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## Full Length Research Paper

# The hunting practice in Northern Nimba County, Liberia

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Mount Nimba is one of the famous sites for biodiversity conservation in West Africa and has been identified as a priority Hotspot for conservation. This specific mountain is shared between three countries (Guinea, Côte d'Ivoire and Liberia) and is more or less well protected. In Liberia, ArcelorMittal Company is now re-launching the exploitation of the remaining iron ore that constitutes the mountain body. In the framework of its impact assessment process, Arcelor Mittal initiated a bushmeat study in its mining concession. Based on the ECOFAC program experience in central Africa, the methodology was based on the high potential of our teams to integrate the region, took into consideration the hunting productivity, the commercial bushmeat network, as well as household consumption. The results presented in this paper provide a first understanding of the hunter characteristics, the methods and tools used to hunt. From this study, hunting activity in northern Nimba County is devoted to men and mainly young men. Hunting activities are mainly dedicated to feeding the hunter's family and additional income to purchase their daily needs. People hunt throughout the year, day and night and ancestral hunting methods have all disappeared and have been replaced by cable snares and shotguns.

**Keywords:** Nimba County, biodiversity, hunting, trap, shotgun, bushmeat

## INTRODUCTION

Forests of all varieties are disappearing rapidly as humans clear the natural landscape to make room for farms and pastures, to harvest timber for construction and fuel, to build roads, urban areas, industrial sites, etc.

Although deforestation meets some human needs it also has significant impacts and costs, including social issues, extinction of plants and animals, loss of means of subsistence for some populations, climate change and soil degradation. All these profound consequences constitute local and global challenges for all of us (SBA, 2008).

Liberian forests and the fauna they contain are a conservation priority within the Upper Guinea Forest block of West Africa. Many endemic or endangered

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species of the region, including: pygmy hippopotamus, Jentink's and zebra duiker, Diana monkey, forest elephant and chimpanzee are found within its forests. Liberia represents the best hope for the conservation of these and many other species in the sub-region. However, wildlife harvest rates for subsistence use and the commercial bushmeat trade may represent a threat to the maintenance of this biodiversity. The on-going civil conflict from 1989 to 2003, and the resulting collapse of the national economy, may have promoted the expansion of the wildlife harvest. During the height of the conflict, domestic meat availability declined and demand for bushmeat is likely to have increased (Hoyt, 2004). Indeed, the rate of bushmeat consumption in Liberia is potentially a threat to its biodiversity. Bushmeat is an important source of protein in many sub-Saharan African countries (Wilkie *et al.*, 1998b). Wild animals and the bushmeat trade represent a resource from which a wide range of Liberians benefit, unlike the timber and mining industries. Anstey (1991) estimated the total wildlife off-take to be 150,000 tons per year.

Bushmeat is particularly valuable to rural communities. It provides cash for the purchase of household supplies and school fees, and is essential to meeting protein needs (Hoyt, 2004). Bushmeat utilization is currently one of the most important conservation challenges in the moist tropical forest region of Africa, from West Africa's Guinean forest hotspot to the wilderness area of Central Africa. In 1993 publication entitled *African Biodiversity* laid out the extraordinary dependence of Africans on locally available biological resources for food, medicine, and materials for shelter. Indeed, hunting and bushmeat utilization have been an integral part of traditional human livelihood throughout Africa for generations (Mohamed *et al.*, 2002).

The impact of hunting on forest ecosystems is often overlooked as deforestation is considered the main cause for biodiversity loss in the tropics (Myers, 1987; Skole and Tucker, 1993). However, recent studies have demonstrated that hunting may have serious effects on the long term viability of forest ecosystems even when habitats are preserved (Oates, 1996; Wilkie *et al.*, 1998b). The challenge ahead is to find a compromise that meets the nation's biodiversity conservation goals, while integrating the management of this valuable natural resource into a broader framework that increases national and community management capacity (Hoyt, 2004).

