Forest/Habitat Fragmentation and Human-elephant Conflicts in the Takamanda-Mone Landscape of the South West Region of Cameroon

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Abstract

Forest/habitat fragmentation and Human-elephant conflicts are among the key factors that are of great concern to conservationists as far as achieving the goals of elephant conservation within their range states is concerned. Although much has been done in some protected areas in the Central African Sub-Region in general and in Cameroon in particular on forest/habitat fragmentation and human-elephant conflicts, very little is known of this situation in the Takamanda-Mone Landscape of South West Cameroon. The absence of such a valuable baseline data has created a knowledge gap that need to be closed and at the same time provide the management bench of the Landscape with appropriate tools for decision making. In the light of the above, there is therefore the need to source baseline information with respect to forest/habitat fragmentation and human-elephant conflicts in the Takamanda National Park and Mone Forest Reserve. It is from this back drop, that this study 'on the evaluation of forest/habitat fragmentation and Human-elephant conflicts in the Takamanda-Mone Landscape of the South West Region of Cameroon was initiated as a contribution to the ongoing regional search for baseline information on the forest/habitat

fragmentation and human elephant conflicts in Cameroon. The study in order to achieve set objectives employed socio-economic and Biological assessment techniques. Biological assessment took the form of line transect establishment, a hunter guided survey, the use of the Global Positioning Systems (GPS Garmin 60CSx) and the Geographic Information System (GIS). The socio-economic techniques made use of the random and the purposive sampling methodologies for the selection of villages and the respondents for questionnaire administration. Alongside these sampling techniques, some selected Participatory Rural Appraisal (PRA) tools were used for data collection. Results revealed that forest/habitat fragmentation and human-elephant conflicts are very prominent in the Takamanda-Mone Landscape due to human activities that are carried out in the area. These activities were identified to range from farming, hunting, poaching, local timber exploitation, Non-timber Forest Products (NTFPs) gathering, road construction to settlement. The associated conflicts (both direct and indirect) were identified to span from crop destruction to loss of lives and injuries. The locations and the effective carry out of these actives were found to have fragmented forest/ habitats and these has resulted into the decline of elephant populations in the study area. In order to reverse the present trend of events, the Takamanda-Mone landscape should be upgraded and classified into a national Park.

Keywords: Forest/habitat, fragmentation, Human-elephant conflicts, Crop destruction, Elephants.

1. Introduction

Human-elephant Conflicts and Habitat fragmentation has been identified by the African Elephant Specialist Group as one of the main conservation problem that has contributed to the decline of elephant populations within their range states (Ndaili, et al 2003, Blom,2000, AfESG, 1999). The broad range nature of elephants makes their movement not limited to particular protected areas or national boundaries. They are known to move between protected areas as well as transmigrate between two or more countries within their range states (Ainge, and Brown, 1996, Buckland et al, 1993, Burnham et al, 1993).

These trans-boundary/frontier's movements in recent years have contracted as a result of the recorded habitat shrinkages emanating from high and unprecedented human pressure within and around potential elephant habitats in West and Central Africa (WWF ameroon, 2003, Bekhuis and Pins, 2003). These human pressures as Epiemelle, and Ekobo,(2003), Tchamba, and Seme,(1993), O'kah, (2003) puts it, range from the establishment of large and small farm estates, forest exploitation, hunting, poaching, road construction, settlement, to traditional and industrial mining activities and others. The encroachment of the populations into potential elephant habitats for the carry out of any form of human activity has made these animals to come face to face with humanity. These face to face encounters have resulted into consequences that have been documented to range from lots of human lives, crop destruction as well as the shrinking population of these animals within their range state (Blanc, 2008, Blake, 2005). In the West and Central African landscape, over 408 human lives have been lost due to human-elephant encounters with un-measurable property damage during the past 23years (Blanc et al,2007). On the bench of the elephant within the same period, over 1017

elephants are estimated to have been lost in the forest zones of the North West, South West, and the Littoral Regions of Cameroon for the International Ivory trade. Despite the ban on the sale of elephants and its associated products, elephants in West and Central Africa continue to be threatened by poaching even in well established national parks (Usongo, 2003, Bekhuis and Prins, 2003, Vick, 2003, White, 1994).

