

**Biodiversity Conservation Problems and Their Implications on Ecotourism
In Kainji Lake National Park, Nigeria**

By

A.J. Meduna, A.A.Ogunjinmi and S.A. Onadeko

ABSTRACT

The study investigated the prevalence of conservation and management problems affecting biodiversity and their implications on ecotourism activities in Kainji Lake National Park, New Bussa, Niger State, Nigeria. Data were collected from villagers in support zone communities and protection staff of the park with questionnaires. The study revealed that Livestock grazing and poaching are the major problems affecting biodiversity in the park. In addition, insufficient funding and poor salary for protection staff are the major management problems affecting conservation of biodiversity. Implications of these on ecotourism activities of the park are low level of tourist inflow and revenue generated by the parks as well as low benefit accruable to the local economy and the economy of the country as a whole. It was suggested that to reduce the spate of illegal activities, conservation awareness aimed at changing local people's attitude, the provision of essential infrastructural facilities and improvement in peoples' living conditions should be embarked upon by the management of the park and government.

Keywords: Biodiversity, Ecotourism, Kainji Lake National Park, Problems, Nigeria

INTRODUCTION

Biodiversity is the wealth of life forms found on earth-animals, plants, and microorganisms in their millions and their differences, the gene they contain and the intricate systems they form. There are fundamentally two reasons for conserving biodiversity. The first is the moral justification and the second is the value to human existence. Biodiversity is essential to human development because of the goods and services it provides. An estimated 40 percent of the global 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).

Nigeria is blessed with rich and unique array of ecosystems and a great variation in natural resources. These have evolved a diversity of fauna and flora supporting more than 1,340 species of animals, among which are 274 mammals, 860 birds and about 4,600 species of plant (FORMECU, 1996). This ranks Nigeria as one of the richest countries of Africa in terms of biodiversity (FMoE, 2001). However, wildlife conservation and management have been facing many social and ecological problems in Nigeria. Several authors have identified some of the factors affecting biodiversity conservation in Nigeria, including land clearing for agriculture and uncontrolled logging, gathering of firewood (Asibey and Child, 1990); overgrazing and deforestation; indiscriminate or ill-planned bush burning; high population rate and illegal hunting for bush meat (Agbelusi, 1994) and shape of the landscape, drainage, vegetation and soil types (Ayodele and Lameed, 1999). These problems have made ecotourism in Nigeria's protected areas unattractive.

Ceballos-Lascurian (1991) defines ecotourism as tourism that involves traveling to a relatively undisturbed natural areas with the objective of admiring, studying and enjoying the scenery and its wild plants and animals, as well as any cultural features that may be found there. Ecotourism is the fastest growing segment of tourism today. An estimated 1.6 billion people from all cultures and all walks of life participate in different kinds of tourism, spending over \$2 trillion (Hetzer, 1965). On a global scale, ecotourism is growing because of its international appeal (Lowman, 2004). The benefits of ecotourism

are clearly seen by governments in both developing and developed nations for a variety of reasons. Such benefits include, protection of the environment, economic sustainability, cultural integrity and enhancement and education (Liu, 1994). Ibeun and Nichor (1989) noted that ecotourism earned Botswana \$32.5 million in 1998 making it the country's third largest foreign exchange earner after diamond and beef. According to World Tourism Organisation, wildlife-based tourism contributed 35.8% and 4.6% to total export and Gross National Product respectively for Kenya, while its contribution to Nigeria was 1.1% and 0.2% for export and Gross National Product respectively (Ayodele and Falade, 1990). Petroleum has remained the backbone of its economy. However, the sad part of the success story is the destruction caused to landscape during oil exploration and oil pollution, which has killed many animals, rendered many homeless and destroyed their livelihood. The need to identifying biodiversity conservation problems and their impacts on ecotourism activities in Kainji Lake National Park necessitate this study.

