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This thesis is submitted for the award of the Doctor of Philosophy Degree (PhD) in Environmental Resource Management

Status of Wildlife and its Utilisation in Faro and Benoué National Parks North Cameroon: Case study of the Derby Eland (*Taurotragus derbianus gigas* Gray, 1947) and the African Wild Dog (*Lycaon pictus* Temminck, 1840)

Ist-bestand der Wild tiere deren N**u**tzung *in den Nationalparks* Faro und Benoué (Nord Kamerun): Fallstudie Riesenelen (*Taurotragus derbianus gigas Gray, 1947*) und Afrikanischem Wildhund (*Lycaon pictus Temminck, 1840*)

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CERTIFICATION

This thesis entitled "Status of Wildlife and its Utilisation in Faro and Benoué National Parks North Cameroon: Case study of the Derby Eland (*Taurotragus derbianus gigas* Gray, 1947) and the African Wild Dog (*Lycaon pictus* Temminck, 1840)" by Tsi Evaristus Angwafo (BSc. ABU MSc. Ibadan, Nigeria) meets the regulations governing the award of a Doctor of Philosophy degree (PhD) in Environmental Resource Management of the Brandenburg University of Technology Cottbus - Germany, and was approved for its contributions to scientific knowledge and literary presentation.

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DECLARATION

I hereby solemnly declare that this thesis is written independently without any unauthorized help. I have used and cited only the materials and sources indicated in the reference list and have quoted all words, phrases or passages taken from these sources. The thesis is wholly the author's and has not been part of any presentation for any other qualification in its present form or similar version.

Cottbus, July 2006

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DEDICATION

This thesis is dedicated to my parents His Majesty Fon S.A.N. Angwafo III and Mrs. Theresia Awah- Ngang Angwafo for the spirit of hard work instilled in me.

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ABSTRACT

Primary and secondary data were collected during the period of January – May 2005 and questionnaires were issued between August – December 2004 to know the Status of Wildlife and its Utilisation in Faro and Benoué National Parks North Cameroon: Case study of the Derby Eland (*Taurotragus derbianus gigas* Gray, 1947) and the African Wild Dog (*Lycaon pictus* Temminck, 1840). The line transect method was used to assess wildlife population. Geographical Information System (GIS) maps of Faro and Benoué National Parks were drawn to show their distribution. Eleven different wildlife species were studied in Faro and Benoué National park. The density of *Kobus kob* in Faro was 0.39 animals/km² and 0.28 animals/km² in Benoué and that for *Acelaphus buselaphus* was 0.4 animals/km² in Benoué National park. The encounter rate was calculated for all other species and it was weak in Faro ranging from 0.009 – 0.01 while in Benoué it was higher ranging from 0.03 – 0.87. The highest encounter rate was from Benoué National Park for *Loxodonta africanna*. The total biomass for wildlife was 13,224.4 kg/km² with the higest percentage contribution of which 60.49% coming from *Taurotragus derbianus gigas* in Faro National Park.The total biomass in Benoué National Park was 37, 1839 kg/km² with the biomass for *Taurotragus derbianus gigas* as 20 kg/km² and percentage contribution of 9.68%. The higest percentage contribution to the total biomass in Benoué National Park was 85.52% coming from *Loxodonta Africana*. No observations or trace of the *Lycaon pictus* was seen in the two parks (Faro and Benoué) within the study period. Removal and replacement rates of *Taurotragus derbianus gigas* showed a polynomial shaped curve with periods of population increase and decrease with regards to yearly behaviour while the previewed *Lycaon pictus* for hunting showed a polynomial shaped curve while its actual removal dwindled on a straight line. Removal and replacement is not influenced by sport hunting activities alone but prey availability, absence and presence of predators, disease, car accidents and other human influences. However, the critical value for the exploitation (sport hunting) of wildlife over a period of 20 years in Faro and Benoué National Parks was necessary to be determined though it was a difficult attempt. Income generated from park activities had doubled from 42.8 million F CFA to 92.5 million F CFA in 2001. Categories of hunters coming to the parks for hunting activities were 90% non-residents, 6% residents and 4% nationals hunting by permit. The estimated annual revenue from wildlife was 91,185.00 Euros and 773,685.00 Euros in Faro and Benoué National Parks respectively. *Taurotragus derbianus gigas* had the highest value of 19,400 Euros in Faro National Park and 87,000 Euros in Benoué National Park. Both parks contribute 0.58% of the

total revenue generated by wildlife in Faro and Benoué. There was a high level of awareness about conservation of the *Taurotragus derbianus gigas* and the *Lycaon pictus*. Also was a general willingness to pay for the conservation of resources though it was an issue of a social dilemma of choosing between self interest and collective gains. However, the population was willing to pay 500 F CFA to generate a conservation fund to sustain identified conservation projects. Assessing the management policy of the government, 40% of the population wish to be compensated for giving away their resource while 28% opt for exchange, 9% expropriation, 16% continuation and 1% had indicated no option (neutral).

ZUSAMMENFASSUNG

Primäre und sekundäre Daten wurden von Januar 2005 bis Mai 2005 erhoben. Die Fragebögen zur Klärung des Wildbestandes und dessen Nutzung in den Faro und Benoué Nationalparks (Nord Kamerun) von Riesenelen (*Taurotragus derbianus gigas Gray, 1947*) und Afrikanischem Wildhund (*Lycaon pictus Temminck, 1840*) wurden im August 2004 und Dezember 2004 verteilt. Um das Ausmass der Nutzung feststellen zu können, wurde die Linien transekt-Methode angewendet. Zur Feststellung der Verteilung von *Taurotragus derbianus gigas* und anderem Großwild wurden GIS-Karten der Nationalparks Faro und Benoué erstellt. Elf Tierarten wurden in Faro und Benoué beobachtet. Die Individuendichte von *Kobus kob* betrug in Faro 0,39 Tiere/km² und 0,28 Tiere/km² in Benoué. Ausserdem wurden 0,4 Tiere/km² von *Acelaphus buselaphus* festgestellt. Die Biomasse für das Wildleben betrug in Faro 13,224.4 kg/km² und die Gesamtbiomasse für *Taurotragus derbianus gigas* betrug 9.69 kg/km² was somiteinen Anteil von 60,49% an der Gesamtbiomasse darstellt. Im Benoué Nationalpark betrug die Gesamtbiomasse für Wildleben 371,839 kg/km² und die Biomasse von *Taurotragus derbianus gigas* 20 kg/km². Diese Tierart hat somiteinen Anteil von 8.9%. Die Antreff-Warscheinlichkeit wurde für alle Arten errechnet. Sie ist in Faro gering und erstreckt sich von 0,009 bis 0,01 Tiere/km², wuhend in Benoué die Spanne mit 0,03 – 0,87 Tiere/km² höher ausfällt. Der Anteildaran von *Loxodonta africana* betrug 85,52%. Innerhalb des Untersuchungszeitraumes konnten keine Direkt-Beobachtungen oder Spuren nachweise von *Lycaon pictus* in den beiden Parks gemacht werden. Zu- und Abnahmeraten von *Taurotragus derbianus gigas* zeigten einen vielgestaltigen Kurvenverlauf mit Perioden von Zu- wie auch Abnahmen bezüglich des jährlichen Verhaltens, während der ebenfalls vielgestaltige Kurvenverlauf von *Lycaon pictus* gegenwärtig eine starke Abnahme zeigt. Die Zu- und Abnahme ist nicht nur durch (Sport-) Jagdaktivitäten beeinflusst, sondern auch durch die Verfügbarkeit von Beutetieren, die An- und Abwesenheit von Räubern, das Auftreten von Krankheiten, Unfällen mit Autos und weiteren menschliche Einflüssen. Es ist besonders wichtig, den Grenzwert in 20 Jahren Sportjagdnutzung von Wild in den Nationalparks Faro und Benoué zu ermitteln. Dieser ist jedoch schwierig festzustellen. Die Einnahmen durch Aktivitäten in den Parks haben sich von 42,8 Millionen F CFA auf 92,5 Millionen F CFA im Jahr 2001 mehr als verdoppelt. 90% der Jäger mit einer Jagderlaubnis, die in die Parks kamen, waren nicht einheimisch, 6% waren Anwohner und 4% Kameruner. *Taurotragus derbianus gigas* hat einen geschätzten Wert von 19400 Euros im Faro Nationalpark und von 87000 Euros im Benoué Nationalpark. Beide Parks tragen damit 0,58 % der durch Wild erzeugten

Gesamteinnahmen bei. Es bestand ein hohes Maß an Bewusstsein für den Schutz von *Taurotragus derbianus gigas* und *Lycaon pictus*. Ebenso bestand eine grundsätzliche Bereitschaft für den Schutz zu bezahlen, obwohl sich eine Art soziales Dilemma zwischen den Eigeninteressen und dem Allgemeinwohl zeigte. Jedoch war die Bevölkerung immerhin bereit, 500 F CFA für einen Erhaltungsfond zu zahlen, um bestimmte Schutzprojekte zu unterstützen. Bei der Beurteilung der Managementpolitik der Regierung äußerten 40% der Bevölkerung den Wunsch, für den Verzicht auf ihre Ressourcen entschädigt zu werden. Während 28% für einen Flächentausch bzw. 9% für eine Enteignung votierten, wollten 16% eine Fortführung der jetzigen Politik. 1% machte keine Angaben.

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AFLEG	African Forest Law Enforcement and Governance
BCTF	Bush meat Crisis Task Force
BEG	Biodiversity Expert Group
BIO_MP	Biodiversity Implementation indicator Programme
BRAG	United Kingdom Biodiversity Research Advisory Group
BRIG	United Kingdom Biodiversity Reporting and Information Group
CBD	Convention on Biological Diversity
CITES	International convention on threatened and Endangered Species
COE	European Council
COP	Conference of Parties
DEFRA	United Kingdom Biodiversity Partnership department for Environment, Food and Rural Affairs
EBMI-F	European Biodiversity Monitoring and Indicator Frame work
EBRI	European Biodiversity Resource Initiative
EFE	Environment for Europe
ESA	Endangered Species Act
FAO	Food and Agricultural Organization
FoE-J	Friends of the Earth- Japan
GIS	Geographical Information System
GPS	Geological Positioning Systems
IFAD	International Fund for Agricultural Development
IEA	Environmental Impact Assessment
ITTO	International Tropical Timber Organization
IRAD	Research Institute for Agricultural Development
IUCN	International Union for the Conservation of Nature
MINAGI	Ministry of Agriculture Cameroon
MINEF	Ministry of Environment and Forest Cameroon
MINEPIA	Ministry of Livestock and Animal Husbandry
MINETOUR	Ministry of Tourism Cameroon
MINMEE	Ministry of Mines, Water and Energy Cameroon
NGOs	Non- Governmental Organizations
OECD	Organization for Economic Co-operation and Development

PEBLDS	Pan- European Biological and Landscape Diversity Strategy
PECR	Pacific Environment and Resource Center
PEEN	Pan – European Ecological Network
PNVRA	National service for Vulgarization and Agricultural Research
QOLC	Quality of Life Count
SDNP	Sustainable Development Network Programme
UDEAC	Union Douaniere de Etats de Afrique Centrale
UK	United Kingdom
UKBAP	United Kingdoms Biodiversity Action Plan
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Education Program
UNESCO	United Nations Education Scientific and Cultural Organization
WCMC	World Conservation Monitoring Center
WWF	World Wide Fund for Nature
ZIC	Zones d' interet cynegetique

CHAPTER ONE

1.0 INTRODUCTION

Relatively pristine habitats around the world are being lost at unprecedented rates as an expanding human population converts them to agriculture, forestry and urban centers (Sisk et al. 1994). For example magnificent forests once stretched across Africa from Central to West Africa. Most of these forests are now destroyed and the future for the creatures and people, which depend on them, is uncertain. Around 85 percent of this ancient forest has been lost, and industrial logging threatens most of what remains. Several more million hectares of logging concessions have been allocated to industrial logging in the last decade. Illegal and destructive logging practices are still the norm in the region, rather than the exemption. African governments gathered in October 2003 in Cameroon at the first African Conference on Law Enforcement and Governance (AFLEG) and formally expressed their political will to curb these threats. Unfortunately, this is no more yet than a non-binding statement (AFLEG, 2003).

Also, Knight et al. (1999) reported that in recent years human population size and human activities have risen in importance on the list of underlying causes that determine the severity of environmental disasters such as climate change, land-use changes (deforestation, land degradation, soil loss and loss of biodiversity), overpopulation and inequity, human population growth, competition for water, river engineering, unfavourable ocean conditions, hatchery and farm fish, commercial exploitation, and loss of ecosystem services. They studied the Salmon (*Oncorhynchus gorbuscha*) decline based on 230 articles reported by journalists. River engineering was connected most consistently to Salmon decline (117 connections). Land use, which includes urbanization and development, was the second most frequently listed factor, although journalists largely failed to identify the underlying issue of population growth (cited only 9 times).There were no connections to human caused patterns of global warming affecting Salmon populations. Press releases from summit highlight on Russian Enviro Issues from Pacific Environment and Resources Center (PERC) and Friends of the Earth-Japan (FoE-J) June 1997 says Russia's "Frontier Forests" is endangered by multinational corporations and illegal trade. Can Russia practice sustainable forestry that protects the ecosystem while supporting local communities?

As habitats are altered, untold numbers of species are disappearing before they have been recognized, or even studied (Wilson, 1989). This loss of biodiversity, at the very time when the

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value of biotic resources is becoming widely recognized (Wiegleb, 2005), has made it strikingly clear that current strategies for conservation are failing dismally.

The CBD, (1992) has not only focused international attention on the concept of biological diversity but has also set expectations that the signatory states will establish objectives and mechanisms for local implementation (Angelstam et al. 2003). According to these international agreements, Central African states have adopted legislation and national policies to conserve biodiversity as well as facilitating the peace processes and ultimate reunification (Ibrahima, 2003). They have legally established large forest areas under protection. Certain zones have remarkable plant and animal diversity and are generally protected (for example, the National Parks of Dja in Cameroon and Dzanga-Ndoki in the Central African Republic) UNESCO, (2001). There are a number of protected area projects managed by regional and national offices. There is considerable legislation relating to protected areas at national levels but a large percentage of it is out of date and, in many cases, sufficient resources and mechanisms to ensure effective implementation are lacking (FAO, 2000; Fotso, 1996). In 1997, the World Conservation Monitoring Center estimated that there are about 83 legally protected areas covering about 5 percent of the total sub-region lands (FAO, 2000).

The Central African experience in trans-boundary protected areas in relation to the tri-state project between the Central African Republic, Congo and Cameroon highlights the importance of domestic stability as a precursor of conservation efforts. They try to combat illegal hunting and regulate the bush meat trade, strengthen law enforcement for the protection of key trans-border protected areas, linking corridors and their buffer zones, improve the management of key protected areas, prepare the nomination of new trans-border World Heritage sites in the Congo Basin forest and identify possibilities for long term funding of the proposed World Heritage Sites. However, many forestry administrations in central Africa lack the resources needed to implement their functions effectively and administer large areas of forest at the national level (FAO, 2000).

The maintenance of biodiversity is currently an agreed value in Cameroon. Consequently, there is common vision that biological diversity should be maintained and quantitative political targets have been formulated for forests and wild animals. A recent International Tropical Timber Organization (ITTO) study (Poore & Thang, 2000) reported that Cameroon is one of only six ITTO tropical producer countries which appeared to have established all the conditions that make it likely that they can manage their forest management units sustainably. In Cameroon, the

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ultimate environmental goal of forest policy is even interpreted as the survival of viable populations of all naturally occurring species. Wildlife conservation in Cameroon has to address the issue of the loss of biodiversity, extinction of species and rapid decline in wildlife numbers (Sibanda, 1996). The average natural extinction before the industrial revolution is estimated at one species every four years (Drayton & Primack. 1996). Now it is around 30,000 species per year (Bauer, 2003). There is also a strong impetus to understand how protected areas must be managed in order to avoid extinctions.

Ecologists are often required to develop plans for managing endangered species where few data are available and population dynamics are poorly understood (Wallinga, 1995). They have been winning its spurs in the real world by joining with economists recently to estimate the value of the service that the world's ecosystems and natural capital provides (Millennium Ecosystem Assessment, 2005)**.** There is no doubt that for just about any ecological question more data are needed to definitively answer it. It is often not possible to wait until more data are collected because decisions must be made rapidly. These are the situations where general guidance from conservation theory is invaluable. However, we can not claim a general habitat quality, and patch arrangement on population dynamics of rare or endangered species. The progress is slow because field experiments take years or even decades. Knowledge of laboratory experiments by empirical ecologists serves us equally well during development of the still immature field of spatial conservation biology (Bancroft & Turchin, 2003). A major concern is that loss of plants and animal resources that could impair future development of important products and processes in agriculture, medicine and industry. Maintaining biodiversity therefore requires a wise combination of protected areas, management and restoration to create and maintain representative and functionally connected networks of all habitat.

Looking at whole ecosystems, wildlife management decisions become more complex and conflicts and disputes become inevitable ingredients. We have to understand their complexity. Continuing conflicts in protected areas establishment and management include cross border disputes, transition in governance systems and ethnic strife. The solution is often found in the interrelated fields of biological/physical and political/social sciences as well as the local community. Holding similar worldviews may not always be achievable or necessary because of divergent opinions. Divergent opinions and values will remain and often appear to compete with one another. However, conflict resolution through participatory management may serve as a framework for finding solutions to many other wildlife management issues (Sandstein et al.

2003). Participatory management is a basic technique of managing conflicts of interest. At the local village level you merge traditional management information and acquired skills to bring potentials closer to rural communities and bridge the gap existing between external support and wildlife-dependent communities (mutually deciding with the public and stakeholders). This however is to build credibility with those whose will be affected, those who will pay and those who will use the project. Man has recognized that a credibility gap has existed between the policy makers and significant segments of the public UNESCO/IHP/WWAP.

Wildlife especially the large mammals contribute a substancial biomass of bushmeat sold in the markets, restoraunts and consumed by households especially those in the visiniy of protected areas in Cameroon. Hunting and poaching for such consumption, bushmeat trade and tourism are therefore threatening wildlife populations. However, species vary in their ability to withstand hunting. In Camerron, before 1997, the government authorized the hunting of wildlife even the African Wild Dog most of which are at risk of extinction due to uncontrolled hunting exercise. People therefore play an important role in the management of wildlife because the landscape is human-dominated. Recognizing this legitimate right and needs will be an important step towards long-term conservation of wildlife. Identifying important wildlife assets and definding the sustainable limits of their exploitation will be a major challenge for protected area managers. Proteceted areas generally have been created following only biological/ecological criteria. Proper management however requires the understanding of the entire management of social, political, cultural, economic and legal variables that are likely to impact the project over the long term. These disturbances and changes are sometimes natural and necessary characteristics of ecosystems stability. But a misinterpretation of the meaning of stability often lead many managers to try to prevent change by keeping the area under their control constantly in terms of animal population and attempting to make the area as spatially homogeneous as possible. Stability should require the management to develop, monitor and assess the distribution and abundance of animal species to determine long term population stability by sufficient incorporation of the diversity of land use practices, habitat present, effectiveness of ongoing and future management plans, status of critical habitat and changes in animal stock assessment. Any prodigious efforts to prevent change so often leads to local loss of species and unpleasant surprises in the dynamics of the ecosystem we try to conserve. Wildlife in Cameroon is threatened by the Cameroonians themselves having become dispossessed on-lookers, trespassers and poachers of their own resources (Musokotwane, 1993). Protecting target and cuddly species of wildlife like the Derby Eland and African Wild Dog excite the public's imagination, but they

are relatively in a low size meaning that their minimal numbers require a persistent inhabitation of large areas and many other less charismatic species are protected under their umbrella (Simberloff, 1999). Further more, large species are often top predators and thus play crucial, so called keystone roles in the community's dynamics. Stanfort biologists, Ehrlich & Ehrlich (1991) and Wiegleb (2005) identify two reasons for saving species: It is wrong to exterminate a species no matter what and it is wrong because extinguishing species may, in the long run, harm humankind. Laws exist to protect species, but black markets also abound. There are those who argue the ethical and even aesthetic defense of animals. Animals have charisma and amenity value. Animals are both like and unlike humans and offer companionship and relief against solitude. Life on earth is interconnected, and everything affects every thing else Ehrlich & Ehrlich (1991).

Habitat fragmentation reduces the size and increases the isolation of habitats and populations (Lienert & Fischer, 2003). Stochasticity may affect small, isolated populations more strongly than larger ones. Environmental stochasticity can drive small populations to extinction, while genetic stochasticity randomly reduces heterozygosity and increases the accumulation of deleterious mutations. Demographic stochasticity (random deviations) in survival and reproduction of individuals from expected population means may change sex ratios or proportions of style morphs in populations. Inbreeding, which can be pronounced in small, isolated populations, again reduces genetic variability and increases the accumulation of deleterious mutations. Furthermore, inbreeding depression can lower individual fitness and population viability. Most species are geographically restricted and numerically rare when they occur. Further more, patchy distributions are common. Some threatened species apparently exist in only a few widely separate localities. Although this apparent patchiness may be a consequence of general rarity and low detectability, but present evidence implies both local rarity and restricted range.

Animal species especially the African Wild Dog species found in Cameroon today are the East African and Australian species (Sillero-Zubiri et al, 1997). It confirms analysis by Beggett, (1998) that the West African species is lost in Cameroon. This scarcity or absence in other parts of Africa where they were originally found might be attributed to anthropization (persistent poverty and alienation of rural communities, rinderpest pandemics, urbanization, conflicts, agriculture and inter-specific competition, Creel & Creel, 1995). Man's exploitation of wildlife and its habitat leads to habitat fragmentation and diversity modification. Rare animals like Derby

Eland and African Wild Dog (Tchamba, 1996) easily portray conservation awareness and serve as tourist attraction. The African Wild Dog is the most threatened animal in the continent (Morell, 1995). The local abundance of a species is expressed quantitatively as numbers per unit or numbers per unit volume. This population density is more useful than population size for many purposes because it provides a better indication to local abundance relative to the availability of resources. Population size however, provides information important in predicting fluctuations and extinction of endangered species where populations are small in absolute terms because such species are often not widespread. Small populations are more vulnerable to random or stochastic events, imbreeding depression and local habitat disturbance. Without any much doubts, 5000 dogs are still found in the wild state (Mills, 1996) of which 3000 are found in the protected areas (Fanshawe et al, 1991).

The Derby Eland is the biggest antelope in the world and a species threatened to extinction though it is partially protected in Cameroon.

1.1 PROBLEM STATEMENT

More than 1.2 billion people (including more than 40 percent of the population in sub-Saharan Africa and South Asia (World Bank 2001), and about one fifth of the population worldwide live on less than $1 per day. Another 1.6 billion live on less than $2 (World Bank 2001). Better environmental management holds special promise for the poor (the people most vulnerable to environmental degradation, and the people whose opinions and ideas are most often muted in environmental decisions). Poverty means more than a lack of income. Poverty is also defined by increase vulnerability in a number of dimensions: Vulnerable to environmental degradation or loss of access to natural resources, to employment scarcity, to property loss, to disease and ill health (IFAD 2001, World Bank 2001). Decisions about wildlife management reach into all of these areas and thus environmental management failures often fall hardest on low-income families. The Derby Eland in north Cameroon still has promising prospects of survival despite pressure on it by safari hunters, poachers and predators, There exist a non alarming population of between 1000 to 3500 individuals but the total area of distribution of the species has drastically reduced over the years from human pressure and habitat fragmentation. The African Wild Dog has declined dramatically during the last century and has experienced a significant reduction in its range throughout Sub-Saharan Africa (Brauer, 2003). Little is known about remnants of the endangered African Wild Dog in Central Africa. The information on the Africa Wild Dog population in northern Cameroon comes from a few quantitative surveys. The population in Cameroon is a priority worldwide for African Wild Dog conservation. Human and ecological

factors limit African Wild Dogs population in northern Cameroon. Studies done in 32 countries show that the African Wild Dog is lost in 19 countries, rare in 7 and found in a reduced number in 6 (Mills, 1996). The world conservation strategy (IUCN) therefore classifies this animal as endangered species (Sillero-Zubiri et al, 1997). MINEF (Ministry of Environment and Forestry) upgraded the legal protection of African Wild Dogs in 1998 from partial protection to total ban on hunting. African Wild Dogs have been a trophy species before valorization to category A in 1999. But villagers still are generally hostile towards African Wild Dogs and traditional authorities decide whether or not to kill African Wild Dogs, even without permission. The Lamido (king) of Wangai was reported to have given permission to kill one adult dog which had killed a goat (Brauer, 2003). The presence of infectious diseases like rabies and canine distemper virus in free-ranging domestic dogs around villages and of traditional herdsmen, are possible threats to hunting dogs in northern Cameroon. Kuwong (2000) showed that domestic dogs around Faro National Park are sero-positive for rabies (8%), canine distemper virus (22%) and have many parasites. Despite the pressure on the African Wild Dog in the study area, there is little quantitative data available for African Wild Dog. Other carnivores (Leopard, Lion) have similar environmental characteristics with same food requirements and habits. Their co-existence affects the carrying capacity of animals like the Derby Eland captured for food. Gause´s principle of competitive exclusion supports that if two species are both competing for the same resource only one species will normally survive (Lecture 21, 1999). The African Wild Dog being a `weaker` carnivore compared to hyenas, lions and leopards available in the study site, the reduction in number of prey might motivate long distance movement in search of food. This act can as well lead to human wildlife conflict by their utilization of domestic animals as prey substitute. “Resources and predators coexistence often require prey to manage the conflicting pressure of resource acquisition and predator avoidance. When two demands cannot be satisfied simultaneously, optimality theory predicts that evolved responses should be an optimal balance of the response to the other. Whether prey, in general balance resource acquisition and predator avoidance remains controversial, however understanding trade-offs between conflicting selection pressure is critical because there is a closer simulation natural conditions where multiple cues are present, could influence population and community dynamics” (Rohr et al. 2003).

1.2 AIMS AND OBJECTIVES

This study is concentrated on large mammals because these animals and their signs are most readily available, people locally and internationally are especially interested in large, charismatic mammal species. This is probably because they tend to be the most heavily hunted animals and

therefore of special conservation concern. As well as, they tend to be a good index of the overall integrity and conservation status of a region. Besides the fact that methods have been developed and widely tested on the field to assess large/medium mammal abundance and distribution, conflicts may easily develop between large mammals and people living in and around the protected areas. Though the research is generally on wildlife status as a whole, emphasis will be concentrated on two focal species (Derby Eland *Taurotragus derbianus gigas* and African Wild Dog *Lycaon pictus*. It provides an insight into the condition for sustainable hunting of wildlife especially the Derby Eland, distinguishing between ecological sustainability, economic feasibility, socio-political acceptability and the population dynamics of the wildlife of Faro and Benoué National Parks. It will ensure that the protected areas are established primarily to maintain biological diversity or controlled resource exploitation while retaining limited but significant commitment to maintaining biological diversity. Threats including poaching, sport hunting and settlement make it difficult or impossible to achieve the conservation objectives. The dominant forms of land use in this large ecological region are:

- Raising cattle both on the Adamawa plateau and through different forms of transhumance throughout the region.
- Conservation and wildlife utilization, in Faro and Benoué National Parks.
- Subsistence farming which is mainly cotton and maize farming.

It is therefore imperative to know the socio-economic political and demographic influences on these species leading to a better management decision(s) reflecting on attempts at compromising conservation and use.

In the present study the following questions will be answered:

- What is the appropriate population density estimate of the wildlife species in the National Parks studied?
- What is the approximate off-take rate of the Derby Eland and African Wild Dog in these National Parks?
- Can we do transplantation of troublesome species to save the reserve?
- Can we attempt to halt the illicit elimination of some wildlife species?
- Can we make efforts towards ex-situ conservation (captive breeding and transplantation)?
- What is the economic feasibility of conservating wildlife species?

Therefore, the study will seek to identify habitat preference, estimate the population dynamics, examine the removal rate of the Derby Eland, investigate economic development based on sustainable utilization of wildlife species by biodiversity valuation, identify the conservation problems and propose conservation methods to the threatened wildlife species.

1.3 DELIMITATIONS OF THE STUDY

1.3.1 WILDLIFE

There is no precise and universal agreed upon definition of the word wildlife. The term in this context implies all animals that are living outside the direct control of man and therefore include all non-domesticated animals. Therefore, the the term is used in the traditional sense refering to large mammals or those big game assumed to be beneficial to man interms of their meat. For example, Elephant, Buffalo Deer, Duikers and antelopes just to name a few. Focus will be only on large and midium size wildlife making constant preference on two species (the Derby Eland and the African Wild Dog) for the reasons already advanced.

1.3.2 UTILISATION

Wildlife Utilisation in this context is refered to commercialisation of wildlife for example sport hunting and tourism. This practice however, should be in a sustainable manner which is the judicious consumptive and non-consumptive use and preservation of wildlife in a condition to ensure its availability to future generations. The utilisation of wildlife is as old as man's existence. It has found various uses in the past and present era of civilazation. Evidences have shown that man was able to maintain himself successfully (healthwise) for ages by hunting wildlife for food. Wildlife is used in three ways as edible products (food and medicine), as non-edible products (trophies) and as sport hunting (tourism).

1.4 LIMITATIONS OF THE STUDY

The short comings of the study are basically the non- availability of sufficient funds, difficulty accessing the field and consequent less field visits and lastly the limited number of species and poor observations. This low observations hinder the substantial application of analytical tools for example the DISTANCE Program requires atleast 30 and above observations.

CHAPTER TWO

2.0 THE GENERAL CAMEROON ENVIRONMENT

2.1 GEOGRAPHICAL LOCATION

Situated on the west coast of Africa, Cameroon is located between longitude 8° and 16° East of the Green Wich Meridian and latitude 2° and 13° North of the Equator (UNDP/SDNP 1996). She is bounded by the Gulf of Guinea, Nigeria, Chad, the Central African Republic, Congo, Gabon and Equatorial Guinea (Figure 1). On Cameroon's border with Nigeria, relations are tense, partly because of the continued impasse over the Bakassi peninsula where Cameroonian and Nigerian troops are engaged in a protracted and ongoing armed conflict. To the east, Cameroon is bordered by Chad, the Central African Republic and Congo. All these are francophone countries and all are members of the same customs and economic union (UDEAC) and share a common currency, the CFA francs. These countries have relatively low human populations and relations between them and Cameroon have been generally friendly over the past few years. However, civil disturbances in neighbouring countries over the last decade have been consequences in Cameroon with influxes of refugees. Also, as in all civil conflict firearms become readily available and are then used in poaching wildlife. The north-east sector of the Bouda Ndjida National Park in Cameroon has been for several years occupied by Chadian factions with significant negative effects on the wildlife of the park. The total land area of Cameroon is 475,440 km^2 with land 469,440 km^2 and water 6,000 km^2 and the coastal line equals 402 km. Cameroon is a nation of incredible diversity, both in its geography and its people. From the desert in the north, to the tropical rain forests of the south, to the savannahs, mountains, national parks, and game reserves throughout the country, the variation in Cameroon's landscape is remarkable. The country to the northwest is beautiful, volcanic peaks covered by bamboo forest rise to over 2000m, with waterfalls and villages scattered over the lower slopes. Cameroon is one of the most geographically diverse countries in Africa, comprising three major zones: the northern savannah, the southern and eastern rainforests, and the north-western hill region near Nigeria. Rich volcanic soils near the towns of Bafoussam and Bamenda in the west and North-West have permitted much higher rural population densities than elsewhere in the country. The West is coffee and cocoa country and home to nearly a quarter of the population. The hot, dry north is home to Lake Chad, the major game reserves, rocky escarpments and the broad Bénoué River.

Figure 1: Map of Cameroon showing National Parks

Source: Consulate of the Republic of Cameroon (2005)

2.2 HISTORY

Little is known about Cameroon before 1472 when the Portuguese arrived shouting 'Camarões, camarões!' in amazement at the many giant shrimp - hence the country's name. For the next 400 years, southern Cameroon's history, like that of the rest of West Africa's Atlantic seaboard, revolved around the slave trade. Northern Cameroon, by contrast, was a battleground for various empires, notably the Kanem-Bornu in Chad. When the Germans arrived in the late 19th century, 'feudal' northern Cameroon was under the control of the Fulani Empire in Sokoto (Nigeria). Despite an invitation from a Douala chief to set up a protectorate over the area in the 1850s, Great Britain dilled and dallied for decades and finally lost to the Germans in 1884, intent on forging their own African empire, who beat them to an agreement by five days. The Germans were active colonizers, building schools, railways and plantations. But German rule was harsh: at one plantation a fifth of the labourers died in a single year from overwork.

After World War 1, Cameroon received new overlords courtesy of the League of Nations, which gave the French a mandate over 80% of the territory, and the British control of two separate areas, one in the south-western highlands (Southern Cameroon's) and the other in the north (Northern Cameroon's, now part of Nigeria). As a result, a single nation was divided into three parts governed by two colonial powers - hardly a situation conducive to later unification. What was worse, the British neglected their territories and instead lavished attention on their administrative capital in Nigeria. Within a few years the Brits sold their Cameroon's holdings back to the Germans, who didn't last much longer - the outbreak of World War II saw them repatriated and stripped of their land by the Allies.