The ArcelorMital Company, one of the world's leaders has obtained authorization from the Liberian government, to exploit the iron ore deposits left vacant by LAMCO in the 1990, near Mount Nimba. According to Liberian law, ArcelorMital should conduct an environmental impact study before implementing its mining operations. Thus,

biological preliminary assessments implemented by AML were characterized by ecological baselines and provided a reliable basis for biodiversity impact assessments. These studies revealed that hunting is an activity practiced by many communities living around the concession of AML. A strategy to control bushmeat hunting is therefore considered urgently necessary by ecologists. However, a coherent bushmeat hunting mitigation strategy needs to include specific measures that can only be developed using detailed information collected during a medium to long term survey. This would establish, as far as possible, the current baseline level of hunting and the territories used by different communities.

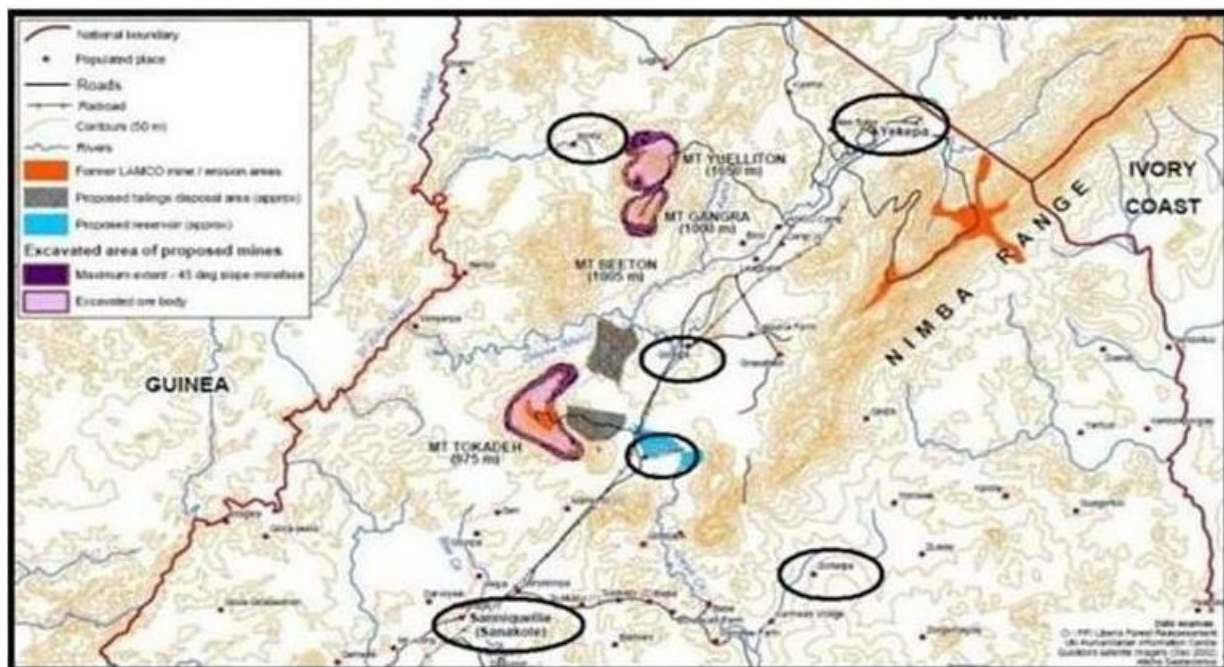
Until now, studies conducted in Liberia on bushmeat focused on the product of hunting, its quantity and quality, and its future. These studies also highlighted the impact of hunting on biodiversity. However, none has really addressed the practice which is to say, the methods and tools used for game hunting. The purpose of this study is to answer these concerns by determining the different methods and tools used in the northern Nimba County.

## METHOD

For this study, we performed (i) the identification and the interview of hunters, (ii) the identification of tools and methods of hunting and finally (iii) the determination of hunting territories.

### Study site

The four towns in which the study occurred are part from the Nimba County. This County is situated in the northeastern portion of Liberia. Sanniquellie serves as the capital of this County with an area of 11 551 square kilometers, the largest in the nation. As of the 2008 Census, it had a population of 462,026, making it the second most populous county in Liberia. Named after Neimba Town Mountain, the tallest mountain in the county, Nimba is bordered by Bong and Grand Bassa counties to the west, River Cess County to the southwest, and Grand Gedeh County to the southeast. The northern and northeastern parts of Nimba border the nation of Guinea, while the northeast lies along the border of Côte d'Ivoire. Nimba County is inhabited predominantly by two ethnic groups, the *Mano* and the *Dan* speaking people. The Mandingos or Malinky or Manding people, who were late arrivers in the region, make up the third group but are smaller in number than either one of the two major groups. This study occurs in four towns in the northern part of the Nimba County (Zolowee, Gbarpa, Bonlah and Zortapa) (figure 1).



