

*Full Length Research Paper*

# Distribution of mammals and hunting practices in Okpambe and Assam areas of the Takamanda Rainforest, South-West Cameroon

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Ecological and social surveys were conducted to determine the mammal distribution and hunting practices in Okpambe and Assam areas of the Takamanda rainforest. The results obtained show that 31 species of the mammals were encountered in the survey. Among these, 4 species are considered to be threatened on the International Union for Conservation of Nature (IUCN) Red List: Putty nose monkey (*Cercopithecus nictitans*), Civet cat (*Civettictis civetta*) Chimpanzee (*Pan troglodytes*) and the Cross River Gorilla (*Gorilla gorilla diehli*). The Cross River Gorilla besides an endangered species is also endemic to the area. The Red Duikers (*Cephalophus callipygus*) were the highest species in abundance recording 70.3% obtained in the matured forest of the Okpambe area. The cane rats (*Thryonomys swinderianus*) were prominent in fallowed land and farmland of the two areas recording 80 and 50%, respectively. The highest diversity indexes were 1.55 in secondary forest and 1.66 in matured forest of the areas. The hunting technique commonly used in both areas is trapping with 77.4 and 72.5% in both areas. Most of the hunters preferred hunting in rainy season with 63 and 75% recorded in the two villages. The hunting periods and hunting techniques practices have greatly influence the distribution of mammals in these areas.

**Key words:** Mammal, distribution, habitat type, hunting, trapping.

## INTRODUCTION

Mammal species are widely distributed in most rainforests in tropical Africa and it is of paramount importance to protect these species for the role they play in ecosystem structuring (Fonkwo et al., 2011). The Okpambe and Assam villages are located at the periphery of the Takamanda reserve, an area noted for its richness and diversity in plants and animal species which are widely distributed in the different habitat types (Sunderland-Groves and Maisels, 2003).

This area harbours some African endangered species which are paramount for conservation interests. Some of

these species included the Cross River gorilla (*Gorilla gorilla diehli*), Nigeria-Cameroon chimpanzee (*Pan troglodytes vellerosus*), drill (*Mandrillus leucophaeus*) and Preuss's guenon (*Cercopithecus preussi*) (Grove and Maisel, 1999; IUCN, 2009). The Cross River gorilla, *G. gorilla diehli* apart of it being endangered, it is endemic to the area (Grove and Maisel, 1999).

Intensive hunting, indiscriminate extraction of timber, collection of non timber forest products (NTFPs) and poor farming techniques have led to forest encroachment, habitat fragmentation, subsequently pushing the mammals to small forest stands where it is difficult to survive (Grubb et al., 1998). As a result of these pressures, most of the species are at the verge of getting extinct while others are fast becoming locally endangered.

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This paper presents the distribution of animal species in the different ecological types around the Okpambe and Assam villages. It also presents the type of hunting techniques used by the inhabitants and how they have affected the distribution of mammal species in the different habitat types.

## Study sites

The study area lies between latitudes 05°59'-06°21' North and longitudes 09°11'-09°30'E, covering 67,599 ha (Figure 1). The Rainforest stretches along the eastern border of Nigeria (Gartlan, 1989). The Takamanda area lacks accurate climatology data, which undoubtedly vary due to the undulated gradient of the area which has favoured its rich diversity in flora and fauna. In general, the region has two distinct seasons (rainy and dry) with most rainfall occurring from April to November. Rainfall peaks in July and August with a second peak in September (Groves and Maisel, 1999). The annual rainfall is about 4,500 mm per year (World Wildlife Fund, 1990). From November to April, the climate is mainly dry. Some months, usually January and February, may receive no rain at all. The mean annual temperature is 27°C. Normally, the temperatures are cooler in the rainy season than in the dry season.

## MATERIALS AND METHODS

The two villages were selected based on their close proximity and accessibility to the forest, as well as their activities on the forest (Figure 1). Information was collected using semi structured questionnaires, structured interviews, observations and field mammal survey.

### Questionnaire and interview establishment

Data collected from semi structured questionnaires, field observations and interviews were based on hunting practices of bushmeat in the two villages (Figure 1). Prior to the administration of the questionnaire, conversations with the informants were held to elaborate the objective of the study and the need of the research work. Within a period of 21 days stay in the two villages, a total of 100 questionnaires (85% households) were administered in the two communities. The targeted groups were hunters, trappers, and others involved in bushmeat related activities such as bushmeat traders and food vendors. The information recorded on data sheets on bushmeat and hunting practices include village of study area, main occupation, period of hunting, hunting techniques, hunting for subsistence or market, species of animal preferred, number of traps set, laws regulating hunting (indigenous and forestry laws), conflicts with authorities and type of sanctions. The information was double checked with other hunters to verify the accuracy

### Field mammal survey

During the dry season, a census of mammal was conducted in the two villages using day time visual counts, nest and dung counts.

