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BIODIVERSITY CONSERVATION PROBLEMS AND THEIR IMPLICATION ON RANGELAND AND ECOTOURISM MANAGEMENT IN GASHAKA-GUMTI NATIONAL PARK, NIGERIA

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ABSTRACT

The study investigates the prevalence of conservation and management problems affecting biodiversity and their implications on rangeland productivity and ecotourism activities in Gashaka-Gumti National Park, Taraba State, Nigeria. Data were collected from villagers in support zone communities and staff of the park through questionnaires. The study revealed that farming on parkland, logging, Livestock grazing and poaching are the major problems affecting biodiversity in the park. More so, lack of manpower, insufficient funding and insecurity are the major management problems identified. Implication of these on rangeland productivity and ecotourism activities of the park was downward trend in range condition, low level of tourist inflow and revenue generated by the park as well as low benefit accruable to the local economy. To reduce the spate of illegal activities and its effects, it was suggested that, community participation, conservation awareness aimed at changing local people's attitude and provision of incentives should be embarked upon by the management of the park and government.

Keywords: Biodiversity, Ecotourism, Gashaka-Gumti National Park, Rangeland Problems, Nigeria

INTRODUCTION

Biodiversity is the wealth of life forms found on earth, that describe nature's variety including both the number and frequency of plant and animal species as well as microorganisms (Meduna *et al*, 2009; Audu and Ayuba, 2016) and diversity living things (Wilson and Tisdell, 2001). It has several components, such as composition, number of abundance, spatial distribution and interactions of species, genotype, trials, population, functional types and landscape units in a given ecosystem (Diaz *et al*., 2015).

Biodiversity conservation on the other hand is a very popular approach in environmental science and has long remained a central theme in ecology and rangeland management. Conservation of biodiversity could either be in-situ or ex situ. It is critical to the maintenance of healthy environment, and its role in meeting human needs directly while maintaining the ecological process upon which our survival depends is enormous (Dushyant and Mishra, 2011). It provides direct benefits such as food, medicine and can affords us a life support system (Saidu, 2017), required for the recycling of essential elements (Carbon, Oxygen and Nitrogen). Notwithstanding, biodiversity conservation has encounter a lot of challenges even when most populace especially the rural dwellers agrees to the values and benefits accrue from it. In the same vein, returning an area to its original state is not only costly but demanding and often difficult.

It has been estimated that, over 40 percent of the global economy is based on biological products and processes (Christ *et al*., 2003). However, outright conflict between conservation and indigenous approach has been the major problem of biodiversity conservation in Nigeria (Osunsina and Fagberiro, 2015) outdated polices, laws and poor funding (Saidu, 2017). Even though the country can boast of its protection and conservation network through national parks,

forest and game reserves distributed across the country's vegetation, residents around protected areas have long- established sedentary agricultural systems and traditional ways of extracting resources from areas of ecological importance (Ogunjinmi, 2007), consequently resulting to biodiversity depletion, decline in rangeland productivity and made ecotourism in Nigeria's protected areas unattractive. On a global scale, ecotourism is growing because of its international appeal (Lowman, 2004), through protection of the environment, economic sustainability, cultural integrity enhancement and education (UNWTO, 2002). According to World Tourism Organization, wildlife-based tourism contributed 35.8% and 4.6% to total export and Gross National Product respectively for Kenya, in Nigeria was about 1.1% and 0.2% for export and Gross National Product respectively (Ayodele *et al*., 2004). The sad part aspect now is the destruction caused to landscape during oil exploration and oil pollution, which has killed many animals, rendered many homeless and destroyed their livelihood (Meduna *et a.l*, 2009). Biodiversity conservation, rangeland productivity and ecotourism activities have inter-connected network on the nation at large if well managed.

Knowledge about biodiversity conservation challenges is valuable in stimulating technological innovation and providing the framework for sustainable development (NBSAPs, 2015). Thus, reliable institution mandated to protect these natural endowments need to be strengthened and supported (Saidu, 2017). The Protected Areas like Gashaka-Gumti National parks are meant to promote sustainable harvest, conservation education, and ecotourism and benefit the host community. Therefore, this study sought to identify illegal activities carried out in the park by households in communities bordering the park, assess management problems and their implication on rangeland productivity and ecotourism activities.

