighted in 2005 and 2006. Lone individuals of female Bush buck were sighted about 307 m apart within 15 minutes of one another (running in opposite directions – one ran across a track road) as well. In 2004 and 2006, grasses grazed and faecal materials of grass cutter were detected within the Ibuya sampling plot.

On the whole, two separate groups of baboons were enumerated to reside in the Ibuya end of the Park. This was enumerated by two back-to-back adult male loud calls heard almost simultaneously with a distance of about 556 m separating them (only one dominant adult male in a group can call, and this is usually done to alert others to danger). Other detections and sightings in the Ibuya site included a squirrel, a Monitor lizard, buffalo footprints, and a crocodile faecal material. All detections and sighting were less than 700 m (as crow flies) from the middle of the plot.

Ipade-Aya

Ipade-Aya wetland harbours fewer number of wildlife. Three faunal species: baboons, and indices of presence of roan antelope and python were encountered. An unidentified species was also detected (Table 5). A trail and dungs that belonged to roan antelope was detected in 2006 around an area where such were seen in the previous year. The python trail was detected in the plot in the wet season of 2004. All detections and sightings were less than 650 m from the middle of the plot (Table 6).

Ajaku

Two faunal species were confirmed present at

Table 6: Distances (as crow flies) of faunal sighted/detected to the middle of survey in the wetlands of Ibuya River, Ipade-Aya and Ajaku in 2004-2005.

S/N	Faunal Species	Distance (m) to mid plot
Ibuya		
1	Bush buck (a)	303
2	Bush buck (b)	10
3	Buffalo (footprint)	663
4	Baboons (Group of 33+)	307
5	Baboons (Group of 7+)	663
6	Ground Squirel	513
7	Patas (2005)	210
8	Pata (2006)	280
9	Grass cutter (faeces)	26
10	Crocodile (dung)	396
11	Monitor lizard	259
12	Baboon footprints	430
Ipade-Aya		
1	Baboons (2005 and 2006)	601
2	Unidentified	476
3	Python trail	15
4	Roan Antelope dung	60-65
5	Baboons trail(2004 & 2005)	37
6	Roan Antelope trail	114
Ajaku		
1	Kob (print at salt lick)	25
2	Python trail	61
3	Bush pig foot prints	87
4	Red Duiker	610
5	Kobs at the buffer zone	1018
6	Unidentified	1055

Ajaku wetland, while another two were noted by indices of detection. The former were ungulates (kob and red-flanked duiker), while the latter were python and bush pig (Tables 5 and 6). The hoof prints of kobs were detected in a small salt lick (UTM 31P 0580224/0939623) in the wetland in 2005. Bush pig activities were detected through footprints along the bank of Ajaku river in 2005. Also, an unidentified fauna was detected some 1.55 km from the middle of the survey plot in 2006 (Table 5).

Discussion

The results of the surveys conducted in the wetlands of Ibuya river, Ipade-Aya and Ajaku river between 2004 and 2006 showed that the wetlands were quite dissimilar to varying degrees in species composition and structure. This has further laid credence to the fact that there is no typical wetland flora as was observed in southwestern Nigeria (Olubode, 2003). However, the wetlands of Ibuya and Ajaku rivers were somewhat similar in herbaceous species composition and structure. Both contained similar types of species with similar relative frequencies and relative densities. The similarity in the floral composition of the two wetlands could be due to effect of the annual burning that the Park is subjected to, alongside their similar soil characteristics. The high relative importance values (RIV) of certain few herbaceous species is an indication of species replacement and dominance, and which was confirmed by the Shannon-Weiner index.

The Shannon-Weaver indices indicated the flora of the Ajaku site to be more evenly distributed than the other two wetlands. This could be due to comparatively reduced effect of the fire on the wetland flora because of the soil characteristics and the fact that it is wetter than the other two sites. The lower Shannon-Weiner indices of the three wetlands in the dry season, when annual burning is practiced was compounded by the dry season in a way that encouraged dominance in the wetlands of Ibuya and Ajaku rivers. This indicated that the wetland of Ipade-Aya contained more herbaceous flora and the flora were more evenly distributed. The higher herbaceous diversity of the Ajaku site could be due, according to Olubode, (2007) to the presence of more woody flora that protected the herbaceous flora from intense fires.

The distribution of ungulates in the Park was clearly dependent on the floral composition and structure of the communities. *Hyparrhenia involucrata* and *Andropogon tectorum* which were the most abundant in the wetlands were not as nutritious as the *Hyparrhenia rufa* and *Andropogon gayanus*. The two dominant species were also hardy by virtue of their high fibrous contents. Therefore, they might not be preferred species to most fauna populations, which may also explain their dominance. The differences in

nutrient composition in the two genera of plants might affect the distribution of the wildlife. This result supports the report of Keddy (2000) that plant nutrient limitation comparably results in nutrient deficiency in animals utilizing such plants, since available nutrient status of wetlands determine to a large extent, the nutritional value of wetland plants, animal health and residency.

From conservation stand point, the continued existence of the grazing faunal populations in the Maguba Range of Old Oyo National Park is most likely being threatened by annual burning practices, especially at the wetlands of Ibuya and Ipade-Aya rivers as a result of mono-floristic processes that are initiated by continuous bush burning. This will affect faunal species diversity as only species that can survive on the dominant flora species will prevail in the range. Certain management practices in the Park should be modified to reflect best conservation practices. These would include a reduction in the frequency of vegetation burning currently being practiced in the Range.

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