By contrast, the French improved the railway (with forced labour, forbidden by their mandate), developed cocoa and palm-oil plantations and exported timber, increasing the value of trade fivefold in its portion of the country between the world wars. After World War II, new political parties formed in French Cameroon, pressing for independence. A northern-based party, the Union Camerounaise, gained control of the national assembly, aggravating the resentment of southerners. Following independence in 1960, that ill will blossomed into a full-scale rebellion that took five battalions of French troops and a squadron of fighter planes eight months to put down. Thousands were ruthlessly killed and a state of emergency was declared that lasted two decades. The Union Camerounaise held onto power and its leader, Ahmadou Ahidjo, a northerner and ardent Muslim, became president.

In 1961, Northern Cameroon's voted to become part of Nigeria; the south opted for federation with French Cameroon, forming single Republic 11 years later. Ahidjo was re-elected as president unopposed in 1975, continuing an exceedingly brutal and autocratic reign, filling jails with tens of thousands of political prisoners and censoring the press. Ahidjo's positive contribution was to invest wisely in agriculture, education, health care and roads, while resisting the temptation to borrow heavily and build expensive show projects. As a result, school enrollment reached 70% and farms produced enough food to keep the country self-sufficient and export a wide range of commodities. At the height of his power and success, Ahidjo unexpectedly announced his resignation in 1982. His hand-picked successor was Prime Minister Paul Biya, a southerner and a Christian who immediately set about removing Ahidjo's northern cronies, known as the 'barons'. By 1984, the barons had had enough and staged a coup that was such a surprise it almost succeeded. But Biya quickly regained control and was re-elected unopposed in 1988.

In 2002, the International Court of Justice ruled in favour of Cameroon in its territorial disputes with Nigeria. These long-simmering disputes - particularly that over the Bakassi peninsula - are strategically important to both countries as they include oil-rich territories. Nigeria refuses to accept the decision, and while negotiations continue under the auspices of the United Nations (UN) the region is the scene of occasional flare-ups of violence.

2.3 CULTURE

Cameroon's split Anglo-French personality is further complicated by its bewildering array of African ethnic groups and languages. Of over 130 ethnic groups, however, there are 5 major ones: Bamiléké and Bamoun in the west, Fulani and Kirdi in the north, and Ewondo around Yaoundé. The Bamiléké are the most populous group in the western highlands and one of the largest communities in Douala, where they have taken control of much of Cameroon's economy. In their rural homeland, there are some 80-odd political units ruled by strongly independent *chefferies* (chiefs). Within each unit there are numerous secret societies responsible for the preservation of rituals. By contrast, the Bamoun are governed by a single leader called the *sultan*.

Whereas the south has been in contact with Europe for over 500 years, until the 20th century the north was part of quasi-feudal Muslim Fulani kingdoms centered in Nigeria, and tradition and resistance to outside influence remain strong. This isolation has kept Western-style development to a minimum. Most northerners, however, are neither Fulani nor Muslim but Kirdi, the Fulani word for pagan. The Kirdi are comprised of tribes driven by the Fulani into the inhospitable and isolated rocky areas near the Nigerian border.

Both French and English are official languages, though French is more widely spoken, especially in large, modern cities such as Yaoundé and Douala. About 10% of the country relies primarily on a Pidgin English, mainly in the western provinces near Nigeria. Among the many African languages spoken in Cameroon, the five major ones are Bamiléké, Ewondo, Bamoun, Fulfilled and Arabic. Among the country's best-known writers are the novelists Kenjo Jumbam and Mongo Beti, both of whom have written about Cameroon's relationship with its European colonizers.

The music of Cameroon is among the most popular in Africa, especially *makossa*, a popular dance rhythm you'll hear blaring out of clubs and discos. *Makossa* is adaptable to a wide variety of instrumentation, from traditional thumb pianos to guitars and synthesizers. Manu Dibango

brought the style to international prominence in the early 1970s; now Sam Fan Thomas is the king of *makossa*. Another popular music is *bikutsi*, typically sung in Ewonde.

Cameroon has some of the best food in Central Africa. Manioc leaves are one of the main ingredients, usually appearing on menus as *feuille*. Sauces are usually accompanied by rice (*riz*) or a thick mashed potato-like substance that comes in three main forms: *couscous*, *pâe* or *fufu*, any of which can be made from rice, corn, manioc, plantains or bananas. Street food is typically excellent, consisting mainly of grilled spiced *brochettes* stuffed into a bread roll with salad and dressing. Yaoundé has particularly good grilled chicken and fish.

2.4 CLIMATE

The climate varies with terrain from tropical along coast to semi arid and hot in the north (Ngwa, 1987). The terrain is diversed with coastal plain in the southwest, dissected plateau in later mountains in west and plains in north. This variations in rainfall from one region to the next are astounding - from barely enough rain to support agriculture in the extreme north to over 500 cm in the south-west around Mt Cameroon. In the rain forest to the West and South, the climate is tropical heavy rains lasting from June to October. In the north, the rainy season is from June to September; in the south, light rains in March and April are followed by downpours from May to November. Humidity soars in the south in July and August. The coolest part of the year is from July to September and the hottest from December to March. The warmest months are March to May, when the average daily high is 30°C in Yaoundé, Douala is cooler but gets much more rain. During the same period, the north gets up to a scorching 40°C. Temperature ranges between 17°c to 32°c. The north has a drier climate with more extreme temperatures. In the mountainous areas in the West, the climate varies widely according to altitude and is considerably cooler.

2.5 NATURAL RESOURCES

On the over all, Cameroon natural resources and oil reserves are diminishing. The country however possesses the second largest tropical rainforest in Africa with reportedly a tremendous potential as a carbon sink and also a principal repository of biodiversity (fifth world highest number of species of mammals and vascular plants) besides being a major source of revenue for the logging industry UNEP/SDNP (1996). Other riches include petroleum, bauxite, iron ore, fisheries, fertile agricultural land and hydropower. A wide variety of food and cash crops are grown and most people depend on agriculture for a living

2.6 ENVIRONMENTAL SITUATION

The immense diversity and variety of natural resources expose Cameroon to related environmental problems. The key ones are desertification in the Sudano-Sahelian zone affecting 25% of the total population of about 16 million people, deforestation in the coastal, central, east and south regions, soil erosion and degradation in the high plateau regions of the west and north west provinces, water supply, urban waste management and industrial pollution in the urban centres as well as marine pollution in the coastal linked in both rural and urban settings as it impacts on the natural resource according to density and activities UNEP (1996).

2.7 STUDY AREA

Figure 2 shows an overview of the study area. The boundaries refer to the administrative boundaries of the North Province enveloping three National Parks, a good number of hunting zones and different village communities. Faro National Park is in the administrative division of Poli while Benoué National Park is in Mayo-Rey Division and sub-division Tcholire. The Benoué National Park starts from the river Benoué which constitutes its eastern limits surrounded by 10 hunting zones and within we have settlements for about thirty villages (figure 2).

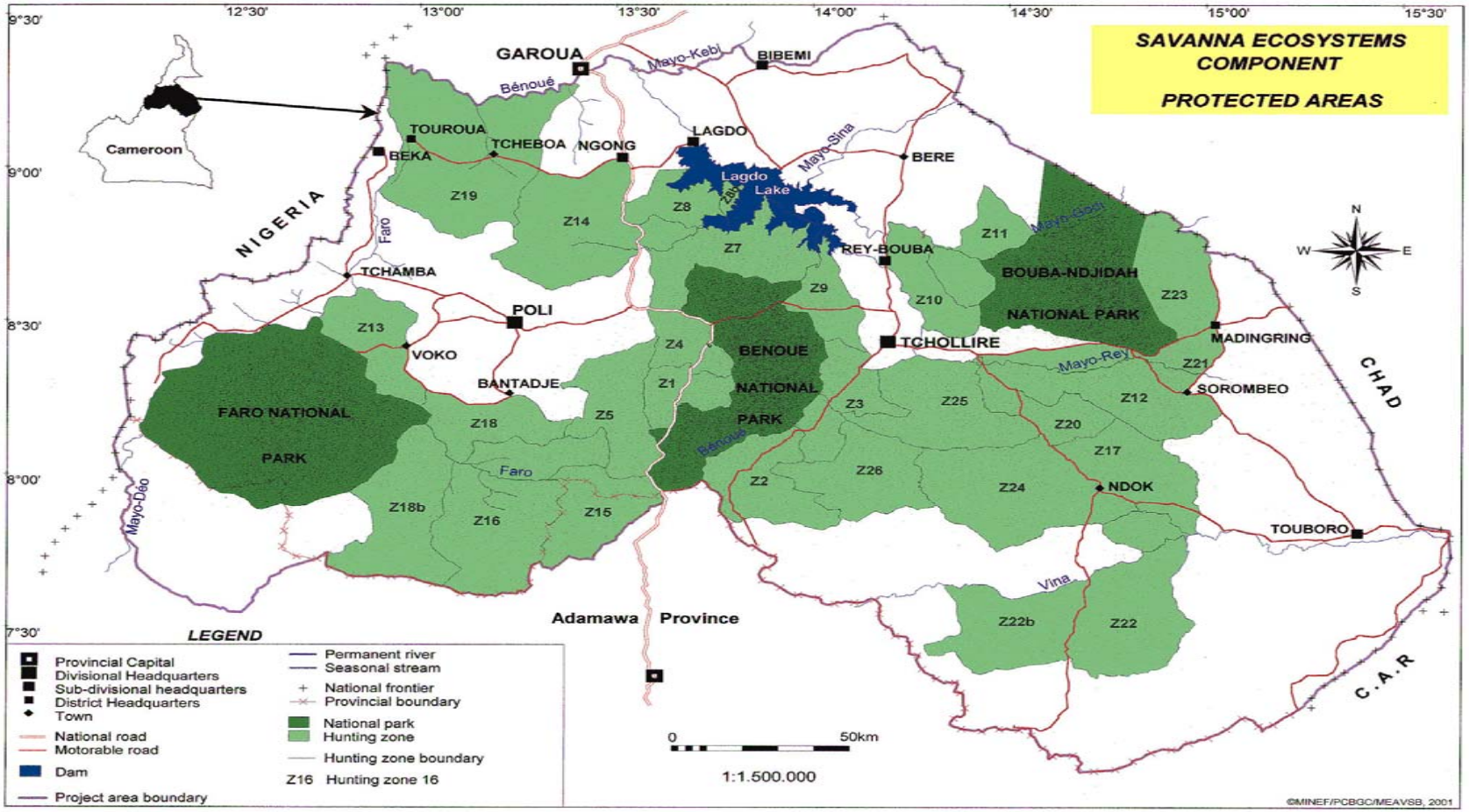

Figure 2: Map of Faro, Benoué, Bouda Ndjida and surrounding

Source: Bauer (2003)

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2.7.1 FARO NATIONAL PARK

Faro National Park (3,300 km^2) found between longitude 12^o 10' – 13^o 08' and latitude 7^o 50'- 8^o 30' was created 1980 transformed from a forest reserve created 13th February, 1947, and made a game reserve 29th June, 1947. The park has an altitude of 600-900 m, a plateau of mountainous massif. The climate has a dry season from November to May. The mean annual rainfall is 1200 mm and mean annual temperature is 26^oC. December is the coldest month (min: 15^oC-max: 34^oC) while April is the hottest (min: 24^oC-max: 37^oC). The vegetation is dominant by arboreal wooded savannah with principal vegetation being *Isoberlinia doka, Burkea africana, Ficus sp, Anogeissus latifolia* and *Cassia sp*. Fauna checklist can be seen in appendix IV.

The manager of the park has his office located at Voko 17 km from the park. There are three camping sites (Campements des Hippopotames ZIC 13, Campement de Demsa ZIC 18 and Campement de Mayo Bigoue ZIC 18 bis). The park is surrounded by a diversity of ethnic groups Koma, Bata, Haoussa, Foulbe, Mbororo, Tchamba, Kolbila, Doupa, Hinga, Pape, Mboum, Pere, Voko, Namdji, Doaya and Illaga. This ethnic groups make up 138 villages and seven Cantons (Voko, Bantadje, Mana, Wangai, Tchamba, Gode, Beka) controlled by Djaouros and Lamidos respectively. It is worth noting that this diverse groups lives within the ark and a greater portion of their traditional food is composed of flora and fauna coming from the park.

2.7.2 BENOUÉ NATIONAL PARK

Benoué National Park (1,800km^2) was created by decision order No 120 of 5th November 1968 by the Secretary of State for rural development of the Republic of Cameroon. Formally a game reserve created by decision orders No 351 of 18th November, 1932 by the French Commissioner in Cameroon. Benoué was approved as a biosphere reserve by the department for ecological sciences of UNESCO in 1981 (UNESCO, 1989). On the Nations plan, she is classified as an operational technical unit of the first category by decision order No 037/CAB/PM of 19th April 1994.

Benoué is found between longitude 13^o 34'-14^o 01' and latitude 7^o 55'-8^o 55'. Average altitude is 300 m with the summit at 650 m. This park is situated in the plain of Benoué at the foot of the Adamaoua plateau. The dry season is in the months of October-April with mean annual temperature of 24^oC and precipitation around 1000 mm. December is the coldest month (min: 13^oC-max: 32^oC) and April the hottest (min: 23^oC-max: 36^oC). Soils are granitic in the south

west of Adamawa. Benoué lies on sedimentary soils as plains in the South/East are littered by inselbergs and small hills. The vegetation is composed of *Isoberlinia doka, Burkea africana, Anogeissus leiocarpus, Terminalia macroptera, Isoberlinia daljelii* while predominant trees include: *Afzelia africana, Borrasus aethiopum, Butyrospermum parkii, Daniella oliveri, Monotes spp., Uapaca detarium, Vitex doniana, Lophira lanceolata, Parkia biglobosa, Boswellia spp., Prosopis africana, Sterculia setigera, Cassia sieberana, Kigelia africana, Ziziphus spp., Piliostigma thoningii, Pterocarpus erinaceus* with 260 species of superior vegetation species identified. Benoué National Park is situated just off the Ngaoundere-Garoua main road, with a rich fauna population of Buffalo, Hippopotamus, Crocodiles, Hyena, Giraffes, Panthers, Lion and a variety of primates and can be visited all year round. Of the 28 hunting zones (ZIC) in the north of Cameroon ZIC No 1, 2, 3, 4, 5, 7, 9 and 15 belong to the Benoué National Park. ZIC 1 and 4 has been given to private operators.

2.8 INSTITUTIONAL FRAME WORK

Since the early 1930s, the establishment of parks, nature reserves and zoological gardens has been the primary method used by the Cameroon government for the conservation of species and ecosystems. As a complementary approach, the government has also developed partnerships with a number of bilateral cooperation agencies, national and international non-governmental organisations (NGOs) and recently with local populations, in order to facilitate biodiversity conservation (Vabi & Gartlan, 2000). The response of the Cameroon government related to biodiversity conservation has evolved timidly from concerns with management of a few economically important species to concerns for all endangered species and the protection of ecosystem.

Prior to 1992, several ministerial departments and attached services were charged with the formulation and implementation of sectoral policies on the environment and by implication, on biodiversity conservation. As the need for proper coordination and harmonisation of the activities of these ministerial departments became evident, a sub-department of Environment and Human Settlement was created in the now defunct Ministry of Planning and Regional Development to spear-head the formulation of a national environmental policy. The national environmental policy was adopted in 1996 following the creation of the Ministry of Environment and Forests (MINEF) in April 1992. The major legal and administrative responsibilities related to biodiversity conservation included:

- Formulation, implementation and follow-up of government policies;
- Guidelines on the environment;
- Negotiation of signatories and rectification of international conventions and treaties.
- The establishment of appropriate linkages with relevant biodiversity conservation institutions and individuals;
- Negotiations of all bilateral cooperation agreements; and
- Sensitisation and community education on environmental issues.

2.8.1 LEGISLATION

The exploitation of wildlife in Cameroon follows regulations found in texts, decree and ministerial orders as follows:

- Law no 81/13 of 27 November, 1981, on forest, wildlife and fisheries today replaced by that of 94/01 of 20th January, 1994.
- The decree no 2313/A of 28 June, 1983, placing animals in class A, B and C with these animals to be hunted by a specific type of permit as well as the latitudes of shooting.
- Law for financial obligations of this exercise.
- Ministerial order stipulating the open and close seasons for hunting in the whole Cameroon territory.

Cameroon has already signed and/or rectified the convention on biodiversity, the Bonn convention on migratory species, the International Convention on Trade in Endangered Species (CITES rectified September 13th 1981), the World Heritage Conservation, the law of the sea, the conservation on climate change and the conservation on desertification and the convention for the conservation of natural resources Convention in Alger's 1968, rectified October 29, 1978 (IUCN 2004).

2.8.2 HUNTING

All hunting in the hunting zones is done by obtaining hunting permits which are divided into three categories:

- Small hunting for the holders of inferior gauges of size 6 mm (gauge 22) and of rifle with unrifled bore (gauges 12, 16 and 20) for hunting for the animals with feathers or hairs (birds and small mammals)

- The average drives out of the rifles of variable between 6 and 9 mm destined to kill average mammals such as the cob of Western Buffon's Kob, Cobe of Reeds, Cobe Defassa, Bush pig, Baboon, Hartebeest, Guib harness
- Great hunting using rifles of superior gauge size 9 mm for the demolition of big games such as: Elephant, Buffalo, Derby Eland, Hippopotamus, Hippotragus spp.

2.8.3 THE CONDITIONS FOR HUNTING

Sports' hunting is granted after fulfilling certain conditions and the hunter has to meet up with the following formalities:

- The hunter must be at least 21 years of age,

- He must complete and deposit at the service dealing with wildlife an application file to obtain the sports hunting permit,

- He must be informed of the texts in force concerning fauna on the list of the animals of classes A, B and C; since the list of the animal species influences the type of permit as well as the latitudes of demolition.

- He must rent a zone of hunting if he wants to hunt in a zone managed by the administration in charge of wildlife.

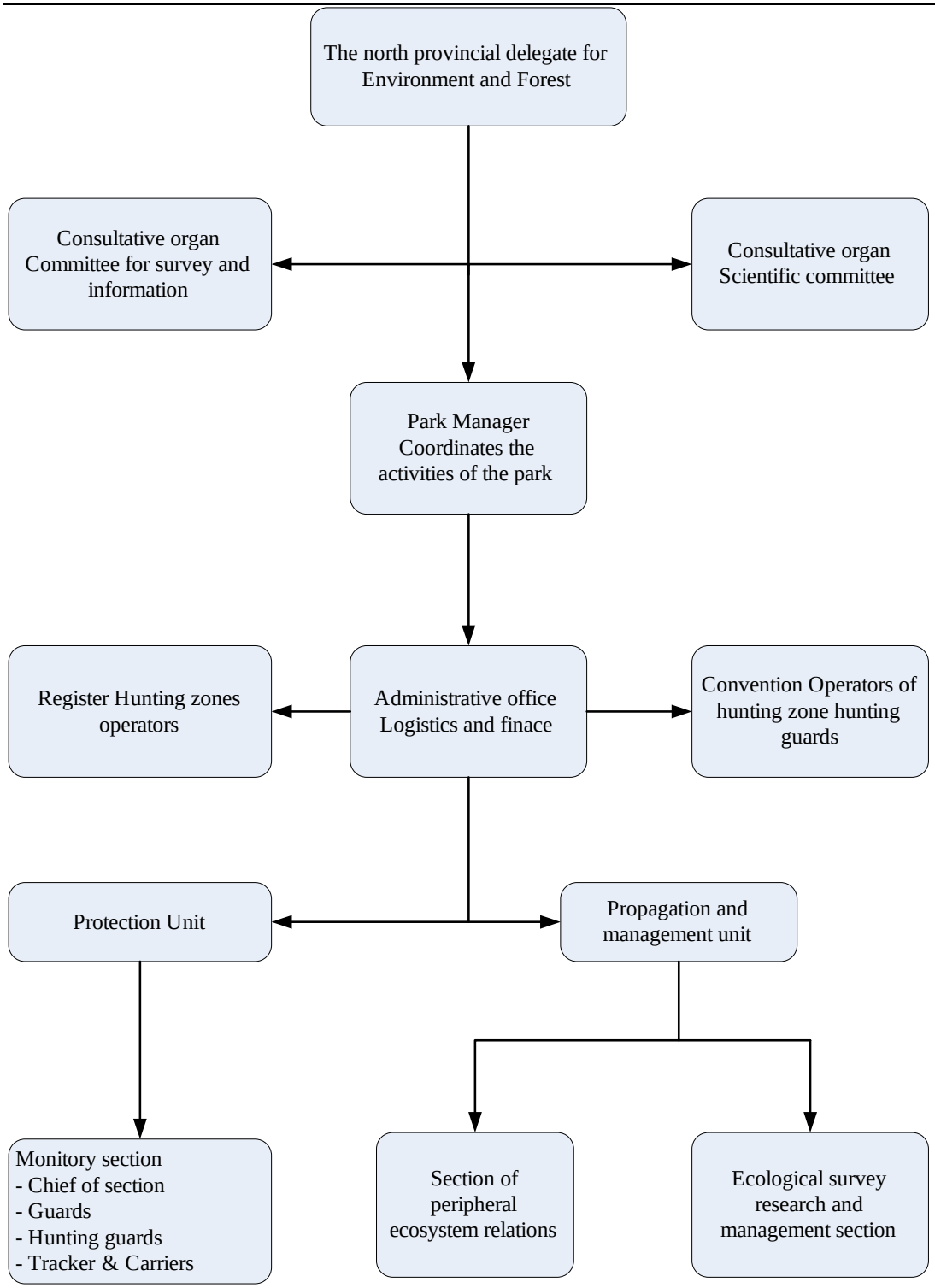


Figure 3: Administrative Organization

Source: MINEF et al. 2003

Figure 3 is the administrative organogram for the provincial delegation for MINEF North province, Garoua - Cameroon showing the distribution of functions and the collaborative units in

the management of wildlife resources in the different National parks. The park is under the control of a manager who depends on the provincial delegate (MINEF) based in Garoua for the north province. The manager coordinates the activities of the park and controls the hunting activities in the hunting zones at the periphery. The manager is assisted by two chiefs of units (Protection and Management and propagation). The survey and information committee and the scientific committees are consultative organs which have to give their accord in the functioning of the park.

2.8.4 ADMINISTRATION

The MINEF is charged with the management of parks and the control of the use of natural resources represented at the provincial level by the provincial delegate of MINEF with it divisional and sub-divisional units (Figure 3). Faro National Park which is situated in two provinces (North and Adamaoua), two divisions (Poli and Beka) and three sub-divisions makes administration very difficult. The Ministry of territorial Administration and decentralization is therefore represented by the Senior Divisional Officer of Faro and that of Faro and Deo, the Divisional Officer for Poli and Beka and Mayo Baleo and the head of the district of Kontcha. The zone also has three rural councils controlled by Mayors. To better manage the park, the interest of the administrators has to be taken making execution of duties very difficult.

The Ministry of Economic Affairs, programming and territorial Management is among those involved in project coordination in territorial management. This structure is represented by its delegation in North and Adamaoua provinces.

The Ministry of Agriculture (MINAGI) and that of Livestock (MINEPIA) are represented by their divisional delegations, sub-divisional delegations, agric posts, the national service of the vulgarization and agricultural research (PNVRA). At the level of MINEPIA, practically the same structures are in place with the preoccupation of representing the Ministry and putting in place a management concerning the species.

The Ministry of Tourism in charge of promoting tourism and development of tourist infrastructure represented by its local and provincial delegations**.** Given the potentials of tourism in the parks, MINTOUR invest in tourism development and the north delegation is investing in opening up track roads.

Ministry of Mines, Water and Energy (MINMEE) is in charge of controlling the mineral exploitation. The representing structures are the provincial delegations. They are to take part to find solutions to the problem of gold searching a well developed activity in the area.

Ministry of Technical and Scientific Research is responsible of coordinating and developing research. This structure is represented by the IRAD station in Garoua and Adamaoua. Collaboration has to be between this stations and management to develop a research program applicable to conservation especially in the area of seed production.

The Ministry of Defense plays a important security role with the frontier and the tourist. They help MINEF also in the program to fight anti poaching. They are represented locally by the Brigade de Gendarmerie de Voko linked to the service of the conservation of the Faro National park.

The Ministry of Higher Education is training students in view of reinforcing the national capacity in management aspects of protected areas. They contribute also in elaborating the laws which are integrated in the management of the parks.

The Ministry of National Education trains young Cameroonians at the primary and secondary level on the role, importance and sensitization of local population especially on environmental education. Especially with respect to the schools around the parks, they have conservation clubs which are advised by an NGO (Conseil Agro Pastoral et Environmental) which teach children conservation awareness.

2.9 PROBLEMS IN IMPLEMENTING LAWS

Most of the administrative frameworks do not function adequately and policy guidelines are not respected because of:

- Low budgetary allocations.
- Insufficient and under-equipped personnel,
- Low degree of autonomy of provincial services and out-stations and
- The insufficient involvement of local population into protected area management systems.

CHAPTER THREE

3.0 THE DERBY ELAND

3.1CLASSIFICATION OF DERBY ELAND

According to Vaughan et al. (2000), classification of the Derby Eland is as follows:

Table 1: Classification of Derby Eland (Vaughan et al. 2000)

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Artiodactyla
Family	Bovidae
Subfamily	Bovinae
Genus	Taurotragus

The even-toed ungulates are currently the most successful group of large herbivores, being native to every continent with the exception of Antarctica and Australia, and inhabiting virtually all latitudes and altitudes. In addition to their native ranges, many artiodactyls species have been introduced into non-native areas and have survived to produce wild populations. An incredible diversity is seen in the approximately 210 members of this order, which includes Swine's, Hippopotami, Camels, Chevrotains, Musk deer, Giraffes, Deer, Pronghorns and Bovid. Sizes vary dramatically from the tiny chevrotains which may weigh less than a kilogram when fully grown to the immense river hippopotamus, weighing up to 4,500 kg. Maximum height is achieved by the giraffe the tallest living land mammal at up to 5.8 meters. Humans have relied heavily upon this order, which has provided us with many domesticated species including cattle, pigs, goats, and sheep. Many species have been introduced into areas outside of their natural range, including New Guinea, Australia, and the islands of Oceania. In addition to the ten extant (modern) families, 18 extinct families are known. The evolution of the artiodactyls occurred primarily in the Old World (Europe and Asia), and while the order originated in the early Eocene about 55 million years ago (Thenius, 1990).

The primary distinguishing feature of this order is the paraxonic limb structure, in which the symmetry of the foot passes between the two middle digits (III and IV). The first digit (the "thumb" or pollex in the hand and the hallux on the hind limb) is absent in all modern artiodactyls, with the result that all species possess an even number of toes on each foot (with the exception of the Tayassuidae, in which the hind foot only has three digits). Two main types of foot structure are recognized; a cloven hoof with two weight-bearing toes and a spreading foot with four digits. In all cases the third and fourth digits are well developed, while the second and fifth are reduced, vestigial, or absent. The nasal bones of the artiodactyls are not expanded caudally, nor is there an alisphenoid canal. Teeth are variable, but the upper incisors are always reduced or absent. Canines are usually small or not present at all, although in some species they are greatly enlarged into tusks. Two main types of molars are recognized - the brachyodont (low-crowned) teeth of the pigs, peccaries, and hippos, and the hypsodont (high-crowned) teeth of the camels and some ruminants. A postorbital bar is present in all species.

3.2 GENERAL CHARACTERISTICS

The smooth coat is reddish-brown to chestnut in colour, with several, well-defined vertical white stripes on the torso. A short-haired black spinal crest extends down the neck to the middle of the back, and is especially prominent on the shoulders. The slender legs are slightly lighter on their inner surfaces, with black and white markings just above the hooves. There are large black spots on the upper forelegs. The bridge of the nose is charcoal black in colour, and there is a thin, indistinct tan-coloured chevron between the eyes. The lips are white, along with several dots along the jaw-line. A pendulous dewlap, larger in males then females, originates from between the jowls and hangs to the upper chest, with a fringe of hair on its edge. An amorphous band of black almost completely encircles the lower neck, extending onto the dewlap. The tail is long, and ends with a dark tuft of hair. Both sexes have tightly spiraled horns, which are relatively straight. In males they form a wide "V" and can grow to 120 cm in length.

Figure 4: Shows the habits of the species. Important size characteristics are: Body length: 220-290 cm, shoulder Height: 150-175 cm, tail length: 90 cm and weight*:* 440-900 kg.

Figure 4: Picture of Derby Eland

Source: Huffmann (1999)

3.3 REPRODUCTION AND BEHAVIOUR

An ultimate fact sheet last date of access 17/12/2005 reports that most species of ungulates up to the size of the Derby Eland are characterized by a relatively high reproduction potential, rapid growth and early maturity. The Derby Eland has a reproductive cycle with a gestation period of 9 months, 1 young per Birth which is usually weaned after 6 months and females gets sexual matured at 15-36 months while males do so at 4-5 years. They have a life span of up to 25 years. There is some evidence that wild animals reach economically harvestable size at an earlier age than domestic stock. Weight gain for Derby Eland is 0.33 kg per day as compared to 0.14 kg per day for poorly managed cattle on similar conditions on the East African rangeland. The average daily gain (g) for Derby Eland is 331g in 72 days while adult live weight (kg) is 725 kg (Males) and 450 kg (females).

Primarily nocturnal, Derby Elands are highly nomadic, with large home ranges and seasonal migration patterns. During the day, herds often rest in sheltered areas. A gregarious species, Derby Eland herds do not disband in the wet season, but remain together, suggesting that social, rather than ecological factors are responsible for herding. There is no evidence of territoriality, and males rarely display aggressive tendencies, even during the breeding season. Derby Eland are alert and wary, making them difficult to approach and observe. They can be quite fast, running over 70 km per hour and, despite their size, are exceptional jumpers, easily clearing

heights of 1.5 m. They move in family group with herds containing up to 60 animals of both sexes have been reported, though groups of 15 to 25 are more usual. Males are often solitary eating leaves, branches, and grasses and drink regularly. Their main predators are lions and spotted hyena. In the dry season when the grass is dried up and sometimes burned by uncontrolled fire, the Derby Eland subsists on surviving and fast rejuvenating shrubs and tree species like *Isobelina doka* and *Gardenia aquala* figure 5 and 6 below.

(5)

(6)

Figure 5: *Garlenia aquala* a herbaceous plant

Figure 6: *Isobelina doka* a treelike plant regenerating after fire burns in the dry season

Figure 5 and 6 are important because the direct observation of an animal feeding can be used to collect quantitative data on its diet and also provide information about where the animal finds food and how much time it spends in foraging for and eating its food. Therefore, this is useful behavioural information.

Derby Elands have specialized water conservation systems and require considerably less water than cattle under the same circumstances. This is due to a high oxygen-extraction efficiency which implies a smaller loss of water in expired air, and a flexible thermo-regulation system. Elands can tolerate a heat stress of 45^0C without any problems. This degree of tolerance is attributed to their ability to permit their body temperature to rise, thereby avoiding the loss of water in thermo-regulation as well as diurnal variations in body temperature of more than 10^0C. These physiological adaptations are further enhanced by behavioural patterns such as resting in the shade and feeding at night on succulent leaves. The practical implication of such water conservation abilities is that wild animals are less dependent upon free water for their survival

and can utilize semi-arid and arid range more effectively. This also means that wild ungulates are able to disperse over greater areas. Therefore, physiological advantages of wild animals make them better adapted to the climatic and habitat conditions of African rangelands. They also show varying feeding habits in terms of preferred food species and parts of plant food items selected. They are therefore able to utilize available vegetation better as compared to domestic stock which has a narrow spectrum of food selection pattern.

3.4 DISTRIBUTION

The distribution of Derby Elands (*Taurotragus derbianus gigas*) in Africa is shown in Figure 7. Derby Eland which is the largest African antelope is found only in the broad-leafed savannas which can today be traces back to two isolated pockets in central (Cameroon, Chad, Central African Republic, and) and western Africa. The western African possibilities are not even so certain.

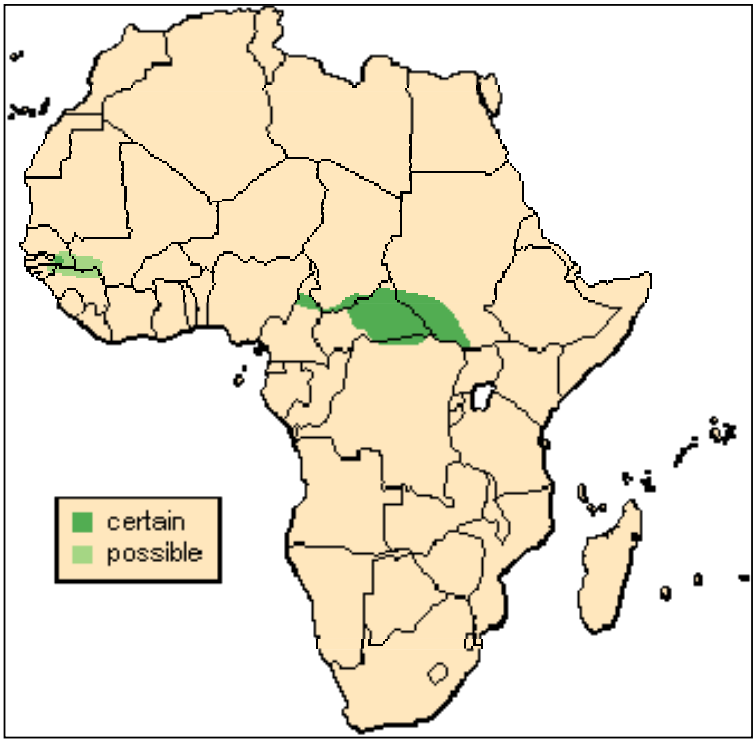


Figure 7: Distribution of Derby Eland (*Taurotragus derbianus gigas*) subspecies in

Source: IEA (1998)

3.5 CONSERVATION STATUS

The Derby Eland as a species is considered a low risk, near threatened species by the IUCN/SSC (2004). The subspecies *Taurotragus derbianus gigas* is classified as a low risk, near threatened while *Taurotragus derbianus derbianus* subspecies is classified as endangered.