MATERIALS AND METHODS

The Study Area

Kainji Lake National Park was established in 1979 by the merger of the two former Game Reserves – Borgu Game Reserve (located in Niger and Kwara State) and Zugurma Game Reserve (located in Niger State), the two sections had been gazetted in 1962 and 1971 respectively as Game Reserves by the then Northern Regional Government. It was the first National Park and the second largest of all the eight National Parks in Nigeria. It is located between latitude $9^{\circ} 40^1$ and $10^{\circ} 30^1$ N and longitude $3^{\circ} 30^1$ and $5^{\circ} 50^1$ E and has a total landmass of $5,370.82\text{km}^2$. It has a savanna climate. Night temperature can be as low as 7°C near Oli River. The drainage system in the two sectors of Kainji Lake National Park is maintained by the Oli, Menai and Doro Rivers (Borgu sector) and Manyara and Nuwa Zurugi Rivers (Zurguma sector). The mean annual rainfall varies from 1100mm in the eastern part to 1150mm in the western part. The trend surface analysis of the mean annual rainfall in Borgu sector indicates a decrease in rainfall from the south to the north and increasing rainfall toward the west and east (Milligan, 1978).

The major vegetation type of Kainji Lake National Park as classified by Keay (1959) is Northern Guinea Savanna ecotype. Afolayan (1977) and Milligan (1978) also identified seven vegetation sub-types in Kainji Lake National Park. These are *Burkea africana/ Detarium microcarpum* woodland, *Azalia*

africana woodland, *Isoberlinia tomentosa* woodland, *Terminalia macroptera* woodland, *Diospyros mespiliformis* dry forest, *Acacia* “complex” dry forest and riparian forest and woodlands. Some dominant animals found in Kainji Lake National Park include African elephant (*Loxodonta africana*), buffalo (*Syncerus caffer*), roan antelope (*Hippotragus equinus*), Senegal kob (*Adenota kob*), lion (*Panthera leo*), leopard (*Panthera pardus*), Nile crocodile (*Crocodilus niloticus*), python (*Python sebae*) and monitor lizards (*Veranus niloticus*) among others. Over 180 species have been recorded including such nationally uncommon species as Pink-backed pelican (*pelecanus rufescens*), African darter (*Anhinga rufa*), Little bittern (*Ixobrychus minutus*), Secretary bird (*Sagittarius serpentarius*), Bateleur (*Terathopius ecaudatus*), Stanley or Denham’s bustard (*Neotis denhami*), Spotted thick knee (*Berhinus capensis*), Water thick knee (*Berhinus vermiculatus*), Long tailed nightjar (*Caprimulgus climacurus*), Abyssinian ground hornbill (*Bucorvus abyssinicus*) and Red-shouldered cuckoo shrike (*Campephaga phoenicea*), Rare palearctic migrants such as Falco Subbuteo and Common cuckoo (*Cuclus canorus*) have been recorded. The shores of Kainji Lake are wintering grounds for many hundreds of palearctic water birds. Twenty-eight (28) of the forty-two (42) species of the Sudan-Guinea Savanna biome that occur in Nigeria have been recorded at this site (Birdlife, 2001).

DATA COLLECTION AND SAMPLING PROCEDURE

The study area was divided into seven zones based on seven ranges established by the management of the park. Two types of questionnaire were designed for the study. The first type was for the villages (support zone communities), 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. In each range, two villages and ten villagers in each village (making a total of 140 villagers) were randomly selected for the administration of questionnaire for data collection. In addition, ten protection staff were also randomly selected per range making seventy (70) protection staff interviewed. Lastly, the record of arrest of poachers from 1994-2003 (10 years) by the park was obtained from the park management. Data obtained were analysed by descriptive statistics such as tables, percentages, and graphs.

