

Threats To Biodiversity Conservation In Yankari Game Reserve, Bauchi State, Nigeria

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Abstract: This study was carried out on the threats of biodiversity conservation in Yankari Game Reserve, Bauchi State, Nigeria. Data were collected from protection staffs and villagers in support zone communities of the reserve using questionnaires. Protection staffs interview revealed that livestock grazing (100%), poaching (100%), and illegal fishing (80%) were among the major problems of biodiversity in the study site. Poor salary (90.9%), lack of equipment (96.4%), and insufficient funding (80%) were also among the main management problems discouraging the reserve management staffs. On the other hand, the results obtained from villagers showed that (33.5%) and (28.8%) of them were involved in fuel wood collection and charcoal production and livestock grazing respectively. The implications of these threats include habitat degradation and overexploitation of biological resources.

Keywords: Poaching, farming, Biodiversity threats, illegal grazing, Biodiversity.

I. INTRODUCTION

Biodiversity is the term used to describe nature's variety, including both the number and frequency of ecosystems, species or genes in a given assemblage (Mc Neely et al. 1990). It is considered by some to be the same as species richness; some consider it as species diversity, while many consider it to be the complete variety of life on this planet (Tackacs 1996). According to the International Convention on Biological Diversity (2003), "Biodiversity"(biological diversity) means the variability among living organisms from all sources, including among other things, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part including within species-diversity, between-species diversity and ecosystem diversity. Biodiversity is fundamentally and categorically divided into three related levels of biological organization which are: Genetic diversity which means variability in genetic composition among the populations and individuals of the same species: Species diversity which means variability among species in ecosystem and ecosystem diversity which means habitat diversity per unit area (Fielder and Jane 1992).

Biodiversity serve as the very bases of human existence and economic development because it plays a significant role in the way ecosystems function and in the many services they provide (Dushyant and Mishra 2011). These services include nutrient and water cycling, soil formation and retention, resistance against invasive species, pollination of plants, and regulation of climates as well as pest and pollution control by ecosystems (Dushyant and Mishra 2011).

Globally, an estimated 40 percent of the economy is based on biological products and processes (Christ et al. 2003). However, on a global scale, biodiversity is being lost at a rate many times higher than that of natural extinction. This is caused by a number of factors, including uncontrolled land conversion, climate change, pollution, unsustainable harvesting of natural resources and introduction of invasive species (Christ et al. 2003).

Conserving of biodiversity is to ensure the use of biological resources in ways that do not diminish or destroy the variety of genes and species or important habitats and ecosystems (Attuquayefio and Fobil 2005). Conservation of biodiversity could be *in situ* (protection, maintenance and management of variety of life forms in their real habitat) or *ex situ* (collection of some species or their populations and

communities in areas away from their real habitat) (Oteng-Yeboah, 1997).

A total of about 7895 plant species identified in 338 families and 2,215 genera have been recorded in Nigeria. There are about 22, 000 vertebrates and invertebrates species. Of these, about 20, 000 are insects, 1, 000 are fishes, 247 are mammals, 123 are reptiles (Federal Government of Nigeria 2001) and 894 are birds (Ezealor 2001). Also about 1,489 species of micro-organisms have been recorded. This ranks Nigeria as one of the richest countries of Africa in terms of biodiversity. All these species of animal and plant are distributed differently within the country's vegetation ranging from the mangrove along the coast in the South to the Sahel in the North (Federal Government of Nigeria 2001).

In an attempt to conserve biodiversity in Nigeria, protected-area system has been employed as one of the most efficient ways to mitigate the impact of humans on the remaining biological resources (Nature Conservation Sector 2006). Hence, there are 7 national parks, 445 forest reserves, 7 strict nature reserves, 1 biosphere reserve, more than 20 natural regeneration plots, more than 200 permanent sample plots, 32 game reserves/sanctuaries, 3 fish parks, and 3 Ramsar sites. However, biodiversity in Nigeria is continued to be threatened by intense pressure from various human related activities such as clearing for agriculture, uncontrolled logging and gathering of firewood (Asibey and Child 1990). Other threads include overgrazing and deforestation, illegal hunting for bush meat, indiscriminate bush burning and high population rate (Agbelusi 1994). Presently, among the biological resources the world may loss as a result of threat from these activities is about 37 species of birds (Ezealor 2002). The population of Nile crocodile (*Crocodilus niloticus*) once present in Nigeria waters right up to Lake Chad is fast declining due to habitat destruction and hunting (Iment and Adebobola 2001). About 65 of 560 species of trees in Nigeria forestry are now faced with extinction while many are at different stage of risk (Iment and Adebobola, 2001). These are all conservation issues to the country. Therefore, this study aims at investigating the types of threats to biodiversity conservation in Yankari Game Reserve Bauchi State, Nigeria and examines the pattern of intrusion in the reserve.