MATERIALS AND METHOD

Study area

Gashaka-Gumti National Park was originally gazette as Gumti, Gashaka and Serti Game sanctuaries by the defunct Northeast Government in 1970s. The three game sanctuaries were merged and upgraded to a National park by the Nigerian National Park Decree of 26th August 1991 which was repealed by Decree 46 of 1999. It is the largest single conservation area in Nigeria, covering an area of 6,731 km^2; the park is a unique area of high nature conservation value, located in the sub-tropical zone of eastern high lands of the savanna area of Nigeria. It lies between Latitude 6° 55' and 8° 05' N and Longitude 11° 11' and 12° 13' E (Mubi and Tukur, 2012; Malik *et al*., 2016) (Figure.1). It has a Guinea savanna climate which is an intermediate between the humid wet climate of rainforest zone and the dry climate of the Sudan and Sahel savanna (Dunn, 1998). The drainage system has the headwaters in the forest Mountains of the park and is maintained by the Kan, Gashaka, Yim, Gangan, Daneji, Tipsan, Jiman and Yum which are important tributaries to River Benue. The mean annual rainfall varies from 1200mm in the northern part to about 3000mm in the Southern part of the park, while the relative humidity is about 15.7%.

The major vegetation type of the park as classified by Mubi and Tukur, (2012) in the Northern Guinea savanna (Gumti) consist of woodland. The species in this ecotype includes: *Acacia spp, Afzelia africana, Khaya senegalensis, Daniellia oliveri, Isoberlna doka* and *Vitellaria paradoxum.* In Southern moist Guinea savanna (Gashaka) the dominate flora species are *Albza gummifera, Afzelia african, Symphonia globulifera, Milletia spp* and *Triplochiton scleroxylon* (Mubi and Tukur, 2012). Some distinctive fauna species found in GGNP include Buffalo (*Syncerus caffer*), Roan antelope (*Hippotragus equinus*), Senegal kob (*Adenota kob*), Lion (*Panthera leo*), Leopard (*Panthera pardus*), Mona monkey (*Cercopithecus mona*), Hunting dog (*Lycaon pitctus*), Giant eland (*Taurotragus debianus*), Oribi (*Ourebia ourebi*), Guniea fowl (*Numida meleagris)* and monitor lizards (*Veranus niloticus*) among other (Mubi and Tukur, 2012). The shores of GGNP are wintering grounds for many hundreds of palearctic water birds.