The location maps of the areas were established to represent the different habitat types found in the two areas (Figures 2 and 3). Eighty (80) mini transects of 200 m in length were used to give good representation of the areas. The mammal surveys were carried out by a team of four persons, the mammal specialist and three local field assistants, usually good hunters who are versed with the fauna of the areas were selected. Transects were positioned all along human trails, about 50 m away from it, using a perpendicular bearing to the trail. The "zero" position of each transect was recorded using global information system (GPS) (Garmin 12 XL) unit and was marked with a red tag on a pole. The mammal team walked towards the given bearing looking for direct observations of mammals until they reached 200 m (measured using a hip chain). The team then walked back along transects to search for dung, foot marks, animal fur, fresh tracks of animals and nest signs. Information about species, distance from "zero" point, perpendicular distance to the transect (using a 50 m tape); type of signs, habitat types and local name of trails were recorded on the field data sheets.

### Data analysis

The Shannon-Wiener index was employed to determine abundance and diversity of species in the different habitat types and the Microsoft Excel statistical tool was also used to analyse the types of hunting techniques practiced in the two communities.

## RESULTS AND DISCUSSION

All mammals seen or recorded through signs (dung pile, furs, animals seen and nest) are shown in Tables 1 and 2. A total of 31 mammal species were encountered in both Okpambe and Assam areas. A total of 12 mammal species information was recorded for Okpambe and 19 recorded for Assam. The most dominant signs seen were dung piles of animals. This was closely followed by the number of animals seen and lastly by the sign of the nest (Tables 1 and 2)

### Distribution of mammal signs in the different habitat types

Dung pile which is the highest in all the four sites might be due to the fact that these mammals migrate often in the study sites in search for food. As such, dung is left on the ground after foraging. The animals may also move far from their normal dwelling places during the breeding period following pheromones produced by a breeding-susceptible male or female thus, depositing pile of dung as it feeds and searches for a susceptible partner. This is in line with studies carried out on large mammals with dung signs occurring frequently than any other signs noticed (Fonkwo et al., 2011). Similar information was also recorded by Reinhard et al. (2009); they studied the distribution and abundance of large mammals in Kuzikus Wildlife Reserve and also noticed a good quantity of dung piles as compared with the other signs. The number of seen animals was low in the different habitat types; probably this is due to the fact that there are only a few

