



POPULATION ABUNDANCE OF ANTELOPES BASED ON PREVALENCE IN SOME SELECTED MARKETS IN RIVERS STATE, NIGERIA

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ABSTRACT: *This study was conducted to investigate the population abundance of antelopes based on prevalence in some selected bushmeat markets in Rivers State, Nigeria. Three (3) markets known to have a long history of wildlife marketing/business were chosen as sampling stations. These include: Omagwa bushmeat market, Imo River bushmeat market and Asa market. The stations were visited twice a week for six (6) months, 6 times in a month (December 2017–February 2018) and 3 wet season months (May 2018–July 2018). Sample and data were collected in the morning hours between 7 am and 12 noon when hunters usually return with their bounty. During each visit, morphometric traits of antelope carcasses brought by hunters/bushmeat traders were measured with the aid of a measuring tape and weighed. The sex of each antelope was determined by examining the reproductive organs and the number of antelope carcasses brought to the market was recorded. A total count of 202 individuals belonging to 3 species—Cephalophus maxwelli, Neotragus batesi and Tragelaphus scriptus from the family Bovidae—were recorded from all the three stations, with C. maxwelli being the dominant species in all stations. C. maxwelli had a total count of 141 individuals while N. batesi and T. scriptus had total counts of 35 and 26 individuals respectively. Omagwa bushmeat market had the highest count of antelope carcasses accounting for 63% (126 individuals) of the total count, followed by Imo River bushmeat market with 23% (47 individuals) and Asa market with 14% (29 individuals). A total of 103 males and 99 females were recorded. Seasonal variation data revealed that the dry season had a count of 72 individuals while the wet season had a count of 130 individuals. Combining of vegetation, night hunting, use of dart guns and use of snare traps were the dominant methods used in the study locations. According to the International Union for Conservation Nature (IUCN), these bovids are said to be the least-concern species but this research work showed that T. scriptus and N. batesi were threatened locally.*

KEYWORDS: Bushmeat, Antelope, Market, Abun



INTRODUCTION

An antelope is a member of a number of even-toed ungulate species indigenous to various regions in Africa and Eurasia. They belong to the Bovidae family (order Artiodactyla) and there are many different species of antelopes, including the tiny royal antelope that stands at the height of a rabbit. Antelopes account for over two-thirds of the approximately 135 species of hollow-horned ruminants (cud chewers) in the family Bovidae, which also includes cattle, sheep and goats. The size of an antelope ranges from 1m to 1.5m with an average weight of 500–900kg (Anonymous, 2008).

The sophistication of Rivers State ecological system—which includes the estuarine, mangrove forest, freshwater swamp and rainforest—that spreads across the state impacts the abundance and distribution of wildlife resource, and as well affects the behavior of wildlife species and the cultural disposition of the people (Powell, 1993; Akani, 2008).

The antelope is one of the many medium-sized mammals holding the African food chain together. Antelopes are also a significant component of the fauna which attracts game-viewing tourists to Africa's better-known National Parks and reserves (Skinner, 1973). Some antelopes, such as the giant eland, giant sable, gemsbok, scimitar-horned oryx and addax are flagship species for the conservation of important wildlife areas in Africa, a role which is exhibited more generally by species such as the elephant and lion (O'connor and Kruger, 2003).