CHAPTER FOUR

4.0 THE AFRICAN WILD DOG

4.1 CLASSIFICATION OF AFRICAN WILD DOG

According to Myers, (2001) classification of African Wild Dog is as follows:

Table 2: Classification of African Wild Dog (Myers, 2001)

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Carnivora
Family	Canidae
Genus	Lycaon
Species	Lycaon pictus

The Canidae is a relatively small but homogeneous family of generalized hunters, but it counts among its members such species as the wolf, fox, coyote and domestic dog. The Wild Dog family contains 35 different species, ranging in size from the tiny fennic to the little studied bush dogs of the Amazon Basin. Eight species of Wild Dog live in North America: red and grey wolves, coyote, and four species of fox. Canids are the most vocal of the carnivores, having a variety of barks, howls and whines. Those members of the family that hunt in packs can bring down large animals, but the solitary hunters usually live on small rodents, insects, birds and berries when hunting is poor. The *Lycaon pictus* translates as “painted Wolf-like animal” is from the genus Lycaon coming from the Greek word “Lukos” and means Wolf. Pictus comes from Latin and means painted (Lalubia, 1985). The first speciment was found in Mozambique and was called Cap hunting Dog (Temminck 1820). Kingdon (1997) distinguishes five subspecies in five different regions in sub- Saharan Africa which include *Lycaon pictus pictus* (South Africa), *Lycaon pictus lupinus* (East Africa), *Lycaon pictus somalicus* (Horn of Africa), *Lycaon pictus saharicus* (Sahara Africa) and *Lycaon pictus manguensis* (West and Central Africa). German et al. (1993) notes a 1% sequence divergence with the species of African Wild Dogs and also proposed that two geographically isolated subspecies occupy eastern and southern Africa. But

parsimony analysis of mtDNA control region haplotypes suggests that there are two clades of African Wild Dogs, but the clades are geographically mingled (German et al. 1997).

The cyber zoomobile last accessed 17/12/2005 reports that canids possess an impressive set of dental equipment, consisting of 42 teeth, paired except for the molars, 20 on the upper and 22 on the lower jaws. Most noticeable are the four canine teeth located at the front corners of the mouth, quite large although not particularly sharp when compared to the felids, which are utilized in holding prey and tearing large pieces of flesh from the carcuss (Figure 8). The lower canines are positioned so that they fit just in front of the corresponding canines in the upper jaw, leaving a small gap (diastema) allowing the canines to lock together when the mouth is shut. The incisors, slightly curved rearward and situated between the canines in the front of the mouth, are used to hold prey and tear at small pieces of food. The premolars and molars complete the canid's dentition allowing for shearing, crushing and even a certain amount of grinding, although canids do not spend much time chewing, rather bolt food down in large chunks.

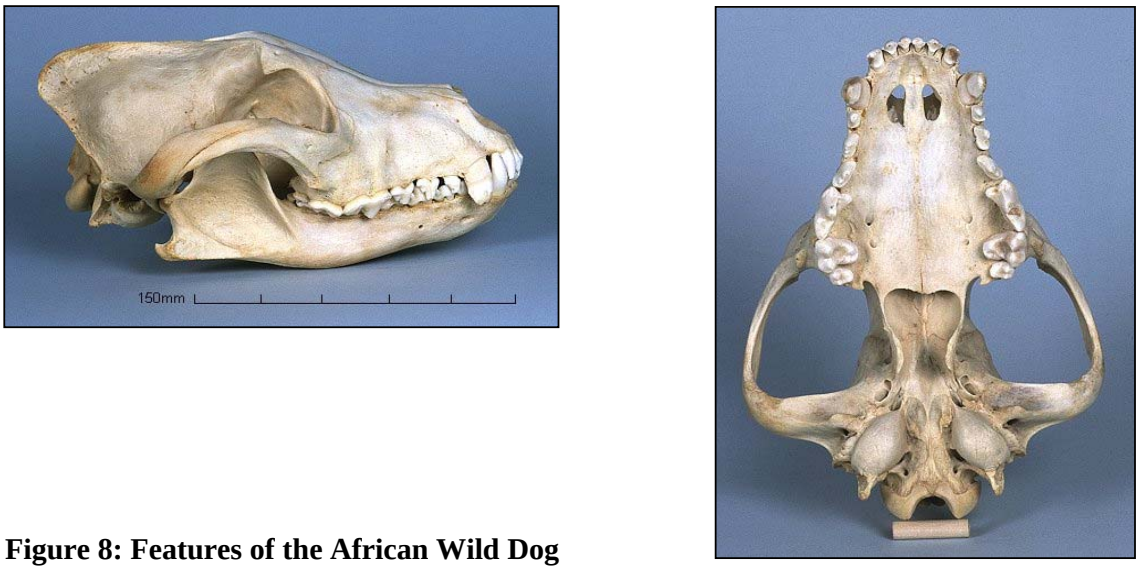


Figure 8: Features of the African Wild Dog

Source: Will's skull page (date of last accessed 24/06/2005)

4.2 GENERAL CHARACTERISTICS OF AFRICAN WILD DOG

The African Hunting Dog's scientific name, *Lycaon pictus*, reflects the colour of their pelage. *Lycaon pictus* literally means painted or ornate wolf. The fur appears to be painted with brown, red, black, yellow and white areas. The pattern of colours is different on each animal's coat, much like the stripes of zebras. The fur of *Lycaon pictus* is short, with little or no under fur, and the blackish skin is sometimes visible where fur is sparse. Typically there is dark fur on the head

and a white tip on the end of their bushy tail. They have large, rounded ears, a thin body, and long, muscular legs with four toes on each foot.

Figure 9 shows the habits of the African Wild Dog whose body length is between 75 and 110 cm, the tail is between 30 and 40 cm long, and they range in weight from 18 to 36 kg. Males and females tend to be approximately the same size (Nowak, 1999; Stuart, 1995).

Figure 9: Picture of the African Wild Dog

Source: Kingdon (1997)

The canids are specifically adapted to running, and to maintaining a trot or galloping gate for great distances. The skeletal structure of all members is remarkably consistent, largely a reflection of a lack of specialization in terms of lifestyle. The most notable feature of the canid skeleton, when compared with other carnivores, is the relative length of limbs compared to body size. Most canids stand tall and upright on elongate and semi-rigid legs which end in four well developed distinctive paws, having five toes on each forefoot and four, with non-retractable nails, on the hind foot. Canids actually walk on their toes (digit grade), which are specially adapted as part of the foot structure, to withstand the shock of impact during running.

Canids rely largely on a combination of hearing and eyesight to track their prey, with the relative significance of each sense depending on individual species and their lifestyle. Keen hearing is important in the case of the more social canids who communicate with each other by a series of vocalizations including howling, yelping and growling. Interestingly, wild canids do not bark loudly like domestic dogs where domestication seems to have led to barking becoming more frequent, much louder and often challenging in nature. Direct long range communication between individuals is accomplished by a number of distinctive howling vocalizations. Howling helps group members to stay in touch during hunting forays, tends to unify a pack, proclaims territorial rights and once started by an individual member of the pack is rapidly picked up by all. Canid howling, although somewhat uniform to the human ear, distinguishes individual pack members with characteristic tones and assures that no territorial incursions or unnecessary conflicts develop with neighboring packs.

4.3 REPRODUCTION AND BEHAVIOUR

Unlike most domestic dogs, wild canids generally breed only once during the year, the period closely related to season so that the young are born in the spring or summer when food is abundant. Breeding behavior is conditioned by changes of daylight and temperature, resulting in an increase of aggression related to territorial claims, scent marking, and displays of dominance. After mating over a period of several days, and a gestation period of between 52 and 80 days, a litter containing one to 16 blind pups is born. The young are unable to hunt or to care for themselves for a period of time ranging from several weeks to several months. This extended dependency appears to strengthen the development of strong social or family ties typically observed in the canids.

Each African Wild Dog pack has a dominant breeding pair. This pair can be identified by their increased tendency to urine mark. They are normally the only pair of pack members to mate and they tend to remain monogamous for life. Their life expectancy is approximately ten years. Generally the dominant pair prevents subordinates from breeding. Breeding suppression between females may often result in aggressive interactions. Occasionally a subordinate female is allowed to mate and rear young. Reproduction is also largely monopolized by alpha male, but the pups of a single litter can have more than one father, as in most carnivores Girman et al. (1997). The dominant female is usually the oldest in the pack, but the old males often lose their rank to prime-age males, so many packs include one or more old, formerly dominant males. Variation in the pattern of immigration, emigration and breeder turnover may produce a complex web of genetic

relatedness within packs. The coefficient of relatedness between pack mates averages 0.25-0.35, but for a specific pair of individuals can range from 0 to 0.5 or above in the case of mild inbreeding (Girman et al 1997).

Lycaon pictus reach sexual maturity at approximately 12 to 18 months, though they usually do not mate until much later. The youngest recorded reproduction of a female was at 22 months old. Gestation is approximately ten weeks and pups are usually born between March and July. The breeding female gives birth to her litter in a grass-lined burrow that is usually an abandoned aardvark (*Orycteropus afer*) hole. The pups remain in the den with their mother for three to four weeks. Once the pups are brought out of the den they become the responsibility of the whole pack. Pups nurse from other females in the pack as well as from their mother. Weaning can occur as early as 5 weeks. The interval between litters is normally 12 to 14 months (Estes, 1991; Kingdon, 1997; Nowak, 1999 & Stuart, 1995).

Lycaon pictus tend to prey on medium sized mammals that are about twice their weight. At times they will kill larger animals, and they will also take smaller prey individually. Some of the animals they prey on include small antelope, impala, duiker, and the old, sick and injured wildebeest and zebra. On occasion some of the food they get from larger kills may be cached, though very often they never return to the cached food. For the most part *Lycaon pictus* does not eat plants or insects, except for small amounts of grass. Also African Wild Dogs will never scavenge, no matter how fresh the kill is. (Estes, 1991; Kingdon, 1997& Nowak, 1999).

Lycaon pictus are gregarious animals that form packs of up to 40 members. Before the recent population decline of African Wild Dog packs of up to 100 animals had been recorded. An average pack size, currently, is 7 to 15 members. The pack has and alpha male and alpha female, which are the dominant pair. There are separate dominance hierarchies for males and females. On average the pack has more males than females. Females have a much higher rate of emigration from their natal group than do males. Females usually leave the pack at 2 1/2 years or older to join other packs that have no adult females. Approximately half of young males will stay with their father's pack; the rest will leave to form a new pack together. Within the pack *Lycaon pictus* have unique social concerns and structure. They cooperate in caring for the young, as well as wounded or sick pack members. When the dogs return from a kill they feed regurgitated food to the young, wounded, and sick, as well as any adult that was not able to go on the hunt. Another unique feature of African Wild Dog is the general lack of aggression between pack members. An

exception to this is the occasional fight between a dominant female and a subordinate female over breeding rights.

Lycaon pictus are cooperative hunters; they hunt in packs led by the alpha male. African Wild Dogs are primarily diurnal, hunting in the morning and early evening. They will hunt at night if there is a bright moon. *Lycaon pictus* use sight, not smell to find prey. Once they locate prey they begin to chase it. The chase can last for several kilometers and reach speeds up to 55 km/hour. The dogs chase the prey until it tires, and at times they will disembowel the prey while it is still running. Once the prey tires they tear it to pieces. African Wild Dogs tolerate scavengers at their kills, except for spotted hyenas. They drive off hyenas, sometimes injuring or killing them.

African Wild Dogs are not territorial animals. This is reflected in the lack of territorial urine marking, which is observed in most canid species. Occasional urine marking is seen in the alpha male and female, but not for territorial purposes. Because African Wild Dogs are non-territorial and do not have exclusive ranges, their home ranges can vary in size from 200 to 2,000 Km^2. (Estes, 1991; Kingdon, 1997& Nowak, 1999).

4.4 DISTRIBUTION OF WILD DOGS

African wild dogs are large, highly mobile carnivores (with home range to be as large as 2000 km^2) that are known to disperse over great distances and across dramatic geographical barriers so are rare throughout much of their geographical range Girman et al. (2001). African Wild Dogs were once common in Africa south of the Sahara Desert in areas of semi-desert to mountainous in virtually every environment except rain forests and deserts (figure 10). Hence there is no "typical" habitat for the African Wild Dog, sufficient prey species being the determining factor, a century ago, African Wild Dog packs could be seen roaming nearly everywhere and were a common sight.

Nowadays the African Wild Dog is extinct, or nearly extinct, in 20 countries of its former range. Many of the remaining populations are too fragmented to remain viable. A combination of a natural wanderlust and bad image among humans has driven African Wild Dogs from nearly two thirds of their original range. They have disappeared from 25 of the 39 countries in which they were formerly recorded, and only six populations are believed to number more than 100 individuals. Numbering a mere 3,000 in the whole of Africa, and only 600 packs of wild dogs, remain in the wild. With only four countries known to have viable populations, it is clear that the situation is urgent and that these unique animals face extinction unless we take action now.

Historically, *Lycaon pictus* probably were found savannas and acacia woodland habitats of sub-Saharan Africa. Therefore they were widely distributed across the African plains and are not found in jungle areas. Their habitat also included semi-desert to mountainous areas south of the Sahara Desert in Africa and tropical savannah and grasslands biomes Nowak (1999). During the past century, African Wild Dog populations have declined dramatically and fragmented and declining populations of African Wild Dogs are currently found in western, central and eastern Africa. It is estimated that there are between 3,000 - 5,000 individual African Wild Dogs in about 600 - 1,000 packs remaining in Africa restricted primarily to protected areas (CSG's 1997). Examining by region today:

4.4.1 North Africa: There are very few, if any, wild dogs remaining in northern African countries.

4.4.2 West Africa: They are doing very poorly in western Africa, with only a single viable population in Senegal, which is of high conservative value.

4.4.3 Central Africa: They are also doing poorly in central Africa having a potentially viable population in Cameroon, with a couple more possibilities in Central African Republic and Chad. The African wild dog is officially extinct in Gabon, the Democratic Republic of Congo, and in the Republic of Congo.

4.4.4 East Africa: They have a patchy distribution in eastern Africa, though better than either western or northern Africa. They have been mostly eradicated throughout most of Kenya and Uganda. There is a very large population in southern Tanzania, which is one of the largest in all of Africa. Other viable populations exist in northern Tanzania, and a small population has been found in southern Ethiopia, which is hoped to spread to nearby Sudan, Kenya and Uganda. There are very few wild dogs left elsewhere in Sudan. They are extinct in Rwanda, Burundi and Eritrea, and also thought to be extinct in Somalia.

4.4.5 Southern Africa: The most viable populations of African wild dogs exist in southern Africa. More than half of the total wild dog population exists in this region. The largest population occurs in Botswana, north-east Namibia, and western Zimbabwe. Kruger National Park has about 400 wild dogs. Zambia has two large populations. They are rare in Malawi, and almost extinct in Mozambique.

Figure 10 shows the distribution of African Wild Dogs in Africa distinguishing between areas with certain populations and those with possible populations but no certainty in its existence.

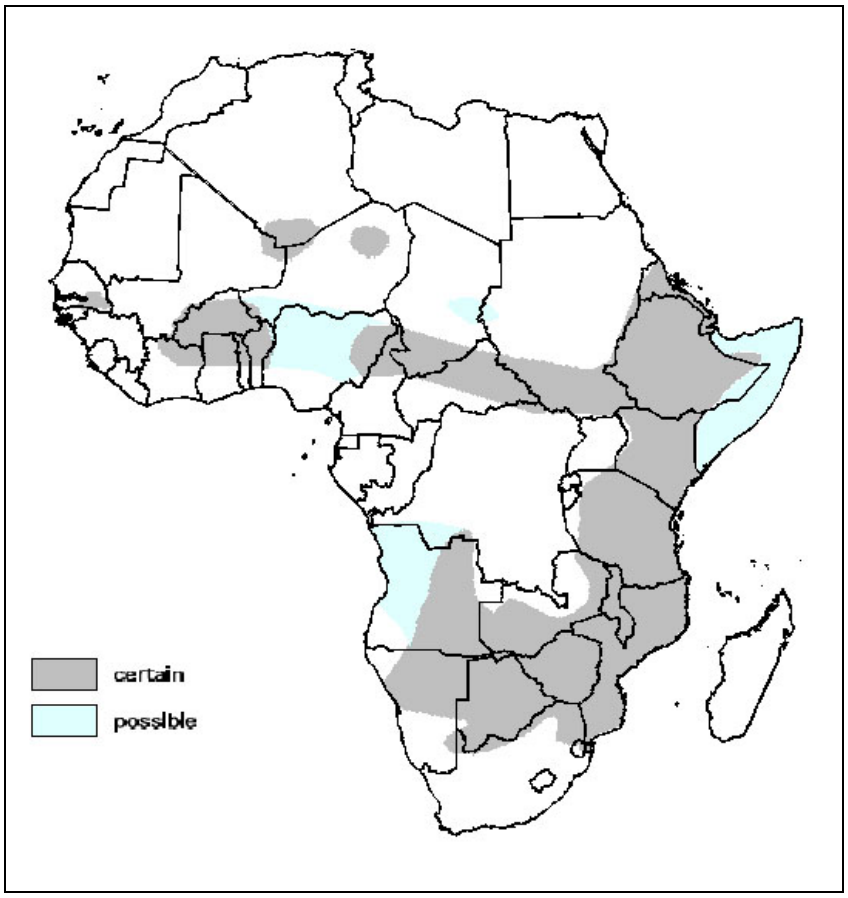


Figure 10: Geographical range of African Wild Dog distribution within protected areas in Africa

Source: Fanshawen et al. (1991) and Ginsberg (1994)

The first Pan-African survey of Wild Dogs' status and distribution was carried out in 1985-1988 (Frame and Fanshawe, 1990). Updates to this survey were presented for several countries at the IUCN/SSC Canid Specialist Group's Workshop on the Conservation and Recovery of the African Wild Dog' held in Arusha, Tanzania, in 1992 (Ginsberg, 1992) Appendix I. Also researches to identify the population of Wild dogs have been carried out by Woodroffe & Ginsberg (1999) and some results are presented in Table 3. Most of the estimates are however based on a guess especially with populations from Central Africa and East African. A general run down of the result show that the African Wild Dog is fair in South and West Africa but not distinctively good in a particular region Table 3.

Table 3: Estimated numbers of Wild Dogs in Africa (Woodroffe & Ginsberg, 1999)

Region	**Associated with national park**	**Outside protected areas**	**Accuracy of estimate**
West Africa			
Senegal	100	-	Fair
Central Africa			
Cameroon	100	-	Guess
Central African Republic	150	-	Guess
Chad	50	-	Guess
East Africa			
Ethiopia	100	100	Guess
Kenya	150	100	Fair
Tanzania	1400	500	Good
Sudan	-	100	Guess
Southern Africa			
Botswana	750	-	Good
Namibia	100	300	Fair
South Africa	400	-	Good
Zambia	500	-	Fair
Zimbabwe	500	200	Fair
Total	4300	1300	

The minus sign (-) on the Table 3 explains situation where the populations were not measured. Also the accuracy of estimates is based on the certainty with which repeated researches were done to guarantee the judgment good, fair and guess.

The population of African Wild Dogs in north Cameroon has been dwindling in the range of 10 and 35 animal the highest records in Faro, Benoue and Bouba Ndjida national parks in that decreasing order respectively. Detailed population studies on African Wild Dog in Cameroon has been reported by Bene Bene et al. (1999) and Bauer (2003) (Table 4).

Table 4: Remaining African Wild Dog population in Cameroon (Bene Bene et al. (1999) and Bauer (2003)

Year	Faro and Surrounding	Benoué and Surrounding	Bouba-Ndjida and surrounding	Population size
1998	20	15	14	49
1999	35	25	03	61
00/01	20-30	10-20	5-15	35-65

The African Dogs found in Northern Cameroon have been estimated to have a density of 0.0016-0.002 African per km^2. Comparatively, the highest density is found in Selous, with an average of population of 1 adult/26.0 km^2over six years. A more typical density is 1 adult per 60-100$km^{2.}$ Even at maximum density, an area of 1,000 km^2 holds a population of only 40 adults, which is likely to be viable in the long run. As a result small packs will play a small role in wild dog conservation, unless they are actively managed (Creel & Creel, 2002).

4.5 CONSERVATION STATUS

African Wild Dogs are considered by some to be the most important predator species in the ecological balance in African grasslands. *Lycaon pictus* occasionally kill livestock and important game animals (Nowak, 1999) and brings about human/wildlife conflict. The method of killing of African Wild Dogs given that they are smaller relative to their prey, and do not have a specialized killing bite; Wild Dogs kill their prey by pulling it to a halt and disemboweling it. Large prey can take half an hour to die (though most die in minutes) and empathy for the prey led to antipathy towards the predator. Secondly, the perception that wild dogs disrupt prey populations more than other predators because they are cursorial hunters that rely on open chase to catch their prey; they set a large number of prey in motion, especially in open habitat. Traffic on highways has also led to kills of Wild Dogs. Traffic on the Tanzania-Zambia highway is estimated to kill between 3% and 12% of the Wild Dog population annually (Creel & Creel, 1998). Wire snares set for game species unintentionally catch carnivores and this is surprisingly common cause of death in some places (Hofer et al. 1993). In Selous National Park, snaring and poisoning by illegal game hunters cause 11% of 45 known-cause deaths, snaring and shooting accounts for 18% of 57 deaths in Kruger National Park (Van Heerden et al. 1995) and 29% of 31 deaths in Hwange National Park (Ginsberg et al. 1995). Infectious diseases have also played a main role in the numerical and distributional decline of African Wild Dogs (Kat et al. 1995).

Many African nations set aside large areas for wildlife, and these parks hold a great many lions, leopards and hyenas. All three of these species pose a greater threat to the livestock (even though people) than Wild Dog do as well as although their ecological needs are similar, a fundamental difference between Wild Dogs and these large carnivores is that Wild Dogs remain at low population density under all conditions. Hyenas typically assemble behind Wild Dog pack as they hunt stealing almost all kills made by dogs (Creel & Creel, 2002). Mill & Gorman (1997) have also shown that lions account for 43% of natural Wild Dog deaths in Kruger National Park. Interspecific competition has strong effects on many carnivore populations (Palomares & Caro, 1999). Interspecific competition also affects carnivore's distributions limiting Wild Dogs in number and distribution (Mill & Gorman, 1997).

CHAPTER FIVE

5.1 BIOLOGICAL DIVERSITY

The United Nations Convention on Biological Diversity (UNEP 1992) defines it as the variability among living organisms from all sources, including terrestrial, marine and ecological complexes of which they are part. Biodiversity refers to the variety of life, but has often mistakenly been equated with species diversity. Franklin (1988) and Noss (1990) depicted a more comprehensive view of biodiversity that encompasses dimensions of composition, structure, and function, and their interactions. Noss (1990) outlined the hierarchies involved in the three main categories of composition, structure, and function (Table 5).

Table 5: Hierarchy involved in the view of Biodiversity (Noss, 1990)

I. Composition
- A. Landscape Types
  - 1. Communities, Ecosystems
    - a. Species, Populations
      - i. Genes

II. Structure
- A. Landscape Patterns
  - 1. Physiognomy, Habitat Structure
    - a. Population Structure
      - i. Genetic Structure

III. Function
- A. Landscape Processes, Disturbances; Land-Use Trends
  - 1. Interspecific Interactions, Ecosystem Processes
    - a. Demographic Processes, Life Histories
      - i. Genetic Processes

Composition can be assessed through simple species lists from national parks. Structure could be evaluated, for example, through an age-class assessment of habitat vegetation or a map showing spatial distribution of species. Function would be addressed by a table or figure depicting diets of various species found in National Parks and the use of various habitats. Function would also be

addressed by research that determined the roles of various organisms in soil-building and nutrient dynamics.

Conservation biology concerns the maintenance of existing populations of organisms. Ideally, conservation biology and restoration ecology should function in tandem. Conservation biology, by contrast, has focused on protection of existing habitats, communities, and populations. In many cases, conservation biology has involved the development and management of natural preserves and has focused on so-called charismatic species that attract much public interest, such as certain large mammals (Derby Eland and African Wild Dog) which are endangered and threatened species respectively.

5.2 ENDANGERED SPECIES

A Taxon is said to be endangered when population(s) have been reduced to a critical level or whose habitats have been so drastically reduced that the population(s) is deemed in immediate danger or considered to be facing a very high risk of extinction in the wild. Cullen et al. (2001) estimated, projected or inferred the probability of extinction to be at least 20% over the next 20 years or five generations.

Joe Kosack, a Wildlife Education Specialist says the Protection for endangered species sort of got its start in 1940 with the U.S. Bald Eagle Protection Act. After that, little occurred until America's environmental awakening in the 1960s. With many species teetering on the brink of extinction from pollution and pesticide poisoning, conservationists repeatedly called on Congress for action. At stake was the existence of myriad wildlife species: birds of prey, songbirds, bats and small mammals, not to mention plants, fish and insects. Congress responded with the U.S. Endangered Species Preservation Act of 1966, which gave broad authority and policy guidance to the Secretary of the Interior to create a comprehensive program for the protection, conservation and propagation of endangered species of fish and wildlife. It also authorized the Secretary to develop and publish a list of rare and endangered native animals, and to conduct research on those species and buy habitat for them. The list would later become known as the "Red Book." In 1969, Congress passed the Endangered Species Conservation Act to provide increased protection for threatened species and extended protection to a wider variety of wildlife. The movement was gathering momentum. Rescuing endangered species had become as important to legislators as tax reform.

The Endangered Species Act of 1973 furthered the cause of endangered species management. Far more comprehensive than the 1969 legislation, the new act reached all animals, whereas the earlier act addressed only vertebrates, molluscs and crustaceans. It established authority for protection before the danger of extinction becomes grave. It addressed all animal populations, whereas the 1969 Act recognized no category below subspecies. The 1973 Act provided for the listing and conservation of plants, which was absent from previous legislation.

When the Endangered Species Act (ESA) was passed, the African Wild Dog was one of the first animals listed. The goal of the art is to protect endangered and threatened animals and plants so that their populations can recover to a point where they are sustainable without further intervention. At this point the species can be removed from the list. If it is removed from the list, management of populations will revert to the states and tribal authorities ESA (1973).

5.3 THREATENED SPECIES

A taxon is threatened when the populations are stable but it is expected that threats will become a problem in less than 10 years if nothing is done. Estimated, projected or inferred probability of extinction is 3-10% in the next 100 years (Cullen et al. 2001). Thomas et al. (1994) and Sisk et al. (1994) have reported the biodiversity and threat data identified as global and continental areas of critical concern of many nations to which the biodiversity of Central African States was adapted for a simple analysis Table 6. Cameroon has 311 mammal species of which 10 are endemic, species richness is at the 12^{th} position by world ranking and 2^{nd} by region, population pressure index measured by annual increase in density is 0.85, world population pressure ranks 62 and 23^{rd} by region, forest loss index measured by annual loss is 0.0049 and forest loss by world ranking is 55^{th} and by region is 31^{st} in ranking. Making a comparison of the data on Table 6 with that on Table 7 below, Table 6 was based on research by individual while Table 7 is the first nation report on the convention on biological diversity whose compilation is a product of different contributors by the Ministry of Environment and Forest, Ministry of Scientific and Technical Research, expert on policy, institutional and legal framework, expert on floral biodiversity, expert on coastal and marine biodiversity and expert on forest biodiversity all working to draw up the convention document. All data on table 7 was based on judgments on the rate of implementation of the different national action plans; National Action Plan 1958 on sustainable forestry and agro-forestry, National Land-use Plan 1994 on distribution of land by use and sustainability, the National Environment Management Plan 1995 on environmental protection and biodiversity protection, National Biodiversity Strategy on forest biodiversity

engulfing Forest Biodiversity Action Plan and Marine Agriculture of 1998 on conservation, sustainable use and benefit sharing, the Special Plan on Agriculture and The Special Plan on Fisheries all last two action plans were on food security. The objectives of the different ministries involved, no continuous monitoring, short-lived action plans and disintegration of ministries to smaller units to satisfy political gains culminate to the only explanation to the disparity in results and figures of species abundance on Tables 6 and 7.

Table 6: Biodiversity loss in Central Africa Adapted from Thomas et al. (1994) and Sisk et al. (1994)

Country	**N° of mammal species and N° of endemic species (in brackets)**	**Species richness by world ranking and by region (in brackets)**	**Population pressure index annual increase in density (in brackets)**	**Forest loss index (annual loss)**	**Forest loss by world ranking and by region (in brackets)**
Cameroon	311 (10)	12 (2)	0.85	0.0049	55 (31)
Central African republic	266 (3)	24 (8)	0.13	0.0025	73 (37)
Chad	200 (1)	61 (28)	0.10	0.0083	30 (16)
Congo	225 (2)	23 (7)	0.20	0.0021	74 (38)
Equatorial Guinea	190 (0)	29 (11)	0.37	o.oo76	40 (22)
Gabon	200 (2)	25 (10)	0.10	0.001	76 (39)

Table 6 agrees with the number of endemism within species especially the mammals reported on both tables but disagrees in the total number of mammals found in Cameroon. It also gives a detail breakdown of different forms of wildlife in Cameroon while several others are under threat and pr extinct. The interest of the researcher to separate reptiles and snakes which belong to the same class can only be a matter of emphases or due to the special attention given by the reporters and the availability of data. One species of bird is extinct, 30 species of birds are near threatened, vulnerable or endangered. There are 1050 species of butterflies (the highest recorded in Africa so far). There is no current information on numbers of wildlife species and inventory yet to be conducted to determine the rate of endemism and threat which gives the reason for the dash (-)

signs on the table. The difficulty to monitor biodiversity as shown from table 6 and 7 is not only an African problem. In the developed World, these difficulties come up though in lesser magnitude.

Table 7: Wildlife biodiversity in Cameroon (MINEF (1997)

Species Type	Total species	Endemic	Threatened	Extinct
Mammals	409	10	27	-
Birds	1000	11	47	1
Reptiles	183	19	2	-
Snakes	85	-	-	-
Amphibians	190	-	1	-
Insects	1110	-	-	-
Butterflies	1550	-	-	-
Microorganisms	1050	-	-	-

In Europe, there are presently some theoretical issues about biodiversity operationization and practical biodiversity successes and failures. The European Union in its 6th Environmental Action programme 2002-2006 has stipulated several issues such as Biodiversity implementation indicator programme (BIO-MP) 2002, Biodiversity action plan issued by the European commission in 2001, community biodiversity strategy 1998, biodiversity expert group (BEG) related to the birds protection directive of 1979, the habitat directive of 1992 and NATURA 2000 habitats network. Other actions so far taken include the Pan-European biodiversity initiative launched by the Environment for Europe (EFE) cooperation with the Organization for Economic Co-operation and development (OECD) and European council (COE). They have organized several conferences (for example Kiev-Ukraine which came out with the Kiev resolution on biodiversity 2003), Pan-European biological and landscape diversity strategy (PEBLDS), Pan-European ecological network (PEEN), the green belt of the former iron curtain, the European biodiversity resource initiative (EBRI) and the European biodiversity monitoring and indicator frame work (EBMI-F). There has been a series of conferences (biodiversity in Europe) in Riga, Budapest and Madrid which might have produced some proceedings. They have been unable to give a clear cut defination to biodiversity hence can not value it. Different states with different organisation working on biodiversity as well as different ways of presenting reports make the hold exercise cumbersome. Germany for example has 16 states with 16 different ways of handling reports (Wiegleb personal communication & Hoffmann et al. 2005). Data published

recently by a Bioplateform Deutschland on the web is the beginning of progress in Germany which will be quite enlightening.

In the whole of Europe, initiatives in single member countries have given some appreciable results. The best biodiversity monitoring system can be found in the United Kingdom (UK). They include the UK biodiversity action plan (UKBAP) consisting of UK biodiversity partnership run by the department for environment, food and rural affairs (DEFRA), UK biodiversity reporting and information group (BRIG), UK biodiversity research advisory group (BRAG), and country biodiversity group responsible for monitoring in England, Wales, Scotland and Northern Ireland. DEFRA is also carrying out the country's side survey and quality of life counts (QOLC) as well as the bird census data. This has made Great Britain to be able to come out with clear cut values of some wildlife. In Great Britain, wildlife contributes 4.8 billion pounds with 3 billion coming from recreation, 8.7 million from hunting, 11.8 million from bird watching, 14 million from deer stalking, 9.2-16.9 million from fishing, 10 million from wild game, 20 million from green products (thatching spars), 200 million from edible plants (herbal medicine) and 10 million from invertebrates Smart (2004).