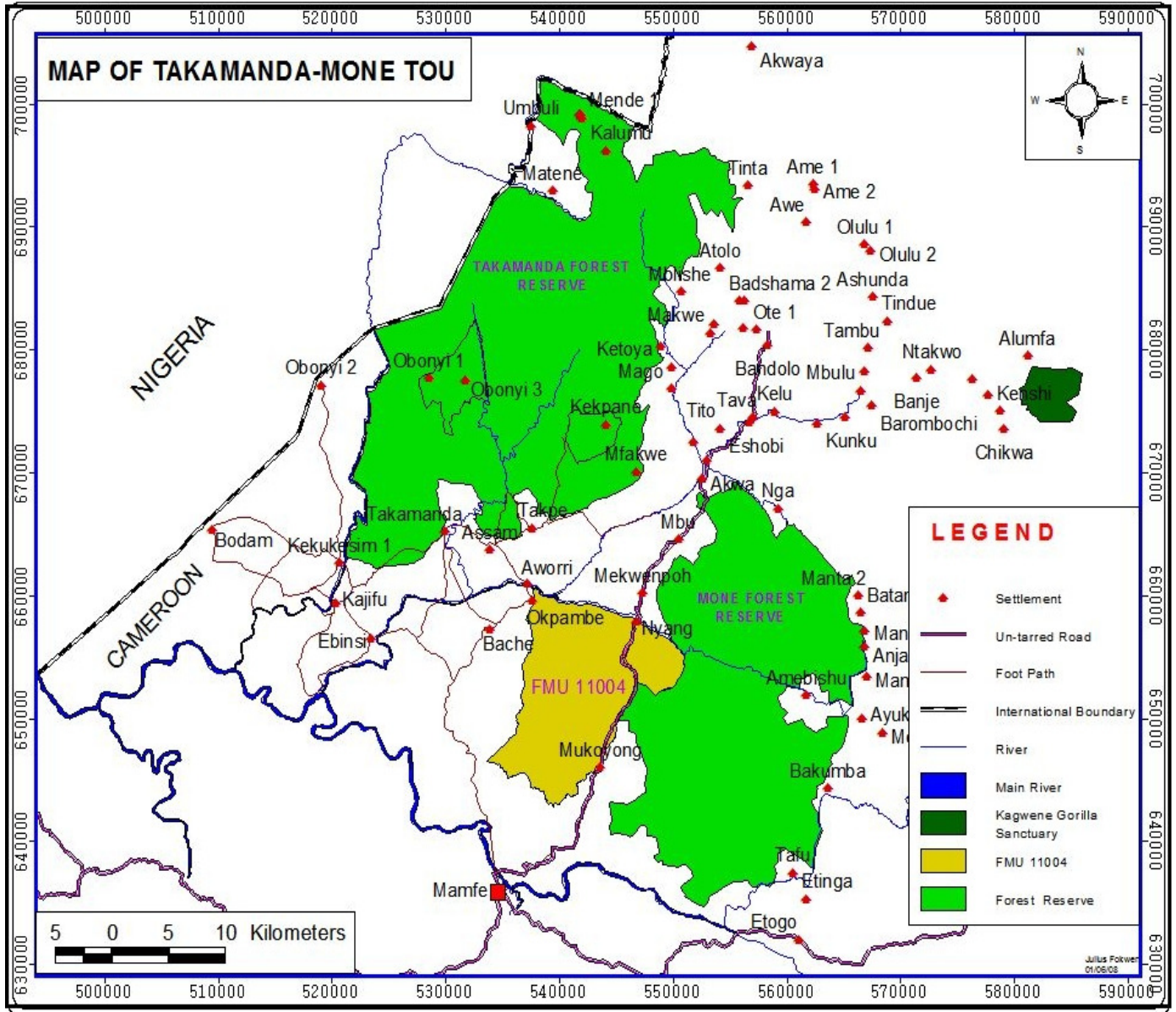


Figure 1. Map of the Takamanda-Mone technical operation unit showing the study sites.

populations of these mammal species within the different habitat types. This could also be as a result to the fact that most of the mammals are sensitive to strange sounds in the forest and easily escaped from the area. Most of the mammals can easily dictate the presence of humans from several meters, thus, escaping without being noticed (Dobson, 1998). The fact that the number of nests is least might be as a result of the fact that only few chimpanzees build nest. These findings collaborate with works of Groves and Maisel (1999), who reported on the large mammals of the Takamanda reserve and Ekobo (2003) on a survey of large mammal in the Nlonako, Makombe and Ebo proposed protected area. These signs are very important because they confirm the existence of

these species in the different sites.

**Abundance and richness of mammal species in the Okpambe and Assam area**

The abundance of mammal species in the Okpambe and Assam areas are shown in Tables 3 and 4. In Okpambe area, fallowed land was the site with the highest abundance of mammals recorded: 59.52% (Table 3). Dobson (1998) mentioned that the remains of harvested crops on the fallowed land during harvesting must have provided enough food to attract most of the mammal species to the site. Ekobo (2003) confirmed that the high