LITERATURE REVIEW

Several species of antelope are native to Africa than other continents, especially savannahs with 20–35 species occurring in East Africa (Bro-Jorgensen & Mallon, 2016). The savannah habitat in Africa has expanded and contracted five times over the last three million years, and the fossil record indicates this is when most extant species evolved. It is believed that isolation in refugia during contractions was a major driver of this diversification (Vrba & Elisabeth, 1995). Other species occur in Asia—the Arabian Peninsula is home to the *Arabian oryx* and *Dorcas gazelle*; India is home to the *Nilgai*, *chinkara*, blackbuck, Tibetan antelope and four-horned antelope; while Russia and Central Asia have the Tibetan antelope and *Saiga*. Many species of antelopes have been imported to other parts of the world, especially the United States, for exotic game hunting. Antelopes live in a wide range of habitats. Numerically, most live in the African savannahs. However, many species are more secluded, such as the forest antelope as well as the extreme cold-loving *Saiga*, the desert-adapted *Arabian oryx*, and semiaquatic sitatunga (Spinage, 1986). Species living in forests, woodlands, or bushes tend to be sedentary, but many of the plains species undertake long migrations. These enable grass-eating species to follow the rains and by extension, their food supply. The Gazelles of East Africa perform some of the most impressive mass migratory circuits of all mammals (Estes, 1992). Antelopes vary greatly in size. For example, a male Eland can measure 178 cm (70 in) at the shoulder and weigh almost 950 kg (2,090 lb.), whereas an adult royal antelope may stand only 24 cm (9.4 in) at the shoulder and weigh a mere 1.5 kg (Bothma *et al.*, 2010). Antelopes have a wide variety of coverings, though most have a dense coat of short fur. In most species, the coat (pelage) is some variation of brown (or several shades of brown), often with white or pale underbodies. Exceptions include the Zebra-marked Zebra duiker, the grey, black and white Jentink's duiker, and the black lechwe. Most of the "spiral-horned" antelopes have pale, vertical stripes on their backs (Cowlshaw *et al.*, 2005). Many desert and semi-desert species are

particularly pale, some almost silvery or whitish (e.g. *Arabian oryx*); the *beisa* and southern *oryxes* have gray and black pelages with vivid black-and-white faces (Estes *et al.*, 2008). Common features of various Gazelles are white rumps, which flash a warning to others when they run from danger, and dark stripes mid-body (the latter feature is also shared by the Springbok and Beira). The Springbok also has a pouch of white brush-like hairs running along its back, which opens up when the animal senses danger, causing the dorsal hairs to stand on end (Gerard *et al.*, 2002)

MATERIALS AND METHOD

Description of Study Area

This research was carried out in some selected Bushmeat markets in Rivers State, Nigeria, West Africa. Rivers state is located on latitude 4.5° North, 6.5° East and longitude 4.75° North, 6.83° East with Port Harcourt as her headquarters (latitude 4.77742°, longitude 7.0134°), having an estimate of about 5,185,400 human inhabitants and a total geographical area of about 11,077km, with a density of 468/km. Rivers State is made up of 23 local government areas. The state has a long history of association with wildlife; this is shown below:

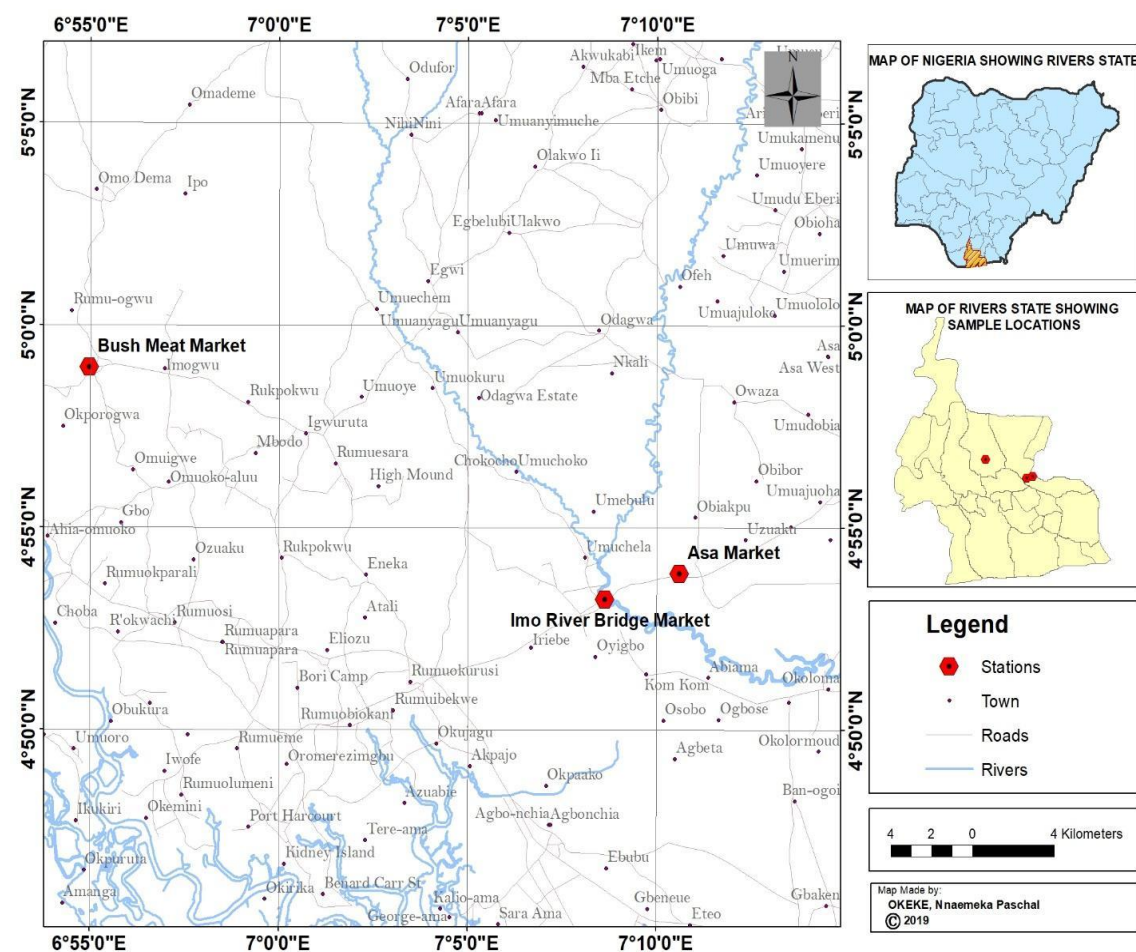


Fig 3.1 Map of Study Area Showing the Sample Station



Sampling/Data Collection

Asa Bushmeat Market/Imo River Bridge Bushmeat Market

Data collection was achieved by waiting for the arrival of traditional hunters as well as farmers who hunt with traps, bows and arrows, as well as guns. This research area (Fig. 1) was chosen because their traditional primary activities revolve around wildlife, hunting, poaching, bush meat trading and farming as a result of their vegetation and terrain. Also, these areas are associated with the old Rivers State Government Forest Reserve, the Upper and the Lower Otamiri Forest Reserve Ikwerre/Etche, the Upper and the Lower Imo River Forest Reserve Etche, Oyibo, and Daen Forest Reserve Khana/Elemo (Akani *et al.*, 2015). Three bushmeat markets (Omagwa bushmeat market, Imo River Bridge bushmeat market and Asa market) were sampled for species of Antelopes during the dry season (December 2017–February 2018) and wet season (May 2018–July 2018) for a total period of six (6) months.

Statistical Analysis

For the purpose of this research, the statistical tests (descriptive statistics) were done using SAS (Statistical Analysis System), PASTEXCEL and STATISTICA package (one-way Anova) to describe and estimate the levels of abundance of antelope species available in the study location, and to ascertain the variation and conservation levels between species and sexes. These were done using (SPSS 2018) Version.

RESULTS

Antelope Abundance and Diversity

Table 4.1 shows the total number of antelopes recorded in each bushmeat market during the sampling duration. From the three (3) stations sampled, a total of 202 antelope carcasses were recorded. At station 1 (Omagwa bushmeat market), a total of 126 antelope carcasses were recorded, comprising *Tragelaphus scriptus* (24), *Cephalophus maxwelli* (82) and *Neotragus batesi* (20). In station 2 (Imo River bushmeat market), a total of 47 antelope carcasses were recorded—*Tragelaphus scriptus* (1), *Cephalophus maxwelli* (38) and *Neotragus batesi* (8). At Station 3 (Asa market), a total of 29 antelope carcasses were counted, comprising *Tragelaphus scriptus* (1), *Cephalophus maxwelli* (21) and *Neotragus batesi* (7).