II. METHODOLOGY

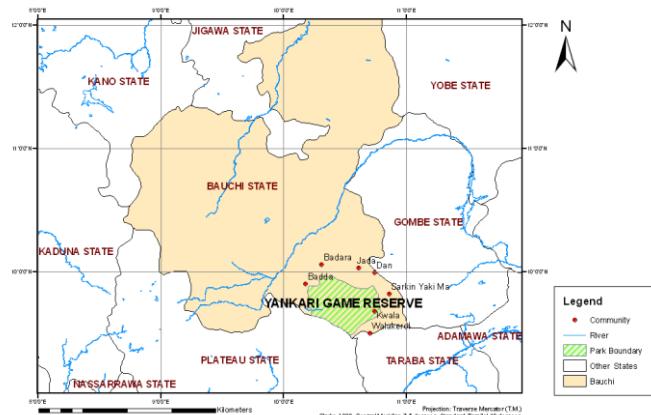
STUDY SITE

Yankari was gazetted as a Game Reserve in 1956, the first in Nigeria, and became a National Park in 1991. As a result of this long period of protection, the park has become the nation's foremost wildlife area and a major tourist attraction in Nigeria. Yankari is located in the east-central part of the country, some 72 km north of the Bauchi-Gombe road at Dindima (09°45'N 10°30'E). It covers an area of 224,400 ha (Ezealor 2001). Yankari National Park was reverted to game reserve in 2006. The reserve is bisected by the Gaji River. Two major habitat-types occur; dry savanna woodlands and riparian vegetation, which includes areas of fadama. Common woodland trees include *Afzelia africana*, *Burkea africana*, *Pterocarpus erinaceus*, *Isoberlinia doka*, *Monotes kerstingii*,

Combretum glutinosum, *Detarium microcarpum* and *Anogeissus leiocarpus*. *Gardenia aqualla* and *Dichrostachys glomerata* are frequent in the shrub layer while *Hyparrhenia involucrata* and *Hyparrhenia bagirmica* are the dominant grasses. In riparian forest *Khaya senegalensis*, *Vitex doniana*, *Acacia sieberiana*, *Tamarindus indica*, *Borassus aethiopum* and *Daniella oliveri* are common (Ezealor 2001). Characteristic of Yankari are large monodominant stands of *Pteleopsis habeensis* which grow in some drier areas along riverbanks, the only place in the country where such stands occur. In the seasonally flooded fadamas, *Ficus* spp. and *Mitragyna* sp. are the dominant trees, while tangles of *Mimosa pigra* dominate the shrub stratum (Ezealor 2001).

Large mammals include *Loxodonta africana*, *Alcelaphus buselaphus*, *Syncerus caffer*, *Hippotragus equinus* and *Panthera leo*.

Some 337 bird species have so far been recorded. Up to six *Ciconia nigra* have been recorded wintering and it is the only site where *Ephippiorhynchus senegalensis* is regularly seen. Annual dry season bush fires set by poachers to flush mammals are also believed to be changing the structure and composition of the park's vegetation. There has also been some concern over the spread of neem tree *Azadirachta indica* in the park. The seeds of the species are dispersed by baboons and other primates which feed on their fruits. In addition, the growing population of *Loxodonta africana* in the park is becoming a problem. During their annual wet-season movements out of the park, they cause damage to crops belonging to the park's support-zone communities. This results in claims for large amounts of compensation, and culling and can also lead to poaching. *Loxodonta africana* have also destroyed many of the baobab trees *Adansonia digitata* in the park and may, in time, completely eliminate the species (Ezealor 2001).



Source: Geomatics Nigeria Limited (2011)

Figure 1: Yankari game reserve

III. DATA COLLECTION

The study area was divided into eighteen zones based on eighteen ranges established by the management of the park. Two types of questionnaire were designed for the study. The first type was for the villages, while the second type was for the park protection staff in each of the ranges. The questionnaire for villagers had two sections: demographic

characteristics and checklist of illegal activities that have been carried out by them inside the park or at the boundary of the park. The questionnaire for staff comprised the illegal activities that they have encountered in the park. Seventeen out of the eighteen ranges were randomly selected. In each range, ten villagers (making a total of 170 villagers) were randomly selected for the administration of questionnaire for data collection. In addition, fifty five (55) protection staffs were also randomly selected across the ranges for interview. Data obtained were analyzed by descriptive statistics.