When elephants and humans co-habit or live in close proximity, human-elephant conflicts will occur. These human-elephant conflicts in addition to the above mentioned could result in the direct injury and killing of livestock, competition over water sources/resources and forest fruits/ tubers resources as well the destruction of traditional settlements. Indirectly, these conflicts are known to institute fear leading to shorter annual school days for children and farmers as more time is spent on protecting crops from elephant depredation and chasing elephants from farms (Parker et al. 2007, Kangwana, 1995, Epiemele and Ekobo, 2003, Tewksury, 2005).

The relationship between elephant's and traditional/indigenous people of Korup National Park, the Mount Cameroon National Park and the Banyang-Mbo Wildlife Sanctuary in Cameroon as outline by Nchanji and Plumetre, (2003), Dinerstein et al, (2005) is complex. In these conservation sites in Cameroon, there is a living believe that the elephants in these vicinities are transformed humans (totems). This believe further holds that once in a while some groups of villagers do transform from humans to elephants to carry out vengeful acts in neighbouring villages to exact retribution for some misdeed or unpaid debt (Stephenson, 2004; Powell, 1998 and Tchamba 1995). Crop raiding by elephants is a growing problem in Africa as the forest (potential elephant habitats) shrinks in the face of expanding human pressure. Human-elephant conflicts have emerged in recent years as one of the most challenging problems to forest and wildlife conservationist that urgently needs an effective and efficient solution (Sebogo, 2004, Taylor, 1982, Whitehouse, 2002, Sunderland-Groves. and Maisels, 2003). In order to evolve effective and efficient solution to this emerging phenomenon, information the magnitude, frequency and dynamics of human-elephant conflicts and its resultant effect on forest/habitats fragmentation need to be evaluated in would be and existing protected areas and their buffer zones in West and Central Africa. In a strive to contribute in the search for a solution to this pan African conservation problem, this study on the Human-elephant Conflicts and Habitat fragmentation in the Takamanda-Mone Landscape of the South West Region of Cameroon was developed with the following objectives:

•   To evaluate the type and nature of human activities.

•   To assess human -elephant conflicts resulting from human activities.

•   To map out potential locations of human activities and associated conflicts.

•   To map out susceptible areas of human-elephant conflicts in the study area.

•   To assess the impact of human activities and associated human-elephant conflicts on elephant habitat fragmentation.

2. Materials and Method

2.1 Location of Study Area:

The Takamanda-Mone Landscape is located between latitude 050 55'- 060 21'N and longitude 09011'-090 33'E covering a surface area of about 676 km2.   It shares its western border with the Cross River National Park in the Cross River State of Nigeria. It is bounded to the South by the River Manyu (Cross River) and to the East by the Mamfe-Widikum road. Finally it is bounded in the North by the Kweguini highlands in the Njinkwa District of the North West Region of Cameroon (MINIPAT, 1987). Its vegetation is of the Guinea-Congolian type dominated by a humid tropical climate, characterized by a single short dry season (November- March) and a corresponding long wet season (April-October), (Mboh and Warren, 2007).   The mean annual rainfall for the period of the study (2008 – 2011) was about 2400mm with monthly peaks in July and August of every year. On the other hand, the mean annual temperature was 25.50C with monthly picks of 28.20C in March of every year (Bisongabang Weather Station, 2010). It is drained principally by River Manyu (Cross River) and its multiple tributaries (Sunderland-Groves et al. 2003, Sunderland and Tchouto (1999).).
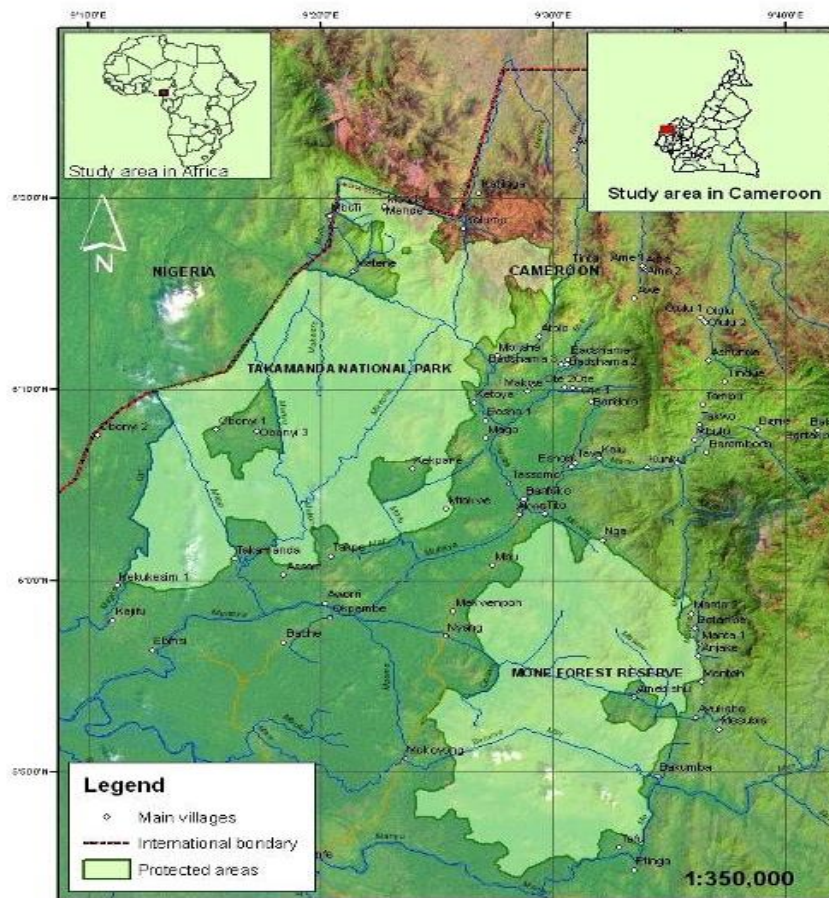