**Figure 1.** Localization of the study towns encircle in black (source ATKINS)

## Sampling

### Identification and coding of hunters

Because of the illegal nature of hunting activities, we identified all hunters by codes. Several meetings were held in the towns to explain the objectives and the need of this bushmeat survey. The hunters then declared themselves on a voluntary basis and were guided mainly by their desire to be useful in this project, to publicize their work and the difficulties they face.

### Hunters surveys

To better understand the motivations of the town people and the human – wildlife relationship, we conducted hunter surveys aimed to:

- Determine the social characteristic of the hunters;
- Evaluate the type and quantity of tools used to hunt;
- Determine the hunting method;
- Determine special and traditional boundaries for hunting territories (rivers, forest block, mountains, roads, etc...).

### Identification of hunting tools

Identification of hunting tools was first made during the surveys with hunters who were asked to list the different

types of tools used and their names. Consequently, we carried out direct observation in the field to illustrate the different names from the interviews.

### Location of hunting area

Details regarding hunting areas used by the different towns included in this study seemed imprecise and sometimes overlapped. Field trips were organized with hunters to record the geographic coordinates of their hunting territories using GPS. During these trips, the routes taken by hunters were traced and plotted on a map; information was also recorded on all hunting signs, lines and types of traps. A camera is used to illustrate the different types of traps.

## RESULTS

### Hunter's characteristics in northern Nimba County

During this study, 246 hunters have registered on a voluntary basis and worked honestly with our team. Data processed in this report involve these hunters who contributed during the study. These hunters are constituted as follow: Bonlah (77), Gbapa (46), Zolowee (66) and Zortapa (57). In this study we counted a total of 885 households in the four towns. All of these households have 2863 men and 2867 women with a sex

**Table 1.** Characteristics of hunter communities and the proportion of the hunters in these communities

Town	Number of Survey Households	Men	Women	Total	Sex Ratio	Number of registered hunters	Proportion of hunters in survey population
Bonlah	158	436	458	887	1:1.05	77	8.70%
Gbapa	320	1127	1089	2216	1:0.97	55	2.50%
Zolowee	228	733	737	1470	1:1.00	145	10.00%
Zortapa	179	567	583	1150	1 :1.03	91	8.00%
Average	221.25	715	716	1289	1:1.00	92	7.13%

**Table 2.** Hunter's social characteristics in the four study towns of Nimba County (%)

	Start before				Learned from				
	25 years	Liberian	Guinean	Christian	Mano	Married	Farmer	Education	parent
Bonlah	81.00	96.98	3.08	62.00	91.42	100.00	83.34	42.92	88.67
Gbapa	49.11	93.34	6.67	96.67	93.34	96.67	83.34	71.50	80.97
Zolowee	86.00	100.00	0.00	22.85	98.50	98.28	97.00	71.44	84.84
Zortapa	92.46	100.00	0.00	91.87	91.37	83.50	83.50	72.72	92.44
Synthesis	77.14	97.58	2.44	68.35	93.66	94.62	86.80	64.65	86.73

ratio of 1:1.00 (men/women). The 246 hunters who have declared themselves represent a proportion of 7.13% of this population (table 1).

During the study only men have been reported as hunters and hunting activity is mainly practiced by young men. Indeed, most registered hunters are between 30 and 39 years old (37%) and between 40 and 49 years old (28%). These hunters are farmers seeking protein and additional income from hunting. In addition, almost all hunters (77%) started this activity before they are 25 years old. The majority of hunters (42%) started between 10 and 19 years old and 18% between the ages of 30 and 39, then 14% between 20 and 29 years old. 24% started later when they were more than 40 years old and 2% started sooner before their 10 years old. The training of these hunters is mainly conducted (88%) by a family member. In 68% of cases it was the work of the father, 12% of hunters learned this business through their brother or their uncle (9 %). A few of the hunters taught themselves (6%) or were taught by friends (5%).