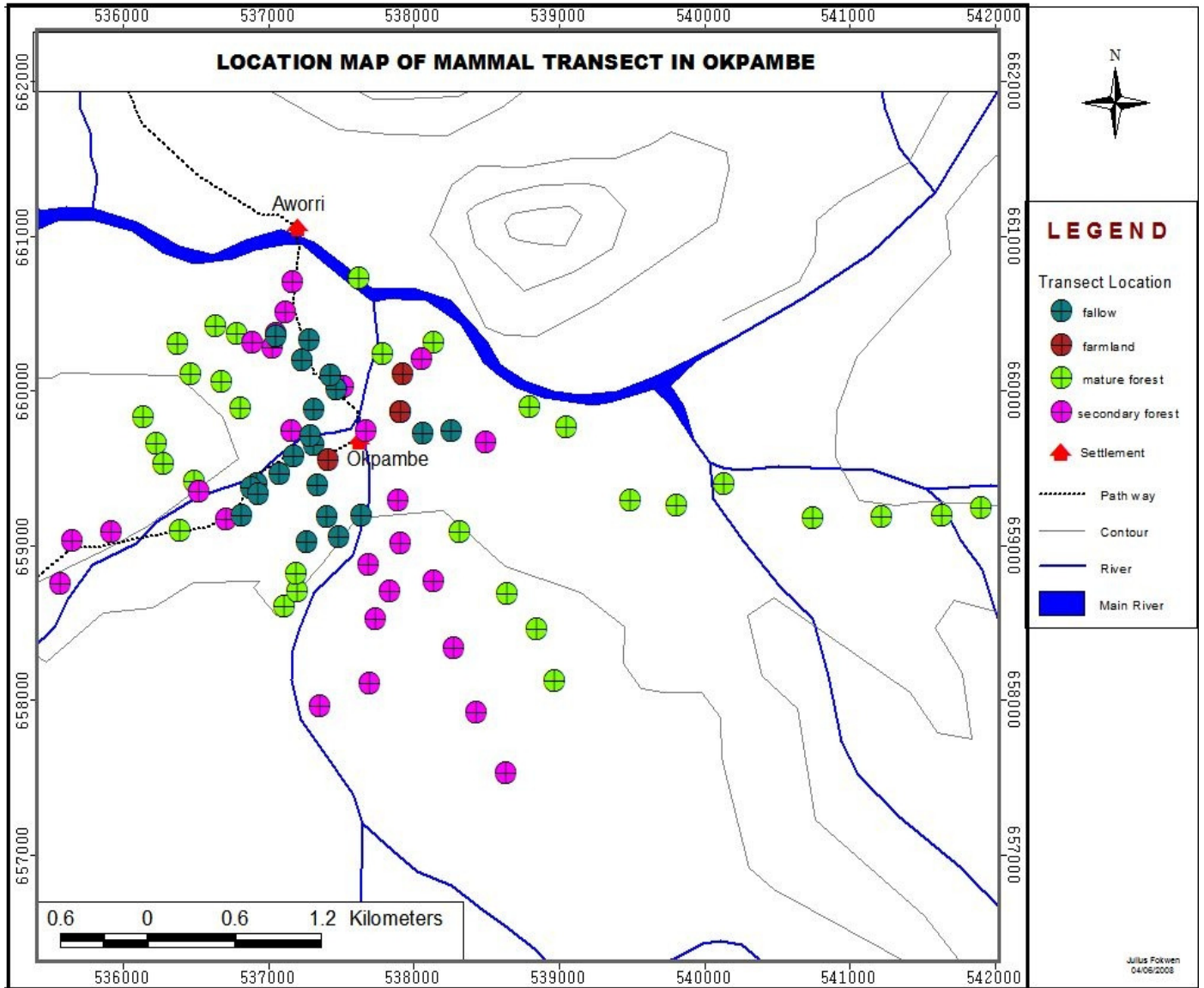


Figure 2. Location map showing transects and different habitat types in Okpambe.

number of mammal species in the fallowed land could be attributed to the fact that the site provided suitable conditions for the growth of vegetation and promoted the invasion of other plant species in the site which must have attracted the abundance of mammals. In the Assam area, the matured forest was the site with the highest abundance of species, recording 41.38% (Table 4). The high species abundance in the matured forest could be attributed to fewer disturbances in the site which have encouraged the flourishing of mammals (Groves and Maisel 1999; Reinhard et al., 2009). Farmland recorded the least abundant with 2.14 and 6.25% for Okpambe and Assam, respectively (Tables 3 and 4). The low abundance of mammal species in the site could be attributed to anthropogenic activities (Harrison, 1998;

Fonkwo et al., 2011).

### Distribution and richness of mammal species in Okpambe and Assam areas

The distribution and richness of mammal species in the study sites is shown in Tables 3 and 4. The site with the highest species richness was the secondary forest of Okpambe with 42.86% recorded. In Assam, 41.18% was recorded for species richness in matured forest. The high species richness in the secondary and matured forest could be linked to the fact that there are large portions of the secondary forest abandoned for a while with limited farming, hunting, local logging and collection of NTFPs