Figure 1. Map of Study Area: Takamanda-Mone Landscape

2.2 Methodology

The study employed Biological and socio-economic assessment techniques. Biological assessment took the form of line transect establishment, and a hunter guided survey. The socio-economic techniques made use of the random and the purposive sampling methodology for the selection of villages and the respondents for questionnaire administration. Alongside these sampling techniques, some selected Participatory Rural Appraisal (PRA) tools such as focused group discussions, transect walk, seasonal calendar, historical time line, triangulation, visual assessments, and key informants, were employed for the collection of data on the type and nature of human activities , human -elephant conflicts resulting from human activities, potential locations of human activities and associated conflicts, susceptible areas of human-elephant conflicts and the impact of human activities and associated human-elephant conflicts on elephant habitat fragmentation.

A total of 18 villages (Nyang, Mbu, Akwa, Tassomo, Basho 1, Basho 2 (Ketoya), Mbelishe, Matene, Kekpane, Obonyi 3, Obonyi 1, Takpe, Mfakwe, Takamanda, Kajifu. Tito, Asam, Ketoya,) were selected for the study. The 18 villages were purposefully selected on the bases of (1), a long documented history of human-elephant conflicts with the village (2), located of the village within the range of 2 to 5 kms from the study area boundary.

In each of the 18 villages, 50 questionnaires were administered giving a total of about 900 questionnaires in all for the study.

2.2.1 Selection of Respondents

One set of questionnaire divided into three sections A, B, and C was used for the conduct of the study. Respondents to the questionnaire were Staff of the Ministry of Forestry and Wildlife, Village Chiefs, Village Traditional Council members, College of elders, hunters, elephant hunters, None-Timber Forest Products (NTFPs) species harvesters/collectors, trappers, farmers, women, youths and other forest users.   These groups of respondents were targeted because they were deemed to treasure a wealth of knowledge on the type and nature of human activities and associated conflicts and most importantly, the impact of human activities and associated human-elephant conflicts on elephant habitat fragmentation in the study area. Sections A and B of the questionnaire which was made up of open ended questions in conjunction with appropriate PRA tools, gathered information on the type and nature of human activities, human -elephant conflicts resulting from these human activities. On the other hand, section C which was made up of a mixture of open ended and close questions in conjunction with appropriate PRA tools, collected information on the potential locations of human activities and associated conflict,   susceptible areas of human-elephant conflicts and the impact of human activities and associated human-elephant conflicts on elephant habitat fragmentation in the study area.