When we analyzed the origin of hunters in the four study sites, we noted that very few foreigners are engaged in hunting (2%) based on voluntary expression. The remaining hunters are all Liberian nationals. Even among these Liberians, only 6% of these hunters are from other areas/counties (Kpelle, Bassa and Gio), the others (94%) being regional native Mano. Most of the hunters (68%) practice a religion while 32% have none. Only few hunters (5%) were single against 95% married

and they have an average of 5 children in their charge. Most of these hunters went to school (65%) before becoming hunter. This hunting is a secondary activity, the main occupation being farming for 87% of them; the 13% is shared between Carpenters, Masons, Wine producers, Students, Sawyers (see table 2).

## Hunting practice

### Hunting tools

All the hunters who contributed during this study, beside collection of animals, digging or putting fire in warren in order to bring out their tenants, use two main types of tools to hunt in northern Nimba County: the gun and the trap.

Some hunters use both shotguns and traps and constitute the majority (44%). Others use exclusively either shotguns (28%) or traps (28%). The shotguns are of five types named locally "Brazil, Fria, French, Russian or Steven" (figure 2) purchased locally in Liberia (76%) or imported from Guinea (24%). The shotguns used by hunters in the county of Nimba are handcrafted. Like the shotguns, ammunitions (figure 3) are also purchased mostly in Liberia (89%) while others come from Guinea (11%). The hunters use an average of 07 cartridges in a week and a hunting period lasts in average 09 hours. However, almost all are unanimous that they hunt for food and animal protein and also to have financial



**Figure 2.** A hunting party with shotguns and dogs



**Figure 3.** Table of sale of cartridges used in hunting in northern Nimba County



**Figure 4.** Picture of a neck trap (local name: kpean)

supplement to insure the daily needs of family regarding health care, clothing and schooling for children etc.

Most farmers use trapping as a means to fight against the harmful animal species to their crops, but other traps are set for the animal protein and sole purpose of harvesting bushmeat. Several (08) types of traps were recorded during the study.

### **Neck trap**

This form of trap is easy to implement. The materials are a cable ending in a loop and a short stick. The cable is attached to a stick driven into the ground about inch of the lane taken by the animals. The loop is adjusted and accommodated to the head of the animal. When the head enters the loop and when the animal advances, the yaw gradually tightens up and causes death by strangulation. This trap is not selective (figure 4).

### **Feet trap**

This trap can catch duikers, the Bushbuck, civet and Bongo by a yaw tightening around the leg of the animal after triggering the device by pressing a trigger system. The trap is installed in the path of animals. This trap is set by making a hole covered with small woods and leaves, and a cable that is placed around the hole. With this method death is not instantaneous. Because large animals can be released carrying the cable, there is a strong branch attached to the cable to make the animal tired during the flight. This trap is not selective (figure 5).

### **Leg hold trap**

The metal trap is triggered by pressure on a pallet. Both jaws close on a limb or the body of the animal. The trap is made locally by blacksmiths. It may be of different sizes and is a non-selective trap (figure 6).



**Figure 5.** Picture of a foot trap (goulipleh)



**Figure 6.** Picture of a Leghold trap (kouipleh)



**Figure 7.** Picture of a long fence traps (kalifa)

### Long fence trap

This trap is based on the use of a shoelace and has a fence constructed around the fields or forests. The materials used are natural such as sticks and leaves. Voids are intentionally left in the fence at strategic locations, where the trapping mechanism is laced. Fruits or seeds of palm trees are placed as bait in these openings. The mechanism consists of a cable terminating in a loop that is attached to a small piece of wood driven into the ground. The trigger system is triggered by an

animal that tries to pass in one of these passages. This trap is not selective (figure 7). The kalifa also tightens on large trunks of fallen trees and in this case it is called Yirikpalalaplè.

### Circular enclosure trap

This system is similar to long fence trap, but it is smaller and is distinguished by its form. It is set mainly in plantations by farmers protecting their crops or in the



**Figure 8.** Picture of a circular enclosure trap (koulou)



**Figure 9.** Picture of a Squirrel Trap (koizangoh)



**Figure 10.** Picture of a neck trap (Laypleh)

bush with the lure of cassava or maize in the centre of the fence. This type of trap is not selective (figure 8).