Table 4.1: Total Number of Antelopes Counted at Each Sampling Station during the Study

Serial number	Common name	Species	Station 1 (Omagwa)	Station 2 (Imo River)	Station 3 (Asa market)
1	Bushbuck	<i>Tragelaphus scriptus</i>	24	1	1
2	Maxwells duiker	<i>Cephalophus maxwelli</i>	82	38	21
3	Dwarf Antelope	<i>Neotragus batesi</i>	20	8	7
Total			126	47	29

Table 4.2 shows the species diversity, abundance, sexual variation and conservation status of the antelope carcasses recorded from three sampled bushmeat markets in Rivers State, Nigeria. *Tragelaphus scriptus* had an abundance of 26 individuals across stations with 10 females and 16 males, *Cephalophus maxwelli* had an abundance of 141 individuals with 71 females and 70 males, and *Neotragus batesi* had an abundance of 35 individuals with 17 males and 18 females. A total of 202 individuals were recorded with 99 being females and 103 males.

Table 4.3 shows species diversity, abundance, sexual variation and conservation status of the community of antelopes recorded from three sampled bushmeat markets in Rivers State, Nigeria. A total of 24 species of *T. scriptus* were counted in Omagwa bushmeat market—15 males and 12 females, while 1 female was recorded for Imo River bushmeat market and 1 male recorded for Asa market.

C. maxwelli had a total count of 82 individuals in Omagwa bushmeat market—43 males and 39 females, while Imo River bushmeat market had a count of 14 males and 2 females. Asa market recorded a count of 21, having 13 males and 8 females.

Neotragus batesi count totalled 20 individuals in Omagwa—7 males and 13 females, Imo River bushmeat market had a count of 8 individuals—6 males and 7 females. The count from Asa market was 7—3males and 4 females.

Table 4.4 shows seasonal variation in the abundance of antelopes documented from the selected bushmeat markets of Rivers State. *Tragelaphus scriptus* had 11 counts during the dry season and 15 counts during the wet season. *Cephalophus maxwelli* had a count of 51 during the dry season and 90 during the wet season. *Neotragus batesi* had a count of 10 individuals during the dry season and 25 individuals during the wet season



Table 4.2: Sexual Variation and Conservation Status of Antelopes Recorded from Three Sampled Bushmeat Markets in Rivers State Nigeria

S/N	Common name	Species	Abundance	Male	Female	Status
1	Bushbuck	<i>Tragelaphus scriptus</i>	26	16	10	LC
2	Maxwell's duiker	<i>Cephalophus maxwelli</i>	141	70	71	LC
3	Dwarf antelope	<i>Neotragus batesi</i>	35	17	18	LC
Total =			202	103	99	

Table 4.3: Sexual Variation of Antelopes Recorded from the Three Stations of Bushmeat Markets Sampled in Rivers State, Nigeria

S/N	Species	Omagwa	M	F	Imo River	M	F	Asa Market	M	F
1	<i>Tragelaphus scriptus</i>	24	1	9	1	0	1	1	1	0
2	<i>Cephalophus maxwelli</i>	82	4	3	38	1	2	21	1	8
3	<i>Neotragus batesi</i>	20	7	1	8	2	6	7	3	4
				3						

Table 4.4: Seasonal Variation in the Abundance of Antelopes Documented from the Selected Bushmeat Markets of Rivers State

S/N	Family	Species	Seasonality	
			Dry	Wet
1	Bovidae	<i>Tragelaphus scriptus</i>	11	15
2	Bovidae	<i>Cephalophus maxwelli</i>	51	90
3	Bovidae	<i>Neotragus batesi</i>	10	25
Total=			72	130

Market Value of Antelope

Figure 4.1 shows the percentage abundance of individuals recorded across the three sampled bushmeat markets of Rivers State, Nigeria. Omagwa bushmeat market recorded the highest percentage abundance of 63% (126) individuals out of the total number of 202 recorded, Imo River market had a percentage abundance of 23% (47), while Asa market had a percentage abundance of 14% accounting for 29 individuals.

Figure 4.2 shows the antelope species composition and percentage abundance of the three sampled bushmeat markets of Rivers State. *Cephalophus maxwelli* had the highest species composition of 141 antelope carcasses accounting for 70%, followed by *Neotragus batesi* with a species composition of 35 antelope carcasses accounting for 17% and *Tragelaphus scriptus* with the least—26 carcasses (13%).

Table 4.5 shows the market value of antelope carcasses by station. A survey of the study stations reveals that there was no unanimous price tag for each antelope carcass brought to the study stations. However, there was a range of prices that were dependent on the size, societal importance and cost of wild animals. This range of prices was seen to be almost the same across the study stations.