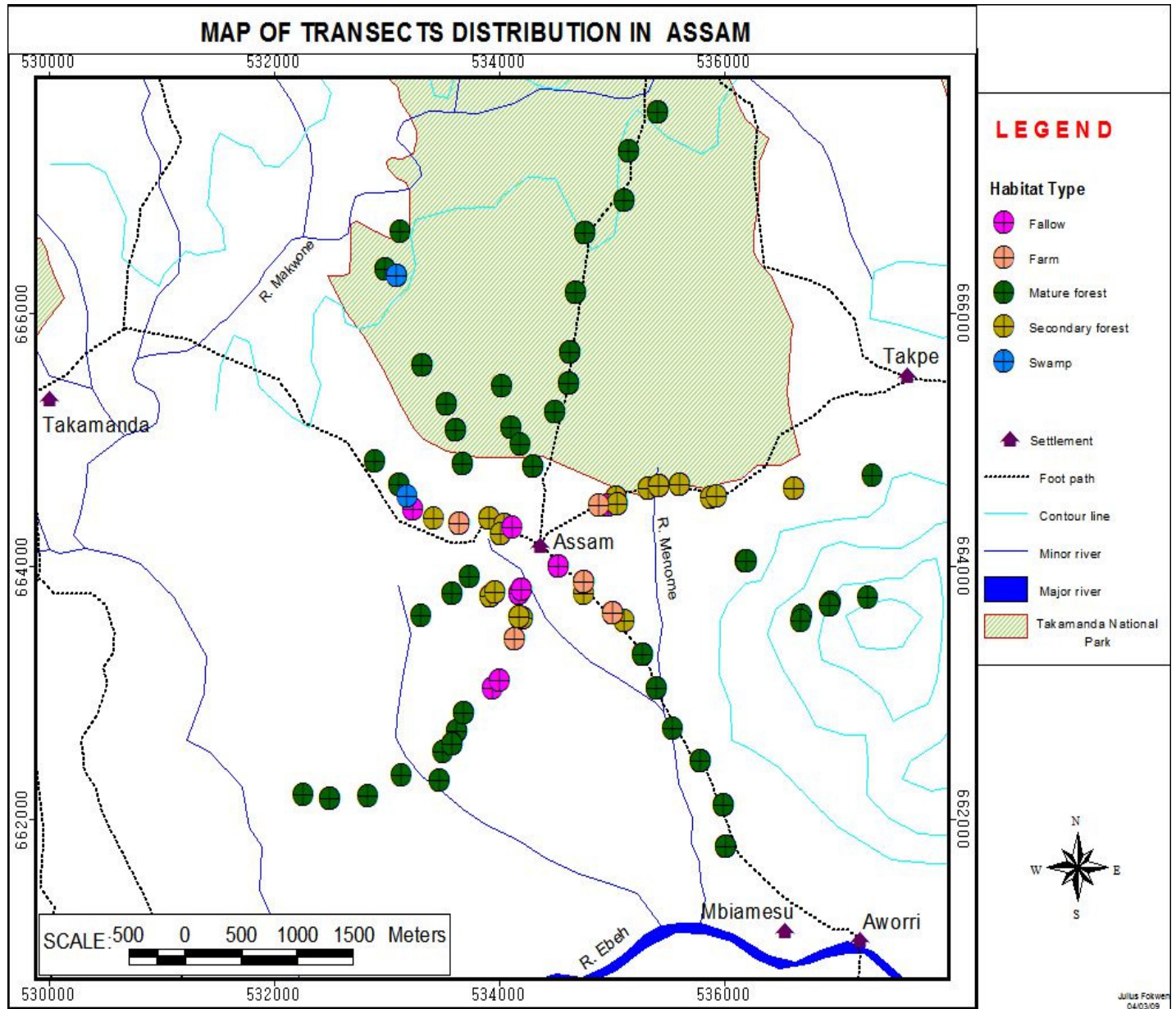


Figure 3. Location map showing transects and different habitat types Assam.

Table 1. Common names, scientific names and signs seen during the mammal survey in Okpambe.

Common name	Scientific name	Animal seen	Dung	Nest
Porcupine	<i>A. africanus</i>	-	+	-
African yellow bat	<i>S. dinganii</i>	-	+	-
Cane rat	<i>T. swinderianus</i>	-	+	-
Blue duiker	<i>C. monticola</i>	-	+	-
Red duikers	<i>C. callipygus</i>	-	+	-
Red duikers	<i>C. nigrifrons</i>	-	+	-
Red duikers	<i>C. ogybi</i>	-	+	-
Putty nose monkey	<i>Cercopithecus nictitans</i>	+	-	-
Civet cat	<i>Civettictis civetta</i>	-	+	-

**Table 1.** Contd.

Red river hog (bush pig)	<i>Potamochoerus porcus</i>	-	+	-
Potto	<i>P. potto</i>	-	+	-
Tortoise	<i>Kinixys erosa</i>	+	-	-
	Wild dog	-	+	-

+ or – indicate the presence or absence of signs.

**Table 2.** Common names, scientific names and signs seen during the mammal survey in Assam area.

Common name	Scientific name	Animal seen	Dung	Nest
Black monkey	<i>C. preussi</i>	+	-	-
Blue duiker	<i>C. monticola</i>	-	+	-
Bush baby or Galago	<i>Galago elegantulus</i>	-	+	-
Bush buck	<i>Tragelaphus scriptus</i>	-	+	-
Bush pig	<i>P. porcus</i>	-	+	-
Cane rat	<i>T. swinderianus</i>	-	+	-
Civet cat	<i>C. civetta</i>	-	+	-
Chimp	<i>P. troglodytes</i>	—	—	+
Cross River gorilla	<i>G. gorilla diehli</i>	-	-	+
Mona monkey	<i>Cercopithecus mona</i>	+	-	-
Mongoose	<i>Herpestes naso</i>	-	+	-
Porcupine	<i>A. africanus</i>	-	+	-
Potto	<i>P. potto</i>	-	+	-
Putty nose monkey	<i>C. nictitans</i>	+	-	-
Rat mole	<i>Cricetomys gambianus</i>	—	+	-
Red duiker	<i>C. callipygus</i>	-	+	-
Squirrel	<i>Funisciurus leucostigma</i>	+	-	-
Wild dog	<i>Lycaon pictus</i>	-	+	-
Yellow bat	<i>S. dinganii</i>	-	+	-

+ or – indicate the presence or absence of signs.