IV. RESULTS

Table 1 shows the demographic characteristics of the villagers interviewed. It showed that 96.5% of the villagers were male while 3.5% were female. Also, 77.7%, 37.6% and 11.8% of the respondents agreed that farming, livestock rearing, trading and civil service are the major occupation of the people around the reserve. The least occupation of the people is vulcanizing and butchery (11.8%). More so, the main source of meat for the respondents is livestock (95.3%), fish (60%) and bushmeat (24.7%), Table1

Variable	Frequency	Percentage
Gender		
Male	164	96.5
Female	06	3.5
Occupation		
Fishing	8	4.7
Farming	132	77.7
Civil servant	20	11.8
Hunter	9	5.3
Trading	20	11.8
Driving	4	2.4
Animal husbandry	64	37.6
Herbalist	8	4.4
Blacksmith	4	2.4
Vulcanizing	1	0.6
Tailoring	2	1.2
Butcher	1	0.6
Source of meat		
Livestock	162	95.3
Bushmeat	42	24.7
Fish	102	60

Table 1: Demographic Factors of the Villagers Interviewed (n=170)

Table 2 shows the results of illegal activities that have been carried out by villagers. Fuel wood collection and charcoal production (33.5%) was recorded as the peak threat to Yankari game reserve. There are also major threats to the game reserve which includes livestock grazing (28.8%), bushmeat hunting (19.4%), illegal bush burning (17.6%), and fodder collection (19.4%).

Variable	Frequency	Percentage
Migration	1	0.6
Livestock grazing	49	28.8
Settlement on parkland	2	1.2
Agriculture	25	14.7
Bushmeat hunting	33	19.4
Fishing	35	13
Non-timber forest product collection	23	13.5
Illegal bush burning	30	17.6
Timber logging	2	1.2
Trophy hunting	14	8.2
Fishing with chemicals	1	0.6
Fodder collection	33	19.4
Fuel wood collection and charcoal Production	57	33.5
Logging for local use	16	9.4

Table 2: Percentage Frequency of Illegal Activities Carried Out by the Villagers (n=170)

Ranking of the problems of biodiversity conservation identified by protection staffs revealed that livestock grazing (100%), poaching (100%), increase in the population of villagers around the reserve (81.8%), illegal fishing (80%) and uncontrolled burning (49.1) are the major threats affecting biodiversity conservation in the reserve(Table 3).

Variable	Frequency	Percentage	Rank
Livestock grazing	55	100	1 st
Increase in the population of Villagers around the reserve	45	81.8	2 nd
Uncontrolled burning	27	49.1	4 th
Logging	23	41.8	5 th
Poaching	55	100	1 st
Illegal fishing	44	80	3 rd

Table 3: Problems Affecting Biodiversity Conservation in Yankari Game Reserve identified by Protection Staff(n=55)

Table 4 showed some managerial constraints identified by protection staff. The respondents agreed that lack of equipment (96.4%), poor remuneration for protection staff (90.9%) insufficient funding (80%), and Low level of communication between the pack and surrounding villages (63.6%) are the major threats to biodiversity conservation in the reserve.

Variable	Frequency	Percentage	Rank
Insufficient funding	44	80	3 rd
Lack of equipment	53	96.4	1 st
Inadequate staffing	18	32.7	5 th
Poor salary for protection staff	50	90.9	2 nd
Low level of communication between the reserve and surrounding villages	35	63.6	4 th
Lack of motivation of rangers	1	1.8	6 th

Table 4: Management Problems Affecting Biodiversity Conservation in Yankari Game Reserve Identified by Protection Staff(n=55)

V. DISCUSSION

The results of our research on biodiversity conservation threats which are mainly identified in our study includes

livestock grazing, increase in the population of villagers around the reserve, uncontrolled bush burning, logging, poaching, illegal fishing, lack of equipments, poor salary for protection staff, insufficient funding and low level of communication between the reserve and surrounding villages are based on the data obtained from the protection staffs who were originally responsible for protecting the reserve than the locals who were in many cases the main sources of threats to biodiversity conservation at Yankari game reserve.