While most human activities are priced in some way or other, there is a temptation to ignore species conservation values as a function of the non-existence of prices. No price means no value. The conservation of species does have value but no easy means of interpreting that value is generally available (Jakobsson & Dragun, 2000). Attempting to value species is one step towards improving policy and decision making and using wildlife resources more appropriately. Economic valuation of biodiversity is based on an instrumental perspective on the value of biodiversity. The theoretical basis of economic valuation is monetary (income) variation as a compensation or equivalent for a direct and indirect impact(s) on the welfare of humans due to certain biodiversity change. Nunes & van den Bergh (2001) gives some reasons why a value should be put on biodiversity. Making public decisions which affect biodiversity implicitly means attaching a value to it, and that monetary valuation can be considered as a democratic approach to decide about public issues. Economic valuation of biodiversity leads to monetary indicators regarded as common unit for comparison and ranking of alternative biodiversity management policies just like species richness indices. Valuation is used to justify biodiversity protection measures since humans use biodiversity for production and consumption.

The preservation of endangered or threatened species of animals requires protection of the individual species. The cost of such conservation to society can generally be easily measured. In order to determine the economic efficiency of specific protection programs, however, it is necessary to compare these costs to some estimates of the economic benefits of preservation Chambers & Whitehead (2003). While many people find putting a dollar value on our wildlife unpalatable, others have developed a taste for it. The Australian Academy of Science (Last accessed date 20/12/2005) gave examples that the kangaroo industry (mainly skins but more recently meat for human consumption) is estimated to be worth around $245 million a year. The plant-based bush foods industry, which markets products such as the Kakadu plum (*Terminalia ferdinandiana*), roasted wattle seed (*Acacia sp*) and quandongs (*Santalum acuminatum* and *Santalum lanceolatum*), was worth $14 million in 1996 and is growing rapidly. And there is more to it than food. Many Australian animals are popular as pets such that reptile enthusiasts have been known to fork out more than $2000 for a single live green tree python, while overseas bird-keepers hardly squawk while paying $9000 for a red-tailed black cockatoo. The wildflower industry is also blooming, earning an estimated $46 million for growers in 1998. The recent expansion in the commercial use of Australian wildlife has sparked a keen debate whether these practices will lead to better conservation or they will threaten the survival of species?

Nunes & van den Bergh (2001) also brought out some of the shortcomings of a biodiversity valuation exercise saying that valuation should focus on change and not levels of biodiversity. Biodiversity is often discussed in a global or worldwide context, so valuation of biodiversity studies frequently address policy changes at local, regional or national levels. Even if biodiversity is taken at different levels (genes, species, and ecosystem) or multiple levels, it leads to double counting. Insufficient knowledge and understanding of the human and economic significance of almost every form of life diversity complicates it translation into monetary value. The assumption that laypersons cannot judge the relevance and complexity of biodiversity ecosystems-functions relationships.

Many studies have been done on valuation of species preservation focusing on single animal species. However, most welfare gains accrue to the individuals and are based on recreation activities such as watching threatened or endangered species in their natural habitat. Kooten (1993) assessed the economic value of waterfowls in a wetland region in Canada. Loomis & Larson (1994) valued emblematic endangered species, namely, the gray whale, and Stevens et al. (1997) valued the restoration of the Atlantic salmon in one river in the state of Massachusetts.

Valuation can also be used to consider public values to resources and encourage public participation in certain initiatives. The outcome of valuation may be applicable in environmental assessment processes and decision-making by providing a reference value against which other economic factors could be compared in order to determine the significance of environmental effects. Economic value means in economic theory exchange value, the value of the benefit is generally determined by the price that is the quantity of money for which if will be exchanged. However, the value of a benefit is not implying the price of that product on the open market. It is rather, the worth of that benefit to a potential buyer. This is measured in economic terms as willingness to pay. There are many other forms of value beyond market economic terms including subjective and intrinsic values. These values are particularly important in environmental conservation in general. Therefore in determining the value of a wildlife species, one is trying to determine people's willingness to pay for benefits ranging from aesthetic beauty to recreational opportunities. The problem with using willingness to pay to measure the value of wildlife species is that it requires a carefully designed survey, so it is not straight forward as market price. Nonetheless, there is growing evidence of consumer's willingness to pay for ecological benefits. An overview is given in table 8.

Table 8: Some valuations of biodiversity Nunes and van den Bergh, (2001)

Biodiversity level	**Biodiversity value type**	**Value ranges**	**Method (s) selected**
Genetic and Species diversity	Bioprospecting	From $175,000 to $3.2 million	MC
Ecosystems and natural habitat diversity	Single species	From $5 to 126	CV
	Multiple species	From $18 to 194	CV
	Terrestrial habitat (NU)	From $27 to 101	CV
	Coastal habitat (NU)	From $9 to 51	CV
	Wetland habitat (NU)	From $8 to 96	CV
	Natural areas habitat (R)	From $23 per trip to 23 million per year	TC, TR
	Wetland life-support	From $0.4 to 1.2 million	RC
Ecosystems and functional diversity	Soil and wind erosion protection	Up to $454 million per year	RC, HP& PF
	Water quality	From $35 to 661 million per year	RC, AE

MC – Market Contracts, CV- Contingent Valuation, TC- Travel Cost, TR- Tourism Revenue, RC- Replacement Cost, HP- Hedonic Price, PF- Production Function, AE- Avertin Expenditure, NU- Non-Use, and R- Recreation.

This break down is yet to be included the studies of developing country. Cameroon has however identified the contributions of biodiversity in the national economy but further studies need to be done at the various levels of biodiversity (see Table 9).

Table 9: Biodiversity contribution to the National Economy in Cameroon MINEF (1997)

Sector	**National GDP contribution (%)**
Petroleum	59.4
Agriculture	26
Fisheries	0.8
Wildlife	0.3
Forestry	14.7
Total	99.2

This information came as a result of compilation of reports by a selected panel from the task-force of the National Biodiversity Strategy and Action plan that represent key ministries and the main NGOs that interfere with biodiversity processes and activities in the country. They came out with a draft copy submitted to the main key players within the institutions and various sectors involved in biodiversity before being approved by government. The draft copy was then sent to UNEP head quarters in Nairobi for examination and criticism and later sent to the Secretariate of the CBD which was tabled to the fourth conference of parties (COP 4) UNEP (MINEF 1997). Biodiversity for my study can be considering only wildlife and fisheries though to a greater extend, forestry can be included and on a larger scale agriculture but when petroleum is coming in, it will be biodiversity in the ancient meaning (Wiegleb's personal communication). O.8% is missing in the above total which keeps me wondering why and where it must have gone.

5.4 MEASURING ENVIRONMENTAL VALUE

Surveys that measure our willingness to pay for certain benefits net value is desired (the gross value of a benefit less the cost that must be incurred to receive that benefit). As naturally occurring assets, wild species provide most of their benefits at little or no cost to society and therefore tend to have high net values. Efforts to put an accurate dollar value are limited by:

Scientific understanding of these complex natural systems. Current economic methods for establishing the value of the non-market benefits produced by: species conservation, time and resources. Instead of trying to judge the total value of conservation, the focus is often on calculating the net value of specific species benefits that will be affected by a development or other change. Though many valuation studies determine only a fraction of species conservation total value and in some cases this partial valuation may prove inadequate for decision-making. Therefore the challenges and limitations, because economic valuation of natural resources allow a better measure of overall economic efficiency.

5.4.1 CENSUSING

Biological diversity can be quantified in many different ways and at many different levels (assessment based on species richness, bases on indexes, based on phylogenetic diversity, based on faunistic complementarity, based on regional threat of extinction, based on continent wide threat of extinction, based on reconstructability of habitat, based on population size and assessment based on aggregation for decision-support Wiegleb (2003). Commonly, however, we choose species richness because this is sensible for practical and fundamental reasons. For many organisms that move around, such as Derby Eland and African Wild Dog, carrying out a census is not easy. It can be easy for stationary organisms such as trees or barnacles; one can count the individuals in an area if the area is small. However, if you need to estimate the number of trees in a 1000 hectare forest or of barnacles on a rocky shore, it is only necessary to count several sample areas. From the numbers in the sample areas you can estimate the total number or you can work out the average population density of the trees per hectare or barnacles per square meter. You can follow this procedure:

1. Define the whole area (A) in which the population is to be estimated.
2. Choose a small sampling unit (area *a*). This is an area in which you expect to be able to see and count all individuals. For example, your sampling unit might be a rectangle with an area of 1 square meter. Ecologists call these sampling units quadrants.
3. Choose a sample size (n). This is the number of quadrants that you will select in area *A*. The selection of quadrants must either be random (if you can select a lot of quadrants) or representative (if you are restricted to only a few).
4. Count the number of individuals in each quadrant.
5. Find the average number of individuals per quadrant. To do this, divide the total number of individuals by the number of quadrants.
6. Calculate the estimated number of individuals (**N**) in the whole area, as follows:

Total population = Average number per quadrant × Total area/Area of quadrant. ……..... (1).

Of course, your estimated number of individuals (*N*) is not the actual number of animals in the area, but a reasonable approximation. How close it is to the real number will depend on how large *a* and *n* are. The more quadrants you select, and the larger each is, the better the estimate will be, but more (and larger) quadrants require more time and effort.

Calculating the population density is simple once you know the total number of individuals in a population and the total area. Divide the total number of individuals by the total area and express the result as number of individuals per unit area (Cappo et al. 2004).

5.4.2 HARVESTING METHODS

Removal is sampling the number of organisms removed from an area in successive samples. This can be plotted on the y-axis of a graph and the number previously removed plotted on the x-axis. If the probability of capture remains reasonably constant, the points will fall on a straight line that can be extended to the zero point (x-axis), which would indicate theoretical 100 percent removal from the area (Zippin, 1958, and Menhinick, 1963).

There is considerable potential for harvesting various different animal and plant species in but this is constrained by certain trade and veterinary regulations. CITES regulations prevent earning revenues from international sales of endangered species products, and the Cameroon environmental law 1994 controls frustrate the possibilities of earning revenues from live game sales of certain species. What is the economic cost of these restrictions?

As indicated above, there are innumerable potential uses for wild resources by local people. It is almost impossible to determine a market value for these, and also pointless. The total economic use value of harvestable resources may not be impressive when seen as a single figure, but to the multitude of disadvantaged local communities living on park boundary, these resources represent a significant opportunity to improve their well-being.

Sustainable community harvesting not only represents an opportunity for economic development, but it can help to create strong institutional incentives for grass-roots conservation. Allowing local people to harvest wild resources can create strong psychological bonds between the people and the land in its natural form. When this is linked to a measure of ownership of the resource rights, the incentives created are potentially very powerful. The concept of sustainable use and incentive-based conservation were pioneered in IUCN (The World Conservation Union).

The convention on Biological Diversity (CBD) mentions sustainable use in 13 of its 19 substantive Articles. Specificically, to "Protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements" (Article 10); and "adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity" (Article 11). In contrast, protection of species and habitats is mentioned in 2 of those 19 Articles. Protected areas can aid this sustain-by-use approach by supporting core populations. Moreover, residual low-productivity areas tend to be refuges for rare species, which can inhabit conservation through sustainable use of wild resources.

IUCN and the Addis Ababa Principles & Guidelines for sustainable Use (AAPG) were developed faced with continuing concerns about the sustainable use, IUCN adopted a policy statement (IUCN 2000) with a conclusion that "Use of wild living resource, if sustainable, is an important conservation tool because the social and economic benefits derived from such use provided incentive for people to conserve them". IUCN also worked with CBD to develop the Addis Ababa Principles and Guidelines for the sustainable Use of Biodiversity (AAPG), which can be summarized as follows.

Sustainability of use of biodiversity will be enhanced if there is:

- Supportive and linked governance at all levels
- Empowerment and accountability of local users
- Adaptive management using science, local knowledge, monitoring and timely feedback
- Transparency and international co-operation
- Public awareness of the benefits

Man is part of the ecosystem. Excluding human activities out of nature is like fighting against man. Efficient nature conservation cannot act against people, it rather acts with people. "Sanctuarizing" nature and biodiversity is a dangerous itinerary for conservation, as it is not sustainable. Since the human factor is becoming major, it must be taken into account. Harmonizing nature and mankind therefore is a safe way for targeting human development together with nature conservation so as to achieve the benefits such as; conflict Resolution, resolving all sort of conflicts, making natural resources utilization sustainable, optimizing production and reducing negative environmental impacts. All of these work for long term goals for the planet's sake.

In the Faro and Benoué National Parks which should be the world's greatest system of land dedicated to the conservation of wildlife going by the definition of a National Park. It is a system

founded in faith; a belief that, in a country as bountiful and diverse as ours, there ought to be special places that are set aside exclusively for the conservation of wildlife. These special places are appropriately enough, the conservation needs of wildlife paramount. Therefore with this faith, the central, overarching purpose of the National Park is, and should remain the conservation of wildlife and their habitat. Wildlife conservation dominant goal and compatibility wildlife dependent recreation as a priority public use should be the focus. If wildlife conservation is our purpose, the opportunity for compatible recreational uses is the important benefits that flow for this purpose. And so, local people might harvest various resources for building materials, craft materials, ornaments clothing, dyes, fuel, food and traditional medicines. There is also potential for them to become involved in trophy hunting and commercial harvesting.

5.4.3 REPLACEMENT RATE

Population decline will occur when mortality exceeds recruitment, either because birth rates are low, or because mortality of adults or juveniles is high. Population viability analyses indicate that wild dog populations are relatively resilient to changes in the proportion of females breeding, and the mortality of pups, but that small increase in adult mortality can greatly increase the probability of local extinction (Ling, 1998). Given the current population growth rates, it is likely that demand for bush meat will increase by 2-4% per year; a rate that exceeds the replacement potential of already over-hunted wildlife populations (BCTF, 2002) though Faro, Benoué and Bouda Ndjida National Parks are located at the savanna region where wildlife populations are believed to be very productive than their counterparts in other regions. Alternatives of wildlife animals (domestic stock) are primarily viewed as saving and insurance rather than as sources of protein (BCTF, 2002). Hunting is very profitable in the short term offering poor families lucrative income.

The Derby Eland is hunted for trophies and as live animals comprising a highly lucrative trade in north Cameroon but most of which does not appear in official statistics. Hunting trophies particularly the horns of Derby Eland are exported to Germany, the United States and Mexico. There is no effective control over the collection of these species and very little control over export. It is a highly corrupt trade with very high waste. The footprints of the developed world are very clear on export of Cameroon's biodiversity. Sport hunting represents another footprint of the Western world on Cameroon's biodiversity. The principal species affected are Elephants, Bongo and Derby Eland. Sport hunting is socially disruptive where local communities are antagonizing and marginalized. It is hard for local communities to understand why their own

hunting necessary for existence and economic survival, is illegal, while sport hunting, a pastime in which only the horns or tusks are taken, is legal

So many companies like Four Star Adventures, African Trophy hunting, Fauna Safari Club just to name a few make a lot of money from this industry. The table below is a sample price list for the purchase of hunting licenses for the hunting of Derby Eland in Cameroon.

The South African Hunting Industry, with its annual turnover of R700 million employs approximately 60,000 mostly illiterate rural people (and supports approximately 250,000-300,000 dependents through those employed), can be divided into four categories of hunters. (See table 10).

Table 10: Example of organization and management by Safari Club International African Chapter

Category	**Annual Participation**	**Economic Contribution (Rands)**
Professional hunters (not bound to a specific area of operation, so operate in various countries)	2000 active + 2000 ad hoc	R 125 million
Visiting International hunters (hunters seeking specific species of certain minimum horn or trophy size)	7500	
Dedicated Amateur hunters (trophy or biltong hunters or both bound to specific areas of operation)	- 250,000 or + 250,000	R 500 million
Occasional Amateur hunters (trophy or biltong hunters or both bound to specific area of operation)		
Total	**295,000**	**R 625 million** (+ further R75 million for downstream industries)

CHAPTER SIX

6.0 MATERIALS AND METHODS

Permission for free access into the National Parks was sort and granted by the Minister of Environment and Forest (MINEF) and the Minister of Nature and Protection (Appendix VIII & IX) respectively from Yaoundé Cameroon. Two types of data were utilized in this study (secondary and primary data). Secondary data was collected from the library of World Wildlife Fund for nature (WWF)-Savannah region Garoua, delegation of MINEF and MINITOUR Garoua. Primary data was collected during field work in the months of January to April of the year 2005. This period corresponds to the dry season where the vegetation cover is less dense and the rivers (Mayos) tributaries of the big rivers Faro and Benoué are accessible.

6.1 QUESTIONNAIRES

Preparation of questionnaires was based on guide book for mail questionnaire surveys developed by Dillman (1978). Questionnaires were close ended question with formal interviews. The sample size was large (over 100) hence was randomly done to draw from the population (all individuals) who had an equal chance of being chosen. This was done essentially to minimise bias.Test questionnaires of the English and French versions were administered to 60 Cameroonian students on the Brandenburg University of Technology campus. Three hundred copies of the final version were distributed to villagers around the parks, competent personnel of the delegation of MINEF and MINETOUR at the province, division and sub-division, owners of hunting zones (ZIC) in the months of August to October, 2004 (Appendix III). The questionnaires consisted of several parts each proceeded by a short text explaining the subsequent questions. Answers were given a scale ranging from very important, important, somewhat important and not important. Respondents were asked to rate the importance of each value. As a guiding principle in my values (not important, somewhat important, important and very important) were presented for a choice. The question targeted the general public because they can give valuable information on wildlife distribution, abundance and even trend (Marks, 1996).

- Questions on expectations for the future generation having and enjoying wildlife were asked as statements and respondents asked to rate on a 4 point scale (1- not important to 4- very important).
- General problem awareness was assessed with two items.

- Finally the dependent measure, willingness to cooperate in paying for resource conservation was assessed with two items. The respondents were asked to indicate how much they were willing to pay.

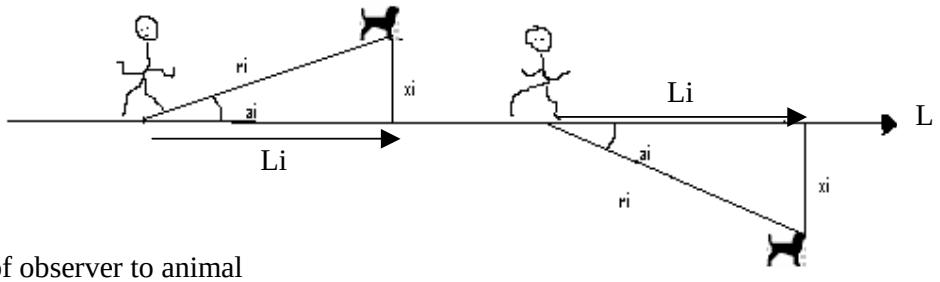
6.2 ECOLOGICAL SUSTAINABILITY

6.2.1 LINE TRANSECTS

Inventory of some wildlife was done during the dry season in the months of January to April 2005. The method used was a foot survey for the species observation along a line transect. Tracking (dung, foot prints, food remains, urine and sounds made by animals) were some of the indicators. Line transects were marked out using prepared geographical information systems (GIS) maps of the parks at intervals of 7km. A non replicate daily walk along transects of 500m and recky transects of 1500m were effected. Replicate walk could not be made because of difficulty of access and the large size of the study area. A recky is a zig-zag walk following a particular bearing. In a recky, you can deviate from the line transect but the angle of deviation must not be more than 60 degrees. This deviation can be as a result of obstacles, animal trail for the benefit of gaining time and reducing damage. Line transect bearing is a walk only at 80 degrees but with recky walk you can deviate between 20 and 40 degrees. A recky can take up to 100km while line transects are only 5km.

The Principle of line transect method is illustrated in figure 11

There is a line called transect walked by observers in which the perpendicular distance of an object detected by an observer from the line is measured. In general, many transects with length L1, L2, L3…Lk are walked so that their total length (L) is known. In practice, it is easier estimating the distance of the observer to the object *ri* and the angle *ai* than the perpendicular *xi*. The perpendicular distance xi is also *ri* sin (*ai*).



ri - distance of observer to animal

xi - perpendicular distance of animal to the line transect

ai - angle of observation of animal from the walking line.

li - distance walked.

Figure 11: Principles of the line transect

Assumption of the line transects method are:

- The probability of detecting animal dung decreases with increasing distance from the line of travel. As well as the probability of seeing objects at different distances will depend on the density of the vegetation.
- Objects on the line are detected with certainty.
- Objects are detected at their initial location.
- Measurements are exact.

Indirect observations of animal dung (see figure 12 for the dung of the Derby Eland) were recorded alone side perpendicular distance unto many field data collection sheets (Appendix VIII) making use of a compass, an instrument for the measurement of distances called “topofil”, a pair of binoculars (Luxon 8 X 25) and a GPS (Garmin 12 XL) for latitudes and longitude coordinates. Data collection was done by a team of six persons (a compass bearer, a field recorder, a field guide and three carriers) all from seven boys from the villages trained (as community hunting guards) by WWF years passed on techniques for field data collection by line transect. The data collection was preceded by two days of acquaintance on line transect. The transect walk was between 7.00 -17.00 (Burnham et al., 1993 and Barnes & Jensen, 1987) at an average speed of 1 Km/h.

Figure 12: Dung of Derby Eland in Benoué National Park April, 2005

6.2.2 GEO REFERENCING AND SATELLITE IMAGERY

The counting starts as soon as the starting point is determined and the geographic coordinates determined with the aid of the GPS, compass oriented and field guide in a good direction. The move is done and the compass surveys permanently as the team maintains the direction of the transect. The length of the transect measured by the "topofil" and as soon as an animal is seen, the information is recorded immediately on the data sheet appendix VIII. These coordinates were then converted from degree/minutes/seconds to decimal degrees using the formula in Microsoft Window Excel 2003 =+ (E2+F2/60+g2/360). This result was incorporated to satellite images 5 landsat – 7 ETM+ satellite images (path/row), acquisition data: 184/54, 184/55 and 185/55 for 1999 and 2000 from Global Land Cover Facility (date of last access 22/12/2005). Because of familiarity and consistency in satellite image interpretation, the band combination (layer stacking) was done using TM band 1 (green), TM band 2 (Blue), TM band 3 (red), TM band 4 (near infrared), TM band 5 (mid infra red) and TM band 7 (violet) display. The compilation of information was based on satellite image interpretation, satellite image vegetation classification and mapping. Satellite images of the IUCN limits for protected areas was then downloaded and added using the program ERDAS IMAGINE 8.6.

Species information collected from the field using GPS prepared in excel and saved as data base file (dbf) was later used as the data base for the species visualization in ArcGis (Arc map). This information was taken at every observation point and imported into a GIS to compare survey intensity and ditribution in the study area. ArcGis allows four types of features to be created in

the shape file format amongst which is the point feature type. A point is a single location on a map representing a specific feature. Each point has its own row in the data table describing the attributes of the point. The limits of the two parks were then cut using Editor in ERDAS 8.6

6.2.3 ESTIMATING ANIMAL DENSITY

Density was calculated using the computer software program DISTANCE (Buckland et al. 1993), using the formula.

$D = N/ (2Lwp)$…… (2).

Where

D - Density

N - Number of objects detected

L - Length of transect

w - Critical width of transect

2Lw - Area of detection zone

P - Detection probability

Density of animal = Number of objects detected (N)/ Area of detection zone and the detection probability (i.e. critical width (w) multiplied by transect length)……...…… (3).

The denominator is multiplied by two (2) because there is a detection zone on each side of the transect line (whose sum is the observation diameter).

6.2.4 DETECTION PROBABILITY

Detection probability is estimated by assuming that object detection distances are normally distributed. The normal distribution provides just the right shape for representing how detection probability decreases with increasing distances from the transect line. It has a value of 1 at zero distance which corresponds to the assumption that the detection probability falls off as object get further from the transect line. The critical point is the distance at which 95% of objects are expected to be detected at distances smaller than the critical distance. We can call it the critical width "w" and the interval between distance zero (the transect line) and w the "detection zone".

If we choose a detection zone which is expected to include 95% of objects, detection probability is always 0.607, no matter how wide the detection zone is (Walsh, 1998).

The procedure involves the following steps.

- Take the square of perpendicular distances for each object detected
- Sum the squares
- Divide the sum of squares by the sample size minus one. This is the variance of your distance data
- Locate the variance estimate on the horizontal axis
- Move vertically up from the horizontal axis until you intersect the curve
- Move horizontally from the curve to the corresponding point on the vertical axis. This is the estimated width of the detection zone (w)
- Detection probability (p)

At the end of the study, animal observations that were less than 30 did not allo the use of the Distance program for their analysis of density. Instead, the encounter rate or Kilometric Index as a measure of relative abundance without giving information on density was used.

6.2.5 ESTIMATING THE BIOMASS OF DERBY ELAND

Biomass = Population * Average weight (Plumptre & Harris, 1995) …..……..…… (4).

A measure of the abundance of an animal in term of the mass (weight) of the animal, stated as the total mass of the animals in a given location or per unit area. This method is unconvincing if the young population constitutes an important proportion of the population; so the biomass will be over estimated. Average weights suggested by Stark (1986) and Drent & Prins (1987) were used in the study. However, biomass is projected based on trends in hunting effort, stock abundance and appropriate factors. Biomass is the total quantity of animals in a stock and is usually measured as the total Kg of animals but could also be numbers. Biomass limit (B lim) is the quantity of biomass below which a stock is considered depleted and in need of a rebuilding plan to increase the stock's abundance until it reaches B msy. Biomass at MSY (B msy) is the same as MSY stock size. This maximum as adopted by the Mid-Atlantic Fishery Council is FMSY – 0.22 or about 35% of the BMSY level and the minimum biomass threshold is ½ BMSY (Mid- Atlantic Fishery Council Last date of access, 20/12/2005).

6.2.6 ESTIMATING THE RATE OF REMOVAL OF WILDLIFE

Rate of removal therefore is how off-take is changing and a number of important population characteristics are concern with rate. A rate may be obtained by dividing the change by the period of time elapsed during the change; such a rate term would indicate the rapidity with which something changes with time. Removal rate is the number of animals taken off from the national park per hour. This is obtained by dividing the population removed per time elapsed

Removal rate = DN/Dt ……...…… (5).

Other harvesting methods include sport hunting a form of tourism, which involves limited and selective removal of certain animal species. Commercial harvesting entails large-scale removal of animal material for commercial purposes and community harvesting involves small-scale removal of material by local people for mainly subsistence purposes. Commercial harvesting was possible to investigate as data from the provincial service for wildlife in the provincial delegation of Environment and Forest (MINEF) was consulted. Community harvesting is not authorized and this practice is done by poachers which could not be accessed since game guards and a patrol team constantly visit the one day weekly local markets checking meat and trophies.

6.3 CONTINGENT VALUATION (CV)

This is a relatively new methodology of valuing biodiversity by asking people directly about their preferences. Though the total value of biological diversity may be unknown, it is indicative that it is essential to human existence. The method will be applied to the conservation of an endangered species (Derby Eland) and a threatened species (African Wild Dog) in two national parks, Cameroon. This CV method will provide information relevant to decision making processes based on monetary economic considerations. CV is a survey method, simply asking people about their values for environmental goods through surveys and direct questioning where there are a number of alternatives that have to be compared and valued, each with different combinations and quantities from their most to their least preferred. Each alternative in the choice set differs from the others in the levels of its component attributes, and the cost which the respondent would incur as a result of the choice. Benefits are measured directly rather than inferred. The underlying idea is that individuals have true, hidden preferences for environmental goods, such as species conservation, which they will reveal if they are asked the appropriate questions.

6.4 ECONOMIC FEASIBILITY

Analysis by Coursey (2002) was based on outcomes looking at total population of Derby Eland in a defined study area. Then look for the total amount of spending by the government on each species and divide this expenditure by the total population of that species. The result is a measure of value, not value defined by biological importance, but a measure of how much the nation benefits from each member of the species.

CHAPTER SEVEN

7.0 RESULTS

7.1 FIELD WORK

7.1.1 DENSITY OF SOME WILDLIFE SPECIES OF FARO NATIONAL PARK

The results of the densities of some wildlife species in Faro and Benoué National Parks could not be calculated to a certain degree of success using the program DISTANCE. However, a few examples are presented below in which some calculations were made achieving a certain degree of success in that the log result was not green (indicating total success) nor red (indicating failure) but amber in colour (indicated no error but some warnings). Repeated analysis and running the program using different model gave no big changes. As a rule of thum, since observations for these species were above 30, there was the assurance in using the progam DISTANCE 5.0. Density of *Kobus kob* in Faro National Park was 0.39 Kob/ km^2, effort 1274, distance 26 Km, encounter rate 10.1, cluster size 82.2, % coefficient of Variation 16.25 and the 95% confidence Interval of 0.28 – 0.54. Figure 13 below show the detection probability of 7.6.

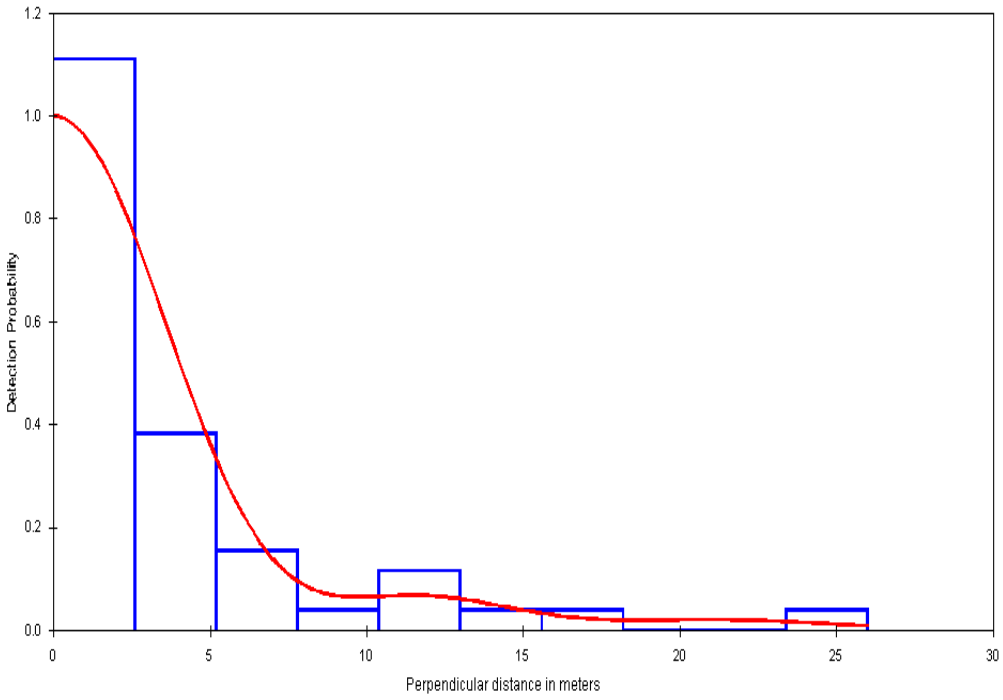


Figure 13: Detection probability of *Kobus kob* in Faro National Park Cameroon

Density of *Kobus kob* in Benoué National Park was 0.28 Kob/ km^2, effort 21 Km, distance 18 Km, encounter rate, cluster size 22.3, % coefficient of Variation 29.3 and the 95% confidence Interval of 0.13 – 0.59. Figure 14 below show the detection probability.

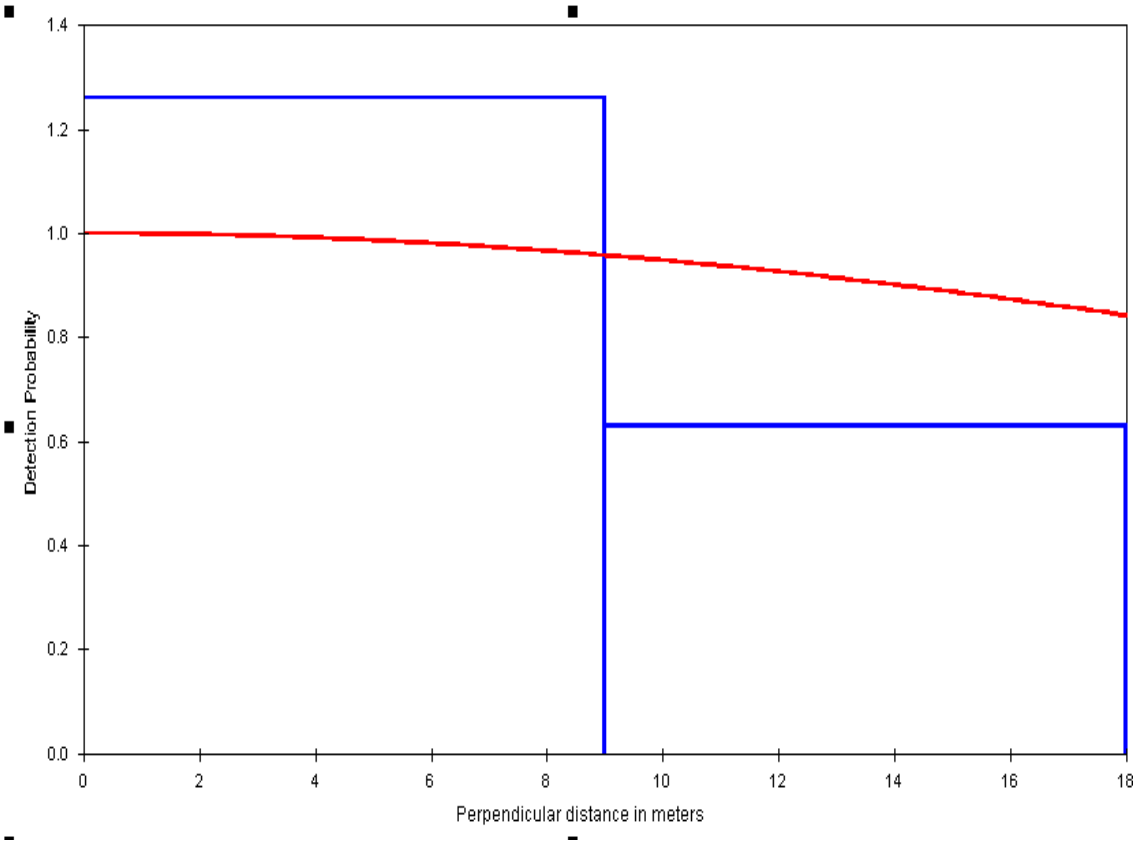


Figure 14: The detection probability of *Kobus kob* in Benoue National Park Cameroon

Density of *Acelaphus buselaphus* in Benoué National Park 0.4 Hartebeest/ km^2, effort 10Km, distance 25Km, encounter rate 30.1, cluster size 1, % coefficient of Variation 31.73 and the 95% confidence Interval of 0.14 – 1.07. Figure 15 below show the detection probability 69.9.

