



Research Article

Impact of Livelihood Improvement on the Conservation of Large Mammals in the Bakossi Landscape, South West Cameroon

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ABSTRACT

Large mammals at least the sizes of duikers are greatly affected by anthropogenic activities in the Bakossi landscape area. The improvement of the livelihood of indigenous population around and within protected areas can be of immense important to wildlife conservationists who want to succeed in their efforts or approaches of conserving large mammals in the landscape. A duration of one year of monitoring large mammals abundance and densities, and human activities have shown that, if those who live around protected areas are provided with alternative sources of proteins to rear or farm, this can boost wildlife conservation. It has also shown that hunting and agriculture are the most dangerous causes of wildlife declines because of a ready consumable market of bush meat in big towns and also due to land use dispute because of a growing human population that needs space for socio-economic activities and large mammals that want to forage. Alternative sources of proteins like Pigs, cane rat and goat rearing, snail and bee farming etc provide enough income than hunting and encroachment into protected areas for bush meat and farming. We strongly recommend livelihood improvement through the provision of alternative sources of proteins in the Bakossi landscape to ease large mammal's conservation.

INTRODUCTION

Cameroon is endowed with an abundance of species diversity; having about more than 900 species of birds, 400 mammals, 1500 butterflies, 9000 plants, 210 reptiles, and 200 amphibians (CCPO, 2003). The Government of Cameroon and some Conservation Organizations such as WWF have doubled their efforts in the past decades to conserve and manage these resources because their values and uses are intimately connected. About 70 % of Cameroon's population depends on these natural resources for their livelihoods (source of income and daily protein intake), with bushmeat contributing about 90 % of animal protein consumed in some rural areas (Boum, 2005). This joint effort of the Government of Cameroon, other stakeholders and WWF (acting as an advisor to the government) has led to the creation of protected areas (such as national parks, reserves and sanctuaries) and presently about 21 % of land area is set aside as a protected areas (Anonymous, 2007). These efforts are to slow down habitat loss or degradation, wildlife poaching and to eventually mitigate reduction rates of natural resources. Despite efforts aimed at putting in place a representative network of protected areas by Government of Cameroon and with the support of wildlife conservation organizations (IUCN, WCS and WWF), conservation is still facing many challenges in safeguarding this natural heritage due to illegal and abusive exploitation of wildlife species characterized by unsustainable management (CCPO, 2005).

However, most people have the notion that, the creation of these protected areas can have a strong negative implication on the livelihood of a good number of indigenous people who inhabit the forest and depend on it for their survival. But on the contrary, the involvement of the inhabitants in the management and conservation process of these protected areas can be profitable and sustainable (Mbile *et al*, 2003).

Natural resource managers recognize the need to work beyond protected areas if they are to sustain a viable population of these resources, and the best way to conserve and manage these natural resources is a new vision developed by WWF-CFP.

Firstly, involving the local community in the conservation process (co-management) and Secondly, for wildlife conservation to succeed, people who live in near or around protected areas must receive benefits as a means of livelihood improvement (which can be through infrastructural, financial, educational and capacity building) which will offset their access to natural resources i.e. participatory approach. Large mammals are always the target of most poachers in protected areas because they believe that these large mammals are always a good source of income and animal protein. The goal of this work was to assess the conservation of large mammals and also assess human threats affecting these large mammals.

Wildlife Managers and Conservationists aspire to preserve natural resources and this usually involve the

marginalization and displacement of the local people from the exploitation of these natural resources in and around protected areas (Usongo, 1996; Robert and Tchamba, 2000; Luc, 2005). With this in mind, people think that conservation is essentially exclusion and refusal of assess rights to natural resources. But on the contrary, and recently, a few wildlife organizations saw people as an integral part of conservation. Such is the case with WWF-Coastal Forest Programme in the Bakossi landscape. In the past five years, it has through its programme introduced livelihood improvement as a means of providing alternative sources of animal protein to those who highly depend on these protected areas for a living (mostly hunters and farmers).

This strategy of livelihood improvement is reducing the attention and interest of the local population from the unsustainable and continuous exploitation of wildlife resources and by so doing, this programme hopes to boost up the conservation status of threatened wildlife species. This reduces human threats or efforts towards these threatened wildlife species, especially large mammals that are always the target. After a period of implementation, it was necessary to assess the strategy or approach how it has affected the conservation of large mammals in the area and human efforts towards these large mammals.