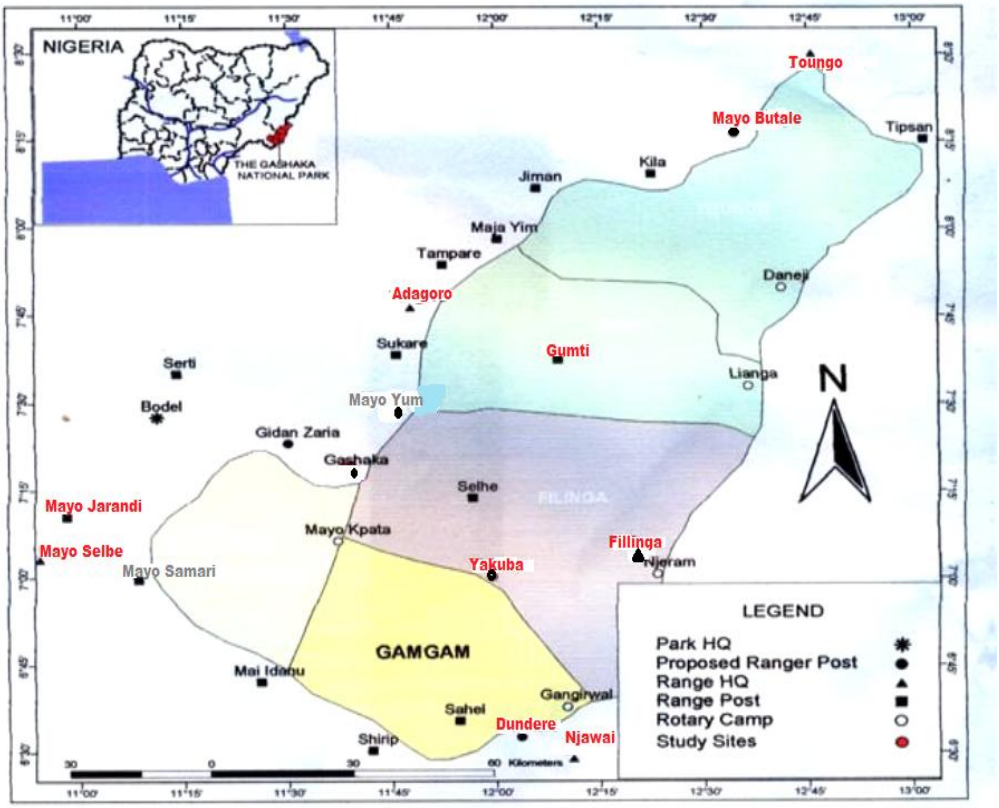

Figure. 1: Map of Gashaka-Gumti National Park, showing the selected Communities
Source: Adopted from Eniang *et al., (*2011)

Sampling Techniques

A multi- stage sampling technique was used for the purpose of selecting respondents within the surrounding communities of Gashaka-Gumti National Park. The park has over thirty support zone communities and 275 staff members. However, for any Department/unit/section with less than 10 members, all were sampled, while the ones greater than 10 members, a thirty percent (30%) sample size were taken as shown in Table 1. For the support zone communities, the selection was based on closeness to the park. Two (2) communities from each of the five (5) ranges were selected totally ten (10) support zone communities. The lists of households were conducted in selected communities using people who are quite conversant with these communities as consistent with Ijeomah *et al*., (2013). Households that were used are further selected by random sampling and respondents were the head. Where he or she is not available, the next most available adult was interviewed as consistent with Uloko and Yager, (2017). In all seven hundred and eight (708) persons were interviewed among the selected households and 89 staff were sampled.

Data Collection and Analysis

Two sets of questionnaire, in-depth interview and desk review were used for data collection. A set of structured questionnaire were administered to households in selected communities bordering the park while second set to staff of the park.

The questionnaire for the support zone community consists of demographic characteristics, checklist of illegal activities involved in and awareness towards biodiversity conservation in the park. For the staff, it comprises of the illegal act and managerial challenges they encountered in the park. The in-depth interview conducted was with household and some park officials who have lived in the vicinity for a minimum of ten (10) years and are quite knowledgeable about the challenges of biodiversity management in the park. The record of arrest made, tourist inflow and revenue generated from 2007 – 2016 (10years) by the park management were also obtained. Data collected were pooled together and analyzed using descriptive statistics (tables, percentages, graphs and charts).

Table.1: Staff Strength in the Park According to Department/Unit/Section and their Percentage Sampled

S/N	Dept./unit/section	Number of staff	Percentage
1	Audit	3	3
2	Public Relation and Protocols	1	1
3	Legal Section	3	3
4	Park Ecology and Resources Management	175	53
5	Works and Maintenance Unit	29	9
6	Ecotourism Department	17	5
7	Finance and Account Unit	13	4
8	Planning Research and ICT Unit	13	4
9	Human Resource and Management	21	7
	Total	**275**	**89**

Source: Field survey, 2017

RESULTS

The result of demographic characteristics of support zone communities sampled as presented in Table 2, indicates that the male respondents were dominant (77.9%), while the female were only 22.1%. Furthermore, 59.9% of the sampled populations were farmers while 15.3% are livestock rearers and the least were traders (3.4%). The main sources of their meat are livestock (55.9%) followed by fish 35% and the least was bush meat (9.0%). Table 3, revealed the illegal activities carried out by the respondents. About 59.3% have actively being involved in one or more illegal act, while 40.7% said they have not. Out of the identified illegal activities, logging and non-timber forest products collection ranked first, followed by farming on park land, livestock grazing and none was involved in bush burning. Table 4 revealed that, about 100% of the park staff ranked logging and non-timber forest products as the major problems affecting biodiversity conservation in the park, this was followed by poaching and farming on park land (97.8%), livestock grazing (81%),` uncontrolled bush burning (67.4%) and illegal fishing had the least number of respondents with (3.4%). The study revealed that there was variation in the number of arrests made in GGNP from 2007 to 2016 (Figure 2). The year 2013 had the highest number of arrest (408 persons), followed by year 2016 with 260 arrests and the least being 69 arrests in year 2009.

