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Subsistence hunting and exploitation of mammals in the Haut-Ogooué province, south-eastern Gabon

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Summary - *An ethnozoological research was conducted in the Haut-Ogooué Province, a poorly studied area of SE Gabon, to collect information on subsistence hunting activities. Specific aims of the study were to describe the hunting activities of local rural people and to gather information on game harvest. This kind of information is useful to both assess the human impact on wild mammals and better comprehend the livelihood strategies of local people. Seven villages within the study area were regularly visited, collecting information on the number of mammals killed, the hunting techniques used, and the prey destination (direct consumption by the hunter or bushmeat trade). During the study period, 432 mammals, belonging to 14 species were captured. The data collected evidenced that most of the animals captured were ungulates (57.3%) and rodents (26.4%), and that two species, i.e. the blue duiker and the brush-tailed porcupine, represented by themselves more than half of the entire off-take (58.5%). No significant correlation was detected between the off-take and the village size. Local hunters adopted three different hunting techniques: guns (86.1% of hunters), nets (10.4%) and traps (1.6%), evidencing a larger use of fire weapons rather than traditional netting and trapping techniques; however, the off-take was not correlated to the number of guns detected in each village surveyed. Bushmeat trade resulted important for local hunters since only a slightly higher percentage of animals (56%) was directly consumed at household level, while the remainder was sold. The bushmeat traffic, defined as the number of animals sold, was not correlated to the size of villages and to the distance of each village surveyed to the main nearest market, i.e. the town of Franceville.*

Keywords - *Subsistence hunting, Mammals, Bushmeat trade, Wildlife exploitation, Gabon.*

Introduction

The harvest of wild mammals for meat consumption is considered a major cause of biodiversity loss in tropical forests worldwide (Redford, 1992). In many tropical countries, the protein intake for rural people largely depends on wild animals, mainly mammals that also represent a relevant source of income (Robinson & Bodmer, 1999, Carpaneto & Fusari, 2000; Fa & García Yuste, 2001; Fa *et al.*, 2001; Hilaluddin & Ghose, 2005; Fusari & Carpaneto, 2006). In Gabon the annual trade of bushmeat was estimated at some 48 millions US$, of which 26 millions in urban market and 22 millions in rural markets (Davies, 2002), concerning all the provinces of the country (Mamfoumbi, 2001). During the last decades, the relevance of subsistence hunting for either local people's livelihood and nature conservation purposes has been studied in many African countries (Alvard *et al.*, 1997; Colell *et al.*, 1994; Fa *et al.*, 1995; FitzGibbon *et al.*, 1995), with a special focus on countries of western and central Africa rainforest block, such as Cameroon and Congo (Carpaneto, 1994; Carpaneto & Queyras, 2000; Usongo & Curran, 1996, Wilkie & Carpenter, 1999). Data from Gabon are not many and mostly concerning north-eastern areas (Lahm, 1993, 1996; Steel, 1994), while the extent of bushmeat hunting and trade within the area of

the present research are very little known. Local hunters often over-harvest wild animals, mainly because of the increase of human populations and the shift from traditional to modern hunting techniques, evidencing the impact of bushmeat exploitation on wildlife conservation in tropical countries (Alvard, 1998; Fitzibbon, 1998; Fa & Peres, 2001; Barnes, 2002; Bennett *et al.*, 2003; Ling *et al.*, 2003; Robinson & Bennett, 2003, Kumara & Mewa Singh, 2004; Fusari & Carpaneto 2006). The present study was carried out with four major objectives: (1) to describe the zoological culture of the ethnic group living in the area (Mbede people); (2) to describe both the traditional and modern hunting techniques used by local hunters; (3) to identify the mammal species hunted for local consumption and bushmeat trade; (4) to get quantitative data on game harvest and bushmeat trade, evaluating the effect of village size and location on bushmeat off-take.