RESULTS AND DISCUSSION

Table 1 shows the demographic characteristics of the villagers interviewed. It revealed that 82.9% of the villagers were male while 17.1% were female. This might be as a result of restriction placed on entering the residence of females due to religious factor (Ogunjinmi *et al.*, 2008). Furthermore, 54.3% of them are farmers while 28.6% are fishermen. This is an indication that the dominant occupations in the study area are farming and fishing. The main source of meat for the respondents are livestock (75%), this is because many of the villagers keep domestic livestock such as goat, sheep, cattle and chickens. This, to a certain extent, will reduce the tendency of hunting of wild animals for their protein's needs, even though personal experience has shown that wild meats form part of the delicacies in most cafeterias in New Bussa, though carefully provided once the identity of the client is determined. Studies worldwide show that where humans depend exclusively on wildlife for meat, tropical forests cannot support much more than one person per square kilometre, even under the most productive circumstances. Nevertheless, human densities in some of our protected areas exceed 10 per square kilometre and the lifestyles of most local communities are integrated with the market economy and modern urban styles (Gubbi, 2003).

Table 1: Demographic Factors of the Villagers Interviewed (n=140)

Variable	Frequency	Percentage
Gender		
Male	116	82.9
Female	24	17.1
Occupation		
Farming	76	54.3
Fishing	40	28.6
Civil servant	8	5.7
Trading	6	4.3
Herbalist	6	4.3
Driving	4	2.8
Source of meat		
Livestock	105	75
Bushmeat	7	5
Fish	28	20

The study shows the illegal activities being carried out by the villagers surrounding the park (Table 2). 92.9% of them have carried out illegal livestock grazing, 87.1% practice farming on park land, 82.1% extracted fuelwood from the park, 78.6% carried out fishing, 60.7% collected fodders, 59.3% carried out logging for local use, 44.3% collect other non-timber forest products, 42.9% were involved in bushmeat hunting, 39.3% were involved in illegal bush burning. The least activities carried out by the villagers were trophy hunting (14.3%), fishing with chemicals (26.4%) and settlement on park land (34.3%). None of the villagers however were involved in timber logging and migration into the park. These results revealed that livestock grazing, farming on parkland, fishing, fuelwood collection, fodder collection, fodder collection and logging are the main threats being faced by the park from the villages surrounding it. This is not surprising since most of these villagers own livestock and the only place where vegetation exists during the dry season is the park. Also, most of them are farmers putting pressures on park land for their farming activities. Aside from these, fuelwood extraction and charcoal production are prominent activities in the study areas because most of the inhabitants depend on fuelwood and charcoal as household energy sources. In addition, fishing is also a major occupation apart from farming among the people; villages along the course of river Niger are mostly anglers whose daily subsistence rests on fishing activities in the river and at the Kainji Lake Basin. Illegal settlements are on the increase in the park despite laws prohibiting it, and this is accompanied by increasing in population of the settlers; putting undue pressures on the resources of the park thereby thwarting conservation efforts.

Table 2: Percentage Frequency of Illegal Activities Carried Out by the Villagers (n=140)

Variable	Frequency	Percentage
Migration	0	0
Livestock grazing	130	92.9
Settlement on parkland	48	34.3
Agriculture (farming)	122	87.1
Bushmeat hunting	60	42.9
Fishing	110	78.6
Non-timber forest products collection	62	44.3
Illegal setting of fire or bush burning	25	39.3
Timber logging	0	0
Trophy hunting	20	14.3
Fishing with chemicals	37	26.4
Fodder collection	85	60.7

Fuelwood removal and charcoal production	115	82.1
Logging for local use	83	59.3

Multiple responses recorded

The result of the interview of the protection staff (Table 3) revealed that 34.3% of the protection staff ranked livestock grazing as one of the major problems affecting biodiversity conservation in the park; this was followed by poaching (22.9%) which was ranked second. Illegal fishing had the least number of respondents with 5.7% and was ranked 6th. In addition, insufficient funding was adjudged first by 40.0% of the staff as management problems affecting biodiversity conservation in the park and was followed by poor salary for protection staff (25.7%); which was also ranked second. Low level of communication between the park and surrounding villages which was ranked 5th was the least management problem facing conservation by 5.7% of the staff (Table 4).