There is a clear similarity in some of the biodiversity conservation issues such as grazing, growing agricultural demands, climate change, invasion, and management problems of biodiversity conservation. According to Freilich et al. (2003), livestock grazing, if poorly managed can negatively affect biodiversity conservation in some ecosystems. Recently, it was also observed that grazing destroys the scenery and can make some animals to be locally extinct (Aramde et al. 2011). The present study revealed that livestock grazing posed a threat as ascertained by 100% of the protection staff. This is in line with the findings of Ezealor (2001), who identified illegal grazing as one of the major threats to biodiversity conservation in Yankari game reserve. Livestock grazing often results to conflict between the herders and the management of the reserve.

Biodiversity is generally threatened mostly where population density is highest, and regions rich in endemic species have higher-than-average population densities and population growth rates (Cincotta and Engelman 2000.). This is true in many parts of Asia and Africa where humans and threatened species are often concentrated within the same geographical locations (Vié, et al. 2010). This study shows that increase in the population of villagers around the reserve threatens biodiversity conservation as agreed by 81.8% of the protection staffs interviewed. This is supported by work of Vié, et al. (2010) who reported that threats to biodiversity is likely to increase in regions where human population growth rates are high due to the predicted increase in demands for resources of a growing population in these regions.

Uncontrolled bush burning affects biodiversity and ecosystem function by damaging habitats, breeding site and food causing the loss of wildlife, the territorial birds and mammals from their natural homes (Bowman and Murphy 2010). The result of our study also shows that uncontrolled bush burning has contributed potential conservation challenges, as ascertained by 49.1% of the park protection respondents, in the study site. This is supported by Ezealor (2001), who reported that bush fire is one of the major challenges to biodiversity conservation in the study area.

Logging and conversion to agriculture are the main cause of deforestation in the tropics (Rowe et al. 1992). In tropical Africa, forest loss is severe in West Africa, montane areas of East Africa, and Madagascar, however, substantial forest still remains in the Congo Basin (Laurance 1999). According to NEST (1992), forest destruction in Nigeria, stood at the rate of about 600,000 hectares per year. The result of our study also shows that logging has contributed a possible conservation challenge, as ascertained by 41.8% of the park protection respondents, in the study area. This is supported by Batta et al. (2013), who reported that Nigeria has one of the highest rates

of deforestation in the world, having lost around 410,100 hectare per year over the period 2005 to 2010.

Peoples need to supplement their protein intake with bush meat and generate income lead to the increasing incidence of poaching of wild animals (Ijeomah et al. 2013). However, indiscriminate hunting of wild animals threatens their existence. Also, poaching is related to the roles of some wild animals in some cultural ceremonies like marriage of the local tribes (Onadeko 2004). In this study, poaching is reported by most of the protected staffs (100%) as one of the difficult biodiversity threat to control. This is supported by the findings of Ezealor (2001), who reported that poaching as one of the major threats to biodiversity conservation in Yankari game reserve.

Yankari game reserve consists of aquatic habitats, River Gaji and its tributaries, which are vulnerable to illegal fishing activities. The interviews made with Yankari game reserve protection staffs (80%) revealed that illegal fishing was one of the major activities threatening the fish diversity of Gaji River that traverses the reserve. According to Agnew et al. (2009), illegal fishing creates significant collateral damage to ecosystem which may aggravate by catch and incidental mortality of aquatic animals.

According to WWF (2007), establishing and managing protected area networks requires money. Annual budgetary allocation for protected areas in developing countries is extremely low (Jones 2005) and protected areas in tropical regions are poorly funded even though they require resources for yearly operating budget, staff training, capital investment, community development and public awareness among a wide range of other activities (Jones 2005). Few countries have managed to define and establish ways to provide long-term, sustainable financing, however; there is an acute funding gap particularly in developing countries (WWF 2007). According to Ogunjinmi et al. (2009), low salary is one of the factors preventing rangers or protection staff not to be employed in protected areas and satisfied with their job resulting to their poor commitment to protection activities. In our study, all these gaps are also observed as a major management challenges to for protection staffs of Yankari game reserve (Table 4).

VI. CONCLUSION

Against the background of socio-economic challenges and administrative constraints, biodiversity conservation in Yankari game reserve is continued to be threatened by unsustainable human activities. Our opinion is that the conventional method of biodiversity conservation which involves, for instance, the arrest and persecution of poachers should be complimented by creating awareness toward changing the attitudes of the locals in relation to biodiversity conservation. This might go a long way in creating understanding between the park management and the locals hence minimizing resistance to conservation. Also, management strategies should always consider poverty alleviation and basic infrastructures such as primary schools and primary healthcare system in adjoining communities.

This will encourage the locals to appreciate the worth of biodiversity and as a result back their conservation.

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