MATERIAL AND METHODS

Study area:

The study area is located in the Kupe-Muanenguba and Mungo Divisions of the South West and Littoral Regions of Cameroon (fig. 1) between Latitudes 04° 38' 20 – 05° 10' 55 N and Longitudes 09° 22' 30 – 09° 58' 16 E, with a total surface area of about 189.900 ha. It harbours amongst others, three key conservation sites (figure 1): The Bakossi National Park (29,320 ha), Mount Muanenguba Integral Ecological Reserve (5,252 ha) and Mount Kupe Integral Ecological Reserve (4,676 ha). The altitude of the Bakossi landscape ranges from about 200m to 2.400m above sea level. The highest altitude of 2400m is found at the peak of Mt Muanenguba. It has two outstanding Mts (Kupe and Muanenguba) with altitudes of 2,050m and 2400m respectively. The slopes of these mountains are made up of mainly fertile soils suitable for cultivation. The climate is dry from mid November to mid March with late December being the hottest month. Rains come from mid March till mid November with August being the wettest. Temperatures range from 25°C to 30°C with humidity between 74% to 88%.

The Bakossi landscape area is characterized by high and low lands that give a rise to a wide range of habitats which support different types of plants and animals (Inyang, 2009 and Nguedem, 2010) and therefore, is generally known for its high biodiversity and endemism like the Mount Kupe bushstrike (*malconotou kupensis*).

Over the years, due to population increase and the people quest for survival, activities such as illegal hunting, farming

by encroaching into protected areas, unsustainable harvest of non timber forest products, and a small scale logging has evolved to unsustainable levels that have put large

mammals in a jeopardy (WWF-CFP reports, 2008 and Nguedem, 2010).

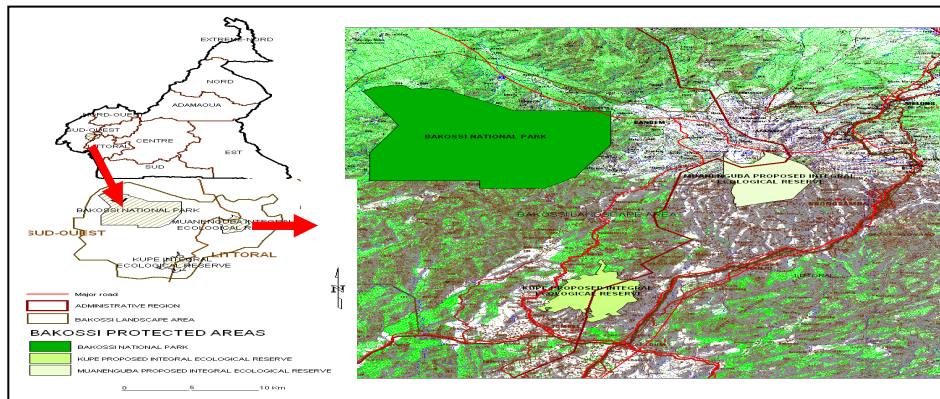


Figure 1. Location of Bakossi Landscape in Cameroon

Source: Okon, WWF-CFP (2009)

Methods: Data was collected using two approaches: the line transect for large mammals surveys and questionnaires for socio-economic data from the local population.

Zoological surveys: The stratification approach of randomly selecting transects (Buckland *et al*, 1993; Whitesides *et al*, 1998 and Lancia *et al*, 2005) was employed whereby the total sampling area in each protected area was stratified into grids of 2 x 2 km and random transects of 2 km were planned. The starting and ending points of each transect was randomly generated using a random number table, their exact positions in the field were determined using a GPS GARMIN 12XL. All transects were oriented to cross major drainage features to sample a representative portion of all the vegetation types. A total of 63 transects were randomly surveyed from February to October; just like was the case in 2005 before the implementation. These transects generated a sampling effort of 101 km. Transects were established by a team of five, consisting of a leader, two assistants and two laborers; all field workers experienced in animal tracking, hunting and human activities were selected from some villages in the vicinity of the study site. They were trained on identification and collection of large mammals facilitated by colour plates from Kingdon (1997). Morphological and behavioural descriptions in recording of calls (<http://www.primates.wise.edu/pin.vocals>, www.bioko.org/sound) were used. All transects were walked daily from 6:30

a.m -5:30 p.m at an average speed of <1km-1. Care was taken during data collection to make sure that animal and human signs on or near transects were not missed and that the measurement of the transect distances were accurately recorded using the 100 m fiber glass tape. Observations were pooled by transects and survey effort was calculated as the total length of transect walk with or without disturbance by the total number of signs observed per large mammal (encounter rate).