In view of the fact that about 90% of the respondents could not read and write, focused group discussions and semi structured interviews were held with respondents using the questionnaire as a check list (guide) while the note taker completed the questionnaire as the interview session progressed to the end.

2.2.2 Biological Assessment Technique

In order to complement the socio-economic data collected on the human-elephant conflicts and habitat fragmentation in the Takamanda-Mone Landscape of the South West Region of Cameroon, the Line transects technique as described by Sunderland and Tchouto (1999), Burnham et al (1980) and Buckland et al (1993) was employed. In each of the selected villages in the study area, three 5km line transects were established at 500m apart in each habitat type (primary forest, secondary forest, farmlands). These transects were established at a predetermined compass bearing, perpendicular to the main access path from the village into these habitat types and parallel to each other. Along each transect, within the range of 20 m on both sides of the central line, a 100% search and recording of all human activities and associated conflicts were carried out. Beside the transect technique, a farmer/hunter-guided survey technique was carried out. This exercise took the form of a constituted team of two knowledgeable farmers, two elephant hunters, two NTFPs gatherers, two timber exploiters and four researchers. The constituted team in search of all human activities and associated conflicts under the guide of the lead farmer/ hunters moved through each of the habitat types in search of indicators for all human activities and associated conflicts. The first three team members form the villages of Kekane, Matene and Mbilishe, guided the team along the Kekpane, Matene and Mbilishe area, the second batch of three villagers from the villages of Obonyi 1 and 3 with Takamanda inclusive guided the team along the Obonyi 1, Obonyi 3 and Takamanda sections of the forest while the third batch of the three team members from villages in the Mone Forest Reserve guided the team along the Mone Forest Reserve area. The farmer/hunter guided survey exercise which lasted for 54 days, started at 9:00 am and ended at 4:00 pm of each day. This was carried out in the two seasons (27days in the dry and 27days in the wet) that prevails in the study area. The choice of this daily time span was because at this time of the day, light intensity on the forest floor was bright enough to permit visibility for the identification of human activities. During the survey, as soon as a sign was found, the GPS position was taken.

2.3 Data Analysis

Data from the questionnaires were analyzed using Microsoft Excel version 2007 and the Statistical Package for the Social Sciences (SPSS) Version 17.0 data from the farmer/hunter-guided survey were analysed using ARCGIS version 8.4. Scanned maps were registered using Universal Transverse Mercator (UTM), Zone 32N, with WGS 84 as datum. The maps were then digitised as shaped files in ArcMap. The ground position of the identified points were recorded with the aid of a GPS, Garmin 60CSx, inputted into Excel 2007, saved as database files (DBF4) and added onto Arc Map.

3. Results

3.1 Types of Human Activities and Human-elephant Conflicts in Takamanda-Mone Landscape

Human activities carried out in the study area that culminated into human elephant conflicts as shown in table 1 ranged from farming to settlement. The associated conflicts (both direct and indirect) recorded in T-ML as shown in table 1, spanned from crop destruction to loss of

human lives and injuries.

Table 1. Human activities and human elephant conflicts.

Type of human activity	Nature of the human activity	Associated conflict	Impact of conflict/human activities
Farming	.Creation of small palm plantations .Creation of cocoa farms . Creation of food crop farms	.Conversion of elephant habitats .crop destruction by elephants .Invasion of elephant territories .Periodic attaches from elephants	.Fragmentation of elephant habitats .Disruption of path ways of elephants .Injury and killing of villagers .Creation of fear in the pop. .reduced working hours.
Hunting	.Use of automatic guns .Building of hunting hurts .Dropping of shells of used cartridges	.Killing elephants .	.Decline in Elephant population from migration. .Creation of fear in the elephant pop. .
Trapping	.Digging of Pits		
Local timber exploitation	.Steaming of engine saws .Cutting down of trees	.Noise .Cutting down trees block elephant path .Creation of forest gaps	.Creats fear in the elephants. .Fragmentation of habitats Forest fruits devastation
Non-Timber Forest Product (NTFPs) exploitation	.Debarking and felling of trees .Forest fruits gathering	.Competition for food between elephants and the population	.Killing of humans . Injury of humans .Shortage of elephant food.
Road construction	.Creation of steep gradients .Digging of trenches	.Isolation of elephant populations .Diversion of elephant path	.Decline in Elephant population from migration
settlement	Building of houses	.Conversion of elephant habitats .Invasion of elephant territories by the population	.Decline in Elephant population .Migration of elephants

As shown in table 2, Periodic evaluations of crop damage by elephants in the study area by

the staff of the Ministries of Agriculture and Forestry revealed that food crops (cassava, cocoyam, banana, plantain, etc), palms and cocoa farms were amongst the most frequently destroyed farm holdings by elephants.