### **Squirrel trap**

This trap with yaw is installed high in the palm or cocoa plantations. A loop of lace is placed on the wooden cross that is used to connect two trees or branches. The loop grabs the neck of the animal who wants to use this shortcut. The animal is hanged by trying to struggle free

and dies by strangulation and suffocation. This trap is more selective than the others in species level (figure 9).

### **Neck and hand trap**

This trap is installed in areas with no possibility to air cross for squirrels and monkeys. It is stretched on a branch installed for this purpose between two trees. It has the ability to take the animals that pass through the area by the leg or neck (figure 10).



**Figure 11.** Picture of a foot trap (Saypa)

### Foot and hand trap

This trap is installed as goulipleh, but here it is not buried in the ground. It often takes the animals by their legs. However, when setting bait (corn or cassava) on the crossbar, it can take partridges by the neck (figure 11).

### Hunting Areas

During this study, eleven hunting areas were recorded in the four towns. The areas most visited by hunters are Tokadeh (20%), Yuelliton (17%), Nimba (14%), Danton, Blei with 11% each, and Beeton with 10%. All these are names of mountains. The hunters share their hunting territories with local people and foreigners. Foreigners can hunt if they ask permission to local people. However, a small number of them claimed to have their own hunting territory that is not shared. Hunting takes place in town areas (farm and forest), protected areas or in areas subject to mining activity. Each community has its own hunting territory with clear boundaries. The boundaries of hunting in this map have been established with an extrapolation of 1km around the real limits identified in GPS. And we note with the map that the hunting territory of Zolowee covers a part of Gbapa and Zortapa hunting areas and vice versa. In addition, according to the map

the hunting territories of the other towns (Bonlah, Zortapa and Gbapa) do not touch (figure 12).

### Hunting period

Hunting is rather a complementary activity of farmers who are engaged in it for an additional source of income and food sources. Only 5% claimed to hunt every day of the week or five days in a week (5%). The majority (36%) hunts only three times in a week or four times (24%), one time (16%), or two times (14%). According to these hunters, hunting is done both during the dry season and rainy season (91%) against 4.5% who hunt only during the dry season and 4.5% in the rainy season. In any case we have an intense hunting activity during the dry season (80%) while 12% do not distinguish a season of active hunting and 8% hunt actively during the rainy season. Regardless of the season, in Nimba County hunting takes place both day and night (59%) or only in the day (30%) or in the night (11%).

### Products of hunting

Regular monitoring of the hunting activity of some hunters identified the game that they caught per trap or killed with guns. According to these data, more animals