Table 5 indicates the management problems affecting biodiversity conservation in GGNP as identified by the park staff. About 56.2% of the park staff ranked lack of man power as one of the major management problems; this was followed by insufficient funding (24.7%) and low level of communication between park and the support zone communities as the least (2.3%). The highest resultant effect was that of difficulty in carrying out the work, decline in wildlife population as well as tourist inflow. This however, was reflected on their perceived percentage on the population status of species, rangeland productivity and ecotourism activities in GGNP as decreasing (Figure 3). Table 6 revealed that, about 71.9% of the park staff was of the opinion that the support zone communities were aware of the need for biodiversity conservation (83.1%). Meanwhile, the park staff response indicated that community participation and conservation education are the best measure for biodiversity conservation in the park.

The yearly variation in tourist inflow in GGNP between the year 2007 to 2016 is presented in (Figure 4). It revealed that the park had the highest records (578) of tourist in year 2014 and gradually decreased from 2015 to 2016 respectively. This could be as a result of management challenges as indicated by the park

staff and willingness to revisit the park. Figure 5, shows that, revenue generated was highest in 2013 at (N9,156,526.25) and lowest was in year 2007 (N1,338,528.75) from the year 2011 to 2012 there was progressive increase in the valve of revenue reflecting (N4,907,263.06) and (N7,949,297.11) respectively. Beside year 2013 the next highest value of revenue was recorded in 2014 (N8,149,297.35) and 2015 (N7,955,227.05).

Table 2: Demographic Factors of the Households Interviewed (n=708)

Variables	Frequency	Percentage
Gender		
Male	552	77.9
Female	156	22.1
Occupation		
Farming	424	59.9
Livestock rearing	108	15.3
Civil servants	64	9.0
Hunting/Fishing	48	6.8
Driving	40	5.7
Trading	24	3.4
Source of meat		
Livestock	396	55.9
Fish	248	35.0
Bush meat	64	9.0

Source: Field survey, 2017

Table 3: Percentage Frequency of Illegal Activities Carried Out by the Households that Entered the Park (n=420**)**

Variable	Frequency	Percentage	Rank
Logging and non-timber forest products collection	204	48.6	1st
Farming on park land	110	26.2	2nd
Livestock grazing	51	12.1	3rd
Poaching	24	5.7	4th
Settlement on park land	20	4.8	5th
Fishing	11	2.6	6th
Illegal bush burning	0	0	7th

Source: Field survey, 2017

Table 4: Problems Affecting Biodiversity Conservation in Gashaka-Gumti National Park Identified by the Park Staff

Variable	Frequency	Percentages	Rank
Logging	89	100	1st
Poaching/Farm encroachment	87	97.8	2nd
Livestock grazing	72	81	3rd
Settlement on park land	70	78.7	4th
Uncontrolled burning	60	67.4	5th
Mining	21	23.6	6th
Illegal fishing	3	3.4	7th

Source: Field survey, 2017

Table 5: Identification and Ranking of Management Problems Affecting Biodiversity Conservation and their Effects on Gashaka-Gumti National Park by Staff (n=89)

Parameters	Variables	Frequency	%	Rank
Problems	Lack of manpower	50	56.2	1st
	Insufficient funding	22	24.7	2nd
	Poor staff salary	7	7.1	3rd
	Non maintenance of equipment	4	4.5	4th
	Insecurity	4	4.5	4th
	Low level of communication between the staff and villager	2	2.3	5th
Effect of the problems	Make work difficult	42	47.2	1st
	Reduced wildlife population	22	24.7	2nd
	Reduced tourists inflow	22	24.7	2nd
	Reduced management practices	3	3.4	3rd

Source: Field survey, 2017

Table 6: Assessment of Awareness and Conservation Strategies towards Biodiversity Management in Gashaka-Gumti National Park by Staff (n=89) and Households (n=708)

Parameter	**Variables**	**Frequency**	**Percentage**
Staff respondents	Aware	64	71.9
	Not aware	23	25.8
	No response	2	2.3
Conservation strategies by staff	Community participation	48	53.9
	Conservation education	30	33.7
	Incentive	11	12.4
Households respondents	Aware	588	83.05
	Not aware	98	13.8
	No response	22	3.1