Materials and methods

Study area

The study area is located in the Haut-Ogooué Province, SE Gabon, and is comprised within the departments of Lekabi-Lewolo and Leconi-Lekori. The area is crossed by two roads linking the towns of Ngouoni and Akiéni, and the towns of Omoy and Alele II respectively (Fig. 1). The Haut-Ogooué Province is the fourth largest administrative province of Gabon (36,547 km^2) and the second one for standard of living after the Ogooué Maritime Province (according to official data). The main town is Franceville (60,000 inhabitants), while Moanda and Mouana are important for their mines of manganese and uranium respectively. The study area is included within the basin of the Lekoni River, and is covered by a mosaic of lowland rain forest and secondary grassland savannah (Catinot, 1978; Reitsma, 1988; White, 1983), with the latter habitat type usually considered as a degraded aspect of the former. The Haut-Ogooué is the only province of Gabon where savannah is the prevalent habitat. The climate deals with a transitional equatorial climatic type with an annual rainfall of 1800-2000 mm and an average temperature of 23-24°C. Two dry seasons can be distinguished: the small dry season between December and February and the large dry season between June and September.

Local people

Rural people of the study area are from the Obamba and Bateke ethnic groups, both belonging to the Mbede tribe which represents circa 9% of the Gabon population. The first group is settled prevalently in forest/savannah transition zones, whereas the second group lives in open savannah habitats. The two groups speak two dialects of the same language and are very similar in their cultural and ethno-zoological traditions. The population within the seven villages of the study area increased of over 32% during the last twenty years, reflecting the consolidated trend of all the country (Franceville Bureau of Immigration, unpublished data). Moreover, the studied villages showed a well marked temporary population increase (over 200%) in the period between September and October, when many non-resident persons come back from the town to their native village and stay there for taking holidays and hunting. Slash and burn agriculture is still the main subsistence activity for rural people that mainly produce maize, bananas, cassava, sweet potatoes and groundnuts. Both environmental constraints and cultural factors prevent rural people from consistent animal husbandry; the only domestic animals are chickens, goats, sheep and pigs on household level. Even if two large bovine farms occur in Gabon, their production is insufficient to cover the internal demand, and meat prices is often too high to be afforded by local rural people. A large amount of bovine meat is imported from other African countries and Argentina, but commercial prices are too high for most of rural people. Hence, a high proportion of meat for local consumption derives from bushmeat (*nyama-a-swaga*).

Hunting techniques and weapons

Local hunters adopted three major hunting techniques: trapping, netting and guns. Three

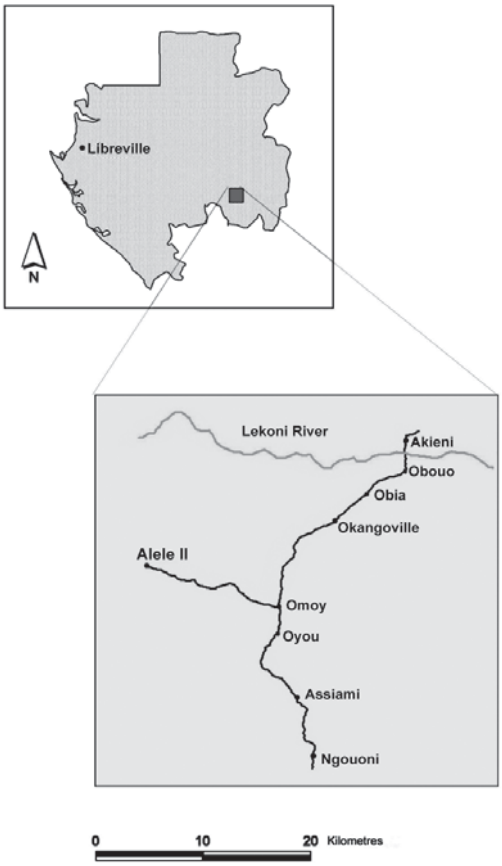

Fig. 1 - Map of the study area showing all the villages where bushmeat data were collected.