**Table 3.** Diversity indices, percentage abundance and percentage richness in different land use types in Okpambe area.

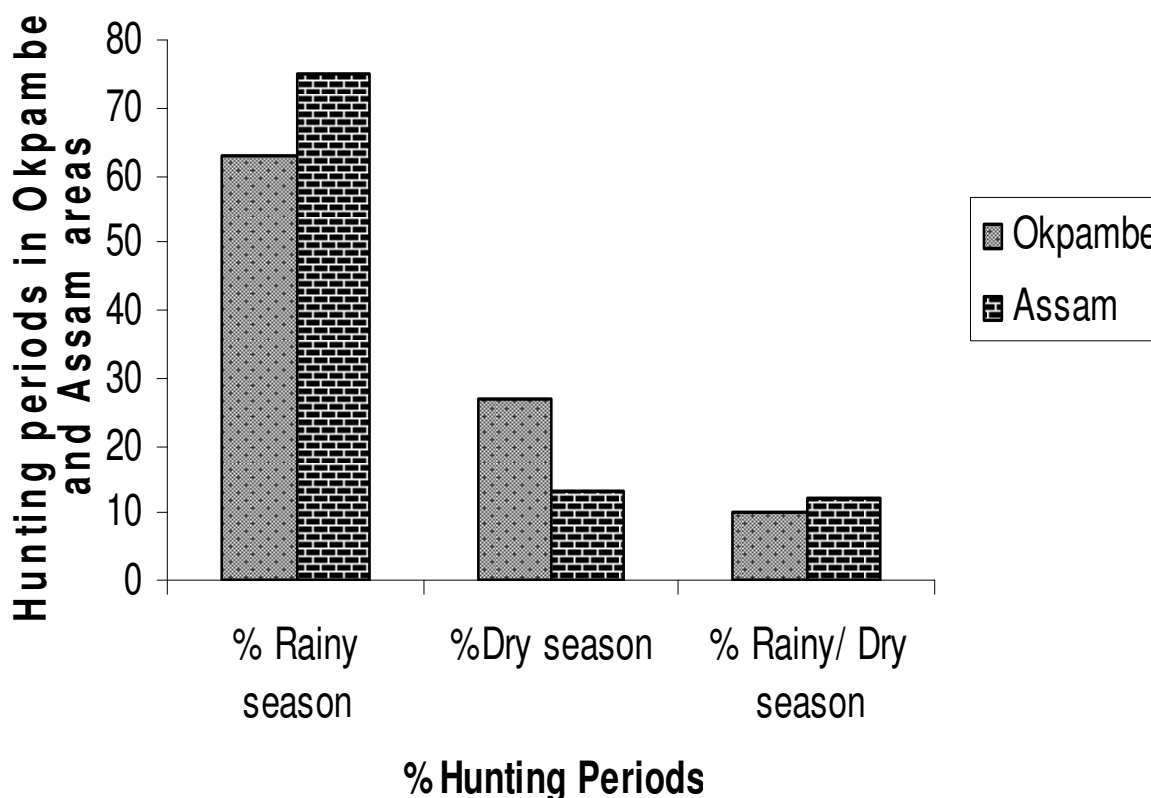
Site	Diversity index	Abundance	Richness	Percentage abundance	Percentage richness
Mature forest	0.97	92	6	21.91	28.57
Secondary forest	1.55	69	9	16.41	42.86
Fallowed land	0.54	250	5	59.52	23.80
Farmland	0.23	9	1	2.14	4.76

**Table 4.** Diversity indices, percentage abundance and percentage richness in different land use types in Assam area.

Site	Diversity index	Abundance	Richness	Percentage abundance	Percentage richness
Mature forest	1.63	192	14	41.38	41.18
Secondary forest	0.93	157	11	33.84	32.35
Fallowed land	1.14	86	3	18.52	17.65
Farmland	0.41	29	6	6.25	8.8

**Table 5.** Mammal distribution with the highest percentage at the different habitat types of the clusters of Okpambe and Assam.