Source: Field survey, 2017

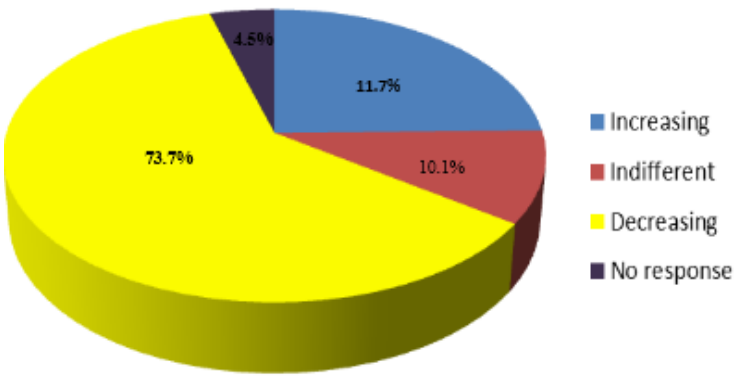

Figure 2. Perceived Percentage Assessment of Population Status of Species, Rangeland Productivity and Ecotourism Activities in Gashaka-Gumti National Park by Staff of the Park (n=89)
Source: Field survey, 2017

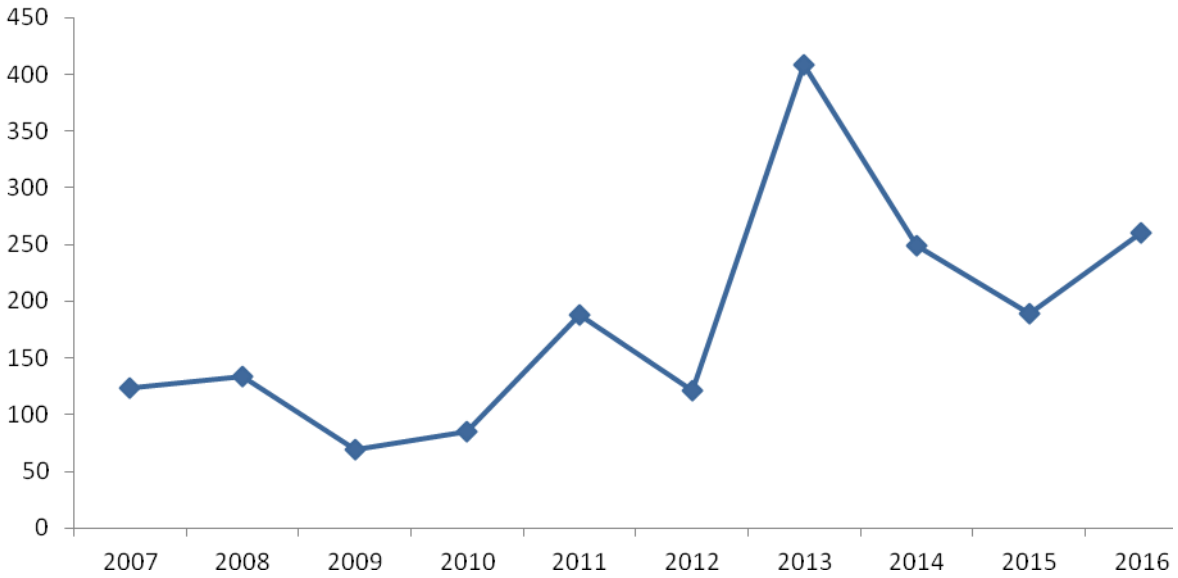

Figure 3. Frequency of Arrest Made in Gashaka-Gumti National Park from 2007-2016
Source: GGNP Annual Report books, 2017