types of traps were encountered during the survey: neck snares (*tolo onki*), foot snares (*tolo ongaga, tolo okwogo*) and pit fall traps (*abila*). The first two traps were traditionally made with fibres of palms of the genus *Raphia*, but the modern use of iron wire was observed during the present research. Foot snares were mainly used for antelopes and the red river hog; while neck snares were set for porcupines and giant pouched rats. Traps were sometimes set with bait (*ongia*), usually a piece of meat, to capture small carnivores and duikers (*Cephalophus* spp.) that have an omnivorous diet. The use of pit fall traps was rarely recorded; usually, these traps were placed far from the village to avoid injuring domestic animals and humans, and used for large mammals such as antelopes, red river hog and the water chevrotain. Traditional hunting nets once made with the bark of the vine *Manniophyton fulvum* (*lekusa*) and the thin branches of the tree *Musanga cecropioides* (*osie*) are nowadays largely replaced by commercial fibres. According to the hunters interviewed, nets (1-1.5m height) are arranged to form a continued semicircular fence of 250-300m and controlled by at least 5-6 hunters scattered along the net line, whilst other hunters, including women and children, drive animals towards the nets. Nets were used for medium and large mammals, especially for antelopes and the red river hog. In the last decades, in Okangoville region, as well as in the whole country, the use of guns highly increased. In the study area the commonest gun used was the twelve-gauge gun. Hunting with guns was mainly a diurnal activity, but nocturnal hunting was also recorded, with the aid of electric torches, mainly for catching blue duikers, small carnivores and porcupines.

Data collection and analysis

The present research was carried out during eight weeks between August and October (long dry season) 1992, when the hunting activities in the study area were more intensive, because of the increased number of non-residents (see above). The following seven villages of Haut-Ogooué Province were visited weekly: Okangoville (160 residents), Obia (121), Obouo (147), Omoy (157), Oyou (92), Alélé II (101), Assiami (115). Each village was visited by one of the authors (Hilaire Okongo) together with a local person of each village, conducting interviews in local language, using the vernacular names of the animals. Data were gathered by interviewing local hunters on the number of mammals killed per week per village, weapons and techniques used, prey destination (direct consumption or trade), market price of bushmeat, and market where bushmeat was sold. The animals captured were identified throughout the examination of carcasses or their remains, such as skins, skulls, hooves and horns, which were kept for the

present research by the local hunters. All the animals captured and reported in the present study were directly observed and identified. The data collected resulted non-normally distributed, recommending the use of non-parametric statistic tests for the analysis. The number of off-take (number of animals killed) was correlated to the size of villages (defined as the number or residents) and to the number of guns in each village to evaluate the influence of these variables on the extent of the off-take. The bushmeat trade (number of animals sold) was correlated to village size and to the distance from the nearest main town (Franceville), in order to evaluate the influence of these factors on bushmeat trade. These analyses were performed using the Spearman Rank Correlation Coefficient (two tails). Comparing the average number of mammals weekly killed in each village (MWV), the related standard error (SE) and the α factor (MWV-2SE), the whole off-take recorded can be divided in one group of species evenly distributed in the total off-take during the study period (α > SE), and one group of species unevenly distributed (α ≤ SE). The proportion of capture for some species per village was compared using the Chi-square Goodness of fit test. In text and tables, means are reported with ± 1 SD and prices in CFA (1 € = 655 CFA).