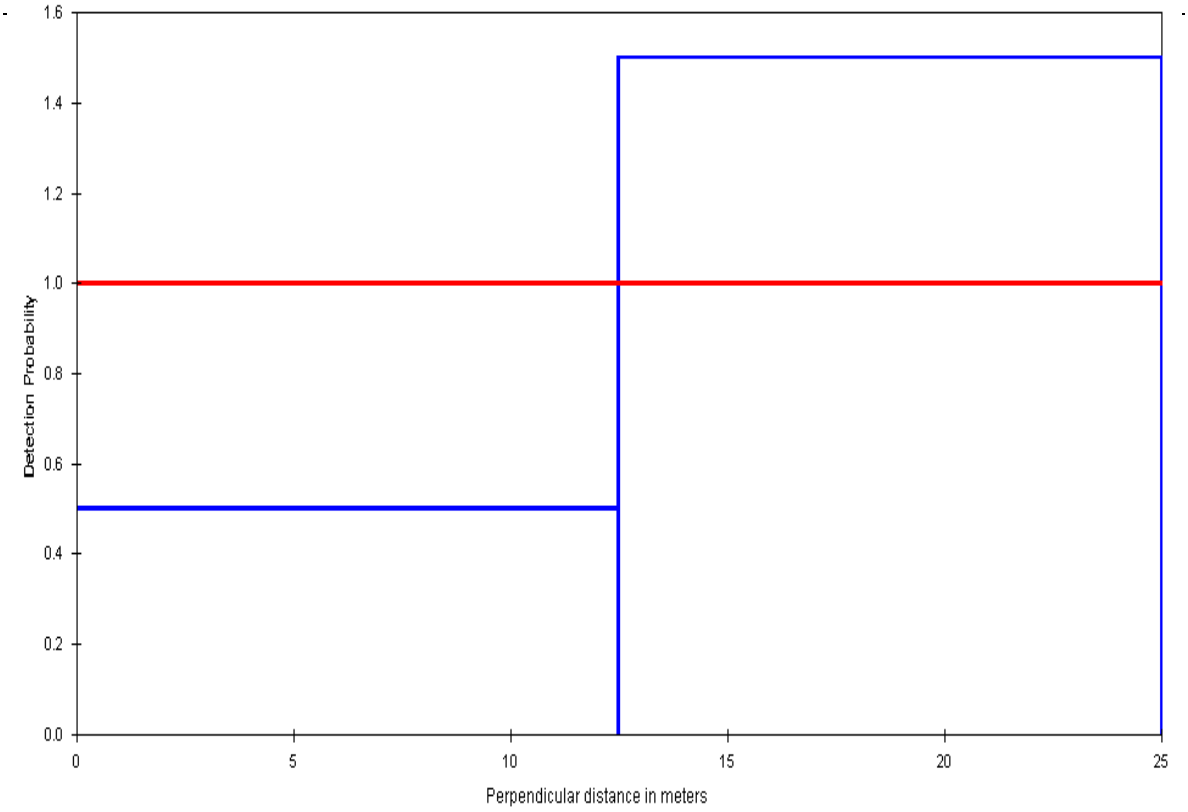


Figure 15: Detection probability of *Alcelaphus buselaphus* in Benoue National Park Cameroon

Other species whose observations were less than 30 could only be used to calculate the encounter rate and other ecological parameters.

7.1.2 ENCOUNTER RATE

Table 11 below, shows the encounter rate of some wildlife species observed directly in Faro and Benoué National Parks. The encounter rate was calculated manually because there was low observation (less than 30 animals) to meet up with the standard for the use of the DISTANCE program for the analysis of encounter rate. This estimate does not take into consideration the dung but an account of direct observation of animal species because it gives an impression of the frequency with which a game watcher or sharp shooter can easily come in contact with the species while covering a specific distance. Measured with the kilometric index (KI), KI is obtained by dividing the number of directly observed species by the total distance covered. Therefore on Table 11, (the measuring units kilometric index of abundance IKA is a bio-indicator as a judgment of how often a person comes in contact with a particular species walking a kilometer square to characterize

the abundance of the population) values obtained are compared with standards. When IKA is less than 0.3 – it is weak, between 0.3 and 0.5 – average and greater than 0.5 – high (based on sufficient frequency contact with animals) Vincent et al. (1991).

Table 11: Encounter rate (kilometric index KI) of some wildlife of Faro and Benoué National Parks

Species	**Faro National Park**			**Benoué National Park**		
	No of Observations	**Distance (Km)**	**KI (km)**	**No of Observations**	**Distance**	**KI (km)**
Taurotragus derbianus	10	108.5	0.009	45	69	0.65
Alcelaphus buselaphus	06	108.5	0.005	-	-	-
Syncerus cafer	-	108.5	-	-	69	-
Loxodonta africana	-	108.5	-	60	69	0.87
Ourebia ourebi	07	108.5	0.006	04	69	0.06
Panthera leo	-	108.5	-	-	69	-
Panthera pardis	-	108.5	-	-	69	-
Crocuta crocuta	-	108.5	-	-	69	-
Giraffa camelopardalis	-	108.5	-	02	69	0.03
Potamochoerus africanus	01	108.5	0.01	11	69	0.1
Redunca redunca	12	108.5	0.01	-	-	-
Total	**36**	**108.8**	**0.04**	**122**	**69**	**1.71**

The dash signs (-) on table 11 imply that the animal species were not observed in the National Park in question. The animals are not omitted because of the significance of the observation of their traces and their importance in creating conservation awareness.

108.8 km and 69 km of survey was walks were conducted in Faro and Benoué National Parks respectively. 12 wildlife species were recorded by direct observation with the total encounter rate of 0.04 animals/ km^2 and 1.71 animals/ km^2 in Faro and Benoué National Parks respectively.

7.1.3 ESTIMATION OF BIOMASS

Table 12: Estimation of the biomass of some wildlife in Faro National Park (1/4 of 3,300 km^2)

One quarter (1/4) of 3,300 km^2 implies that only a quarter of the total surface area of 3,300 km^2 of land cover of Faro National Park was covered for this studies ie 825 km^2.

Species	**Average weight (AW) in kg**	**Observ-ation (O)**	**Total Biomass AW * O**	**Contribution to Total Biomass (%)**	**Biomass (kg/ km^2)**
Taurotragus derbianus	800	10	8000	60.49	9.69
Alcelaphus buselaphus	160	06	960	7.25	1.16
Kobus kob	70	55	3850	29.11	4.67
Ourebia ourebi	20	07	140	1.05	0.16
Loxodonta africana	5300	-	-	-	-
Potamochoerus africanus	80	01	80	0.06	0.09
Giraffa camelopardalis	800	-	-	-	-
Redunca redunca	16.2	12	194.4	1.47	0.23
Total	**7246.2**	**91**	**13224.4**	**99.43**	**16**

The dash sign (-) on table 12 shows that the animal species was absent. It is significant because the animal species is conspicuous in the other National Park and can be used on the bases of comparison.

On table 12 and 13, average weights of animal species are calculated from standard weights of male and female. The average weight of a species multiplied by the number of that species observed gives the biomass. The total biomass of all species is calculated by summing the biomass of the different species and the percentage contribution by each species is the the species biomass divided by the total biomass multiplied by 100. Therefore, the biomass per hectare can be determined since the total surface area of the different National Parks is known. Calculated values for the biomass can be compared with standard values to determine the threshold at which wildlife species are at maximum sustainable yield (MSY) or at minimum sustainable yield in a National Park. Maximum biomass of wildlife at maximum sustainable yield (MSY) is 0.22 or about 35% of the biomass at maximum sustainable yield (BMSY) level. Minimum Biomass threshold is ½ BMSY (Mid- Atlantic Fishery Management Council, last date of access 20/12/2005).

Table 13: Estimated biomass of some wildlife in Benoué National Park (1,800 km^2)

Species	Average weight (AW)	Observ-ation (O)	Total Biomass AW * O	Contribution to Total Biomass (%)	Biomass (kg/ km^2)
Taurotragus derbianus	800	45	36000	9.68	20
Alcelaphus buselaphus	160	64	10240	2.75	5.68
Kobus kob	70	45	3150	0.85	1.75
Ourebia ourebi	20	17	340	0.09	0.18
Loxodonta africana	5300	60	318000	85.52	176.67
Potamochoerus africanus	80	11	880	0.24	0.49
Giraffa camelopardalis	800	02	1600	0.43	0.89
Cephalophus rufilatus	7	07	49	0.013	0.03
Cephalophus monticla	70	10	700	0.19	0.39
Phacochoerus aethiopicus	80	11	880	0.24	0.49
Total	**7387**	**272**	**371839**	**100**	**206.57**

7.1.4 THE FREQUENCY OF ANIMAL SPECIES IN FARO AND BENOUÉ NATIONAL PARKS

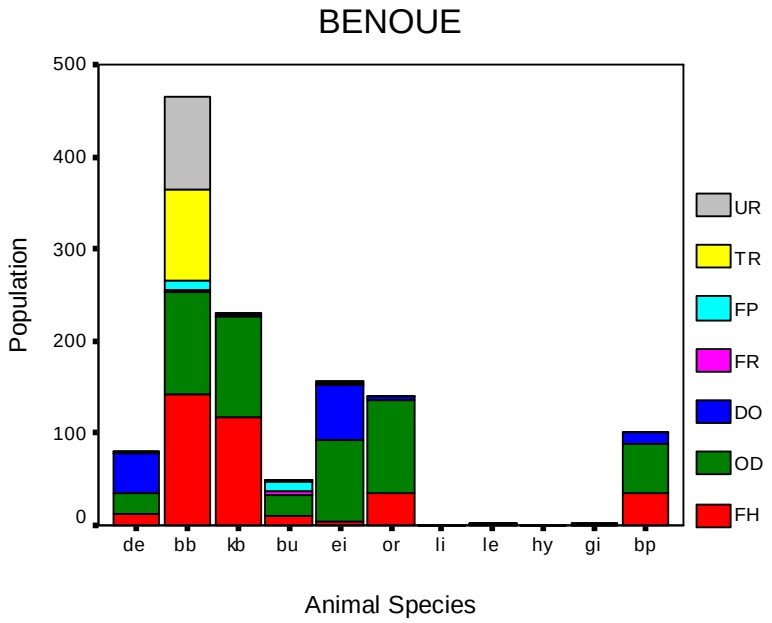


Figure 16: Population estimate of some wildlife in Benoué National Park

On the vertical axis, UR- Urine, TR- Trail, FP- Foot print, FR- Food remains, DO- Direct observation, OD- Old, FH- Fresh and on the horizontal axis, de- Derby Eland, bb- Hartebeest, kb- Western Buffon's Kob, bu- Buffalo, ei- Elephant, or- Oribi, li- Lion, le- Leopard, hy- Hyena, gi- Giraffe, and bp- Bush pig. The vertical axis are the different direct and indirect criteria used to access the frequency of the wildlife in Faro and Benoué National park (Figure 16 and 17).

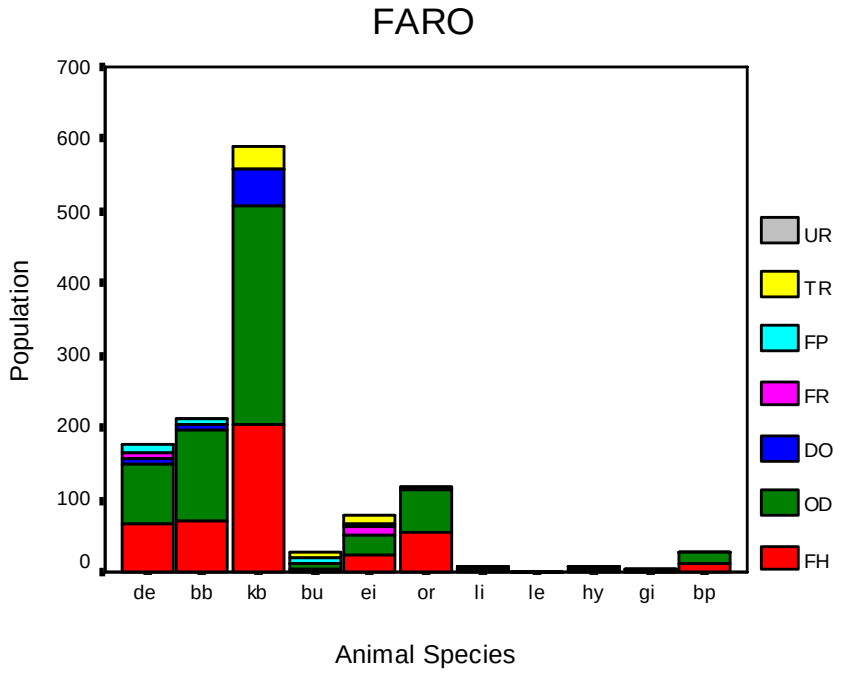


Figure 17: Population estimate of some wildlife in Faro National Park

Figure 16 and 17 gives a comparative population estimate of some wildlife species in Benoué and Faro National Parks using indirect and direct observations of traces of the animals using the principles of animal tracking (tracking is probably the oldest science were a track refers to a single foot or hand print and looking for such, we learn to observe useful details to hunt or to avoid the animal. It is a non-invasive method constituting an important tool for studying threatened species difficult to trap or observe by mark capture recapture method or captive breeding and it can be applied to study rare and nocturnal animals). The importance of tracking is that one can get a good sample size for signs with less time and expense than for sighting. This is because animals are very wary of humans, wheras dung do not flee. Data collection for animals observation census tend to be more complicated than for signs and therefore requires a greater level of training. The results of this study would have been very funny if only direct observations (blue colour) were used but with the help of other indirect methods, the frequencies of the wildlife were determined.

7.1.5 REVENUE GENERATED FROM SOME WILDLIFE IN FARO AND BENOUÉ NATIONAL PARKS

Table 14 and 15 shows an estimate of the economic value of some wildlife in Faro and Benoué National Parks making use of the populations of animals observed directly multiplying by the cost of harvesting or shooting one animal species by a sport hunter. The cost comes from the stipulations in the Cameroon text (Appendix I). The value of biotic resources in monetary terms depicts its conservation statues and its contribution to the welfare and health of the environment in that the higher the value of a resource, it is expected that more attention will be given to its conservation provided the benefit is equitably enjoyed by the entire community. Hence, caters for the welfare of all and its conservation keeps the environment healthy.

Table 14: Estimated revenue from some wildlife in Faro National Park from January- May 2005

Animal Species	**Estimated Number**	**Unit Value (Euros)**	**Estimated Value (Euros)**
Taurotragus derbianus	10	1940	19,400.00
Alcelaphus buselaphus	06	470	2820.00
Kobus kob	55	270	3850.00
Ourebia ourebi	07	155	1085.00
Loxodonta africana	-	1940	-
Potamochoerus africanus	-	310	-
Giraffa camelopardalis	-	1940	-
Redunca redunca	12	270	3240.00
Total	75		**30395.00**
Annual Total			30395.00 * 3 = **91185.00**

The dash sign (-) is not saying that the species in question has no economic value in the park. It is potraying that the species was not observed directly during the study period. However, it was included on the list because traces of the animal were seen and recorded on the field. Besides, observations were done in the other park.

Table 15: Estimated revenue from some wildlife in Benoué National Park from January - May 2005

Animal Species	Estimated Number	Unit Value (Euros)	Estimated Value
Taurotragus derbianus	45	1940	87,300.00
Alcelaphus buselaphus	64	470	30,080.00
Kobus kob	45	270	12,150.00
Ourebia ourebi	17	155	2,635.00
Loxodonta africana	60	1940	116,400.00
Potamochoerus africanus	11	310	3,410.00
Giraffa camelopardalis	02	1940	3,880.00
Cephalop de flank rouche	07	120	840.00
Cephalus de grimme	10	120	1,200.00
Total	123		**257,895.00**
Annual Total			257,895.00 * 3 **= 773,685.00**

From table 14 and 15, since this study was carried out in four months (January – May), the annual value in monetary terms of some wildlife species was projected by multiplying the total estimated economic value from the parks by a factor of three months. This however was done with the assumption that all other factors remain the same which is not the case. Without which the argument that the animal populations can change in the course of the months within species and other fluctuations within the year. To estimate the contribution of some wildlife in the revenue generated from the North Province Garoua, the following calculations were made:

A -Total income generated from North Cameroon extracted from official sources (figure 25) = 96.5 million F CFA which is approximately 148,461,538.5 Euros

B – The cost of wildlife in North Cameroon annually = Annual total Table 14 + annual total Table 15 = 864,870.00 Euros

C - Percentage income generated coming from wild animal resources in North Cameroon = B/A*100 = 864,870/148,461,538.5 * 100

= 0.58%

7.1.6 CRITICAL VALUE FOR WILDLIFE EXPLOITATION IN FARO AND BENOUÉ NATIONAL PARKS

Obtaining a critical value for the exploitation of wildlife is a very important issue. However it is very difficult to come by given the differences in densities, population structure and reproductive performance of the different species. Besides, it could be attempted like in this study by considering data of the big game population hunted over a period of 20 years at intervals of 5 years. A sort of populations exploited over the years from lowest to highest and a 50% percentile gives a critical limit. This critical limit is at a population of 77 animals for annual exploitation. Therefore any exploitation above this limit is putting the population of animals at jeopardy assuming that all conditions of migration, disease or epidemics and human activities remain controlled.

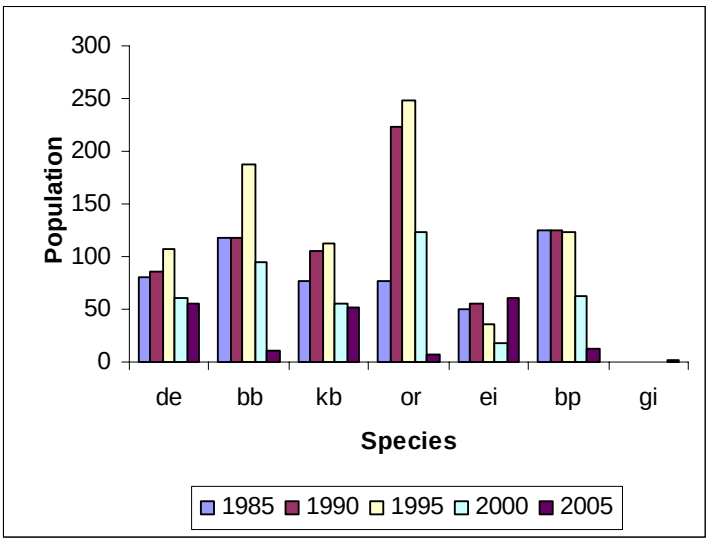


Figure 18: Comparative exploitation of Wildlife in Faro and Benoué National Parks

On the horizontal axis (Figure 15), de- *Taurotragus derbianus gigas*, bb- *Alcelaphus buselaphus*, kb- *Kobus kob*, ei- *Loxodonta fricana*, or- *Ourebia oueribi*, gi- *Giraffa camelopardis*, and bp- *Potamochoerus africanus*.

From fig. 18, with the exception of the Elephant and the Derby Eland, it is clearly visible that the off-take of wildlife from the National Parks for the year 2005 showed a general decline.

7.1.7 DISTRIBUTION OF WILDLIFE IN FARO AND BENOUÉ NATIONAL PARKS

Animal distribution which allows managers and researchers to locate protected and unprotected areas of high biological diversity by targeting specific areas for protection or to allow improved management is shown on figure 19 and figure 20. To reduce ambiguity, the specific case of the Derby Eland is used for demonstration and easy comparison in Faro and Benoué National Parks.

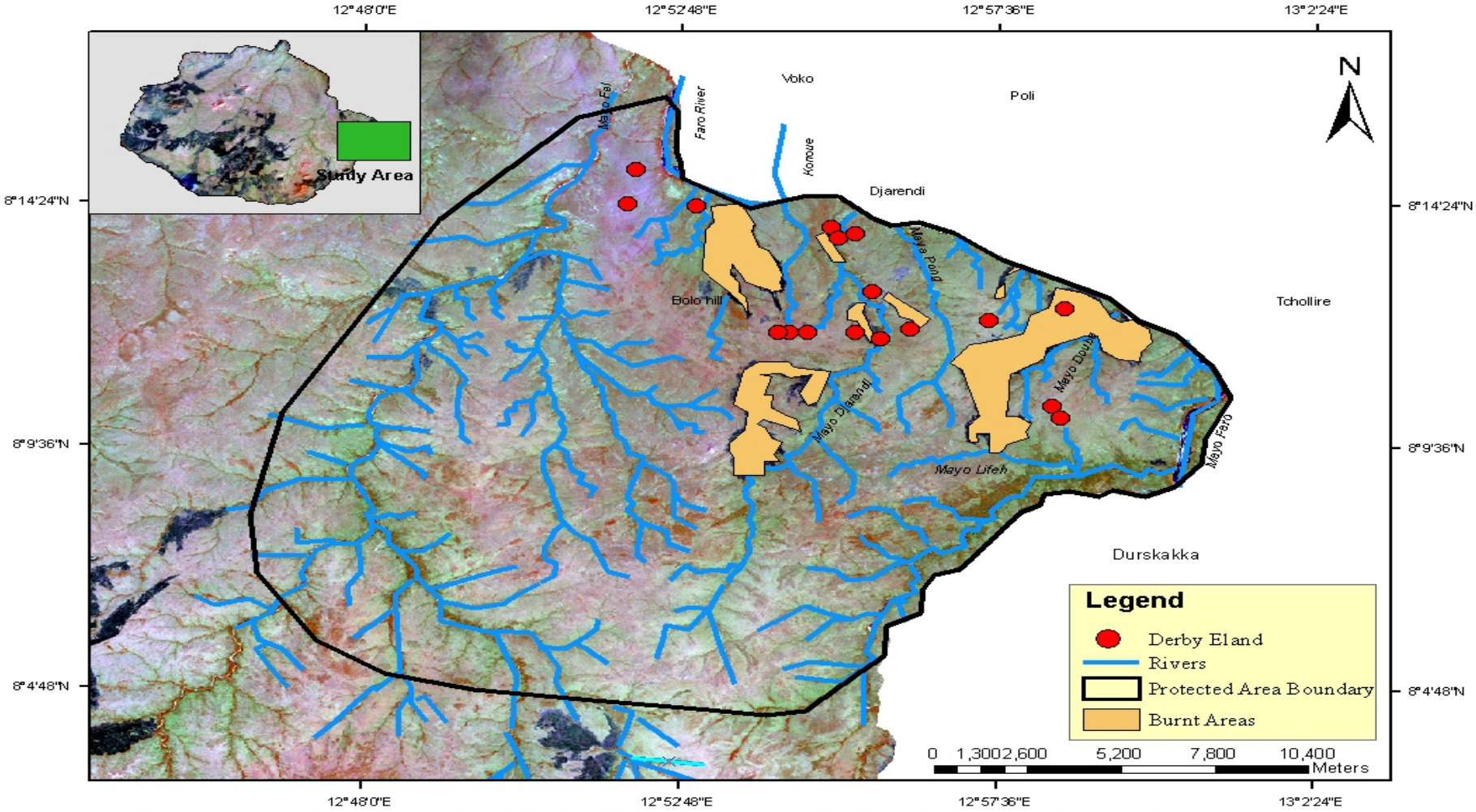


Figure 16: GIS Map of the Eastern Part of Faro National Park showing the distribution of Derby Eland

Tsi, E. A. Chair of General Ecology. Faculty of Environmental Resources and Process Engineering. BTU-Cottbus, Siemens & Halske Ring 8, Postfach 101344. D-03013 Cottbus, Germany. tsievaristus@yahoo.co.nz

Species richness for the Derby Eland in the study area ranges from 1-3 red dots in figure 19 and 1-5 brown dots in figure 20 within the location of its availability. The overall distribution map using GIS and field survey data gives a clear understanding for Derby Eland distribution pattern than is otherwise difficult to see survey data. It ranged from areas with missing animals (no dots), rare or sporadic (atleast a dot), present (2 or more dots) and frequent or viable population size (3 or more dots). Habitat requirements (river courses, salt licks, vegetation and human activities) should be the most important factors influenceing the abundance of species distribution in the study area (Faro and Benoué National Parks) which is surrounded by hunting zones, settlements and trans-national boundaries (figure 2).

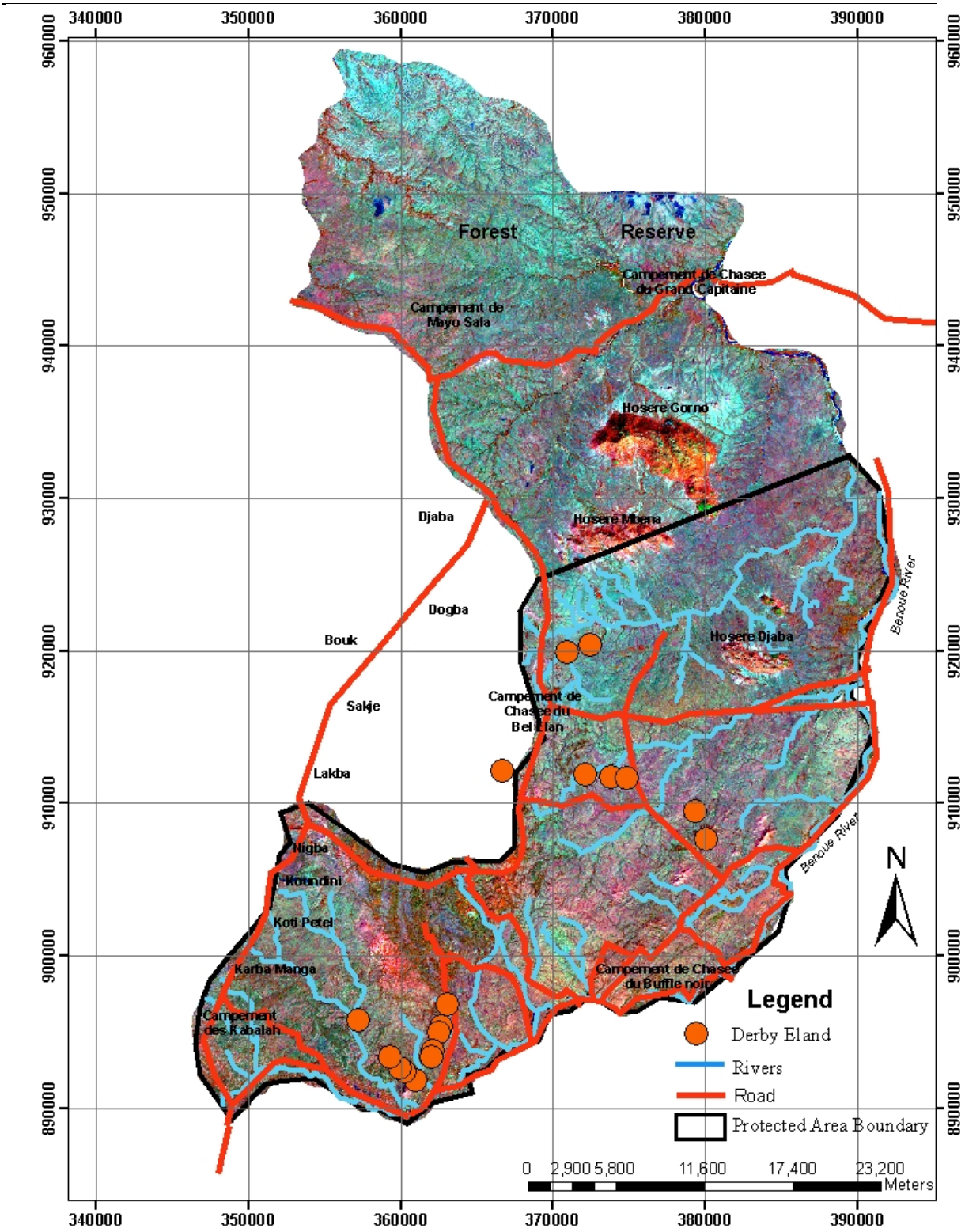


Figure 17 GIS Map of Benoue National Park showing the distribution of Derby Eland

7.1.8 THE AFRICAN WILD DOG

There is a need to emphasize on the result that there was no observation for the African Wild Dog in the different National Parks Faro and Benoué. Niether was it possible to see traces of this animal. It is true that the animal in the years back was classified in Class B by Camerron law. Therefore, it was hunted but in the recent years, it has been re-classified to Class A with strict protection statues. Not being able to see this animal is a call for concern especially as national and Internation (IUCN) has also classified the animal as endangered with priority status.

7.2 RESULTS OF THE SURVEY OF OFFICIAL DATA SOURCES

7.2.1 HUNTING ACTIVITY FOR DERBY ELAND AND THE AFRICAN WILD DOG FROM 1983 – 2004

Amist many wildlife species, permit me use the Derby Eland and the African wild Dog for some analysis. The choice the two species is because of their numerious problems and their benefits to man and the ecosystem. Given the fact that the African Wild Dog was previously hunted and later reclassified, it would be of much importance the compare the behaviour of its activities with a species that has all long been hunted.

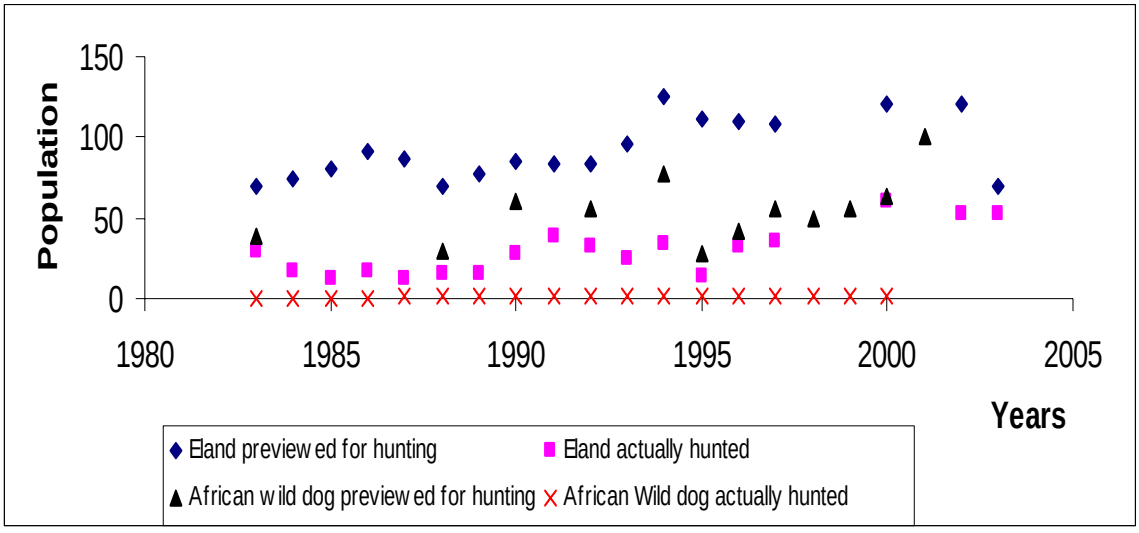
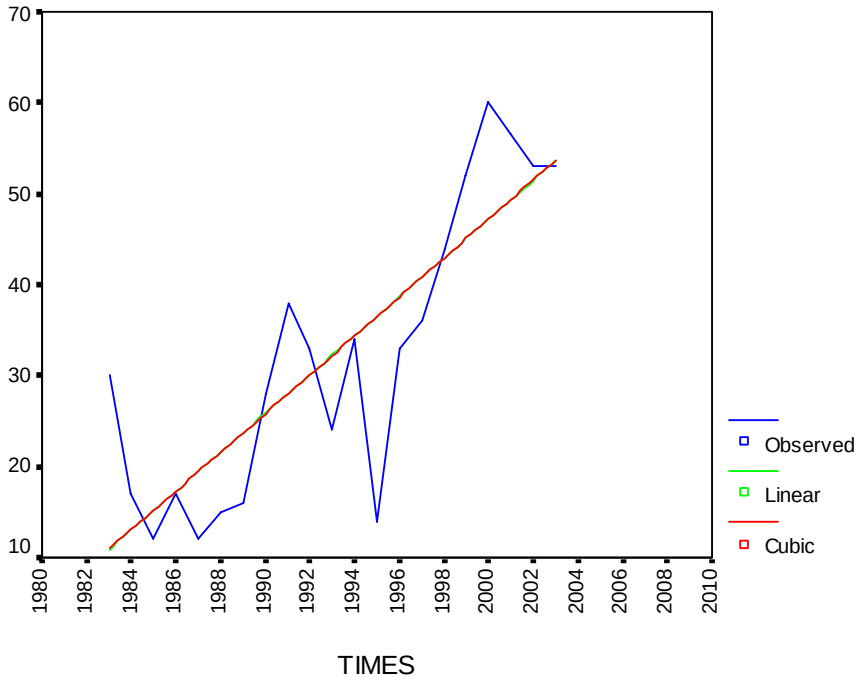


Figure 21: Animals previewed for hunting and those actually hunted from 1983 – 2003

Source: Adapted from Kirda (2000), Provincial delegation for Tourism for the North & Delegation for MINEF (1983-2004)

Figure 21 shows a plot of the official data for Derby Eland and African Wild Dog previewed and actually hunted in North Cameroon Parks from 1980 to 2003. This figure will in the subsequent figures be sub-divided between Derby Eland and African Wild Dog separately to be able to analyze the rate of removal over the years with the software Statistical Package for Social Sciences (SPSS) to get the trend and judgment.