Table 2. Crops commonly destroyed by elephants in the TM-L

Scientific name	Family	Common name
Musa sapientum	Musaceae	Banana
Musa paradisiacal	Musaceae	Plantain
Colocassia sp	Araceae	Cocoyam
Manihot esculenta	Euphorbiaceae	Cassava
Dioscrea sp	Dioscoreacea	Yam
Theobroma cacao	Steculaceae	Cocoa
Elaeis guineensis	Arecaceae	Palm tree
Solanium scabium	Solanaceae	Huckleberry
Gnetum africana	Gnetaceae	Eru
Irvingia gabonensis	Irvingiaceae	Bush mango

As summarized in table 3, a total of 8 and 10 villagers were reported killed and injured respectively in the TM-L over the past 15years.

Table 3. Villages and villagers killed/injured in the TM-L

Villages	Protected area	Number of people killed by elephants	Number of people injured by elephants	Villages in which elephants have been killed/injured during conflicts	Period of occurrence
Takpe	TNP	2	-	√	1991-1995
Nyang	MFR	1	-	√	1985-1990
Obonyi 1	TNP	1	3	√	1990-1996
Obonyi 3	TNP	1	2	√	1991-1995
Mbu	MFR	1	-	√	1979-1980
Kekpane	TNP	1	3	√	1991-1995
Between Obonyi 1 and 3	TNP	1	1	-	1985-1990
Matene	TNP	-	1	√	1979-1980
Total		1 8	10		

3.2 Locations of Activities/human-elephant Conflicts Areas in Takamanda-Mone Landscape

Figure 2 brings to focus a picture of the locations of the various human activities/human-elephant conflict area visualised and enumerated in the TM-L during the

study exercise. These enumerated human activities ranged from the setting up of traps, plantation agriculture, poaching to the establishment of hunters bush shades.
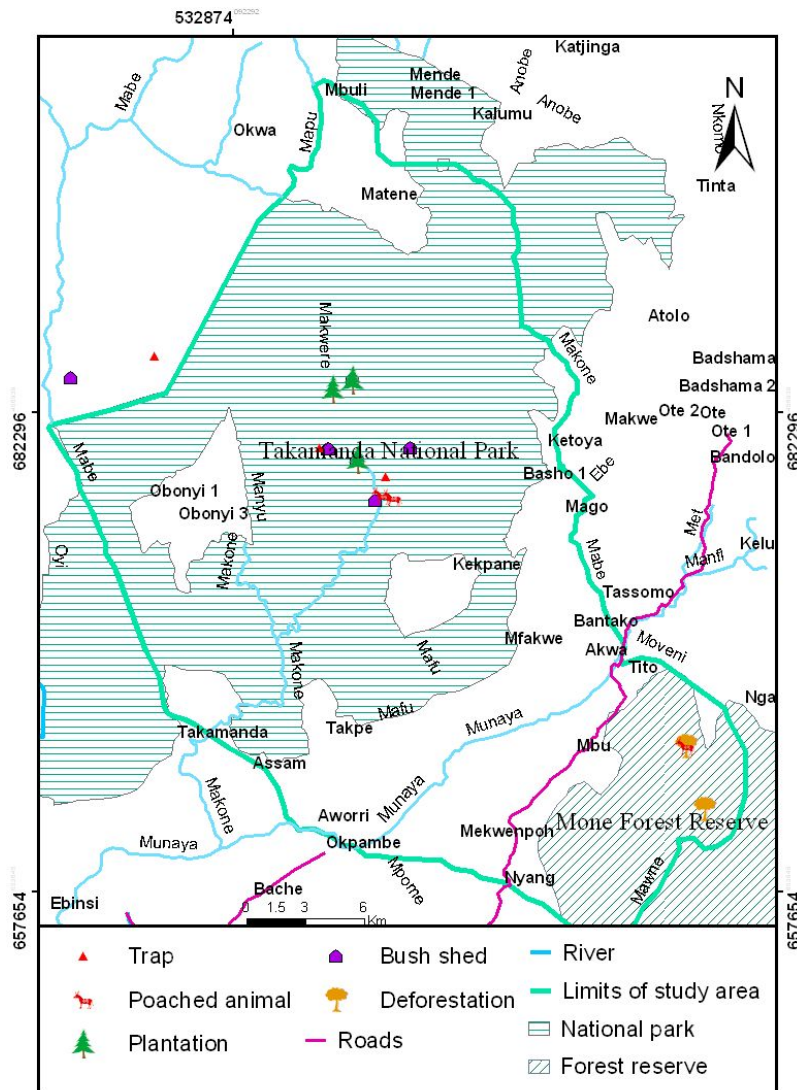