Results and Discussion

During the study period (eight weeks) a total of 432 mammals, belonging to 14 species, were captured by local hunters: Bovidae 220 (51%), Rodentia 114 (26.4%), Primates 37 (8.6%), Tragulidae 24 (5.6%), Pholidota 24 (5.6%), Herpestidae 10 (2.3%), Suidae 3 (0.7%) (Tab. 1). A mean of 54 ± 8.26 (range 27) mammals captured per week was recorded. No significant difference resulted in the mean number of animals captured per week, revealing a constant hunting pressure by local hunters during the whole study period (One-Way ANOVA, $F_{7,104} = 0.13$, n.s.). A mean of 61.7 ± 25.4 (range = 59) animals per village was recorded during the study period. No significant

Tab. 1 - Number of mammals captured per village during the study period. (Oka = Okangoville; Obi = Obia; Obo = Obouo; Omo = Omoy; Oyo = Oyou; Ale = Alele II; Ass = Assiami)

Species	Vernacular names	Oka	Obi	Obo	Omo	Oyo	Ale	Ass	Total	%
Cephalophus monticola	Seri	35	21	17	25	19	31	17	165	38,2
Atherurus africanus	Nguma	9	8	10	3	11	41	6	88	20,4
Cercopithecus cephus	Nkima	11	4	7	7	1	3	4	37	8,6
Cephalophus dorsalis	Ossibi	9	4	5	3	2	8	5	36	8,3
Hyemoschus aquaticus	Gnili	12	2	1	6	-	1	2	24	5,6
Manis tricuspis	Legaka	9	2	5	2	6	-	-	24	5,6
Cephalophus callipygus	Ossomi	4	1	-	2	-	8	3	18	4,2
Heliosciurus rufobrachium	Mpali	4	4	1	3	1	1	1	15	3,5
Protoxerus stangeri	Mbugu	3	2	1	1	1	-	2	10	2,3
Xenogale naso / Atilax paludinosus	Obagi	2	1	2	1	1	1	1	9	2,1
Potamochoerus porcus	Nguya	1	-	-	-	-	2	-	3	0,7
Tragelaphus scriptus	Okayi	1	-	-	-	-	-	-	1	0,2
Cricetomys emini	Nkulu	1	-	-	-	-	-	-	1	0,2
Ichneumia albicauda	Obagi-a-mwengele	-	-	-	-	-	-	1	1	0,2
Total		101	49	49	53	42	96	42	432	100

difference resulted in the average number of animals captured per village, suggesting that each village induced a similar hunting impact on the local mammal populations (One-Way ANOVA, $F_{6,94} = 0.85$, n.s.). No significant correlation was detected between the off-take (number of animals captured in each village) and the village size, revealing that the latter factor did not heavily influence the hunting pressure during the study period ($r_s = 0.6$, n = 7, n.s.). Bovids were represented by three species of duikers: Peter's duiker *Cephalophus callipygus*, bay duiker *Cephalophus dorsalis,* blue duiker *Cephalophus monticola,* and by the bushbuck *Tragelaphus scriptus*. Rodents were represented by two species of squirrels (i.e. the African giant squirrel *Protoxerus stangeri* and the red-legged sun squirrel *Heliosciurus rufobrachium*), the giant pouched rat *Cricetomys emini*, and the African brush-tailed porcupine *Atherurus africanus* (Fig. 2), which represented the 20.4% of the entire off-take. Primates figured with only one species, the moustached monkey *Cercopithecus cephus* (Fig. 3), which is common and widespread in the west-central rain forest block. No other guenon species were recorded in the off-take and from repeated surveys conducted within the study area. Only other two primates were recorded by our survey in the study area, but not included in the quantitative data set because were not killed within the study period; they are the mandrill *Mandrillus sphinx* (Fig. 4) and the grey-cheeked mangabey *Lophocebus albigena*. The two specimens were killed by two local hunters some months before our survey (we only could examine the pictures spot by a local person) and were considered very rare by all other villagers interviewed. No specimens of these two species figured in the off-take of the local hunters during the study period, likely because of their rarity. The locality where the mandrill specimen was quoted (Okangoville), as all the Franceville Province is out of the known distribution range of the species provided by literature (Harrison, 1988; Telfer *et al.* 2003), and represented the south-easternmost record for the species itself. Carnivores were represented by three species of mongooses (family Herpestidae). Two of them are widespread and common in central Africa, i.e. the marsh mongoose *Atilax paludinosus* and the white-tailed mongoose *Ichneumia albicauda*. The third species captured was the long-snouted mongoose *Xenogale naso*, a rare and poorly known carnivore endemic to the central African rainforest. It was impossible to separate the quantitative data for the marsh mongoose