Socio-economic survey: Interviews using questionnaires were also administered randomly to the local population in the landscape to know their own conception about conservation, how it can be managed and how the provisions of alternative sources of proteins have changed their living standards. Only active hunters, farmers and community based-management organizations were interviewed, (to avoid bias, interviews were conducted on various age groups who participate in the occupation).

RESULTS

In order to know the impact of livelihood improvement on the conservation of large mammals in the Bakossi landscape, encounter rate recorded on transect lines for large mammal in 2005 before the implementation were compared with those of 2009.

Table 1. Encounter rate of large mammals in the Bakossi landscape in 2005 and 2009

Mammals	Encounter Rate 2005	Encounter rate 2009	Livelihood Impact (Increased or decreased)
Blue Duikers	4.25	1.15	Decreased
Red Forest Duikers	4.1	2.41	Decreased
Bushbucks	1.09	0.12	Decreased
Drills	1.08	0.20	Decreased
Red River Hog	0.65	0.78	Increased
African Civet	0.48	0.12	Decreased
Chimpanzees	0.3	0.37	Increased
Tree Hyrax	0.17	0.07	Decreased
White Nose Monkey	0.1	0.19	Increased
Mona Monkey	0.08	0.09	Increased
Preuss Monkey	0.04	0.01	Decreased
Crowned Monkey	0.01	/	Decreased
<i>Sitatunga</i>	/	0.03	increased

When the kilometric index abundance (IKA) or encounter rate (ER) is:

- **< 0.3** = abundance is weak, between **0.3 and 0.5** = abundance is average and **> 0.5** = abundance is high. This is based on frequency contact with animals (Vincent *et al*, 1991 and Tsi *et al*, 2009)

The results show that the total encounter rate of *Cephalophus spp* (Red and Blue Duikers) in 2009 surveys decreased by half of 2005 surveys. One of the endangered species, the Drills (*Mandrillus leucophaeus*) decreased drastically (thus became rare) in its encounter rate, i.e. from 1.08 to 0.20 in 2005 and 2009 respectively. Apart from the drill, other large mammals like the African civet, the Tree hyrax, Bushbuck and the Crowned Monkey also showed lower encounter rates thus were less common in the area. On the contrary, some large mammals encounter rate like the Red river hog, White nosed monkey, Mona monkey etc., experienced an increase in their encounter rates. The Chimpanzees, one of the endangered species also had a slight increase in its encounter rate, i.e. from 0.3 to 0.37. (See figure 7). The comparative analysis further indicates that one of the species (*Sitatunga*) which did not show any signs in the 2005 surveys showed visible signs (ER= 0.03) in this survey, while the Crowned monkey that had the least

encounter rate of 0.01 in 2005 did not show any signs in this survey of 2009 thus became less common. The species *Sitatunga* showed signs as a new species in the landscape that was not known to exist because it did not show any signs physically or indirectly during the biomonitoring survey conducted in 2005 or before; meanwhile another species (the Crowned monkey) became rare from the list of large mammal species in 2009 because it did not show any signs. With the exception of *C. monticola*, it was difficult to differentiate the signs of other *Cephalophus spp* (Bay duikers, Ogilbya duiker, yellow back duiker and black fronted duiker) thus were grouped as Red forest duikers.

Data suggested that human activities encountered in the landscape are seemingly the same (figure 2). When both encounter rates were analyzed, it showed that hunting dropped highly and agriculture just a bit while logging and grazing dropped by three quarters.

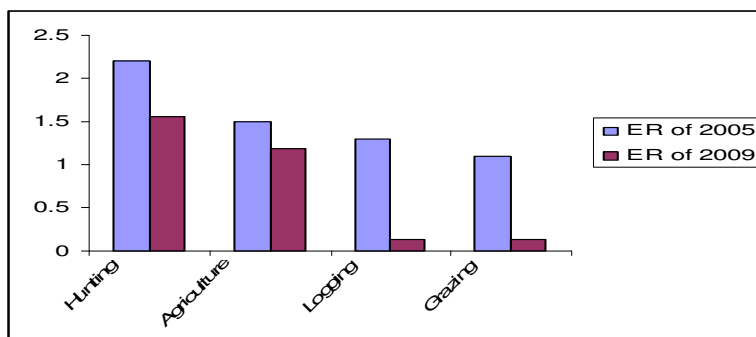


Figure 2: Comparing human activities of 2005 and 2009 in the Bakossi landscape

Figure 2 show that agriculture and hunting remain the outstanding factors that still have a negative effect on the survival of large mammals in the area.