Overgrazing and deforestation over time have denied most of reserves in Nigeria of their natural flora. With the increase in livestock and human population, more deforestation and overgrazing would be expected. The degradation caused by illegal grazing has caused some animals to migrate to the neighbouring states or countries (Salami, 1979). Right now, elephants hitherto in abundance in Kainji Lake National Park, have migrated to Benin Republic. The population of waterbuck has also been extirpated from the Park. Ayeni *et al* (1982) also revealed that the lopping of *Azelia africana*, *Khaya senegalensis* and *Tamarindus indica* by the cattle Fulani men in Kainji Lake National Park, Dagida and Kwambana Game Reserves which provide cover and dry season browse materials for wildlife a major problem which needed urgent check. Furthermore, poaching activities in and around the park, as well as the unwise use of natural resources have been the major problems facing the park and have led to the extinction of some fauna species. For example, out of 274 known species of mammals in Nigeria, 27 species are threatened (EarthTrends, 2003). In a sample survey conducted in 2001 parks from 16 tropical countries on three continents, in over 85% of the parks, poaching headed the list of problems (Gubbi, 2003). Hunting for the pot either for self-consumption or to cater for the burgeoning urban market that fetches cash incomes seems to be the most widespread motive to hunt wildlife in most countries. Local traditional hunting has led to the extinction of some species of wildlife and pushing several others to critical levels (Gubbi, 2003). According to WWF (2007), putting representative protected area networks in place and managing them requires money. Few countries have managed to

define and establish ways to provide long-term, sustainable financing and this funding gap is particularly acute in developing countries (WWF, 2007). Also, annual expenditure on protected areas in many developing countries is extremely low (James *et al.*, 1999) and protected areas in tropical regions are under-funded even though they require resources for annual operating budgets, capital investment, staff training, community development and public awareness among a wide range of other activities (James *et al.*, 1999). Ogunjinmi *et al* (in press) reported low pay as one the variables hindering rangers (protection staff) in Yankari Game reserve's satisfaction with their job leading them to low commitment to protection activities.

Table 3: Problems Affecting Biodiversity Conservation in Kainji Lake National Park Identified by Protection Staff (n=70)

Variable	Frequency	Percentage	Rank
Livestock grazing	24	34.3	1 st
Increase in the population of the villages surrounding the park	8	11.4	4 th
Uncontrolled burning	12	17.1	3 rd
Logging	6	8.6	5 th
Poaching	16	22.9	2 nd
Illegal fishing	4	5.7	6 th