Fig. 2 - The African brush-tailed porcupine,* Atherurus africanus, *is one of the most harvested species in the study area (photo by H. Okongo).

and the long-snouted mongoose because the remains provided by the local hunters were often inadequate for a correct taxonomic identification of these two species in field; furthermore local hunters indicate these species with the same vernacular name (*obagi*), showing that they do not distinguish them. Only one species of pangolins appeared in the off-take: the tree pangolin *Manis tricuspis*, which is the commonest scaly ant-eater of central African forests. Two taxa (bovids and large rodents) represented together the major part of the off-take (77.3%). In particular, two species (the blue duiker and the brush-tailed porcupine) resulted to be the most harvested species during the present research, being more than half of the entire off-take (58.5%). These results are similar to those obtained in Makokou, NE Gabon, by Lahm (1993). Both these species are much appreciated as food and probably abundant in the study area (Blom *et al.*, 1990). The blue duiker was the most captured species (38.2%) among all the animals recorded on the study period. This result is similar to those from other studies on subsistence hunting (cfr. Carpaneto, 1994; Lahm, 1993; Carpaneto & Queryas, 2000), revealing the importance of this small antelope in the off-take of rural hunters

Fig. 3 - The moustached monkey,* Cercopithecus cephus*, is the most harvested primate in the study area (photo by H. Okongo).

in the whole region. This species was captured with a similar frequency in the seven villages of the study area (χ^2 = 3.33, d.f. = 6, n.s.), whereas highly significant differences were recorded between villages in the capture frequencies of the brush-tailed porcupine (χ^2 = 34.29, P < 0.01, d.f. = 6). This difference is explained by the fact that in Allele II, during the fourth week of the research, local villagers conducted a collective hunting beat (*akwaga*) mainly aimed to capture the brush-tailed porcupine, and succeeded to capture 15 animals of this species in a single day. Other species were equally captured during the study period (Tab. 2): the moustached monkey, the bay duiker, the water chevrotain *Hyemoschus aquaticus*, the tree pangolin, the red-legged sun squirrel, the Peter's duiker, the African giant squirrel, and two species of mongoose (marsh mongoose and the long-snouted mongoose). On the other hand, four species resulted occasional preys: the red river hog *Potamochoerus porcus*, the bushbuck, the giant pouched rat (Fig. 5), and the white-tailed mongoose. Even if difficult to assess, the low capture frequency of the red river hog and bushbuck, which were very appreciated as food, was likely to ascribe to their scarcity in the study area, rather than to a hunters' choice. Fire weapons were the main hunting tools used by local hunters: 27.9% of residents in the seven villages of the study area owned a gun, i.e. more than the double of that observed in NE Gabon (one gun for 6.5 persons), confirming an advanced shift from traditional hunting activities based on trapping and netting to the wide use of fire weapons in the study area. These data led us to infer that local hunters had enough economic resources to acquire munitions regularly during the study period, even if it was not possible to establish which proportion of the bushmeat trade revenues was reinvested for munitions restocking. Although the larger part of animals (86.1%) was killed using guns, the off-take was not correlated to the number of guns recorded in each village (r_s = 0.5, n = 7, n.s.). The remaining animals were captured by nets (10.4%) and by traps (1.6%); only pangolins were captured by hand (1.9%) (Tab. 3).

Tab. 2 - Evenly and unevenly distributed species in the recorded off-take along the study period. MW = mean per week; MWV = mean per week per village; SE = standard error; a = MWV - 2SE. Evenly distributed species: a > SE; unevenly distributed species: a < SE.