Habitat type	Mammal	Sign	Percentage Okpambe area	Percentage Assam area
Mature forest	<i>C. callipygus</i>	Dung	70.3	43.8
Secondary forest	<i>C. callipygus</i>	Dung	47	33
Fallowed land	<i>T. swinderianus</i>	Dung	80	50
Farmland	<i>T. swinderianus</i>	Dung	50	80

**Figure 4.** Percentage hunting periods in the Okpambe and Assam areas.

(Barbosa et al., 2011). Similarly, the high species richness in the matured forest could be attributed to minimal disturbance (Alvard et al., 1997; Carpaneto and Fusari, 2000; Ekobo, 2003). The site that reported the least species richness in the two communities was farmland (8.8% Okpambe and 4.7% Assam). This may be due to human influences.

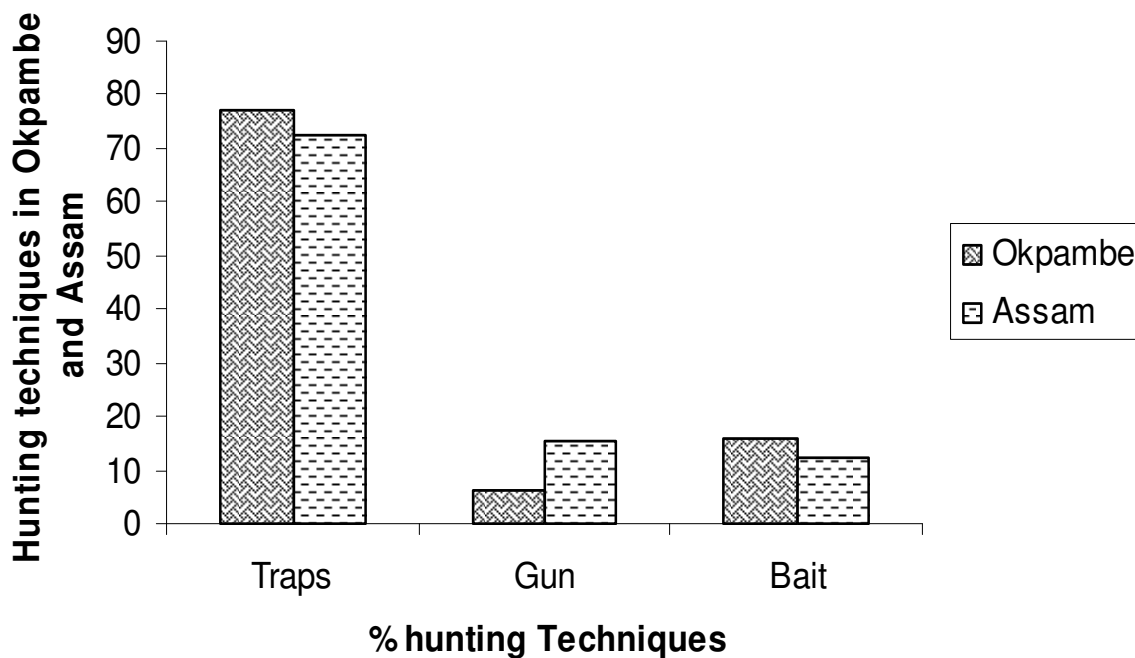
#### Mammal distribution in the different habitat types of Okpambe and Assam areas

The *Cephalophus* spp (*Cephalophus monticola*, *Cephalophus ogyilbi*, *Cephalophus callipygus*, *Cephalophus nigrifrons*) were found in the mature forest, secondary forest and fallow land. The percentages of the

*Cephalophus* spp were prominent in the mature (70.3 and 43.8%) and secondary (47 and 33%) for Okpambe and Assam areas. The sign used to confirm presence of these species was dung piles (Table 5). The red duikers (*Cephalophus* spp) were abundant in the different ecological types than blue duikers (*C. monticola*) (Figure 4). This may be due to the larger sizes of the animals that provide strength to forage wider in the different habitats and escape snares when trapped. Other species which were also noticed in the mature and secondary forest include *Atherurus africanus*, Tortoise, *Perodicticus potto* and *Scotophilus dinganii* (Figure 4). The cane rats (*Thryonomys swinderianus*) were prominent in the fallow land and farmland. Probably since they are farm pests they are found around those sites where they feed on cultivated crops (Blom et al., 2005; Carpaneto and

**Table 6.** Diversity indices (H), abundance and richness of mammal species in the different sites.

Area	Site	Diversity index	Abundance	Richness
Okpambe	Mature forest	0.97	92	6
	Secondary forest	1.55	69	9
	Fallow land	0.54	250	5
	Farmland	0.23	9	1
Assam	Mature forest	1.63	192	14
	Secondary forest	0.93	157	11
	Fallow land	1.14	29	6
	Farmland	0.41	86	3



**Figure 5.** Hunting Techniques in Okpambe and Assam.

Fusari, 2007).