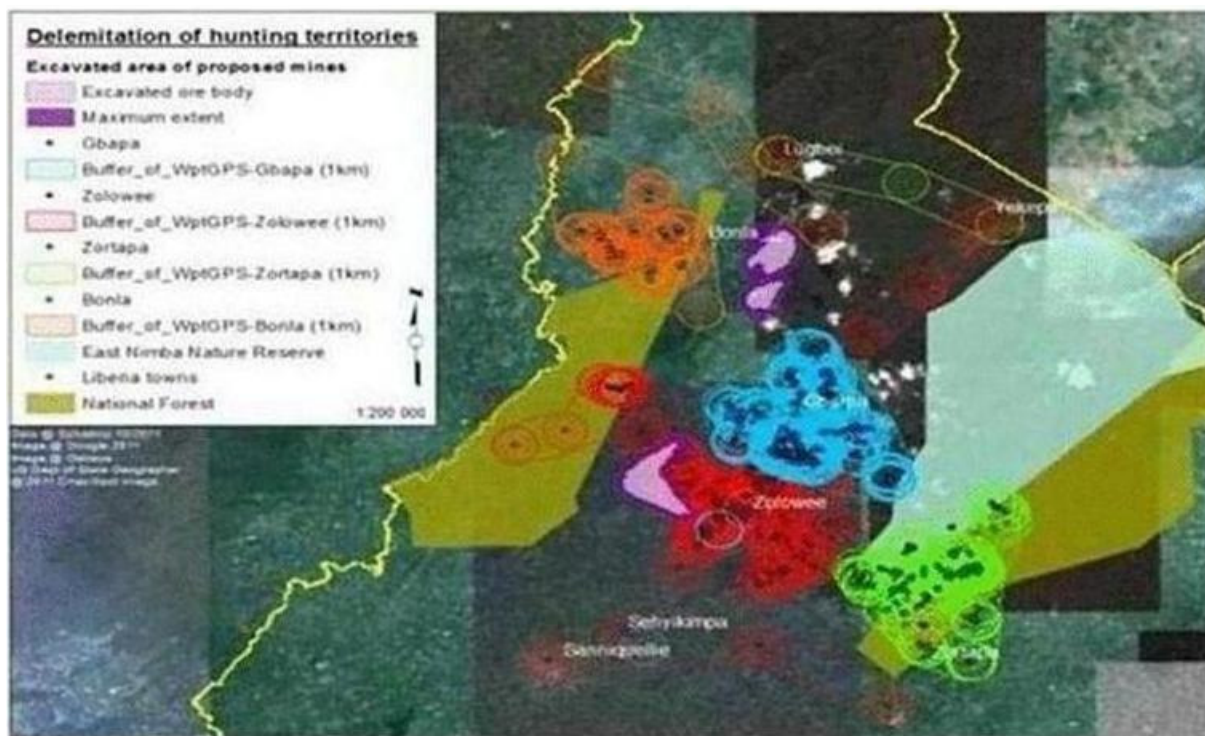


Figure 12. Hunting territories delimitation for the survey towns

were killed by gun (57.5%) compared to trap (40.5%) and by other means (2%) like dog, cutlass... As shown in Table 3, the animals are mainly constituted at the genus level, by Rodents (57.45%), Ungulates (20.41%), Carnivores (12.97%), Primates (5.27%) and Pholidota (3.38%).

At specific level, the analysis shows that, the Brush-tailed porcupine (*Atherurus africanus*) is the most encountered in the bushmeat (12.16%), and the striped ground squirrel (*Euxerus erythropus*) with a frequency of 11.76%. The Giant pouched rats (*Cricetomys gambianus*) is at the third place making up 10.41% of the animals killed, then the marsh cane rat (*Tryonomys swinderianus*) 10%. The first Ungulate in the list is the Bay duiker (*Cephalophus dorsalis*) with 8.11%, then the Maxwell duiker (*C. maxwelli*) (5.68%). Among the Carnivores, the most encountered in the hunting game is the Cusimanse (*Crossarchus obscurus*) that appear between the two first Ungulates with a rate about 5.81%. The African giant squirrel (*Protoxerus stangeri*) (5.41%) is at the eighth place. The bushbuck comes just after with 5% of the take off. Some species have a mean rate around 3%: the Red-legged sun squirrel (*Heliosciurus rufobrachium*) with 3.92%, the Potto (*Perodicticus potto*) with 3.51%, the Giant pouched rats (*Cricetomys emini*) with the same rate 3.51% and the African palm civet (*Nandinia binotata*) with 3.24%. The Genet species, the Long-tailed pangolin (*Uromanis tetradactyla*), the Black

duiker (*Cephalophus niger*), the Tree pangolin (*Phataginus tricuspis*), and the Slender mongoose (*Herpestes sanguinea*) have a rate comprise between 1.08% and 1.89%. The Western tree hyrax (*Dendrohyrax dorsalis*), the lesser spot-nose (*Cercopithecus petaurista buttikofferi*), Campbell's monkey (*Cercopithecus mona campbelli*) and the African civet (*Civettictis civetta*) are the less encountered in that list. (Table 3)

## DISCUSSION

In most cases, men who used to hunt bush animals claim to be hunters. This definition is comprehensive and hunter does not take into account the frequency or the hunting booties. It includes all the hunters; from the farmer installing traps around his field to fight against crops predators, to sport hunting and to professional hunter. The total number of such hunters who collaborated with our team is 246 for this report. In Côte d'Ivoire these types of hunters are estimated at 1.4 million of people (Caspary and Momo, 1998; Caspary, 1999,2000). We note that the number of hunters who reported voluntarily is far below what should be, probably only 50% of them have been identified (Dufour, 2000,2006). This could be explained because of the very special social situation that occurs in the Liberian Nimba County. The civil war remains present in the people's