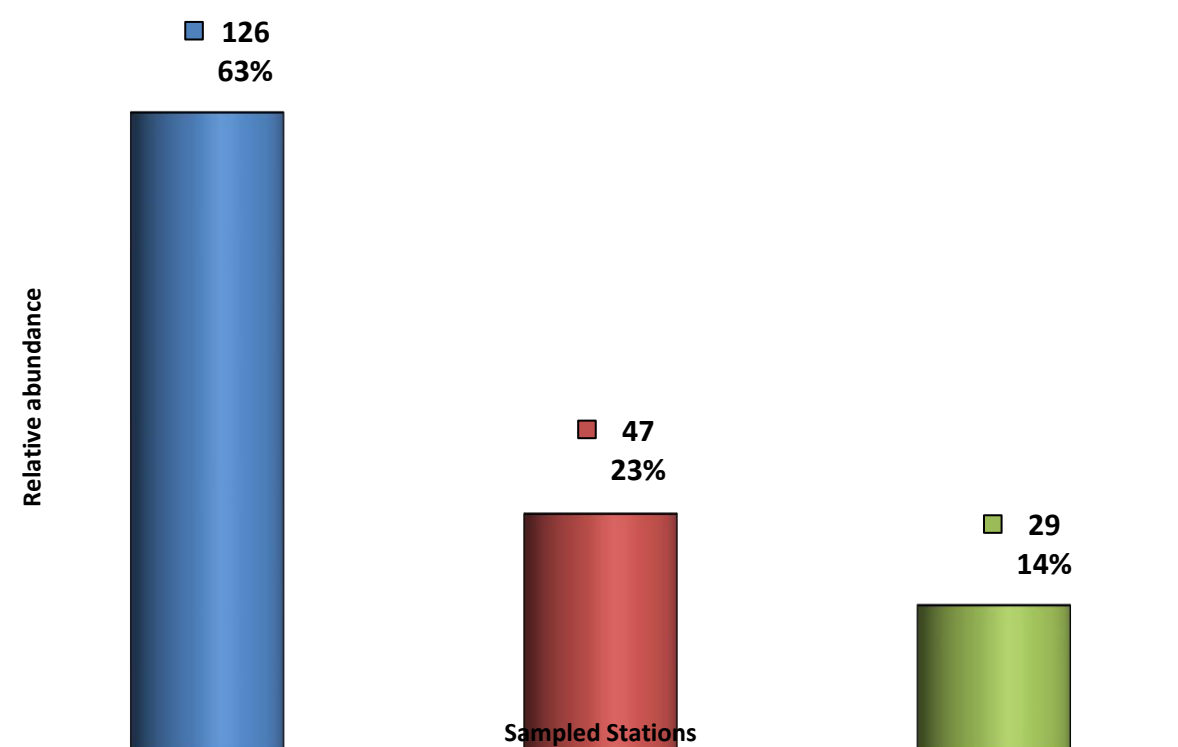


Figure 4.1: Percentage Abundance of Antelope Carcasses Recorded across the three Sampled Bushmeat Markets of Rivers State, Nigeria