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	R. Square	**df**	**F**	**Significant F**
Linear	0.692	19	42.76	0.000

Figure 22: Removal of Derby Eland in North Cameroon

Figure 22 is the extrapolated pink colour curve on figure 21. The curve starts from 1983 with a decrease trend with four minimum peaks and with an undulating general increase and also four maximum peaks which seem to flatten out within the last years 2001-2003. The plot gives a polynomial curve with an R-square value of 0.79 and a trend line equation $y = -0.02x^4 + 0.57x^3 – 6.06x^2 + 24.76x + 49.05$. Since R-square is obtained at x^4, the best R-square value will be to look for the linear line, but interesting enough is the fact that the linear and cubic lines fall on the

same trend with an R-Square value of 0.69. That is the reason why attention has to be given on Figure 22 to see the green line hidden behind the red.

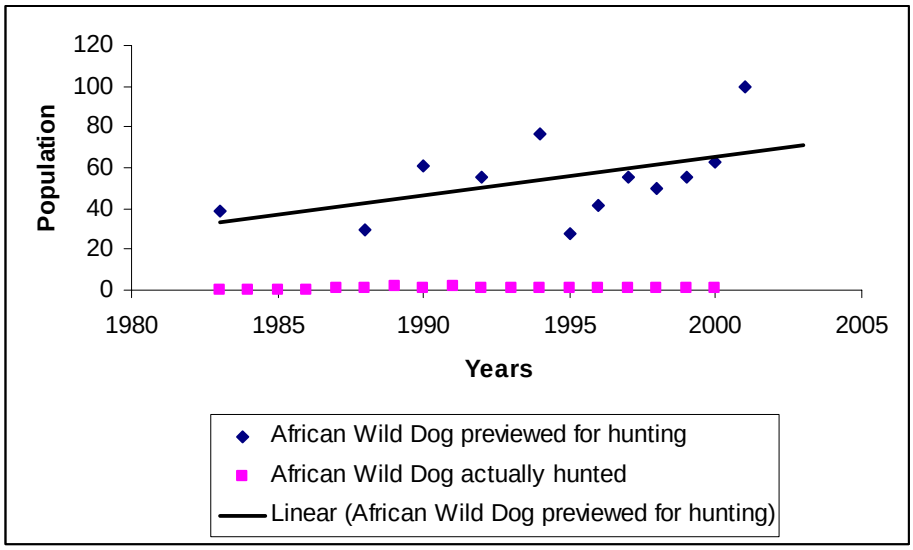

Figure 23: Removal of Wild Dogs in North Cameroon before its reclassification

Figure 23 is the previewed African Wild Dog for hunting (Blue colour curve) and the actual hunted dogs (Pink colour curve). Figure 23 has been extracted from the black and red colour curves in figure 21 respectively. The actual hunted dogs seem to follow a straight line along the X-axis but the line trend for the previewed dogs for hunting shows a steady increasing line with trend line equation Y = 2.33x – 4598.2 at R-square value 1.

7.2.2 SIGHTINGS OF WILD DOGS IN NORTH CAMEROON

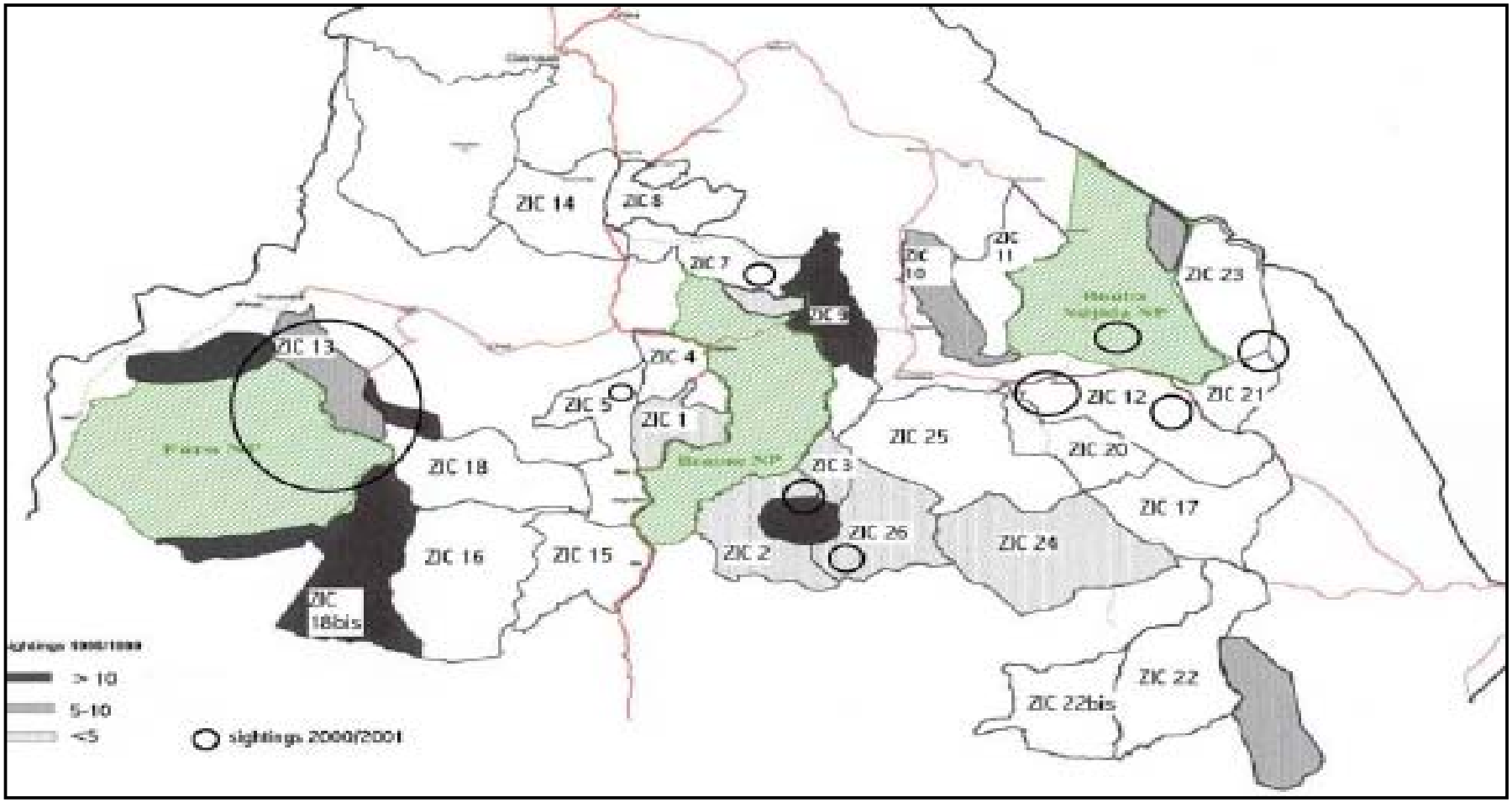

Figure 24: Reported sighting of African Wild Dogs in North Cameroon 1998/1999 and 2000/2001 (Bauer, 2003 modified from Bene Bene et al. 1999)

Even though African While Dogs were not observed during my study period within the packs, figure 24 shows results by previous researches. Bauer (2003) and Bene Bene et al. (1999) identified African Wild Dogs in the north Cameroon Parks (Faro, Benoué and Bouba Ndjida). However, apart from Faro and Bouba Ndjida National Packs where a few observations were made inside the pack (the black circles), most of the observations were located outside the pack (ZIC 2, 3, 5, 12, 13, 18, 21, 23 and 26). Table 16 below shows a detail account of reports of observations of the African Wild Dog in North Cameroon by different researchers. The observations were detailed to the different parks by stating the location, numbers, gender and age (adult and juvenile). Most of the studies have been conducted during January and June which coincides with the dry season, the same period of my study and a time where access into the parks is possible.

Table 16: Reported African Wild Dogs observed in North Cameroon (Bauer, 2003)

Date	**Protected area**	**Location**	**No**	**A**	**M**	**J**	**Jy**
September 2000	Bouba Ndjida NP	Mayo Demsa	4	0	0	0	0
March 2001	South of Bouba Ndjida NP	15 km from village Tam	6	0	0	0	0
December 2000	Faro NP (east)	15km SE of camp Hippotamus	7	0	0	0	0
Mid April 2001	Faro NP (east)	Eastern tip	2	0	0	0	0
Begin 2000	Faro NP (north)		12	0	0	0	0
10 November 2000	Faro NP (north)	Mayo Isselou near Tongo	8	6	3	3	2
20 November 2000	Faro NP (north)	Near Mali	12	9	5	4	3
November 2000	Faro NP (north)	Mayo Nial	2	0	0	0	0
November 2000	Faro NP (north)	Confluence of Mayo Kokalti	14-15	0	0	0	0
February 2001	Faro NP (north)	Faro NP (Tapare)	2	0	0	0	0

Date	Protected area	Location	No	A	M	J	Jy
March 2001	Faro NP (north)	Near Mayo Fel	many	0	0	0	0
Mid March 2001	Faro NP (north)	Mayo Faro, near Mayo Fel	6	6	0	0	0
16 April 2001	ZCB Voko-Bantadje	Mayo Boukar between Djonge and Bantadje	2	0	0	0	0
January 2001	ZCB Voko-Bantadje	Bantadje	1	1	0	0	0
November 2000	ZIC 2		0	0	0	0	0
2000/2001	ZIC5		0	0	0	0	0
Febuaury 2001	ZIC7		4	0	0	0	0
-	ZIC12		6	0	0	0	0
March 2000	ZIC12		8	0	0	0	0
20 May 2001	ZIC13	Near Dundai	14-15	0	0	0	0
25 May 2001	ZIC13		15	10	0	0	5
April 2000	ZIC13		1	0	0	0	0
Begin March 2001	ZIC13	8 km N/E of Dschalingo	many	0	0	0	0
End March 2001	ZIC13	Near Mayo Djarindai	3	3	0	0	0
January 2001	ZIC13		6	6	0	0	0
March 2001	ZIC13	5 km from Mayo Faro	1	0	0	0	0
March 2001	ZIC13		8	8	0	0	0
March 2001	ZIC13	Mayo Konoue	4	0	0	0	0
March 2001	ZIC13		8	8	0	0	0
Mid April 2001	ZIC13	Near Campement des Hippopotamus	6	0	0	0	0
November 2000	ZIC13		14-15	10	0	0	4
November 2000	ZIC13	Near Dundai	14-15	0	0	0	0
10 June 2001	ZIC 18	Mayo Djarindi near	1	1	1	0	0

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		Taroua					
-	ZIC 23/21	Mayo-Djame	4	0	0	0	0
4 June 2000	ZIC 26	Hosere Mbansi	6	0	0	0	0

No- Numbers

A- Adults F- Females

M- Males J- Juveniles

Above all, the distribution of African Wild Dogs in Cameroon and Africa at large has been a question of concern to many researchers from 1985 to present. Appendix II gives a run down of studies conducted in certain sites, the surface area, the abundance and the dates such estimates were done. There are a good number of sites where the population is extinct, absent, rare, uncommon, and common, a few sightings and vibrant populations. These terminologies are probably used at the convenience of the researcher without clear cut limits. Generally, a message is conveyed that African Wild Dogs still exist in Cameroon and Africa but the status is a nightmare.

7.2.3 INCOME GENERATED FROM PARK ACTIVITIES IN NORTH CAMEROON

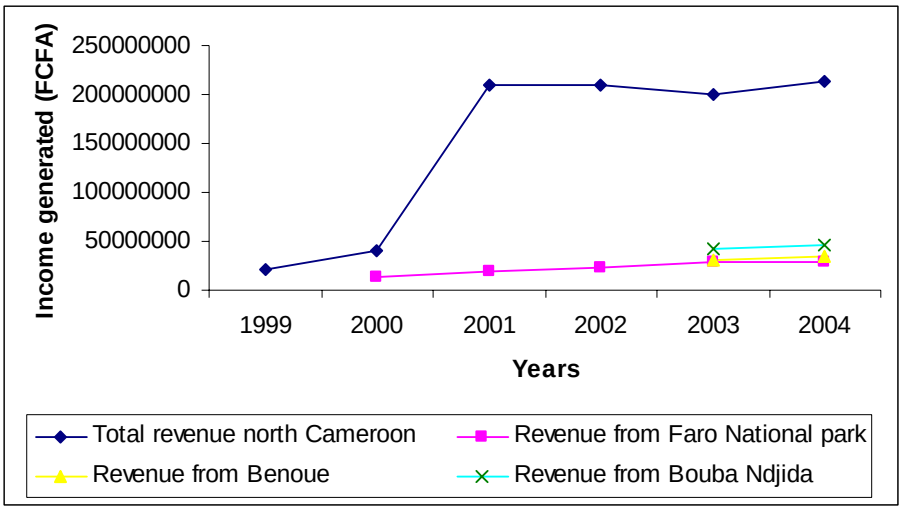

Figure 25: Evolution of hunting taxes from 1999- 2004

Adapted from Kirda (2000) & Provincial Delegation MINFOF (2004)

From Figure 25, the official information of the revenue generated by the north province Garoua where Faro and Benoué National Parks are found from 1999 to 2004 was plotted on a graph. Revenue generated from the three National Parks (Faro, Benoué and Bouba Ndjida) was plotted in the same vane. From 2001, the sum total of revenue generated from the three parks is

less than the total money generated from the north province which implies that there are other sources of income generation, but wildlife resources contribute a significant portion through sport hunting with beautiful trophies like the trophy of Derby Eland (Figure 26).

Figure 26: Trophy of Derby Eland prepared in Mr. Carlo Rizzotti's zone No 2 Benoué National Park

7.2.4 CATEGORIZATION OF HUNTING PERMITS IN FARO AND BENOUÉ NATIONAL PARKS

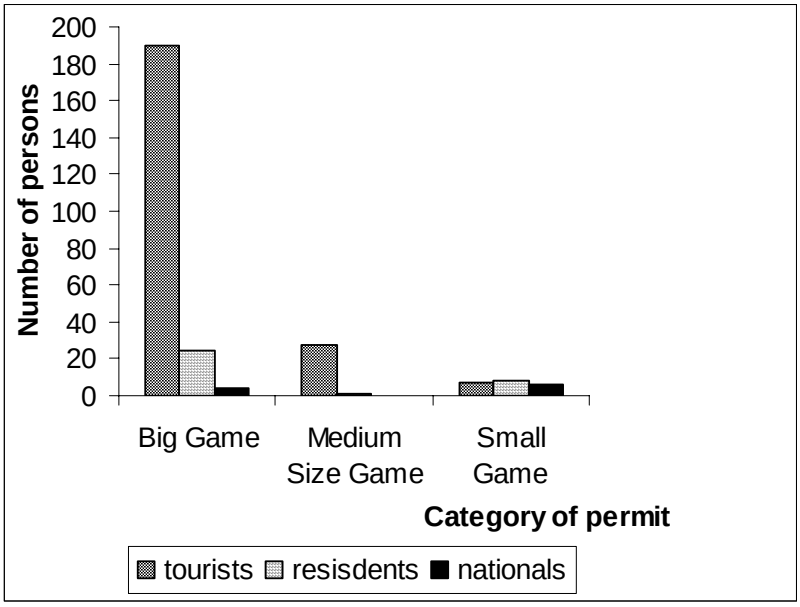

Figure 27: Sport hunting permits 2002- 2003 (Kirda (2000)

From Figure 27, the bulk of persons who come or visit the parks for sport hunting are tourist, followed by residents and a few nationals in that decreasing order. The tourist's interest is the big game for trophies while nationals go for small game probably because of the sophiscated weapons needed to bring dawn the big game.

7.3 RESULTS OF QUESTIONNAIRE ADMINISTRATION

7.3.1 IDENTIFICATION OF THE POPULATION SAMPLED

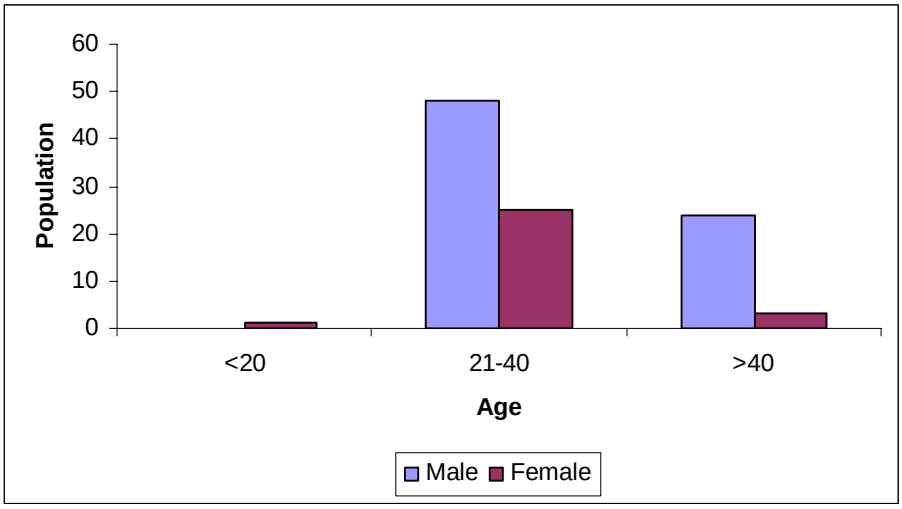

Figure 28: Age and gender involvement in the study

Figure 28 shows the age and gender involved in this study. The age was grouped in three classes (less than 20, between 20 and 40 and above 40) all for the sake of easy assessment. Only females were found as respondents below 20 and generally, more men were involved than females. The young (less than 20) were mostly left out because they do not realize the importance of conservation while the older generations to some extend do.The intension of the questionnaire and its design was to be broad based but people will not answer some questions especially the demographic data section. The census was virtually imposible to complete because some individuals were inevitably unavailable or unwilling to participate. Therefore, some of these issues were better asked and answered directly by oral interview. In future researches, where age was not known, episodes which will be known to everyone in the area could be used, so that when censusing indiviauals of unknown age, their approximate dates of birth may be calculated based on their proximity to known historical events. Also, education and profession can be obtained by a layout. For example I = Iliterate, L = Litereate, P = Primary, S = Secondary and HE = Higher Education or Farmer, carpenter, student, just to name a few.

7.3.2 THE IMPORTANCE OF CONSERVATION PROJECTS IN FARO AND BENOUE NATIONAL PARKS

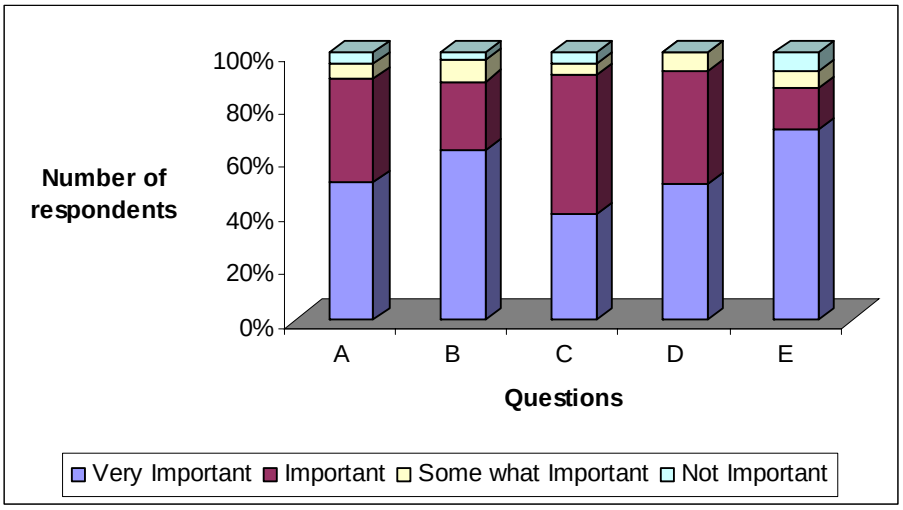

Figure 29: Rating of the level of importance of conservation

A - Do you think it is important to know that other people are able to enjoy African Wild Dogs and Derby Eland in the parks?

B - How important is it to know that future generations will be able to enjoy African Wild Dogs and Derby Eland in the parks.

C - How important is it to know that African Wild Dogs and Derby Elands exist in Cameroon parks even if you do not see them

D - How important is it to allow the existence of endangered species (African Wild Dog) in National Parks

E- How important is it to allow the existence of endangered species (Derby Eland) in National Parks?

Figure 29 shows the number of respondents against different questions asked A-E. From the figure, 50% of respondents said question C is important, 60% said question B and E are very important, for question D there was a 50:50 % response for important and very important, D had no person responding that it is not important as A, B, C and E had some respondents on some what important and not important though were very little at less than 10%. Finally, question C and D had almost equal respondents to the fact that the question was very important.

7.3.3 THE CONSERVATION AWARENESS OF DERBY ELAND AND AFRICAN WILD DOG IN FARO AND BENOUÉ NATIONAL PARKS

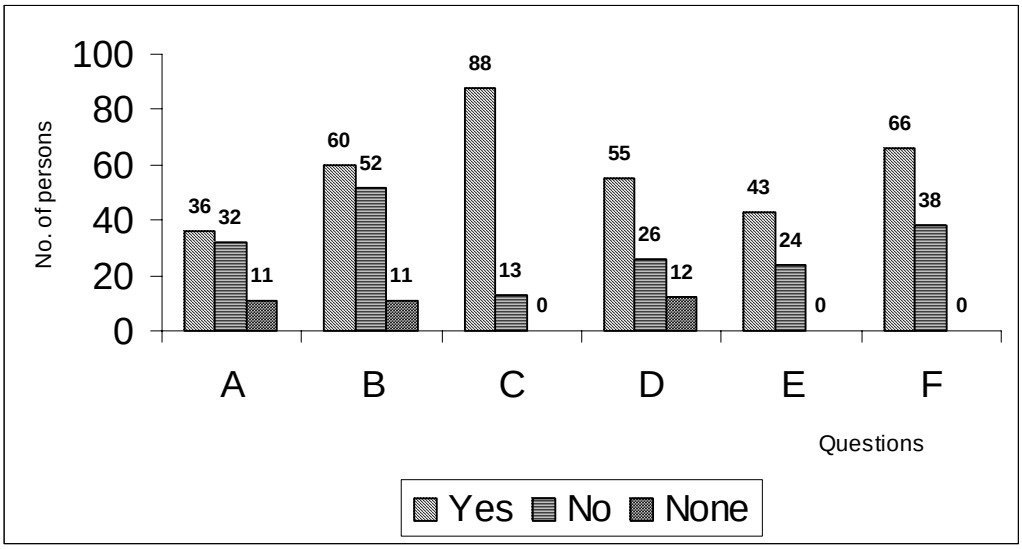

Figure 30: Sources of acquiring conservation information

A- Got information on conservation issues of Derby Eland from magazines, news papers and watched television.

B- Haven seen or heard Derby Eland in the wild.

C- Willing to pay for a one time tax increase to fund conservation projects.

D- Willing to fund program for compensation of lost livestock hurt by destruction by African Wild Dog.

E-Got information on conservation issues of African Wild Dog from magazines, news papers and watched television.

F- Haven seen or heard African Wild Dog in the wild.

Figure 30 shows the numbers of persons responding to question A-F asked. There were persons responding to having none response to questions C, E and F. The same number of persons responded No to questions A, B and D. Question C had the maximum number of persons saying Yes while question A and B had equal response to None. The general response trend was declining from Yes, No and None responses when we consider questions A, B, C, D, E and F individually and the respective order.

7.3.4 THE WILLINGNESS TO PAY FOR THE CONSERVATION OF DERBY ELAND AND AFRICAN WILD DOG

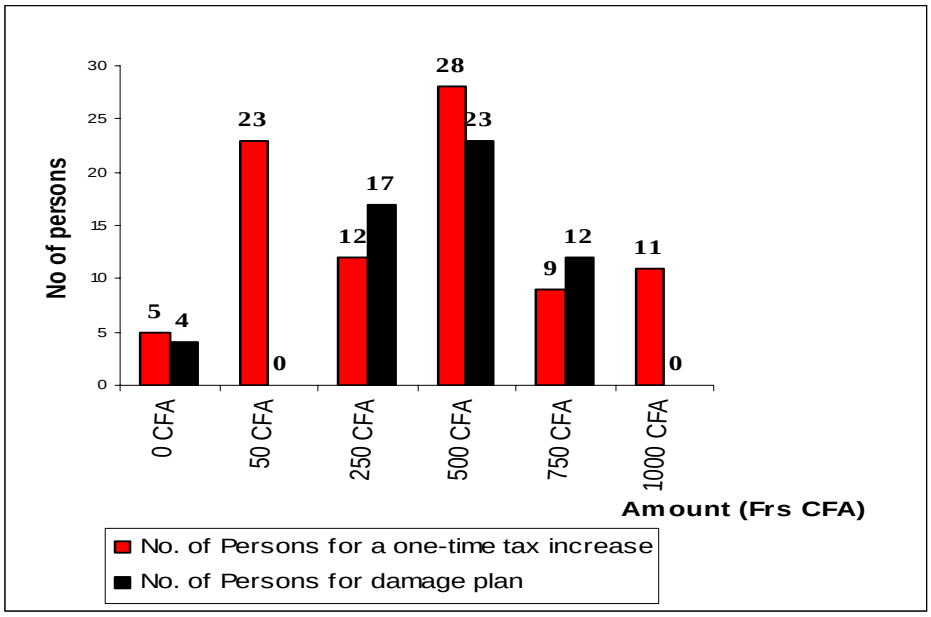

Figure 31: Willingness to contribute for conservation issues

From Figure 31, it has been remarked that the conservation of species in most third World countries including Cameroon has been funded by International donors and Non Governmental Organizations. These projects are usually not sustainable and when the funding agents withdraw their funding, the projects gradually come back to the normal phenomenon and possible closure. Also keeping animals like the African Wild Dog in the parks sometimes cause damage on the domestic stock of the local population around the Park since the Afican Wild Dog is a carnivorous animal. This figure explains the response of the population with respect to their readiness to pay a one-time tax increase to fund conservation projects and to contribute to a fund created to compensate people who have lost their domestic stock as a result of damage caused by the African Wild Dog. The currency used in the questionnaires is the F CFA being used in Cameroon and the CEMAC region.

7.3.5 AN ASSESSMENT OF THE MANAGEMENT POLICY

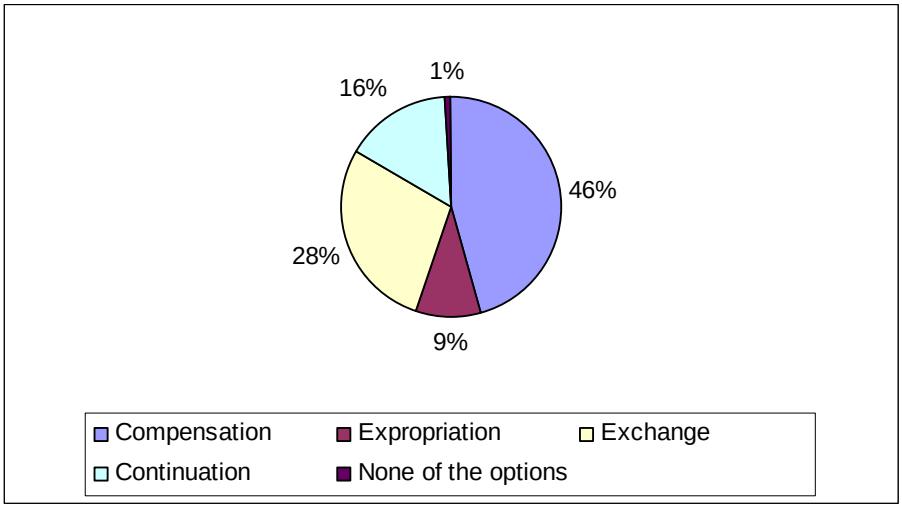

Figure 32: Assessment of the management policy by the community

During the creation of the National Parks Faro and Benoué, the Cameroon government used the policy of compensation to settle the local population. As of that time, the objective of the park simply put use based on a "no-use policy". But today the objectives have changed with the inclusion of tourism where the local inhabitants see "their resource" being enjoyed by foreigners and money coming from different sources. Figure 32 tries to re-examine the management policy vis a vis the preferences of the local population. This will serve as a decision or data support to meaningful suggestions to the government as to the ways to curb disorder. This was done by presenting a series of options of management policies which were assessed be respondents and analysed percentages.

CHAPTER EIGHT

8.0 DISCUSSION

8.1 FIELD WORK

8.1.1 DENSITY OF SOME WILDLIFE SPECIES IN FARO AND BENOUÉ NATIONAL PARKS

The density (the number of animals per unit area if the assumption is true that animals are uniformly distributed in space) of some wildlife species of Faro and Benoué National Parks is generally on the decline in terms of numbers. If this steady decline continues at its present rate, there will be no supprise when the species go extinct (Caughley, 1994). Coupled with the fact that about 85% of the populations in north Cameroon live in rural areas and depending solely on cheap animal protein coming from wildlife, besides seeing wildlife as their inherent property, there is always constant poaching pressure on these animals for food. The poor management of the hunting activities viewed as a source of income and an objective of the park during park creation and policy making equally deplits the populations of wildlife.

The biomass of wildlife species depends on the productivity of the trophic level. In general, as the trophic levels increase, the biomass decreases by 10%. That is the producers (grass and trees) will have higher biomass than animals that consume the producers. Most wildlife species recorded in Faro and Benoué National Parks were ungulates which depend on the vegetation for live sustainance. The total biomass per hectare was 16 kg/km^2 for Faro and 206,57 kg/km^2 for Benoué National Park. These figures fall at the extremes of the range of the estimates of WWF (1998), Stark (1986) and Assan and Mahop (2000) of total biomass 7.4 kg/km^2, 10.3 kg/km^2 and 23 kg/km^2 respectively. Tsague (1994) noted that the Hartebeest is abundant in the valley of the river Benoué with a density of 0.45animals/km$^{2.}$ This result disagrees with Tsague (1994) that the Western Buffon's Kob is the most common, most abundant in Benoué National Park. This result does not need to call for any alarm because his research was oriented to studies of this specific animal (Western Buffon's Kob). The biomass in Faro and Benoué National Park is low probably due to the low quality of the vegetation typical for west and central African Savannas (Bell, 1982). The complete absence of direct observation of carnivores and cosiquently the estimation of its biomass should not be a supprise since they depend on these species as prey and their low biomass has a lot of influence on their existence. The disparity in the results can only be attributed to the absence of observation of certain herbivores like the hippopotamus and

buffalo which contributed significantly in their estimates and were not included in this study. Also the total surface area covered during the census, timing and location may be different. Species that move in a group (flock, herd) migrating locally from one park to the next influenced by prevailing conditions (fire, poaching activity, sport hunting) may disturt wildlife biomass estimation. Also to some extend, differences in counting methods masked changing environmental conditions due to congregation around water holes.Therefore a clear cut outcome can be achieved if a synchronized census is carried out inculprating more census methods like point count, aerial surveys over the years. This will seem appropriate, cost effective, allow monitoring and avoid bias on certain species leading to overestimation of its population numbers.

8.1.2 ESTIMATING THE INDICES OF ABUNDANCE FOR WILDLIFE SPECIES

The abundance of animal species measured by "indice kilometric d'abundance" IKA is an average faster and practical way to know the spatial temporal distribution of wildlife when the number of observations is low (La chasse en Guyane au jourd'hui: vers une gestion durable last date of access 08/01/2006). This is the number of individuals observed with regards to the distance (km) walked. When the chances of getting any wildlife species in the parks is becoming so slim, a call for concern for managerial practice to focus on re-introduction from captive breeding exercises as one of the solution. IKA is a bio-indicator index to characterize the abundance of animal population. When IKA is less than 0.3 we say it is weak and between 0.3 and 0.5 we say it is average and greater than 0.5 we say it is high (based on sufficient frequent contact with the animals).