Figure 2. Location of human activities within the Takamanda-Mone Landscape

3.4 Locations of SUsceptible AReas to Human-elephant COnflicts in Takamanda-Mone Landscape

Based on the identified and enumerated human activities and an anticipated human-elephant conflict there off in the TM-L, a human-elephant susceptibility conflict zonation map was developed as shown in figure 3
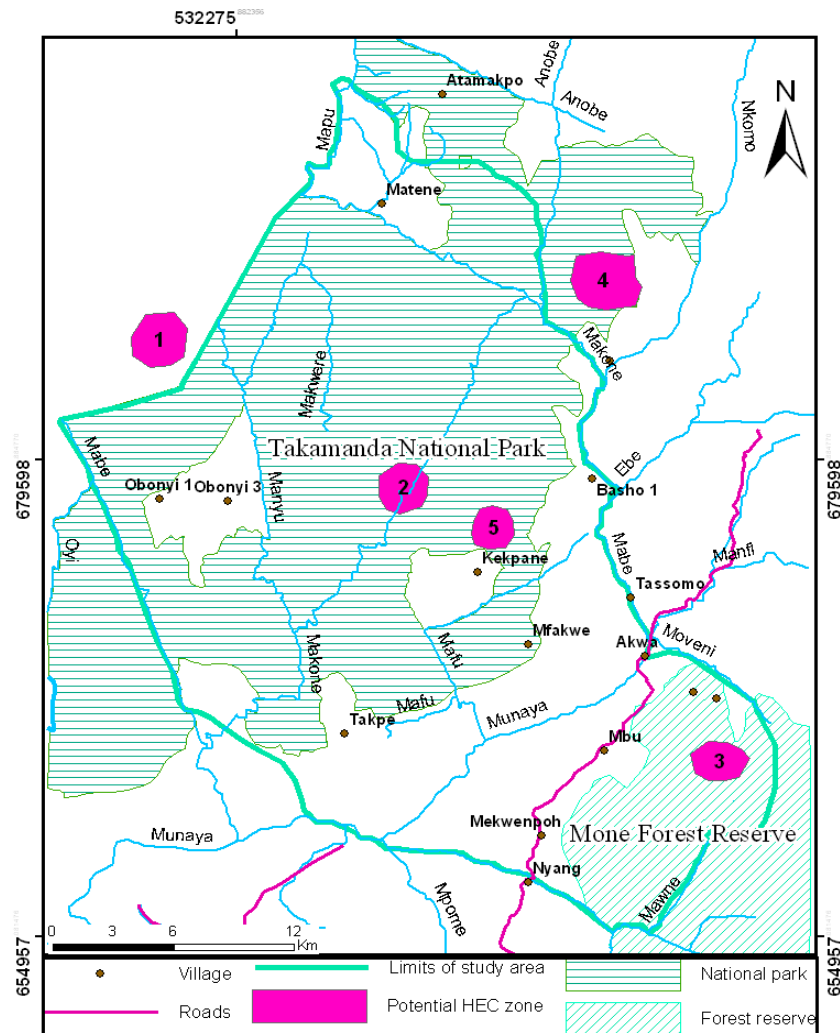
Figure 3. Map showing the areas susceptible to human-elephant conflicts(HEC) in Takamanda-Mone Landscape

4. Discussion

4.1 Types and Nature of Human Activities

Human activities carried out in the study area ranges from farming to settlement. Activities such as farming that bring along deforestation, has reduced closed primary forest which were potential elephant habitats to farm lands. Farming and Poaching has contributed tremendously in the migration of these animals form the TM-L to the neighboring well protected Cross River National Park (Okwango Division) in Nigeria.