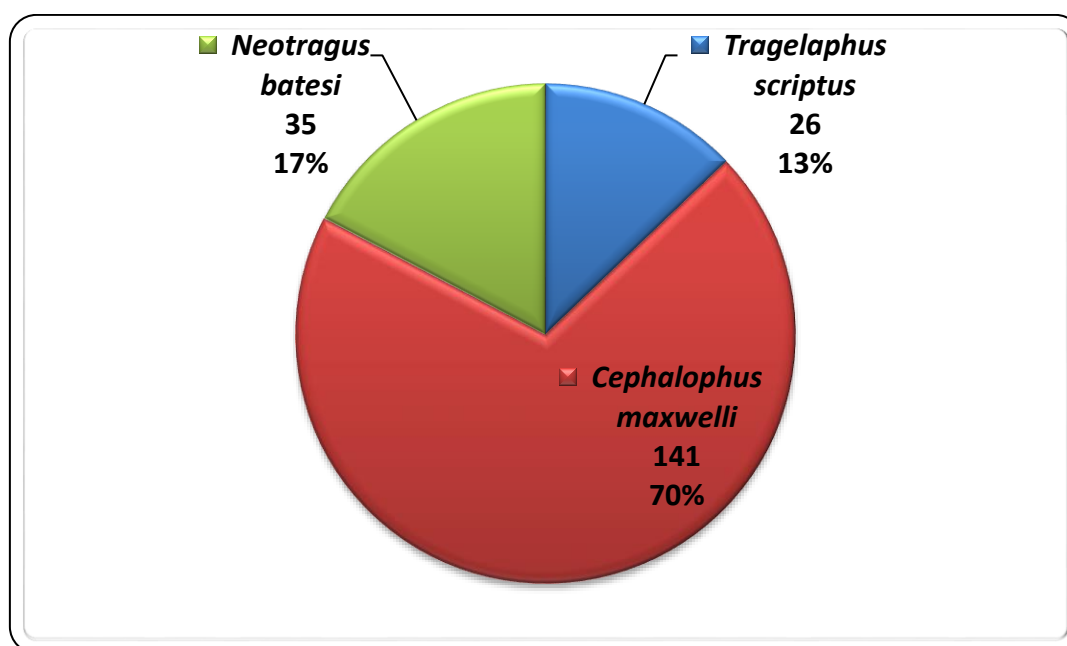


Figure 4.2: Antelope Species Composition and Percentage Abundance of the three Sampled Bushmeat Markets of Rivers State

Table 4.5 Market Value of Antelope Carcasses by Station

S/No	Antelope Species	Station	Price Range (#)	Mean Price
1	<i>Cephalophus maxwelli</i>	Omagwa	6,000–11,000	7,500
		Imo River	7,000–9,000	8,000
		Asa Market	6,800–10,000	7,850
2	<i>Neotragus batesi</i>	Omagwa	5,000–8,000	6,500
		Imo River	4,500–8,000	6,000
		Asa Market	4,500–8,000	6,000
3	<i>Tragelaphus scriptus</i>	Omagwa	14,000–25,000	10,500
		Imo River	8,500–13,500	10,000
		Asa Market	8,000–12,000	9,500

4.4 Morphometric Characteristics of Antelope Species

Table 4.6 shows the summary of the morphometric characteristics of the different species of antelopes across stations sampled during this study. The male and female *Cephalophus maxwelli* found in the three stations all had an average weight of 6.53kg and a total length ranging from 26cm to 28cm. *Neotragus batesi* found in the three stations all had an average weight of 5.11kg and a total length ranging from 16cm to 18cm. The male and female *Tragelaphus scriptus* found in the three stations all had an average weight of 50.68kg and an average total length of 45.71cm.



The length and weight of the male and female species of antelopes found in the study stations were analysed and compared. The linear regression length-weight graphs are shown in Fig 4.3 to 4.2 and the summary outlined in Table 4.7. Most of the female species sampled across stations exhibited a strong relationship between the length and weight of the antelope.

DISCUSSION

A total of three species of Antelopes were recorded at the study stations (Omagwa bushmeat market, Imo River bushmeat market and Asa bushmeat market) at two seasons—3 dry season months (December 2017–February 2018) and 3 wet season months (May 2018–July 2018). A total of 202 antelopes were recorded from these three species of antelopes—*Tragelaphus scriptus*, *Cephalophus maxwelli* and *Neotragus batesi*). They are under various threats or endangered due to the low number that was recorded in some of the sample stations. The conservation status of a species is very important as it relates to its continuity in the environment. The report of this study revealed that the population size of antelopes in the study the density is low especially with low counts recorded in *Tragelaphus scriptus* and *Neotragus batesi*—26% and 35% respectively—though of the total individuals recorded from the markets, this corresponds with the report of SSC/ASG/IUCN as compiled by East (1999), which label kob as being “vulnerable” in Nigeria, although the species recorded were different from the ones recorded in this study. However, when this is viewed on a national and global scale they may be vulnerable as the species is likely to be very rare elsewhere or outside the protected area (Clarke, 1983; Hunte *et al.*, 2007).