When human activities were analyzed (between the survey of 2005 and 2009), it was noticed that hunting, i.e. its encounter rate, has dropped. This could be confirmed by the 70.5 % response that was obtained through questionnaire analysis. Those who had benefited from livelihood improvement testified that their standard of living had increased without any poaching. But this was contrary to what was observed by Tsi *et al* (2009) in Benoué National park where hunters testified that the harvesting of wildlife resources often provided the best return for labour input in the short-term. Some of the hunters complained that they faced difficulties accessing the forest; this could be confirmed by similar studies carried out in Lobeke National park which showed that most hunters in the area have easy access to biodiversity hotspots because logging companies open up the way for easy movement during the cutting down of trees and these hunters can easily hunt and carry out their bushmeat (CARPO, 2005).

It was realised that agriculture did not decrease as hunting as most of the hunters still move into protected areas in search of fertile lands to do farming because of a ready market for food crops, especially from heavy trucks that enter the market from Gabon and Equatorial Guinea in search of food like cocoyams, plantains and maize. If hunters have benefited from livelihood improvement and farmers have not been targeted then there is a problem because, in the region, most of the farmers behave like

hunters who always go to the farm with dogs and shot guns. This shows that a farmer cannot see a large mammal and spare it because he or she came to cultivate. Despite the restrictions placed on encroachment into protected areas by demarcation carried out around Kupe and Muanenguba, there is still a problem because those who farm around the protected areas see their crops consumed by mammals that forage the boundaries of the protected areas and they set snares for these mammals. Most farmers suffer from destruction of maize and bananas by monkeys and they are determined to kill any monkey that comes by. Logging dropped drastically because in this region, houses are constructed with the use of planks (*caraboa*) but because of modernism and environmental education through sensitization on the need to conserve our forest, most houses are constructed with bricks. Logging in the entire landscape is not intensive because of the absence of logging companies in the area.

This table below represents the type of livelihood improvement that has been provided to the local population so as to divert their attention from illegal exploitation and encroachment into protected areas after a four year period of trial implementation.

If better implemented, it would be of immense value to the local population and in turn ease the job of conservationists. The production shows that for a short period of four years, much was produced and if alternative sources are provided to the indigenous people, it would reduce the rate of land-use dispute and hunting in the area and elsewhere.

Table 2. Livelihood improvement strategies in the Bakossi landscape

Types of Community Based Management Organisations (CBOs)	Groups involved (common initiative groups)	Production status
Cain-rat rearing	Two groups (Endeavour & GIC-GEPDIS)	800 animals/year
Bee-farming	15 groups	2000 litres of honey/ yr
Snail-farming	09 snail farms (two groups PAPCIG & CADEV)	400 to 2000 snails/year
Snails transformation	One group (CADEV)	100 sachets of frozen snails a week
Pig-rearing	07 Farmers	46 pigs/year
Organic gardening	01 organic farm by EKU&KITH (now SAFE-CIG)	Tons upon tons produced and sold out to gardeners
Community Forests	02 CFs (Ndise-Ekeb & Wo'Ongé)	60 ha exploited and income used for infrastructural construction like roads, schools etc
<i>Prunus africana</i> (Planting)	One group PFPF	15 ha targeted

CONCLUSION

This research contributes towards an improved understanding of the conservation status of large mammals;

demonstrate how human activities in a landscape can erratically affect the conservation of large mammals in protected areas. The results of this research lead to the following conclusions:

Livelihood improvement programme is a good approach because it can sustain the survival and conservation of large mammals. It equally leads to better living standards than hunting and reduces illegal exploitation of natural resources. If the programme is well implemented, it can achieve conservation aims.

Human activities (hunting, agriculture, logging and grazing) are present in the Bakossi landscape and when pooled together through regression analyses, do not affect the smooth conservation of large mammals in the landscape. Hunting is the highest human activity and will probably have a devastating effect on the conservation of large mammals in future if unchecked. But if the local population is continuously provided with better alternative sources of proteins, this will reduce human efforts towards illegal exploitation of wildlife.

A new species of large mammals (Sitatunga) was discovered in this area, since it had never showed signs in the area.

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