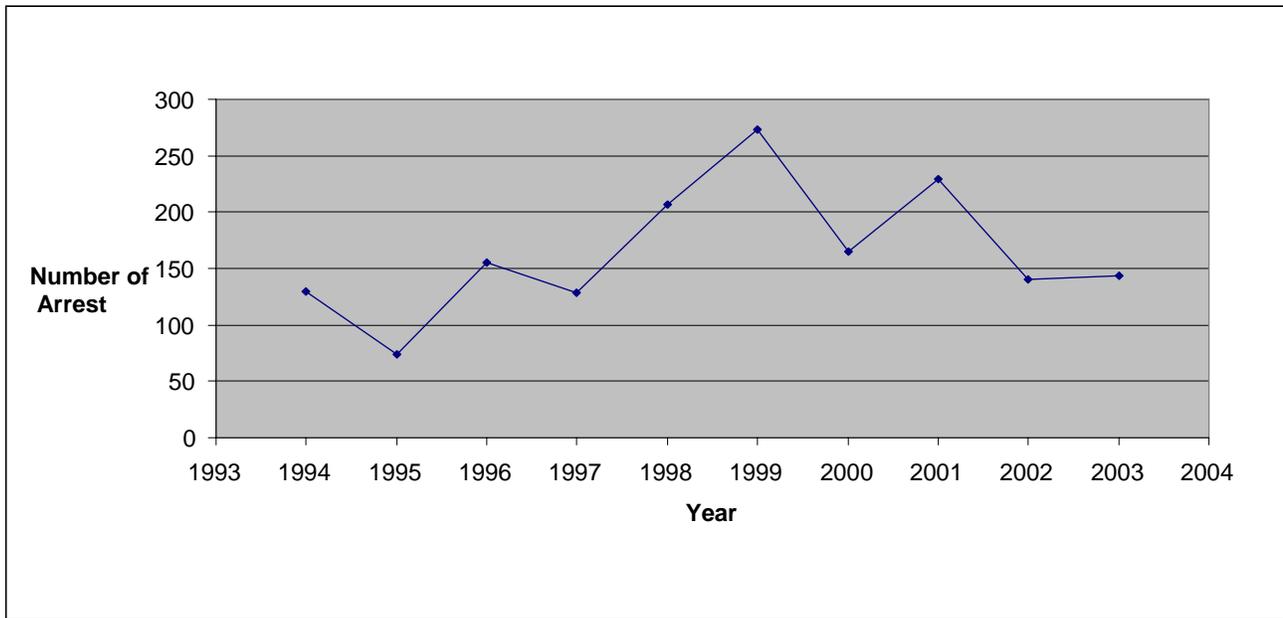
Table 4: Management Problems Affecting Biodiversity Conservation in Kainji Lake National Park Identified by Protection Staff (n=70)

Variable	Frequency	Percentage	Rank
Insufficient funding	28	40.0	1 st
Lack of equipment	12	17.1	3 rd
Inadequate staffing	8	11.4	4 th
Poor salary for protection staff	18	25.7	2 nd
Low level of communication between The park and surrounding villages	4	5.7	5 th

Figure 1 shows the variation in the number of arrest of poachers in Kainji Lake National Park from 1994 to 2003 (10 years) (Table 5). The year 1999 had the highest number of arrests (273 arrests) while 1995

had the least (74 arrests). Arrest has been a major tool of law enforcement in Nigerian protected areas but has not been a deterrent or reduced illegal activities in the protected areas particularly National Parks due to frequent release of poachers by courts and mild penalties imposed by current wildlife laws. Intelligence gathering needs to be beefed up (Gubbi, 2003) in protection of wildlife resources.

Figure 1: Frequency of arrest of poachers in Kainji Lake National Park



The study revealed that there was variation in the number of visitation to Kainji Lake National Park and the revenue generated from 1993 to 2002 (Table 5). The year 2001 had the highest number of visitation with 3,075 tourists, this was followed by year 2000 with 2,666 tourists and year 1994 with 2,391 tourists. However, 1999 had the least number of visitations with 1,323 tourists. Although year 2002 had the 4th highest number of tourists visitations, yet, it emerged the highest in terms of revenue generation with three million, eight hundred and sixty-two thousand, three hundred and eighty four naira and eleven kobo (₦3,862,384.11). This was followed by year 1998 with three million, six hundred and ninety-nine thousand, seven hundred and thirty-eight naira and thirty-five kobo (₦3,699,738.35) and year 2001 with three million, seventy-nine thousand, three hundred naira and sixty-three kobo (₦3,379,300.65). The year 1993 however had the least amount generated with seven hundred and thirty-four thousand, eight hundred and twenty-one naira and forty kobo (₦734,821.40). Thus, for a period of ten year (1993-2002), the sum of nineteen million, sixty-seven thousand, eight hundred and forty naira and eighty-one kobo

(₦19,067,840.81) was generated from twenty thousand, three hundred and nineteen tourists. This results show that visitation to Kainji Lake National Park during the period of the study was low and the income generated was also low in comparison with yearly subventions from Federal Government (Meduna *et al.*, 2005).