**Diversity of mammal species in the Okpambe and Assam areas**

Table 6 shows the diversity indices, abundance and species richness of mammal species in the different sites. Diversity indices of secondary forest and matured forest of Okpambe and Assam were the highest in their respective areas with diversity values of 1.55 and 1.63. Probably, this is due to less interaction of man and his activities such as hunting and farming around the areas thus, favouring animal diversity. Farmland in the two areas had the lowest diversity indices of 0.23 and 0.41. This may be due to constant human interactions around

the area such including hunting, trapping logging and road construction may have influenced the diversity of species (Wilkie and Carpenter, 1999; van Vliet and Nasi, 2008). Similar findings were reported by Cheeseman and Dalany (1979) on the population dynamics of small rodents in tropical grassland where the diversity of the rodents were highest in areas of less human influence.

A high index of species richness was recorded for matured forest in both areas (Table 6). This may be due to the fact that enough food (on which the animal depends) is found in the reserve (matured forest) and the fact that these areas have marked boundaries beyond which hunting and farming are forbidden (Barnes, 2002; Azevedo-Ramos et al., 2006). The site with the least index of richness was farmland in both areas. This might be due to frequent distractions from farmland such as



noise from chain saws, rapid encroachment into their habitats scare the animals forcing them to migrate to other favourable habitats free from distractions.

### Hunting periods in Okpambe and Assam areas

Hunting for bushmeat in Okpambe and Assam areas is done in both rainy and dry seasons. Although the majority of the hunters in the two communities preferred hunting mostly in the rainy season as opposed to the dry season. In both areas, 63 and 75% of the hunters carried out hunting only in the rainy season while 27 and 13% of the hunters preferred hunting during the dry season in Okpambe and Assam areas (Figure 2). 10 and 12% of hunters in the Okpambe and Assam carried out hunting in both rainy and dry seasons (Figure 2). A majority of the hunters responded that hunting is mostly carried out during the rainy season where traces of their foot prints and traces of the kind of animal can easily be seen on the forest floor. Some of the responses attributed to the high hunting during the rainy season to limited food supply during this time causing animals to resort to the few fruit trees which are fruiting and hunters can easily trap the animals. These responses from the hunters are in conformity with works of Fonkwo et al. (2011) who mentioned that the high hunting activities during the rainy reasons could be related to less agricultural activities during this period than in the dry season when there is serious land preparation and were more hunters concentrated on their farms. Also, Muchaal and Ngandjui (1999), Davies (2002) and Reinhard et al. (2009) mentioned that high hunting activities in the rainy season may be based on the fact that foot prints and tracks of the animals could be followed and traps are placed.

### Hunting techniques in Okpambe and Assam areas

Local hunters of the areas have adopted three hunting techniques: trapping, the use of guns and baits. The hunting technique most practiced in the area is trapping with 77.4 and 72.5% for Okpambe and Assam areas (Figure 5). The hunters mentioned that traps are easily affordable to most hunters. Also, local traps can be constructed from sticks as opposed to guns and baits which needed a good sum of money to purchase. Only 6 and 15.3% of the hunters used guns in the Okpambe and Assam areas, respectively (Figure 5). The low use of guns was reported to be due to the high cost of guns to most hunters. Also, most of the hunters reported that guns were only allowed for licensed hunters and the procedures to obtain a gun license was too complicated and most of the hunters have resorted to traps. The use of baits was very low as compared to traps. Hunters mentioned that the use of baits was totally forbidden since animals killed by baits could be very dangerous. The hunting techniques and the seasons of hunting have

greatly influenced the distribution of mammals in their different habitat types and species distribution. The high number of traps set in the different ecological types and inadequate follow up to check the species caught affected species abundance and richness of the area.

### Conclusion

The areas of Okpambe and Assam in the Takamanda rainforest are rich in mammal species of high ecological interest. These mammals play an important role in ecosystem structuring, dynamics and functioning. This area because of its diversity of species has served as a 'gene bank' to most species and as home to most mammal species. This area is home to the endangered species like Cross River gorilla amongst others. Presently, total dependence of inhabitants on the forest and the use of sophisticated tools for harvesting resources have left most of the mammals locally endangered. Proper management of the anthropogenic activities in the rainforest may be paramount to preserve or ensure survival of most of the mammal species which are at the verge of extinction.

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