The construction of the Mamfe to Akwaya road in the 1980s, separating MFR and TNP has also probably contributed in the fragmentation of Takamanda National Park (TNP) and Mone Forest Reserve (MFR) which was before then used by the elephants as a continuous habitat. This explains the reason why during field work, very few elephant signs were found in the MFR, indicative of a small population of elephants. The isolated populations in the fragmented habitats might face the risk of genetic weakness as a result of inbreeding. This

could be similar to what was realized by Cunningham and Cunningham (2005), Tewksburry (2005).

4.2 Human-elephant Conflicts in Takamanda-Mone Landscape

As in many other areas within the range state of the African elephant, elephants in the T-ML were found to feed on a variety of plants species including crops planted by the local people. These animals in search of what to eat and in view of the fact that agricultural crops now dominate the plant species in their range state were found to invade farmlands. In most cases, banana (Musa sapentum) and plantain (Musa paradisiaca) farms as well as cassava (Manihot esculenta) and cocoyam (Colocassia sp)farms were the most frequently invaded farms. This is in conformity with what Epiemelle and Ekobo (2003) who found out in the Mount Cameroon area that plantains and bananas crops were the most heavily eaten crops during crops raiding and farm invasions by elephants.

Crop raiding by elephants from a scientific stand point is a normal invasion of farms in search of food either as a result of farm locations within the animals range state or as a result of increase in animal population with a corresponding shortage of food supply from the wild. This scientific stand point on the part of the local population is baseless as they believe that the old (the elderly villagers) from time to time do transform into elephants and move into their enemies farms to cause farm devastation and crop destruction. This is in conformity with what Powell (1998) found out in the Korup National Park and Banyang-Mbo Sanctuary respectively where village witches and wizards are known to transform into elephants to cause crop depredation on their enemies farms.

In some of the human-elephant encounters or conflicts, people are known to have been killed (8) and injured (10) in the T-ML in the past 15 years respectively. Although this is lower than in other areas, it is similar to the records of (Barnes et al.2005), Epiemelle and Ekobo (2003) in the Mount Cameroon area of South West Cameroon. The disparity in the number of people killed or injured in an event of human-elephant conflicts in different areas around the globe, can possibly be attributed to the elephant density and proximity of humans to elephant habitats and range states. This is similar to the findings of Stephenson (2004) who demonstrated that at any moment elephants populations increases above the carrying capacity of their range state, human-elephant encounters and conflicts are eminent.

In a strive to reduce human-elephant encounters in the TM-L, intimidative shooting is practiced to reduce the number and frequency of elephants farm visits and subsequent crop depredation by elephants. This is because it is believed that the sounds from the guns (den guns or automatic rifles) are known to keep elephants away from human settlements and farm lands. This trend is however different from what is practiced in Southern and Eastern Africa where fences and 'Chilli' (pepper) are used respectively to prevent human-elephant conflicts as realized by Parker, (2007) and Taylor, (1982).

In the TM-L government is known to have once carried out administrative hunting to reduce the population of elephants as a result of high incidences of reported human-elephant conflicts. This practice is regularly carried out in Africa. In Tanzania the Wildlife Division

carried out animal Control in Western Serengeti and Kilimanjaro protected areas to prevent the continuous killing of people and the destruction of their crops (Parker et al. 2007).

5. Conclusion and Recommendations

5.1 Conclusion

The types and nature of human activities carried out and their associated conflicts have resulted in the fragmentation of elephant habitats and the resultant migration of large elephant populations out of the TM-L.

5.2 Recommendations

•The TM-L which is made up of the TNP and its adjoining forest, MFR and its adjoining forest, should be upgraded into a national park with a specific focus on the reduction of human actives within the vicinity of the park.

•The management of the TM-L should collaborate very closely with the management of the Cross River National Park in neighboring Nigeria for an effective management of the elephant population in the two protected areas.

Acknowledgements

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