	Species	MW	MWV	SE	a
Evenly distributed species	*Cephalophus monticola*	20,63	2,95	0,24	2,47
	Atherurus africanus	11,00	1,57	0,38	0,81
	Cercopithecus cephus	4,63	*0,66*	0,11	0,45
	Cephalophus dorsalis	4,50	0,64	0,07	0,51
	Hyemoschus aquaticus	3,00	0,43	0,07	0,30
	Heliosciurus rufobrachium	1,88	0,27	0,06	0,15
	Manis tricuspis	3,00	0,43	0,11	0,21
	Cephalophus callipygus	2,25	0,32	0,09	0,14
	Protoxerus stangeri	1,25	0,18	0,04	0,09
	Xenogale naso / Atilax paludinosus	1,13	0,16	0,05	0,06
Unevenly distributed species	*Potamochoerus porcus*	0,38	0,05	0,03	0,001
	Tragelaphus scriptus	0,13	0,02	0,02	-0,02
	Cricetomys emini	0,13	0,02	0,02	-0,02
	Ichneumia albicauda	0,13	0,02	0,02	-0,02

Tab. 3 - Mammals killed during the study period by local hunters using different weapons.

Species	Guns	%	Nets	%	Traps	%	Others	%	Total
Cephalophus monticola	155	93,9	9	5,5	1	0,6	_	_	165
Atherurus africanus	54	61,4	32	36,4	2	2,3	_	_	88
Cercopithecus cephus	37	100	_	_	_	_	_	_	37
Cephalophus dorsalis	35	97,2	1	2,8	_	_	_	_	36
Hyemoschus aquaticus	21	87,5	1	4,2	2	8,3	_	_	24
Manis tricuspis	15	62,5	_	_	1	4,2	8	33,3	24
Cephalophus callipygus	18	100	_	_	_	_	_	_	18
Heliosciurus rufobrachium	15	100	_	_	_	_	_	_	15
Protoxerus stangeri	10	100	_	_	_	_	_	_	10
Xenogale naso / Atilax paludinosus	7	77,8	2	22,2	_	_	_	_	9
Potamochoerus porcus	3	100	_	_	_	_	_	_	3
Tragelaphus scriptus	1	100	_	_	_	_	_	_	1
Cricetomys emini	_	_	_	_	1	100	_	_	1
Ichneumia albicauda	1	100	_	_	_	_	_	_	1
Total	**372**	**86,1**	**45**	**10,4**	**7**	**1,62**	**8**	**1,9**	**432**

Fig. 4 - An adult male of mandrill,* Mandrillus sphinx*, killed near Okangoville, in 1986, is the rarest monkey of the Haut-Ogooué Province (photo by H. Okongo).

Fig. 5 - The giant pouched rat,* Cricetomys emini*, on sale along the mainroad (photo by H. Okongo).

Prey destination and bushmeat trade

Animals captured were either consume for sold; hunting was not particularly finalized to crop protection or to harvest animals for traditional medicine. Of a total of 481 mammals captured during the study period, 241 (55.8%) were directly consumed by the hunter and his family, 191 (44.2%) were sold (Tab. 4). Thus, either direct consumption or trade of bushmeat had the same order of economic magnitude in the study area. According to the distance between villages and towns, the number of mammals eaten or sold was different from village to village. In Alélé II (the remoteness village), the majority of mammals was consumed by the hunter's household (70.8%), whereas, in Assiami (the nearest to Franceville) the larger part of mammals were sold (66.6%). However, the different proportion of animals sold was correlated neither to the village size (r_s = 0.34, n = 7, n.s.) nor to the distance of each village from the main bushmeat market in Franceville (r_s = -0.12, n = 7, n.s.).