Table 5: Tourist Inflow and Revenue Generated by Kainji Lake National Park from 1993-2002

Year	Tourist Inflow	Revenue Generated (₦)
1993	1,865	734,821.40
1994	2,391	924,470.10
1995	1,836	1,042,367.00
1996	1,867	1,228,037.20
1997	1,542	1,068,264.40
1998	1,608	3,699,738.00
1999	1,323	1,705,824.99
2000	2,666	1,722,632.63
2001	3,075	3,079,300.63
2002	2,146	3,862,384.11
Total	20,319	19,067,840.81

Impacts of Biodiversity Conservation Problems on Ecotourism in Kainji Lake National Park

The major casualty of biodiversity conservation problems in Kainji Lake National Park is tourist inflow. Tourist inflow to a destination is determined by site attractions in the form of fauna and flora, cultural and historical materials as well as morphological and geo-morphological features. An average tourist to Africa is interested in observing wild animals in their natural state particularly the big game such as elephant, buffalo, lion, leopard, cheetah, and large antelopes (Eltringham, 1984). For example, Eagles (1992) reported that the travel motives of the Canadian ecotourists are attraction-oriented, with tropical forests, wilderness, and wildlife highly ranked. Many tourists prefer to see and interact with wild species in their habitats and experience a much more intimate closeness to authentic habitat (Shackley, 1996). In cases where appreciable number of wild animals were not observed by tourists, the tendency to visit such destination in the future diminishes, leading to reduced tourist inflow. Kainji Lake National Park is second to Yankari Game Reserve in terms of visitation (Ogunjinmi, 2007) due to the presence of elephants, buffalo, waterbuck and other large mammals. At present, there are no elephant populations in

Kainji Lake National Park due to migration and waterbuck has been extirpated from the park. Apart from being the first National Park in Nigeria, Kainji Lake National Park is the second largest park (Gashaka Gumti National Park being the first) in terms of size. This size has however, not conferred any advantage on the park in terms of animal population. The low level of animal populations could be traced to hunting, which is the traditional occupation of the inhabitants of the surrounding settlements (Ajayi, 1979) and the roles of wild animals in some cultural ceremonies and tradition like marriage of the local tribes (Onadeko, 2004). One of the requirements for aspiring husband is the killing of three roan antelopes (*Hyppotragus equinus*) and four buffaloes (*Syncerus cafer*), thus making the aspirant a killer of seven strong beast. In addition, he must also have killed a lion (*Panthera leo*), one cheetah (*Acynonx jubatus*), a male baboon (*Papio Anubis*), and rare birds (Onadeko, 2004). The ecotourist industry according to Eagles (n.d.) is critically dependent upon the long-term viability of the management of the natural environment by government agencies.

Since visitation thrives on tourists' experience, and income on the other hand relies on visitations, Kainji Lake National Park has not enjoyed high income or revenue from ecotourism activities; thus depends solely on annual subventions from government for conservation activities which are always inadequate and insufficient.

CONCLUSION

Nigeria ecotourist industry has been largely affected by conservation and management problems. These problems emanated from socio-economic cum cultural factors as well as low priority being accorded conservation programs by the three tiers of government (Federal, State and Local Governments). The fact that National Parks in Nigeria are experiencing low visitation is a pointer to the debilitating effect of these problems on ecotourism activities, economy of the local people and that of the country as a whole. National Parks management agencies require new strategies to curb illegal activities in the parks. It is obvious that the traditional measures such as arrest and prosecution of poachers have failed; conservation awareness aimed at changing local attitude will go a long way in reducing incessant attack on the integrity of biological systems in our Parks. However, improvement in living conditions of the local people is paramount to long-term sustainability of biodiversity; thus, provision of essential

infrastructural facilities such as motorable roads, clean water, affordable primary healthcare system, electricity and affordable prices of energy (kerosene in particular) is highly desirable.

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