Table 3. Catches list based on their encounter rate

Order	Scientific name	English name	Local name	Number	encounter rate
Artiodactyla	<i>Cephalophus dorsalis</i>	Bay duiker	Belleh	60	8,11
	<i>Tragelaphus scriptus</i>	Bushbuck	Zolo	37	5
	<i>Cephalophus maxwelli</i>	Maxwell's duiker	Velleh	42	5,68
	<i>Cephalophus niger</i>	Black duiker	Gba	12	1,62
	<i>Crossarchus obscurus</i>	Cusimanse	Wehin	43	5,81
	<i>Herpestes sanguinea</i>	Slender mongoose	Kelin	14	1,89
	<i>Nandinia binotata</i>	African palm civet	Gouo	24	3,24
Carnivora	<i>Genetta sp</i>	Genet	Blohou	8	1,08
	<i>Civettictis civetta</i>	African civet	Goua	7	0,95
Chiroptera	<i>Hypsignathus monstrosus</i>	Bat	Laye	1	0,14
Pholidota	<i>Phataginus tricuspis</i>	Tree pangolin	Balakelezech	13	1,76
	<i>Uromanis tetradactyla</i>	Long-tailed pangolin	Balakelezech	10	1,35
Primates	<i>Perodicticus potto</i>	Potto	Zohon	26	3,51
	<i>Cercopithecus petaurista b.</i>	Lesser spot-nose	Golo	6	0,81
	<i>Cercopithecus m. campbelli</i>	Campbell's monkey	Kanh	7	0,95
Hyracoidae	<i>Dendrohyrax dorsalis</i>	Western tree hyrax	Weeh	2	0,27
Reptila	<i>Python spp</i>	Python	Bili	3	0,41
Rodentia	<i>Anomalurus sp</i>		Kpelleh	1	0,14
	<i>Artherurus africanus</i>	brush-tailed porcupine	The	90	12,16
	<i>Trynomys swinderianus</i>	marsh cane rat	Sobeh	74	10
	<i>Cricetomys emini</i>	Giant pouched rats	Bonon	26	3,51
	<i>Cricetomys gambianus</i>	Giant pouched rats	Bonon	77	10,41
	<i>Euxerus erythropus</i>	Striped ground squirrel	Loo	87	11,76
	<i>Protoxerus stangeri</i>	African giant squirrel	Wankpo	40	5,41
	<i>Heliosciurus rufobrachium</i>	Red-legged sun squirrel	Gbein	29	3,92
			Korokoro	1	0,14
<b>TOTAL</b>				<b>740</b>	<b>100</b>

minds, and people continue to carry psychological stigmas of the conflicts.

Hunter communities often form associations or brotherhoods, which are informal groups of hunters constituting at the town level. They are characterized by a hierarchy based on the degree of initiation and traditional hunting regulations mainly based on mythological aspects of the natural environment (Caspary *et al.*, 2001). We have not met a structured organization of hunters in northern Nimba County which makes difficult to control the hunting activity. The existence of such organization should educate hunters on the various tools used, because to date the tools used by hunters in Nimba County are non-selective and do not distinguish between mythological animals, totem animal and the others.

Indeed, the current Nimba County hunters' equipment does not encourage rational and sustainable wildlife management. Trapping as well as hunting with guns are not selective practices, mainly when hunting with gun

takes place in the night. The same observations were reported by Dufour (2000 and 2006) during his surveys in FC Diecke and Guinean Nimba side. Hunters, both rural and urban, consider hunting as a means of meat supply (Caspary *et al.*, 2001). This is also true for hunters in Nimba County who sometimes hunt to protect their field crops against predators, while hunters in some cities consider hunting first, as a hobby and others define it as a traditional activity. In this type of hunting, the priority is the production of wild meat no matter the species, sex and age. Most techniques used for hunting is certainly harmful to exploited wildlife rehabilitation. The vast majority of hunters have a firearm, however, lack of community organization of these hunters does not allow us to count these weapons accurately, but all are unanimous that the number has increased after the long civil war that occurred in the country. What can be noted is that apart from hunters who have declared themselves and have cooperated with our team, almost every farmer

has a shotgun in the study area. These shotguns can shoot a maximum distance of 40 m. The shooting is done with lead shot cartridges. These firearms are not only used by owners but are sometimes lent to friends or brothers who in return, as they wish, may give him part of their hunting booties. Besides the firearms, other means of hunting have been reported. Hunters also capture wild animals with traps of all types of manufacturing. These traps can either take the animal by the neck or leg, and do not distinguish between gender, age, shape, and size, state of gestation of the animal. Even if it was not taken into account in this study, capture included also animals killed through the use of catapults, especially Rodents and Birds.