IKA for Faro and Benoué National Park ranges from 0.009 animals/ km^2 – 0.87 animals/ km^2. IKA was very weak for the National Parks but the discovery of tracks (dung, footprints, foot remains, urine) and trials of animals in the parks (Figure 16 and 17) was a positive identification that confirms the presence of wildlife species though direct observation was low to interpret. Since the animals had previously been sighted in these parks, there was no ambiguity to conclude its presence using tracks. A weak IKA is not a good indication to a tourist because it conveys a message of the difficulty of coming in contact with the animal species and it is very bad for the park management whose income comes from the hunting of species that are the center of tourist attraction. The low abundance of wildlife species is due to poaching activities within the park. Poaching is done during the rainy season when access is difficult, the close season when tourists are absent from the park. This problem of poaching is persistent because antipoaching and law enforcement activities in many tropical countries are ineffective or both due to underfunding and lack of adequate staff, equipment and training. For example, a game guard in north Cameroon

must survey between 6,700 and 40,000 ha, and the area is covered on foot (Koulagna and Planton, 1998). Moreso, professional hunters in Cameroon are not controlling the hunting concessions during off-season months (Wilkie and Carpenter, 1999). Apart from Cameroonian poachers, Nigerians are also infiltrating the park up to the extend that the Nigerian currency (Niara) and hot drinks circulates right up to Voko.

Encounter rate has proven to be a useful method in the monitoring of certain large maamals in a similar African savanna (Maillard et al. 2001). It can give information of the distribution, abundance, age and group structure and if the method is standardized, it can be used as a monitoring tool (maillard et al. 2001; Wilson and Delahay, 2001). Goms'e and Mahop (2000) estimated the Kob population in Faro National Park to 20,397 (6.18 Kob/ km^2) and the hartebeest population to 8,889 (2.69 hartebeest/ km^2). These numbers are in strong contrast to an estimate by the IUCN/Antelope Specialist Group which estimated 13,800 Kob and 7,970 hartebeest for the whole of Cameroon (East, 1999).

8.1.3 COMPARATIVE POPULATION ESTIMATES OF WILDLIFE IN FARO AND BENOUÉ NATIONAL PARKS

From the estimate Figure 16 & 17, we see that the Hartebeest (bb), Western Buffon's Kob (kb), Oribi (or) Elephant (ei) and Bush pig (bp) are common in the Benoué National Park when we considers dung assessment (FH- fresh & OD- old) than Faro National Park. Direct observation (DO) was more for Elephants, Derby Eland and Bush pig in that order in Benoué than Faro meanwhile the Derby Eland dung was more in Faro than Benoué. The artiodactyls were represented by three families (Bovidae, Suidae and Girraffidae) recording 13 species counted during the dry season in Benoué and Faro National Parks.

Generally Derby Eland is a timid animal, show increase vigilance, shyness, more cryptic behaviour and difficult to observe frequently. The most abundant animals were the Hartebeest seen as trails(TR) and foot prints (FP) left by the Buffalos and Western Buffon's Kob from the wet and dry season respectively. The absence of trails for other animals shows that they do not frequent a particular track or that they have migrated. There were indications of carnivores like Lion (li) and Hyena (hy) in Faro and Leopard (le) and in the Benoué National Park but with very low populations. Carnivores generally have a problem with low populations which could be either due to absence of prey, low probability of reproductive success, disease and habitat destruction. Africa Wild Dogs and other carnivores are ideal indicators of habitat fragmentation and increase in human activities (Woodroffe et al.1997) and their decline seem to demonstrate these trends. The giraffe was also observed with the same low population in Benoué National

Park. Low observations imply that these species have become rare in the zone or that they are looking for habitats to support the poor dry season conditions. However, the Western Buffon's Kob is less than the Hartebeest in Benoué National Park.

The dung for Derby Eland was seen in Faro but direct observations were very few. Most of the species seen in Faro were also found in Benoué but its distribution patterns are different (Figure 16 and 17). The population of Buffalos in Faro is less than that of Benoué National Park. All these results comparatively can be sentimental, but we must consider only the region of the park and the time to which the census was carried out.

There are diverse ecological connections between large mammals and their habitat, as well as among the large mammal community (Du Toit and Cumming, 1999). The decline of certain keystone species, especially large herbivores will have wide ranging effects for several other mammals and their habitat and hence a decline in biodiversity. Ungulates play important regulatory roles in maintaining savanna ecosystem structure and function (Owen-Smith, 1988). Elephants keep the vegetation open and provide access to water and mineral throughout the savanna. Mineral licks are centres of social activity not only for elephants but also for Derby Eland and Roan antelopes, thus providing increased large mammal carrying capacity (Ruggiero and Fay, 1991). Large mammal species play a major role in seed dispersal and their decline can lead to a reduction in the number of tree species (Chapman et al., 1992), species extinction (Hawthorne and Parren, 2000) and composition (Maisels et al., 2002).

Large herbivores have an important ecological role in the savanna ecosystem. They can minimize the potential effects of disastrous bushfires, because they remove substantial amounts of plant matter (Dublin, 1995). Thus their decline can lead to changes in plant species composition and cause major ecosystem changes.

Also, a decline in wildlife numbers can cause changes on diet choice of large carnivores and may lead to an increase in predator-livestock conflict (Woodroffe, 2001). Carnivores have an important role in the savanna because the remove the ill and weak individuals from their prey populations tus avoiding the spread of diseases like rinderpest (Mills, 1991).

8.1.4 REVENUE GENERATED FROM THE WILDLIFE IN FARO AND BENOUÉ NATIONAL PARKS

The fact that many countries of the world are investing in the tourism industry especially wildlife tourism is an indication that it generates much income and this revenue comes after petroleum in many countries where its practices fall within the norms. The estimated worth of the value of wildlife in Faro and Benoué National Parks stand at 864,870.00 Euros. There is glaring proof

that if management is under sound principles, maintaining a carry capacity for its species, revenue generated can counter mount to solving some of the problems of poverty in Cameroon. This no doubt can meet such needs only when the local community is involved and allowed to benefit from the revenue generated.

8.1.5 CRITICAL VALUE FOR WILDLIFE EXPLOITATION IN FARO AND BENOUÉ NATIONAL PARKS

Determining and maintaining the threshold for the exploitation of resources especially wildlife species is a difficult task for many game biologists. For the big game of Faro and Benoué National Parks, the critical value for exploitation was determined at 77 animals annually. This should be the optimum sustainable population level of harvest which is the population level where maximum net production can be achieved. The method used to assess the sustainability of hunting may not be precautionary and likely to overestimate the sustainable level of off take and so I suggest that more be done using vital methods that explicitly incorporate uncertainty. Harvesting at carrying capacity (the number of animals a given area of land or water can support over time) will mean removal at a little bit above or below the maximum capacity that is by determining how much habitat must be conserved to maintain healthy wildlife populations. However, as the years go by, management is improving. The decline of harvesting by the year 2005 may be an indication of the intensive effort of the government to intensify and improve management strategies.

8.1.6 DISTRIBUTION OF DERBY ELAND IN FARO AND BENOUÉ NATIONAL PARKS

The borders of Faro and Benoue National Parks are built by rivers (Mayos) with the biggest (river Faro and river Benoue) in the Faro National Park and Benoué National Park respectively. There are several important rivers inside the park with water retained in Mayo Faro, Mayo Deo and Mayo Nial throughout the year in Faro National Park (Mahamat, 1981) but during this survey, there were drastical changes and little or no river had water left between January and May 2005. The entire parks are dominated by Sudaninan savannah and woodland with 40% of the trees higher than 8m (White, 1983) of which the *Isoberlina doka* and *Isoberlina angolensis* (*tomentosa*) as the dominant species. Dry forests are dominated by *Anogenssus leiocarpus*, which can be 20m in height. A vegetation study in the dry season 2000 in Faro National Park has identified 454 plant species and in Benoué National Park 620 species (Donfack et al. 2001). Derby Eland are distributed follows water courses, food availability and salt lick but the

influence of anthropogenic activities (sport hunting, poaching, uncontrolled bush fire, exploration of goal and fishing exercises) as well as farming (cotton, maize and cattle and sheep raering).

8.2 OFFICIAL DATA SOURCES

8.2.1 DERBY ELAND

From 1985 government had recognized the importance of the Derby Eland in economic terms as generating income from sport hunting. This was discovered probably by the nature of permits sort for by non-residents, the type of trophies and the amount paid. Eland previewed for hunting has generally been on an increase and the same trend for those actually hunted throughout the years (Figure 21). Within the 1995 – 1997, we witness a drop in actual hunt probably because of the economic crisis, political tension, corruption in the country and a general atmosphere of insecurity. As the society is being sanitized, service for wildlife of the delegation of MINEF Garoua is being computerized chief of service for wildlife Mr. Mbouyo Emmanuel (personal communication), says there is adequate documentation. The drop in numbers of Eland previewed for hunting 2000 -2003 can be attributed to the accepted reality that previous over hunting, issue of many licenses to sharp shooters without adequate population census and determination of carrying capacity, ecological studies and finally poor managerial abilities affect animal populations. A law is to be implemented that census must be done by all hunting zone owners and by the park manager yearly before permits for hunting can be issued for the next hunting season. If this is affected, it will answer some of the worries of this research in that, while income is generated for poverty reduction, positive links will be between conservation and development.

Generally, to assess whether hunting pressure is adversely affecting the animal population, it is necessary to monitor the age structure of the population. Given the fact that highly stressed populations may stop reproduction resulting in absence of infants or that hunter may have selectively target large males and by monitoring such trends over time, we can identify and react to management problems.

Figure 22 explains the removal/replacement of the Derby Eland from north Cameroon. As the years go by the off take follows a polynomial curve with maximum between the 1st 10 years and a minimum between the 2nd 10 years of the study interval of 30 years. The best R-square value of 0.69 which explains this is from a linear graph which explains the relationship over time. This shows that Derby Eland population off take is not only time dependent but other factors apart from time influence removal/replacement rates.

8.2.2 AFRICAN WILD DOG

When the population of African Wild Dogs was common in the parks (1987-1995), government previewed them for hunting (Figure 23). This was not for the sake of trophies (Figure 26) definitely though it is placed in class C at the cost of 230 Euros. It may be hunted probably of the threat given to livestock of local herdsmen. Even though the population was so low, by government policies, some were hunted. From 1995 onwards, only some persons can attest havens seen the African Wild Dog in some hunting zones and parks. Through out the entire study period, though Woodroffe & Ginsberg (1999) in their estimate of the population of African Wild Dogs, made a guess of a population of 100 in Cameroon (Table 19) direct observations have been mostly out of the strict protection zones (the park). A plot of the previewed hunting record of African Wild Dog shows "R Square" value best when linear at value 0.25. This shows that population dependence and time independence for African Wild Dogs indicates other factors apart from time that influence removal/replacement rates. Figure 24 and Table 16 report of sightings of African Wild Dogs in north Cameroon 1998-2001 supporting the fact that the dogs still exist in north Cameroon. It also confirms the findings that the locations of the dogs is out side the strict protected zones as they are found mostly in small patches of zone 2, 3, 5, 12, 13, 21, 23 and 25.

8.2.3 INCOME GENERATED FROM PARK ACTIVITIES IN NORTH CAMEROON

Figure 25 shows that from 2001, the yearly income from the hunt of the Derby Eland almost tripled as every sport hunter coming to hunt in the savannah area desires to hunt the Derby Eland. Gaming activities generate a significant income seen from the period 1985- 2000, with 641,767,080 FCFA saved in the public treasury with an average of 42,767,080 FCFA annually (Figure 25.This annual average had long doubled (96.5 million FCFA) within three years (1994-1997) (Kirda, 2000). We have seen it even increasing drastically in the last three years (2001-2003) (greater than 200 million FCFA) probably because of the introduction of the computerized system and improvements by the good governance program of the Head of state. Total income generated from north Cameroon extracted from figure 25 is approximately 148,461,538.5 Euros of which 857,670.00 Euros comes from wildlife in north Cameroon annually. In Tanzania (Mabugu and Mugoya, 2001) have analyzed the financial statement and revenue estimates of wildlife in 1998/99 and 1999/2000 to be US $ 6,989,928 and 5,508,273 respectively. This simply shows that Cameroon has more wildlife resources or better marketing strategies whose end result

can be beneficial to generating the country's revenue. Percentage income generated in north province coming from wildlife is 0.58%. This contribution is therefore a measure and an urge for stricter conservation management to enjoy the inherent benefits this species can offer. Part of these benefits goes to the local community by forming associations with identified developmental projects that will permit funding by government from this money (Appendix IV and V). In general, wildlife has higher economic returns depending on the area. This value can be greatly enhanced through wildlife based industries such as tourism and sport hunting, even at much lower levels of stocking and utilization. This recent development has set standards and thresholds for human health and the environment as it deters the local population from wanton destruction to sustainable harvest and maximum utility, conflict resolution and reducing negative environmental impact.

8.2.4 CATEGORIZATION OF HUNTING PERMITS IN FARO AND BENOUÉ NATIONAL PARKS

Ninety percent of hunters were non-residents, 6% residents and 4% nationals categorizing the hunters by permit (figure 27). The non-residents were tourists and sport hunters who are very much interested in the big game. They hunt medium size and small game only after frustration of not having their desires. Nationals hardly hunt or pay for permits to go hunt, instead they poach. Their highest hunt is the small game which has little or no impact on wildlife extermination since most of them are prolific animals. On the other hand, they will not leave the big game not hunted but for lack of sophisticated equipment and when they do, the use crude methods and equipment which can exterminate some wildlife species.

8.3 RESULTS OF QUESTIONNAIRE ADMINISTRATION

8.3.1 IDENTIFICATION OF THE POPULATION SAMPLED

From the questionnaires issued to the population of north Cameroon, the respondent rate was 41.3% (n = 300). Some respondents (n = 20) was excluded because their demographic data was not complete and also the responses showed a considerable amount of missing data. This resulted in 104 respondents in the data analysis. The repartition of respondents to age and gender gave less than 20, 20 – 40 and greater than 40 years composed of 23.3 % women and 76.7% men respectively. The male domination was due to the fact that women in the study area are not accessible because they are left in the homes not to come in contact with other men according to the Muslim tradition which is dorminant in northern Cameroon. The percentage of women interviewed must be the few non- Muslim women working in north Cameroon. The median age

interviewed was 20.5 years. Intervals of less than 20 years, 21- 40 years and greater than 40 years were used to assess an analyse the population involvements. The bulk of respondents were in the active age group of 21- 40 which presumable is the age implicated most in the exploitation of natural resources. Below this age, the population is involved in catering for the young, looking after cattle, sheep and goats and above this age (the old people) who sit at home to be assisted by their children.

8.3.2 THE PERCEPTION OF THE CONSERVATION OF DERBY ELAND AND AFRICAN WILD DOG IN FARO AND BENOUÉ NATIONAL PARKS

The willingness to pay for the conservation of species leaves people in a social dilemma choice. This choice is between one's self-interest and the collective-interest which are governed by the personalities, desire, attitudes, motivations, perception, ethics and culture. Individual immediate gains may always motivate individuals to act in one's self-interest based on individual principles. But non cooperative choices have negative collective consequences that tend to accumulate until the individuals are faced with a situation in which all would have been better off, had they chosen to cooperate. However, acting in a collective-interest requires cooperation only why individuals are ready to make short-term sacrifices (Komorita & Parks, 1994).

The willingness to pay or not to pay for the conservation of Derby Eland or African Wild Dog species. The assessment of the willingness to pay comes out with the individual outcomes, collective outcomes and no idea outcomes. The individual outcomes include payment of fines, poaching, violating the national laws on protected areas management, a push to poor management consequences, poor moral obligation or personal norm and collective outcomes (environmental goal achievement) is a social dilemma. It goes without saying that one should act according to collective rationality since everyone will be better off if all cooperate. Nordlund (2003) and Van Lange (1992) concluded that there is no objectively rational solution to guide one's decision. And suggested that the decision problem in a social dilemma could be seen as a moral issue, where at some cost to oneself. Cooperation may thus be considered as the morally right, or good, choice to make. Five questions (A, B, C, D and E) (Figure 26) were assessed and the mean rating, for each respondent, was plotted. A greater portion of the population said it was very important or important in favour of the questions A-E asked. Looking within two responses very important and important, the respondents exhibited a tie. However, there is no clear cut analysis of the difference between the two statements given the fact that the state of mind of the person influences his/her response at a particular time. The other questions some what important and not important (C and D) had a maximum rating in its favour. This shows that there is

awareness about the National Park and a greater public perceive it a lofty issue. This certainly could be a proof to the level of benefit(s) enjoyed by the local communities with respect to the revenue generated from National Parks activities (Appendix IV). About 70% said it was very important to know that other people will be able to enjoy the Derby Eland and African Wild Dog in the parks. It almost was a 50:50 percent bases when asked other questions B – D as respondents were either indicating very important and important. When asked question B, no person indicated categorically that it was not important. This response seemed most persons were aware about conservation issues which gave way to try to get the sources of conservation information.

8.3.3 CONSERVATION AWARENESS FOR DERBY ELAND AND AFRICAN WILD DOG

Generally, preliminary thinking was that local people do not care about parks for it is a nuisance to them blocking them to access the natural resources at their doorstep. They do not care if a "white man" is interested in Derby Eland or African Wild Dog. We hope that they think about food today and have no knowledge about these animals. The statistics (Figure 30) show a great deal of things. There is a higher acceptance of haven seen species or read about them. Some persons also refuse haven seen or heard about these species either as well as some people indicate having no idea. For all questions A, B, C, D, E and F, the highest response is in favour, seconded with refusal and a few persons with no responses. But the striking thing is that there exist the African Wild Dog (questions E and F) since there is no person who indicates ignorance or lack of awareness of the existence of the African Wild Dog. This supports previous declarations by village chiefs (Lamidos) that the African Wild Dog be exterminated because of its distructive potentials. The community therefore is highly sensitized about the dog and its destructive potentials to the domestic stock. Some schools of thought feel that the locals will not know about the African Wild Dog because it has gone scares. But communications of information on this African Wild Dog has been observed to take place through newspaper, televisions, oral information exchanged by community members. Dr Per Aarhaug from Norway, owning a hunting zone (No 7 Naari 97.920 ha) attest that "for good eyes like him" has seen the African Wild Dog and has adored them, but it was 30 years ago for in the last 15 years he has not found them again. However, Mr. Dott. Carlo Rizzotti an Italian and his hunting tracker (personal communication) say they have seen the African dog in their hunting zone (No 2 Bandjoukri 75.648 ha). The park manager of Benoué National Park Mr. Assan Gomse' during a facts finding discussion indicates that he came across the African Wild Dogs while on a drive into the park

from the central road from the camp (Campement de chasee du Bel Eland) to the camp (Campement de chasee du Buffle noir) (personal communication). This is evident that the African Wild Dog still exists in the park but are rare and endangered for they are almost getting extinct.

The distribution of Wildlife in the park in general sometimes depends on how good the management principle(s) are. Since the government and private operator do management, it is a sad fact that needs to be taken into account when planning conservation of these species because the private operator invests a lot in conserving his zone by protecting, liming and creating artificial rich salt lick for his animals. Often these zones are better protected and richer in animals than the parks based on the notion of territoriality which influences private operator's investment objectives. Without the help of International organizations (WWF, IUCN, GTZ, ECOFA) providing every thing for the conservation of African Wild dog and Derby Eland, even with their contribution in monetary terms, there is no allocated fund for special conservation projects in Cameroon.

8.3.4 THE WILLINGNESS TO PAY FOR THE CONSERVATION OF DERBY ELAND AND AFRICAN WILD DOG

Every respondent seem to realize the need for a financial contribution probably coming from taxes generated from within park activities. The high level of the willingness to pay for the conservation of species shows that conservation has been seen by respondents as important. A good proportion of persons need to be informed by the application of specific awareness campaigns with the help of registered associations. With these funds government may as well fund conservation projects and / or compensate damages caused by wildlife. The population of north Cameroon will wish to pay 500FCFA shown by the respondents based on their willingness to pay (Figure 31) from the agreed amounts from a range of modest contribution of 0 – 1000FCFA. Quite a remarkable population wants a cut of 50FCFA from their monthly salaries as well as those for 1000 FCFA. Generally, the distribution of amounts responded by the interviewed population can be referred to as normally distributed and those which represents the social classes in the society (peasants, middle class and bourgeoisie) with the two extremes peasants (lower extreme) and bourgeoisies (upper extreme). However the curve seems squid to the left with a slidely greater population in favour of paying amounts less than the mean. This also show the behaviour of the bourgeoisie when contributions in the society on public goods come up. The have a positive environmental attitude which influences their WTP for environmental goods certainly out of their surplus and personality. Such personality refers to individuals unique disposition, perception, organisation, understanding and appreciation of the

environment. Such a relationship between personality and environment is a vital frame work for the understanding of ecological realities and process of environmental management.

8.3.5 ASSESSMENT OF THE MANAGEMENT POLICY BY THE COMMUNITY

Forty-six percent of the population (Figure 32) wishes they were compensated for the giving away their resource, 28% with the options of exchange, 9% expropriation, 16% continuation and 1% none of the options. However, whether compensation, exchange, expropriation, continuation or none of the options, “an idle mind is the devils workshop” and so with most locals being idle, they are always prone to committing crimes. Under the present management scheme, local communities around Faro and Benoué National Parks benefit from taxes quota (Appendix IV) by forming associations (Appendix V) which are funded by income generated from conserving the wildlife in the parks. However, the chief of service for wildlife at the provincial delegation of MINEF Garuoa Mr. Mbouyo Emmanuel (personal communication) says in the procedure creating National Parks in the north of Cameroon, financial loss by local communities had been compensated for already. The loss acliamed by the community currently should be loss in the long term which is much more than money. His argument however must not be true, the fact that government has recognized the modification of its policies to meet up with the challenges of a dynamic society and global ecotourism economy. Income generated from Derby Eland hunt which is constantly increasing due to the size, beauty and quality of trophy of these species has and will always remain to the benefited the local communities.

The questionnaire study has potrayed the fundamental role of ecotourism as a socio-economic and environmental good which require sustainable management within a global development partnership. Such conservation activities as is the case with National Parks in Cameroon requires the protection of endangered species especially the African Wild Dog and the Derby Eland which have over the years become very rare. The near extinction of these animals has been accerated by the attitude of the inhabitants of the community who believe that the African Wild Dog is destructive to the domestic livestock due to their canivous nutrition. To revert such attitudes require a cost benefit analysis of the conservation objectives and strategies for the protection of these species.

Some benefits of these conservation projects to local and national community includes job creation through the employment of the local people on the projects, who most often are trained and educated on conservation related skills. The influx of visitors generates interchange of experiences, finances, improves trade and motivates positive attitude change. Sustainable park

management should build on the culture of the people within the designated community, their knowledge, motivations, level of education, beleives, willingness to pay for and the willingness to accept conservation. This study has shown that given the high level of sensitization, there is a high level of a WTP for the conservation of the African Wild Dog and Derby Eland despite the short comings underlinninng previous attitudes. Further investigation should be able to determine the amount of money suitable to be payed by the greatest proportion of the population based on an objective community participation.

There is the need to improve the sensitisaton and communication on the potentials and the benefits of such projects through environmental education programs in the school curricula, use the media, news letters, door-to-door campaigns for the benefits of all stake holders. The African Wild Dog and Derby Eland amongst other species are becoming rare and need protection. A study of their production and to enhance their multiplicity is encouraged and can be done through genetic engineering and artificial incimination, domestication, improved breeding, crunninng etc.

A review of management policies and an improvement towards community participation leading to involvement of local people in the decision making processes is paramount to achieving their support and commitment. This will enable them to change their attitudes towards the African Wild Dog and Derby Eland and to view ecotourism as an asset that takes care of both individual and collective interest.

Perception of the conservation program is generally positive but is challenged by personality threats, that governs the dominance of personal over collective interest. This is responsible for the negative attitude of the people towards the African Wild Dog and Derby Eland motivatin g the desire to exterminate the species because of their destructive potential to domestic livestock against environmental interest. The adjustment of such perception requires personality and attitude change through education at all societal levels.

Environmental laws and policies need to be dynamic within the global development partnership. They should have a positive influence on sustainable management of the ecotourism \industry based on a win-win frame work that upholds human welfare within a sustainable environment.

The value of a park and the need for conservation cannot be underestimated given the high level of sensitization. Coorperation of all stake holders such as the community, governments,

NGO's, foreign donors agencies is paramount to the innovative and optimized management of such a valuable resource. Given the above, the understanding of how to better intergrate community participation and gender in the conservation, the National Park requires a careful attention.

The role of the African Wild Dog and Derby Eland as an attractive and beautiful animal that deserves the right to be protected as an entity of the ecosystem remains a universal fact despite its destructive effects on livestock. Alternative protection strategies for domestic livestock need to be adopted as well as the provision of almternative food sources to the African Wild Dog and Derby Eland to enhance mutual co-existence. This should be a focus for contemporary reseach since the extinction of African Wild Dog and Derby Eland at the benefits of domestic offers an ethical challenge fnor which prosperity will live to regret.

CHAPTER NINE

1.0 CONCLUSION AND RECOMMENDATIONS

1.1 CONCLUSION

These research consisting of different parts (questionnaires, field research and secondary data analysis) all play a back-up roll in which local people through the questionnaires responses identify the park and its numerious benefit and are willing to pay for conservation projects as well as field survey shows the presence of the species and the posibilitie(s) of population manipulation under a good management scheme. This gives a conviencing conclusion that good management working together with the local population (manpower and finances) will enhance animal polulation, attract tourist who will bring foreign currency and improve life in a long term while lowering cost in the future.

Figure 33 shows a conceptual model of the local community and their vulnerability to environmental degradation. A visible link is seen between the causes of environmental problems and their effects on the state of the environment as well as the societal responses in Faro and Benoué National Parks. The main driving force is untold financial hardship, lack of technological know how and problems of underdevelopment. These put a pressure on the environment and its resources through poaching, uncontrolled bush fire, illegal exploration of gold and fishing exercise as well as, the ease with which sport hunting is incorporated with the absence of adequate facilities like motorable roads and practices of artificial liming and salting by owners of private hunting zones. The impact of which is over hunting, ecosystem imbalance and migration. However, efforts are being made by the management to fight poaching activities by forming anti-poaching teams and make the local community benefit from the revenue generated from park resources, but they are not yet sufficient.

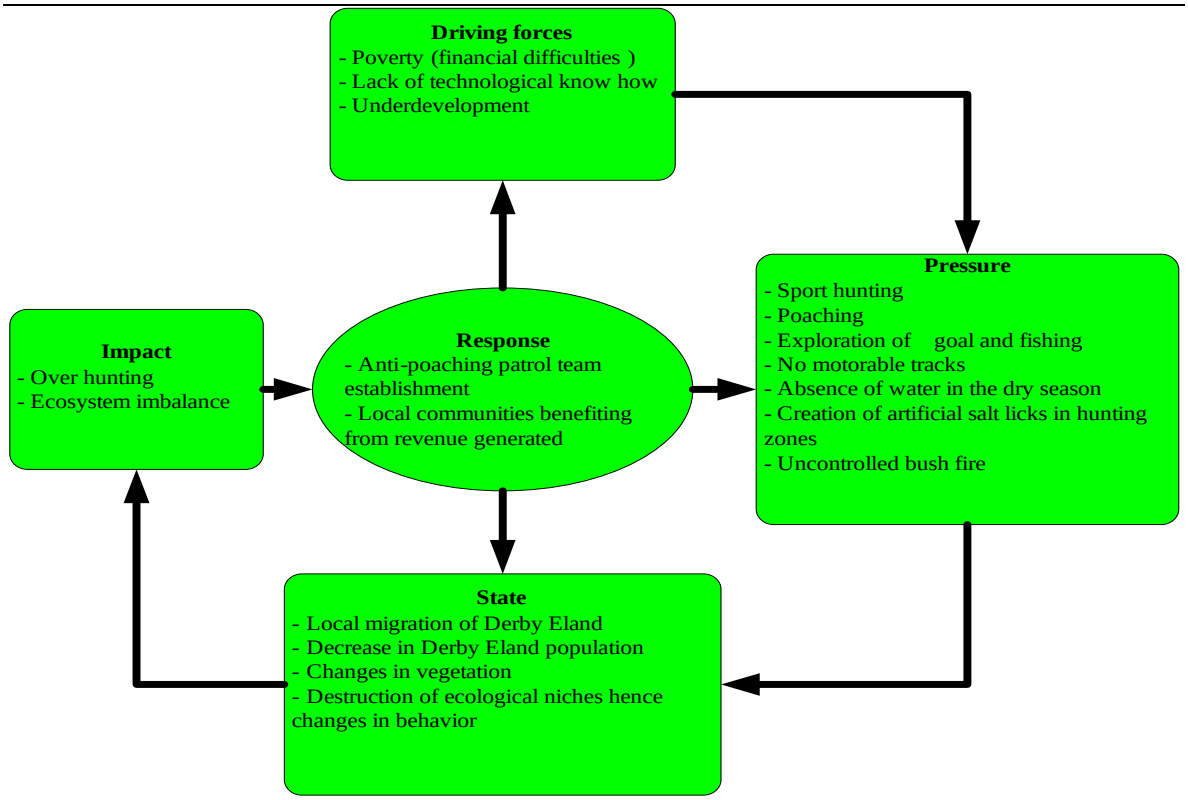

Figure 33: The driving force- pressure- state- impact- response model

Even though the density of each species and its distribution over different habitat types can provide valuable insights into the species that exist, they can not tell about the animals' behaviour so it is necessary to observe the animal and record its interactions with its habitat and other members of its society and other animal species (that is inter and intra-specific interactions). Density studies should be combined with behavioural studies so that direct information affecting management of the population can enable a conservationist, assess animal habitat, decide how many animals live in an area, decide whether the population can survive and breed, decide how important animals are in this population and finally can be able to resolve conflicts between animals and humans or predict where problems may arise and adjust the management plan.

The African Wild Dog is frequently reported by researchers to be outside the National Parks in the hunting zones. Proprietors of the hunting zones offer better management practices which attract higher populations of species. Therefore, standardized and harmonized management principles should be implemented by the government in the National Parks and by the proprietors of hunting zones. This may reduce the risk of the wildlife/human conflict and subsequent wanton destruction by local communities who easily come in contact with wild animals because of their

locations. Such standards will mean that the following are taken into strict consideration by forming legal, ecological, economic and social groups which will provide a comprehensive management and operational support from formation to ongoing facilitation, administration and management of daily activities. So that the resources required and provided can be tailored to meet the needs and objectives of each group. Groups can mobilize quickly and maintain their unique identity without the need to develop their own "do-it-your" like the present organogram where technical staff and manager of parks perform administrative and management functions on a daily basis.

1.1.1 The Legal Group

Compliance with national laws and international agreements by respecting all applicable laws of the country and international treaties and agreements which the country is a signatory and complies with all principles so that cost-effective, stable programs in support of new or emerging technology will meet rapid development of standards and specifications.

Also, long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.

1.1.2 The Ecological Group

Game management measures shall encourage efficient and rational use of habitats based on the achieved balance in order to ensure a wide range of environmental and social benefits and economic viability of game management enterprises. Environmental benefits such as the installation of new lighting technology, transportation cost and water conservation measure and social benefits such as community participation in decision making, earning a wage, struggle against abuse of the environment, struggle against poverty and social injustice, management of camps, empowerment of local communities, education and other social benefits like portable water, health services, communication and road infrastructure, and sharing and networking expertise.

Game management shall conserve biological diversity (mammals and all that they depend on for proper functioning) and its associated values, unique and fragile ecosystem and landscape and by so doing, maintain the ecological functions and the integrity of the park.

The enumeration of game population and monitoring of habitats shall be conducted- appropriately to scale and intensity of game management - to measure the response of game population to changes in their environment and to evaluate the condition of habitats, chain of custody, management activities and their environmental impacts.

Game management shall maintain and enhance quality of game populations through employing selection and building up an appropriate gender-age population structure. Decision regarding hunting animals of high trophy quality shall always be considered after the annual synchronized census of the animal population and except order wise, can be made in the context of a precautionary approach (which is a science-based risk management which recognizes that the absence of full scientific certainty shall not be used as a reason to postpone decision when faced with the threat of serious or irreversible harm. However, the guidance and assurance are required as to the conditions governing the decisions that will be made. Guidance and assurance are particularly needed when a decision must be made regarding a risk of serious or irreversible harm about which there is significant scientific uncertainty).

1.1.3 The Economic Group

A management plan- appropriate to the scale and intensity of the game activities- shall be written, implemented, and kept updated. The long-term goals of management and of achieving them shall be clearly stated.

Breeding of game species in fenced habitats and further release of them to open habitat shall contribute to satisfying social and economic needs for hunting products; fenced habitats should complement the management of, reduce pressure on and promote the restoration and conservation of open game habitats.

1.1.4 The Social Group

Sites of special cultural, ecological, economic or religious significance to the region and/or the whole country shall be recognized and protected by game managers in cooperation with forest servant. Game management activity shall maintain or enhance the long-term social and economic well-being of employees and local communities.