The area sampled represents the major bushmeat markets in the state, where farming and hunting are the major occupations of the natives. Other bushmeat markets in the State include Nonwa bushmeat market, Akabuka and Mbiama. The study stations are characterized by dense vegetation cover resulting from high and longer annual rainfall and short sunshine duration. The area covered by vegetation (land cover) serves to obstruct vision, thereby providing a means of escape for the hunted animal and increasing foraging efficiency. This is in agreement with the finding of (Okiwelu *et al.*, 2009) who by an interview with hunters revealed that the fast growth of vegetation in the rainy season limits the sightings of non-canopy dwelling wildlife, adversely affecting hunting effectiveness.

The result from table 4.3 shows that hunters believed that hunting in wet seasons was more productive than in the dry seasons. This implies the easiness of hunting in the wet season than in the dry season. According to respondents, the sound from dry grasses/vegetation during dry season provides a signalling effect that alerts the animal before the hunter approaches a stable shooting range.

There are also more escape routes available for the antelopes during the dry season than in the wet season, especially during flooding when the animal is unable to swim to dry land quickly before they are hunted down. This is in contrast with the study of (Nic *et al.*, 2008) that antelopes are known for their water-loving behavior. This study revealed that the genus Sitatunga are amphibious antelopes associated with wetlands and are represented by three subspecies (*T. gratus*, *T. selousi* and *T. spekei*) that occur in the Congo basin, around Lake Victoria, and in the Bangweulu, Zambesi and Okavango basins; likewise in Rivers state,



Nigeria. They have small home ranges close to water; when threatened by land-based predators, they submerge in water up to the level of their nostrils.

Results on table 4.1 show that there were more bushmeat carcasses at station 1 (Omagwa bushmeat market) as 126 (63%) of the 202 antelopes counted were found here. This was followed by station 2 (Imo River bushmeat market) with a count of 47 (23%), and station 3 (Asa market) with a count of 29 (14%). The result shows that bushmeat carcasses were more abundant at station 1; it also shows an obvious decrease in the other two stations, with the least abundance recorded in station three (Asa market). A reason for this is likely that Omagwa bushmeat market serves as the major site for the trading of bushmeat across the catchment area. This result is in agreement with (Okiwelu *et al.*, 2008) who found Omagwa to be one of the areas with intense bushmeat trading in Rivers State.

CONCLUSION

The study was conducted at three different bushmeat markets in Rivers State. Three (3) species of Antelopes were recorded: *Cephalophus maxwelli*, *Tragelaphus scriptus* and *Neotragus batesi*. A total of 202 individuals were recorded from the three (3) species of antelope carcasses from the study areas.

C. maxwelli was the dominant species in all stations sampled, thus accounting for 141 carcasses count from the 202 total counts recorded; this was followed by *N. batesi* (35). *T. scriptus* was the least dominant species with a total count of 26 carcasses.

Wet season recorded a higher count on antelope carcasses seen, with a total of 130 antelope carcasses while dry season had a count of 72 carcasses.

Station 1 (Omagwa bushmeat market) had the highest count of antelope traded recorded 126 (63%), followed by station 2 (Imo River bushmeat market) with a count of 47 (23%), while station 3 had the least count of 29 (14%).

RECOMMENDATIONS

1. Hunting of wildlife is part of the daily life activities carried out by hunters from various communities who mostly depend on it for sustenance; however, hunters should reduce their hunting rates to enable regeneration of hunted wildlife species.
2. Government should plan the development of these areas to encourage sustainability of wildlife by creating forest reserves or patches, which will serve and cater for displaced wildlife.
3. Government, in the course of planning its conservation programs, should train individuals in various departments, targeted at controlling the size and species of animals that should be hunted at a particular season, considering their abundance.
4. Antelope farming should be encouraged in either reserve or in captivity by encouraging domestic ranching.



5. Land tenure system should be endorsed as it will encourage the existence of wildlife in our surroundings.

Contribution to knowledge

1. This study confirms that *N. batesi* and *T. scriptus* are locally threatened although IUCN internationally reported that they are a lesser concern because they can still be found in other regions of the world.
2. This study also confirmed that *C. maxwelli* was still in abundance in Rivers State, Nigeria.

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