This hunt takes place in town areas, reserves and mining areas. The decrease of wildlife found by hunters themselves obliged them to travel long distances in search of suitable areas for this activity. We find that most hunters from Gbapa, Zolowee and Zortapa are hunting in areas that will "disappear" in a near future. Indeed, Mount Tokadeh is subject to mining activity and Mount Blei is become a Community Reserve. Bonlah hunters hunt in Mount Yuelliton, in Mount Danton but also in the area supposed to be the future West Nimba Reserve while Mont Yuelliton is a mining area. Here we have cited only towns that have been studied. We can reasonably expect that every towns or villages also house hunters who surely hunt in the same areas that those mentioned above. With the ability to hunt in rural domain, and mining areas, the East Nimba Nature Reserve and the future West Nimba Reserve are already aggressed. What will happen then, when communities will be deprived of these hunting areas? This question is worth asking especially when these areas are also used for agriculture.

Agriculture is the main activity of both women and men constituting the main source of income for all communities subject to our study. And one can easily imagine that it is also the source of income of all Nimba County. Moreover, it was reported that most of the hunters of Nimba County are not professionals but rather farmers seeking additional financial support by converting to occasional hunters. We can also imagine that hunting plays an important role in supplying markets in animal protein. It is therefore evident that the "disappearance" of areas where the hunting and agriculture take place will be a disaster for these communities if appropriate measures are not taken to compensate for that loss. The displacement of hunting areas will definitely constitute an increasing risk for the remnant places that harbor biodiversity richness, which are East Nimba Natural Reserve, the future West Nimba Reserve and the community forests of which the ecological importance has already been demonstrated by the EIA (Environmental Impact Assessment) conducted in BIOPA1 and 2 in 2009.

As mentioned above, most of the tools used by hunters are not selective and do not generally allow wildlife sustainable reproduction rates. The importance of risk varies for each species, depending on the number of individuals, their reproductive rate and their concentration. The decimation that occurred so far has been primarily correlated with increasing human population and destruction of habitat, although subsistence hunting has always existed (Eltringham, 1984). Studies conducted in the Congo Basin show that large animals with low reproductive rates are more sensitive to hunting pressure (Wilkie and Carpenter, 1999; Wilkie, 2000). Some studies have shown that commercial and subsistence hunting can lead to unsustainable game exploitation (Caldecott, 1987; Geist, 1988; Alvard, 1993,1994; Ludwig et al., 1993; Lahm, 1993a; Joanen et al., 1994; Fitzgibbon et al., 1995; Noss, 1995; Chardonnet et al., 1995; Bowen-Jones, 1997), and hunters can destroy some large slow-breeding species (Redford, 1993; Lahm, 1994; Fitzgibbon et al., 1995).

In Nimba County, purely commercial hunting is rare, however, throughout the forest region of West and Central Africa, a number of factors combine to make hunting for commercial purposes a major threat to the survival of many animals including primates (Oates, 1996b). Hunting by humans has been catalogued as a serious threat to the survival of species. The situation is even worse for the remaining species in areas outside parks and reserves. In most of these areas, many animal populations that are unique or ecological significant which have never been studied are disappearing and the situation will worsen if current trends continue (Oates 1996a; Rose, 1996c; Bowen-Jones, 1998; Bowen-Jones et al., 2002). In Liberia, Anstey (1991) found the wildlife harvest to be significant, but he did not conclude that any species was at immediate risk of extinction. He did suggest that the wildlife harvest poses a potential long-term threat to the survival of the most vulnerable species. The majority of the meat sold in Sinoe County, adjacent to Sapo National Park, was from common species but a significant amount of a hunter's catch and sales may have come from protected species.

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