Bushmeat was sold at house level, along the main road, inside or outside the village, or alternatively transported to towns by trucks (mainly to the near Franceville). The selling prices were different: minimum in the village, and maximum in the towns. Prices in towns resulted almost doubled than prices in small villages (Tab. 4). Nonetheless, the price of bushmeat was largely cheaper than the price of domestic animals. During the study period, the price of a goat was 20,000 – 50,000 CFA, while a bushbuck was 10,000-15,000. Such difference was also reported by Steel (1994) from Libreville, where the average price of bushmeat was 3.7 $ per kg, over 1.6 times the price of bovine meat.

The average commercial value of mammals consumed during the study period was circa 902,000 CFA, while the average income from the mammals sold was circa 1,056,500 CFA, revealing that direct consumption and commercialisation of bushmeat had similar economic importance in the study area.

Tab. 4 - Number and percentage of mammals sold (S) or consumed (C) by local hunters and their prices in the rural and urban markets (price in CFA referred to the whole carcass, during the study period, 1992).

Taxa	S	% S	C	% C	Price rural markets	Price in urban markets
Cephalophus monticola	81	49,1	84	50,9	2,000 - 4,000	6,000 - 8,000
Atherurus africanus	36	40,9	52	59,1	2,000 - 4,000	6,000 - 8,000
Cercopithecus cephus	17	45,9	20	54,1	1,500 - 3,000	4,000 - 7,000
Cephalophus dorsalis	25	69,4	11	30,6	10,000 - 15,000	18,000 - 25,000
Hyemoschus aquaticus	16	66,7	8	33,3	10,000 - 13,000	16,000 - 20,000
Manis tricuspis	1	4,1	23	95,9	1,500 - 2,500	-
Cephalophus callipygus	9	50	9	50	10,000 - 15,000	18,000 - 25,000
Heliosciurus rufobrachium	-	-	15	100	500 - 1,500	-
Protoxerus stangeri	-	-	10	100	500 - 1,500	-
Xenogale naso / Atilax paludinosus	1	11,1	8	88,9	1,500 - 2,500	4,000 - 6,000
Potamochoerus porcus	2	66,7	1	33,3	15,000 - 25,000	30,000 - 50,000
Tragelaphus scriptus	1	100	-	-	10,000 - 15,000	18,000 - 25,000
Cricetomys emini	1	100	-	-	1,500 - 2,000	-
Ichneumia albicauda	1	100	-	-	1,500 - 2,500	4,000 - 6,000

Conclusions

The hunting activities in the study area pursue two main objectives: direct consumption and/or bushmeat trade. Both resulted similar in terms of number of animals captured, even though the number of mammals directly consumed was slightly higher than the number of mammals sold. In particular, rodents and pangolins were mostly consumed, while ungulates and primates, which provided higher revenues to local hunters, were mainly sold. The level of bushmeat trade was not correlated either to the village size or to the distance of each surveyed village from the main local market, demonstrating that the level of bushmeat trade was not predictable in the study area both from demographic and logistic parameters. Most of mammals were killed by guns, showing a consolidated trend in hunting practices and tools, from more traditional and non-selective techniques (trapping and netting) to the more effective and selective fire weapons. However, the number of guns detected in each village was not correlated to the off-take, suggesting a very selective use of fire weapons. The economic resources of local hunters appeared adequate to acquire munitions regularly during the study period. Hunting activities in the study area remained constant during all the study period, both in terms of animals captured per week and in terms of animals captured per village per inhabitants, confirming a constant effort and the importance of bushmeat harvest in the livelihood strategies of local people, both for direct consumption and as relevant source of income. Differences in the weekly frequencies of capture for various species led to consider an unequal weight within the off-take recorded. In particular, this study succeeded to highlight the importance of two species, i.e. the blue duiker and the brush-tailed porcupine, which are very common and widespread in all central Africa

and represented the larger part of the entire off-take of the present study, as well as in other contexts described for other areas of Gabon and Congo. The high selective use of fire weapons is the main reason because these two species were the most harvested, respect to rodents, pangolins and small carnivores which are more easy to catch by traps and other unselective tools.

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