The removal and replacement rate of Derby Eland follows a dwindling trend with sudden increases and decreases in population over the years. Five National Parks (Gashaga- Gomti

National Park Nigeria, Faro, Benoue and Bouba Ndjida National Parks Cameroon and Zakouma National Parks Tchad) in the same ecological region but different administrative set up, permit the migration and immigration of animal species. Management agreements should be reached by authorities of these respective institutions and synchronize the census of species. However, sustainable harvest of Derby Eland by sport hunting can be a good avenue for poverty reduction under a good governance scheme which seems to be the cry of most third world countries especially Cameroon which has been identified as one of the heavily indebted poor countries (HIPC) by the International Monetary Fund (IMF) and the World Bank. The outstanding populations over the years indicate that the environment is still capable of permitting the wildlife to thrive. Therefore a captive breeding exercise and re-introduction scheme will be a project to embark on by the management of the protected areas if the benefits of these species are to be sustainable.

1.2 RECOMMENDATIONS

1. Maintaining large (greater than 10,000 km^2) continuous tracts of land set aside for wildlife by establishing cross-border parks, linking reserves by corridors, control of poaching to maintain their prey base, severe restrictions on building high speed road in wildlife areas and where they do exist, build speed breaks and zero tolerance of domestic dogs-strays must be shot on sight.
2. Integrated carnivore management programmes should be established to resolve conflicts between people and African Wild Dogs where they coexist. Such programmes could involve; local conservation organizations working with farmers to minimize livestock losses through better husbandry practices, compensation programmes for stock that are killed, control and perhaps vaccination of domestic dogs populations and a ban on sport hunting of African Wild Dogs which has been reclassified to Class A by the Cameroon wildlife law.
3. Establishing tiny populations in small, fenced reserves which may be the only way to conserve some wildlife in highly fragmented landscape. Re-introduction of wildlife is technically possible provided the newly established population receives adequate protection from persecution and disease. However, captive African Wild Dogs may still contribute to field conservation by providing subjects for research and increasing public awareness and sympathy for critical wildlife both in Africa and abroad.

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APPENDIX I

SCHEDULE OF FEES AND HUNTING DOCUMENTS

List application documents

- passport with at least 9 months of residual validity;
- permission to temporary export weapons issued by a competent authority;
- Valid VISA form the Cameroon embassy or consulate;
- permission of temporary export trophies form Cameroon by Cameroon government;

The permission for importation of weapons for hunting or safari in Cameroon from the embassy or consulate of the Country.The followings contents and documents must be presented:

1) Reason for the importation of the indicated weapons signed by the applicant, addressed to the Consulate, and containing:

- Personal date (registry, residence, occupation);
- the specified weapons that he/she wants to bring in Cameroon (type, brand, caliber, register);
- the number and the type of cartridges,
- the trip (departure, arrival, exact destination), name and address applicant of the safari or reserve of hunting where he will want to hunt.

2) Invitation letter (original) from the hunting reserve in Cameroon where he will hunt;

3) Original weapons;

4) Original of the permission of export and declaration of possession of the weapons, released by the competent authority;

5) One size port photograph;

6) 30 €.

Hunting safari (smaller – antelopes)

(LICENSE FOR THE SMALLER HUNTING):

Program: 7 days of hunting:

group composed by 6 hunters - 2 guides: €s 2550

group composed by 3 hunters - 1 guide: € 2850

group composed by 4 hunters - 2 guides: €s 3300

group composed by 2 hunters - 1 guide: € 3600

The intermediary formulas need a permission of big hunting: “Smaller hunting with the option

and supplement for hunters: € 850.

SAFARI IN SAVANNA

(LICENSE FOR THE BIG HUNTING):

Program: 12 days of hunting:

group composed by 4 hunters - 2 guides: €s 6400

group composed by 2 hunters - 1 guide: € 7800

group composed by 1 hunter - 1 guide: €11400

Rates for companions in a group hunt:

€ 250 is paid for any days hunt in the safari where off take of smaller safaris in savanna is done. They organize themselves into groups and hunt in denominated hunting zone "KOUROUK", and hunting is carried out in the north - east of the Country. This "Safari of smaller hunting" allows the demolition of 8 animals, among which: *Alcelaphus buselaphus* is the major, *Tragelaphus scriptus, Kobus kob, Redunca redunca, Crocuta crocuta, Lycaon pictus, Phacochoerus aethiopicus, Ourebia ourebi, Cephalophus spp, Papio anubis,* and python (as inserted here in the classes B and C below).

The intermediary formulas of smaller hunting allow the demolition of 4 more animals of smaller hunting as alternative options. The formula for the safari in the savanna allows the demolition of two animals of class A, two animals of class B and two animals of class C.

The rates exposed above do not include:

- big hunting's permission: € 850
- little hunting's permission: € 495
- the specific taxes of hunting
- the aerial flight: around € 1000 / 1100

A 50% account has to be paid during the booking and is non refundable which must be made at least one month before the departure. It is obligatory to pay the insurances against the annulment of the trip and for the civil responsibility.

Taxes of demolition

CLASS A.:

Bufalo (*Syncerus caffer*) € 930

Derby Eland (*Taurotragus derbianus gigas*) € 1940

Elephant (*Loxodonta africana*) € 1940

Roan Antelope (*Hipotragus equinus*) € 930

Leopard (*Panthera pardus*) and Lion (*Panthera leo*) € 1940

more €s 30 for every ivory kilo.

CLASS B:

Hartebeest (*Alcephalus buselaphus*) € 470

Kob (*Kobus kob*) € 270

Waterbuck (*Kobus ellipsiprymnus ellipsiprymnus*) € 545

Reedbuck (*Redunca redunca*) € 270

Bushbuck (*Tragelaphus scriptus*) € 270

Python € 270

CLASS C:

Baboon (*Papio anubis*) € 120

Duikers (*Cephalophus sp*) € 120

Hyena (*Crocuta crocuta*)€ 230

Bushpig (*Phacochoerus aethiopicus*) € 310

African Wild Dog (*Lycaon pictus*) € 230 because of its protection status has been moved to Class A recently.

Oribi (*Ourebia ourebi*) € 155

Wart-hog (*Potamochoerus africanus*) € 230

These prices and taxes besides those of the permissions of hunting can be increased or decreased at any time by the government especially shipping and handling, customs expenses at departure, sanitary expenses, pickings and the preliminary preparation of the trophies.

APPENDIX II

DISTRIBUTION OF AFRICAN WILD DOGS IN AFRICA

Site	Area (Km)	Abundance	Date of estimate
West Africa			
Burkina Faso			
Arli Natinal Park	1,143	Extinct	1987
"W" National Park	1,900	Extinct	1987
Po Forest reserve	-	Extinct	1977
Nazinga Game ranch	757	1 Sighting	1985
Cote d'Ivoire			
Comoé National Park	11,500	Extinct	1995
Marahoue National Park	1,038	Extinct	1987
Ghana			
Bui National Park	2,100	Extinct	1987
Digya National Park	3,478	Extinct	1987
Mole National Park	4,840	Extinct	1995
Kyabobo Range National Park	-	Rare	1994
Gbele Game Production Reserve	-	Extinct	1995
Kalakpa Game Production Reserve	-	Extinct	1987
Guinea			
Badiar National Park	380	Uncommon	1996
Ndama Forest reserve	500	1 sightings	1996
Sankarani River	n/a	1 sightings	1990/91
Niger			
`w´ National Park	3,340	Extinct	1996
Air et ténéré Reserve	-	Extinct	1987
National Park	-	-	1987
Nigeria			
Kainji Lake National Park	5,300	Extinct	1995
Chingurmia-Duguma National Park	-	Vibrant	1995
Gashaka Gumpti Natioanal Park	-	Extinct	1988

Yankari National Park	2,244	Extinct	1991
Lame Burra Game Reserve	-	1 Sighting	1991
Sambisa Game Reserve	518	Extinct	1987
Sénégal			
Niokolo-Koba National Park			
Falemé Hunting Area	9,130	Uncommon	1997
Ferlo-Nord Faunal reserve	13,360	Uncommon	1997
Ferlo-Sud faunal reserve	49,700	Extinct	1995
Delta de Sloun	63,400	Extinct	1985
Central Africa	n/a	1 sighting	1985
Cameroon			
Benoué National Park	1,781	Uncommon	1995
Bouda-Njida National Park	1,940	Uncommon	1993
Faro National Park	3,410	Common	1995
Kala-Maloué National Park	-	Absent	1987
Waza National Park	1,700	Absent	1987
Kimbi River Fauna Riserve	-	Absent	1987
Central African Republic			
Bamingui- Bangoran Comples	32,00	Rare	1995
Manovo Gounda-st floris Complex	32,400	Rare	1993
Democratic republic of Congo			
Garamba National Park	15,125	Extinct	1987
Upembe National Park	11,700	Vibrant	1986
Virunga National Park	75006	Extinct	1987
Tchad			
Manda National Park	1,100	Uncommon	1987
Zakourma National Park	3,156	Extinct	1987
Oudai- Rimé—Ouadi Achim Game	80,000	Rare	1987
Reserve	-	Uncommon	1987
Siniaka-Minim Game Riserve			
East Africa			
Ethiopia	400	Extinct	1992
Abijatta-shalla Lake National Park	750	Vibrant	1990
Awash National Park	2,470	Rare	1995

Haenna-Bale Mountains National Park	5,060	Rare	1987
Gambela National Park	2,200	Common	1992
Mago National Park	500	Vibrant	1992
Nechisar National Park	3,000	Rare	1995
Omo National Park	180	Absent	1987
Simien Mountains National Park	2,500	Uncommon	1996
Yabello Sanctuary	4,700	Extinct	1987
Yangudi Rasa National Park	n/a	Uncommon	1995
South Of Jigjiga	n/a	Uncommon	1994
Sof Omar	n/a	1 Sighting	1995
Filtu	n/a	Uncommon	1995
South-East of Bale Province	n/a	Uncommon	1994
Mehal Meda, Shoa			
Kenya	2,000	Extinct	1987
Aberdare National Park	365	Extinct	1993
Amboseli National Park	57	Extinct	1992
Lake Nakuru National Park	1,367	Extinct	1987
Mount Kenya national park	117	Extinct	1987
Narobi National Park	20,574	Uncommon	1992
Tsavo East National Park	-	Rare	1992
Tsavo West National Park	1,672	Extinct	1991
Masai Mara national Park	339	Extinct	1992
Buffalo Springs National Park	-	Uncommon	1991
Dodori National Park	1,787	Rare	1992
Kora National Park	4,000	Extinct	1987
Nasolot National park	225	Vibrant	1991
Samburu National Park	1,000	Rare	1987
South Turkana Reserve	169	Vibrant	1993
Tana River National park	n/a	Uncommon	1992
Kajiado District	n/a	Uncommon	1996
Timaui Laikipa	n/a	Uncommon	1992
North-West Kenya	n/a	1 Sighting	1993
Garsen	n/a	1 Sighting	1992
Lokichoko	n/a	1 Sighting	1991

Mandal Island	n/a	1 Sighting	1993
Wamba			
Somalia	4,267	1 Sighting	1994
Bush Bush National Park	n/a	Rare	1994
Juba river	n/a	Vibrant	1987
Buulu berde			
Sudan	6,500	1 Sighting	1995
Dinder National Park	-	Uncommon	1987
Southern National Park	-	Uncommon	1987
Bengagai Game Reserve	-	Extinct	1992
Jebel Marra forest Reserve			
Tanzania	137	Vibrant	1994
Arusha National Park	52	Extinct	1987
Gombe National Park	70	Vibrant	1991
Kilimanjaro National park	325	Extinct	1987
Lake Manyara National park	-	Rare	1993
Mahale national Park	3,200	Common	1993
Mikumi national park	10,400	Common	1996
Ruaha National Park	13,000	Vibrant	1996
Serengati National park	-	Rare	1994
Tarangire National Park	14,160	Uncommon	1996
Kisigo Game reserve	3,509	Vibrant	1995
Mkomazi Game reserve	21,869	Rare	1987
Moyowosi Game Reserve	-	Uncommon	1996
Rungwa game riserve	43,000	Common	1996
Selous Game riserve	6,984	Rare	1987
Mgalla River game riserve	6,929	Uncommon	1996
Kilombero Game Riserve	n/a	Uncommon	1995
Massai steppe			
Uganda	1,483	Vibrant	1996
Kidepo valley National Park	3,346	1 Sighting	1990
Murchison falls National Park	1,978	Extinct	1987
Queen Elizabeth National Park	-	Vibrant	1996
North Karamoja Controlled hunting area			

South Africa			
Botswana	-	Common	1992
Chobe National Park	26,038	Rare	1987
Gemsbok National Park	-	Rare	1987
Nxai Pan National Park	55,374	Rare	1987
Central Kalahari game reserve	2,500	Rare	1996
Khutse game reserve	-	Rare	1987
Mabuasehube game reserve	-	Rare	1992
Makgadikgadi game Rserve	-	Common	1996
Moremi Wildlife reserve	n/a	Uncommon	1992
Chobe district	n/a	Uncommon	1991/2
Central District	n/a	Uncommon	1992
Nganiland District	n/a	Rare	1992
Gharizi district			
Malawi	2,316	Uncommon	1991
Kasungu National Park	-	Absent	1987
Lengwe National Park	548	Extinct	1987
Liwonde National Park	3,040	Vibrant	1995
Nyika National Park	-	Absent	1987
Majete Game reserve	260	Rare	1987
Mwabvi Game reserve	1,750	Extinct	1987
Nkhotakota Game riserve	1,040	Extinct	1987
Vwaz Marsh Game Reserve			
Namibia			
Etosha National Park	21,346	Extinct	1996
Kaudom Game reserve	12,492	Uncommon	1996
Bushmanland	n/a	Uncommon	1996
Caprive Strip	n/a	Uncommon	1996
Hereroland East	n/a	Uncommon	1996
Kavango	n/a	Uncommon	1996
South Africa			
Addo Elephant National Park	-	Extinct	1987
Golden gate Highland national Park	-	Extinct	1987
Kalahari gemsbok National Park	9,500	Vibrant	1996

Karoo National Park	-	Extinct	1987
Kruger National Park	22,000	Common	1996
Mountain Zebra National park	-	Extinct	1987
Hluhluwe Game reserve	-	Uncommon	1996
Itala Game Riserve	300	Vibrant	1995
Mkuze game riserve	-	Extinct	1987
Ndumu Game Riserve	-	Extinct	1987
Umfolozi Game riserve	-	Uncommon	1996
Near Messina	n/a	1 Sighting	1996
Zambia			
Blue Lagoon National Park	-	extinct	1994
Isangano National Park	840	Extinct	1994
Kafue National Park	22,500	Common	1994
Kasanka National Park	390	Extinct	1994
Liuwa Plain National Park	3660	Uncommon	1994
Lochinvar National Park	-	Extinct	1994
Lower Zambezi National Park	4,140	Rare	1994
Luambe National Park	3210	Uncommon	1994
Kukusuzi National Park	2700	Rare	1994
Lusenga Plain National Park	-	Rare	1987
Mosi-Oa-Tunya National Park	66	Extinct	1994
Mweru Wantipa National park	3,134	Extinct	1994
North Luangwa national Park	4,600	Rare	1994
Sioma-Ngwezi national park	5,276	Rare	1994
South Luangwa National Park	8,500	Rare	1994
Sumbu National Park	2,020	Rare	1994
West lungar National Park	1,684	Uncommon	1994
Bangweulu Game management Area	-	Extinct	1994
Kafue Flat game Management Area	-	-	1994
Kasonso-Busanga Game management Area	-	Rare	1994
Lumimba Game management Area	2,700	Rare	1994
Lunga game management area	13,340	Rare	1994
Lupande Game Management Area	4,840	Rare	1994
Luwingu Game management area	-	Extinct	1994

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Mulobezi Game management Area	7,383	Common	1994
Mumbwa game Management area	3,370	Rare	1994
Muyamdzi Game management Area	2,500	Rare	1994
Musalangu Game Management area	17,350	Rare	1994
Namwala Game Management Area	-	Rare	1994
Sichifula Game Management Area	-	Common	1994
Tondwa Game Management Area	-	1 Sighting	1994
West Zambezi Game management area	-	Rare	1994
Great East road	n/a	2 Sightings	1993
Zimbabwe			
Chizarira National Park	2,161	Vibrant	1992
Gona zhou National park	5,189	Uncommon	1992
Hwango National Park	15,219	Common	1992
Mana Pools	-	Uncommon	1992
Matusadona National Park	1,343	Extinct	1992
Zambezi National park	-	Uncommon	1992
Charara safari Area	-	Rare	1992
Chete safari area	1,237	Rare	1992
Chewore safari Area	-	Rare	1992
Chirisa safari Area	1,498	Extinct	1992
Dande safari area	-	Rare	1992
Doma safari Area	-	Rare	1992
Matetsi safari area	4,399	Common	1992
Sapi safari Area	-	Rare	1992
Kazuma pan forestry Area	-	Uncommon	1992

Source: Fanshawe et al**.** (1997)

APPENDIX III

FIELD QUESTIONNAIRES

BRANDENBURG UNIVERSITY OF TECHNOLOGY COTTBUS

Removal and replacement rates of Derby Eland *Taurotragus derbianus* Gigas (1847) and some statues of the African Wild Dog *Lycaon pictus* Temminck (1820) in Faro and Benoué National Parks Cameroon.

Dear respondents,

We are investigating economic development based on sustainable utilisation of renewable natural resources by biodiversity valuation of Derby Eland and African Wild Dog. We therefore will not want to speak of things without the impression of the people. This questionnaire is intended to assist attain one of the five research goals set out for obtaining a doctor of philosophy (PhD) in Environmental Resource Management (ERM) in BTU-Cottbus. The questionnaire is purely for academic purposes and the information given will be treated in strict security and confidentiality. We are grateful for your help.

Contact

TSI EVARISTUS ANGWAFO

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1. What are your occupational characteristics? ☐ Transhumance pastoralist ☐ Settled agriculturalist ☐ other occupations ----------.

2. Do you have knowledge about the objectives of protection in Cameroon? ☐ Yes ☐ No ☐ Don't Know.

3. If yes in 2 above, then list some.

a) ----------

b) ----------

c) ----------

d) ----------.

4. What will be your reaction to these different scenarios in National Parks?

Compensation ☐ Yes ☐ No ☐ Don't Know.

Expropriation. ☐ Yes ☐ No ☐ Don't Know

Exchange ☐ Yes ☐ No ☐ Don't Know

Continuation ☐ Yes ☐ No ☐ Don't know

5. If you do not know 4) above, but are you interested to know more? ☐ Yes ☐ No.

6. What are your perceptions on options of development of the area with regards to National Park? ----------

---

ECOTOURISM

Eco-tourism is the travel and stay of non-residents in another area for recreation purposes in so far as it does not lead to any employment or earning.

7. What reactions have you towards eco-tourism to supplement income?----------

---

---

8. Have you ever seen or heard an African Wild Dog in the wild? ☐ Yes ☐ No and What about the Derby Eland? ☐ Yes ☐ No.

9. If No is your response move to question 13.

10. Do you remember ever reading a magazine, reading a news paper or watching a television program about the statues of the African Wild Dog? ☐ Yes ☐ No

What about the Derby Eland? ☐ Yes ☐ No.

11. During the next 12 months, do you have plans to take a trip to a National Park to observe, photograph, see signs of or listen to African Wild Dogs in the park? ☐ Yes ☐ No and any of such plans for the Derby Eland? ☐ Yes ☐ No.

12. Do you think it is?

☐ Very important ☐ important ☐ some what important or ☐ not important to know that other people are able to enjoy African Wild Dogs and Derby Eland in the parks?

13. How important is it to know that future generations will be able to enjoy African Wild Dogs

☐ Very important ☐ Important ☐ Some what important ☐ Not important.

And Derby Elands ☐ Very important ☐ Important ☐ Some what important ☐ Not important

14. How important is it to know that African Wild Dogs and Derby Elands exist in Cameroon parks even if you do not see them?

☐ Very important ☐ Important ☐ Some what important ☐ Not important.

15. How important is it to allow the existence of endangered species in National parks?

☐ Very important ☐ important ☐ some what important ☐ not important.

CONSERVATION OF RESOURCES

Conservation of resources cost money and now that you know it is important and is interested:

16. Will you be willing to pay a one-time tax increase (CFA) to fund a conservation plan for such species? ☐ Yes ☐ No.

17 If yes, choose the right amount (CFA). ☐ 50, ☐ 250, ☐ 500, ☐ 750 and ☐ 1.000.

18. Funded programmes depend on the success of African Wild Dog management plans (Wild Dog Damage Plan) (WDDP) to compensate owners for the lost of livestock and veterinary costs associated with hurt animals. Would you pay a one-time tax increase (CFA) to fund this damage plan?

☐ Yes, ☐ No and ☐ don't know.

19 If yes, choose the right amount you will like to pay?

☐ 10, ☐ 100, ☐ 150, ☐ 250, ☐ 350, ☐ 500 and ☐ 750 FRS.

20. Have you an idea about the impact of Wild Dog on the economic, social and cultural status of the people around here?

☐ Yes ☐ No.

21. If yes, what is your idea? ----------

---

22. Currently, government is protecting the Wild Dog in the National Parks. What is your view on the effectiveness of the existing administrative set-up?

☐ Very effective ☐ Effective ☐ less effective ☐ not effective.

23. Why rate the existing administration in this way? ----------

---

24. What other implementation will you propose to the government to compensate for preventing your use of the protected area? ----------

---

25. Which administrative or management scheme do you prefer for controlling the National Parks

☐ Forest department (MINEF) ☐ Agric department (MINAGRI) ☐ Animal husbandry (MINEPIA) multiple answers are possible.

ONLY MANAGERS OF PARKS, HEADS OF GOVERNMENT INSTITUTIONS AND NGO´S CONCERNED

26. How much money comes in to your park in form of tourism based on sport hunting licenses for Derby Eland? ----------

27. How much money does government policy bring in on conservation of Derby Eland?

---

28. How much money do Non-governmental organizations or international organizations bring in the conservation of Derby Eland?

a). Fauna safari club. ----------. b) Four star hunting adventures----------

c). African trophy hunting (Mayo Oldiri Safari) ----------

SOCIO DEMOGRAPHIC DATA

For all persons

Gender: ---------- Educational level: ----------

Age: ---------- Country: ----------

Function: ---------- Individual/group: ----------

Duration of stay: ----------

END – THANK YOU

APPENDIX IV

TAXES QUOTA BENEFITS FOR THE RURAL COMMUNITIES 2004

S/N	Rural Community	Amount	Exchang preniums	Net Amount recieved
1	Tchollire	19075640	288000	18787640
2	Touboro	10780552	144000	10636552
3	Poli	8363776	144000	8219776
4	Madingring	4786720	144000	4642720
5	Lagdo	2864384	144000	2720384
6	Ray Bouba	2298096	144000	2154096
7	Tcheboa	1997184	1440000	1853184
8	Beka	857024	-	857024

Delegation MINEF Garoua, (2005).

APPENDIX V

ASSOCIATIONS OF RURAL COMMUNITIES BENEFITING FROM HUNTING TAXES

Acronmy	**Names**
CDLT	Comite de developpement du lamidat de Tchamba
ADECOTONBOU	Association pour le developpement communautaire des villages de Tongo a Bounmedje
KAIE (KAWTAL)	Association des villages riverains de la ZIC No 7 Est.
KAZIO	Association des villages riverians de la Zic No 7 ouest BP 47 Garoua
ADEVAN	Association pour le developpement des villages allant de vagba noto (Song-kap)
ADECOWINA	Asociation pour le developpement communautaire des villages Winde Ngong 1 a Malla BP 601 Garoua
CDCM	Comite de developpement du Canton de Mana
AMAGA	Association pour le developpement des village du mayo-Alim a Gare'
HOPEEN	Association pour le developpement communautair des villages Doudja de Mbaou a Daugou
NACKOPEEN	Association pour le developpement communautaire des villages de Doudja a Banjoukri
SOPENNOUNG	Comite de developpement du Lamidat de Ndong lassere
CDLV	Comite de developpement du lamidat de Voko
ARLAB	Association des ressortissants du Lamidat de Bantadje
CLRB	Comite de developpement du lamidat de Rey-Bouba
CCDGG	Comite de develppement du secteur de Dode- Gare
CDSD	Comite de developpement du secteur de Doupa
KAWTAL	Association pour le developpement communautaire des villages allant de tabou a Wafango

Provincial delegation of MINEF Garoua (2005)

APPENDIX VI

CHECK LIST OF MAMMALS OF FARO AND BENOUÉ NATIONAL PARKS CAMEROON

Common name	**Scientific name**	**Local name**
Buffalo	*Syncerus cafffer*	Mbana
Ourebi	*Ourebia ourebi*	Gabare
Bushbuck	*Sylvicapra grimma*	
Western buffons Kob	*Cobe defassa*	Mbada
Derby Eland	*Taurotragus derbianus*	Yamuss
Hyaena	*Hyaena hyaena*	Faoru
African wild dog	*Lycaon pictus*	
Elephant	*Loxodonta africana*	Yiebi
Giraffe	*Giraffe camelopardalis*	
Hippopotomus	*Hippopotamus amphibius*	Colba
Leopard	*Panthera pardus*	
Lion	*Panthera leo*	Babalade
Warthog	*Phacochoerus aethiopicus*	Gadoro
Baboon	*Papio anubis*	Wandou
Hipotragus	*Hipotragus equinus*	
Hartebeest	*Alcephalus buselaphus*	
Guib harnache	*Tragelaphus scriptus*	
Reedbuck (Redunca)	*Redunca redunca*	
Water buck	*Kobus ellipsiprymnus ellipsiprymnus*	
Porcupine	*Hystrix sp*	
Civette	*Viverra civetta*	
Green Monkey	*Cercopithecus aethiops*	
Chacal	*Canis sp*	
Duikers	*Cephalophus sp*	
Wart-hog	*Potamochoerus africanus*	

APPENDIX VII

FREQUENCY OF ANIMALS IN FARO AND BENOUÉ NATIONAL PARKS CENSORED JANUARY – MAY 2005

Faro										Benoué							
S/N	Species	Dung		Direct observ.	Food remains	Foot prints	Trail	Urine	Call	Dung		Direct observ.	Food remains	Foot print	Trail	Urine	Call
		Fresh	Old							Fresh	Old						
1	Eland	68	81	10	07	11	00	01	00	13	21	45	00	02	00	∞	00
2	Hartebeest	71	125	06	00	06	02	00	04	141	112	64	02	10	100		01
3	Kob	206	549	55	00	03	29	00	00	118	108	45	00	02	01	00	00
4	Buffalo	02	09	00	01	08	07	00	00	10	22	00	00	11	01	00	00
5	Elephant	25	28	00	10	05	10	00	00	05	87	60	05	03	01	00	00
6	Oribi	57	56	07	00	01	00	00	00	35	100	17	00	00	00	00	00
7	Lion	02	03	00	00	01	00	00	00	0	0	00	00	00	00	00	00
8	Leopard	00	01	00	00	00	00	00	00	01	01	00	00	00	00	00	00
9	Hyena	02	06	00	00	01	00	00	00	00	00	00	00	00	00	00	00
10	Giraffe	00	02	00	00	01	00	00	00	00	01	02	00	00	00	00	00
11	warthog	12	15	01	00	00	00	00	00	35	54	11	00	00	00	00	00

F- Fresh, O- Old, DO- Direct observation, FR- Food Remains, FP- Foot Print, TR- Trail, UR- Urine, & CA- Call

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APPENDIX VIII

WILDLIFE SURVEY IN THE FARO AND BENOUÉ NATIONAL PARKS: DATA COLLECTION SHEETS

A) **Direct observations, dung, paths, vocalization**

Line No: Line Length: Area Name: Start Time: End Time:

Date: Observer(s): GPS Start: GPS End:

Interval	**species**	**Grp. Size/Single**	**Field Conditions**					**Direct Observations**			**Vocalisations**		**Dung**			**Track**	**Grp. Composition**	
			TIME	WEATHER	VEGE. TYPE	VISIBILITY	DISTURBANCE LEV.	PERP. DIST.(M)	SIGHTING DIST. (M)	DURATION	TYPE	PERP DIST.(M)	No	AGE	PERP. DIST. (M)	SUBSTRATE	ADULT	JUVENILLE

Complete overleaf datasheet (human signs) Notes on datasheet overleaf

A) Human signs checksheet

	Cartridges		**Paths/trails**	**Direct encounters**				**Bush huts**
INTERVAL	NUMBER OF CARTRIDGES SEEN	PERP. DIST. (M)	POINT CROSSED PATH	NUMBER OF GUNSHOTS HEARD	APPROX. DIST. HEARD	HUNTERS ENCOUNTERED	TRAPS/ SNARES ENCOUNTERED	GPS READING

Notes:

Disturbance Level Categories (i.e. leaf litter): High (dry); Low (wet or no leaves)

Visibility categories: 0-5m 5-10m 10-15m 15-20m 20-25m 25-30m 30-35m

Weather Conditions: Sunny Dull Light rains/mist

APPENDIX IX

PERMISSION TO CARRY OUT FIELD RESEARCH IN NATIONAL PROTECTED AREAS FROM THE MINISTRY OF ENVIRONMENT AND PROTECTION OF NATURE

MINISTERE DE L'ENVIRONNEMENT
ET DE LA PROTECTION DE LA NATURE

SECRETARIAT GENERAL

SECRETARIAT PERMANENT A L'ENVIRONNEMENT

N° 0129/L/MINEF/SG/SPE/DPDP/CP/CEA3.

Réf. V/ Lettre de TSI EVRISUS ANGWAFO du 18 Nov.2004

MINISTRY OF ENVIRONMENT
AND PROTECTION OF NATURE

SECRETARIAT GENERAL

PERMANENT SECRETARIAT FOR ENVIRONMENT

Yaoundé, le 0 2 MARS 2005

LE MINISTRE

Objet: *An application for permission to carry field research in Faro, Benoué and Bouba Ndjida National Parks in North Cameroon.*

A Monsieur TSI EVRISUS ANGWAFO
Chair of General Ecology. Faculty of Environment Science and Process Engineering Brandenburg University Cottbus .
P.O.Box: 101344 D.03013 Cottbus .
Germany.

Monsieur,

Faisant suite à votre correspondance dont les références et l'objet sont repris en marge.

J'ai l'honneur de vous autoriser de collecter les données de terrain pour votre thèse « Renoval and replacement rate of Derby Eland, Taurotratus derebianus gigas and African Wild dog lycon, Pictus temminck in Faro, Benoué and Bouba Ndjida National Parks North Cameroon » dans les Aires Protégées sus mentionnées.

Les résultats des vos recherches scientifiques obtenus doivent en permanence être mis à la disposition de mon Département Ministériel et tout prélèvement des produits génétiques à des fins scientifiques ou culturelles seront soumis à l'obtention préalable d'un permis délivré par l'Administration compétente.

Veuillez agréer Monsieur , l'assurance de ma haute considération./.

Le Ministre
The Minister

HELE Pierre

APPENDIX X

PERMISSION TO CARRY OUT FIELD RESEARCH IN NATIONAL PROTECTED AREAS FROM THE MINISTRY OF FORESTRY AND WILDLIFE

REPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie

MINISTERE DES FORETS ET DE LA FAUNE

SECRETARIAT GENERAL

DIRECTION DE LA FAUNE ET DES AIRES PROTEGEES

REPUBLIC OF CAMEROON
Peace-Work-Fatherland

MINISTRY OF FORESTRY AND WILDLIFE

SECRETARIAT GENERAL

WILDLIFE AND PROTECTED AREAS DEPARTEMENT

Yaoundé, le 19 JAN 2005

N° 00049/AAGAPN/MINFOF/DFAP

AUTORISATION D'ACCES GRATUIT DANS LES AIRES PROTEGEES NATIONALES

Le Ministre des Forêts et de la Faune soussigné,

Autorise Monsieur **TSI EVARIUSTUS ANGWAFO**, Enseignant au Département de Foresterie à l'Université de Dschang et en stage de perfectionnement à l'Université Technologique de Cottbus en Allemagne, à accéder, à titre exceptionnel, dans les parcs nationaux du Faro, Bénoué et Bouba Ndjida.

Période : Janvier à Mai 2005.

But : Préparation d'une thèse de doctorat (Ph.D) sur le thème : « Removal and replacement rate of Derby Eland ***Taurotragus derbianus*** **and African wild dog *Lycaon pictus* in Faro, Benoue and Bouba Ndjida National Parks, North Cameroon »**

Ces travaux de recherche se dérouleront dans et autour des parcs sus mentionnés. A ce titre l'intéressé devra se conformer aux dispositions réglementaires sur la protection de la faune sauvage. Il devra en outre faire la restitution de ses travaux au niveau de la conservation des parcs nationaux concernés et faire parvenir au Ministère des Forêts et de la Faune, Direction de la Faune et des Aires Protégées, une copie de son rapport d'activités.

POUR LE MINISTRE
DES FORETS ET DE LA FAUNE
LE DIRECTEUR DE LA FAUNE ET DES AIRES PROTEGEES
Ebai Takang Kenneth

Ampliations :
-Gouverneur de Prov. Nord
-Dél. Prov. MINFOF. Nord
-Ts les Conservateurs des A.P concernés
-CHRONO
-Archives.