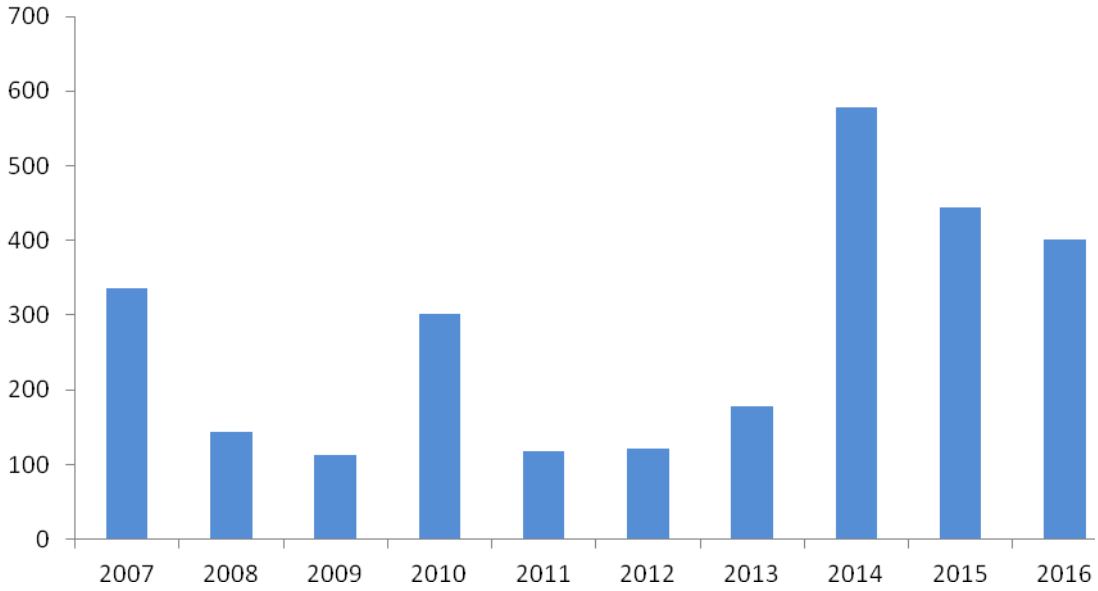

Figure 4. Variations in Tourist Inflow of GGNP
Source: GGNP Annual Report books, 2017

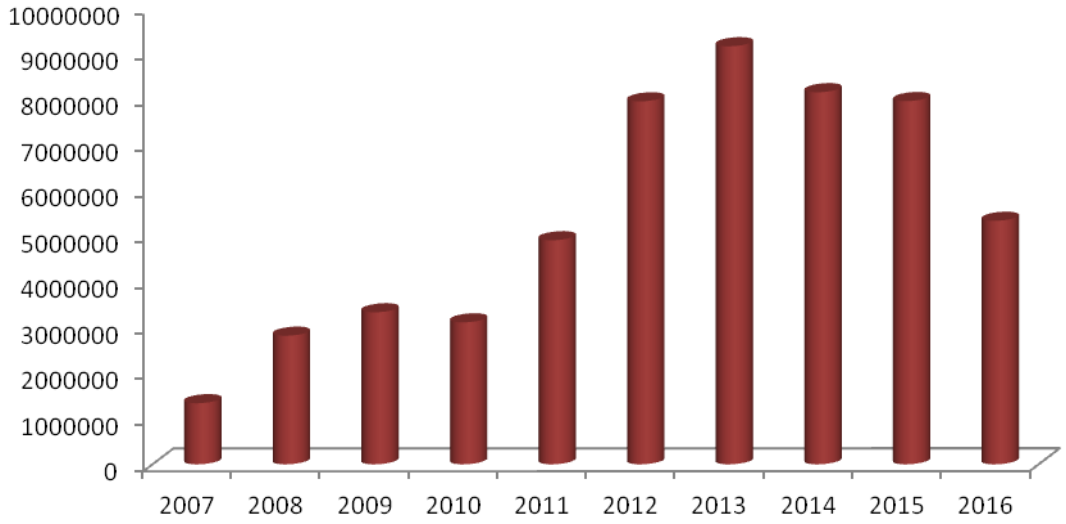

Figure 5. Variation in Revenue Generation from 2007-2016 in GGNP
Source: GGNP Annual Report books, 2017

DISCUSSION

In this present work, issues of biodiversity conservation problems have raised some fundamental view on their implication on rangeland productivity and ecotourism performance in the study area. The result revealed that, women in rural areas have less access than male to productive resources, series and activities in the park. This is the reflection of the male being dominant in the study area, also the fact that the communities surrounding the area are dominated by Muslims and thus, creates restrictions on entering the residences of female due to religion factors (Ogunjinmi *et al*., 2008). Furthermore, majority of the respondents are farmers and livestock rearers, the main source of meat for the respondents was livestock, and this is because many of the support zone communities keep domestic livestock such as sheep, goat, chicken and cattle. This, to a certain extent reduces the tendency and intensity of hunting of wild animals for protein requirement in the study area. This agrees with the report of Meduna *et al.,* (2009); Malik *et al.,* (2016) that domestication of animals reduces over dependence and pressure on wild animals. According to African biodiversity (African Biodiversity, 1993), biodiversity conservation challenges in protected area come from different categories of illegal activities carried out by the support zone communities. Majority of them carried out illegal farming on park lands and livestock grazing. The park staff identified logging, farming and livestock grazing are the main threats being faced by the park from the communities surrounding. This is not surprising, since most of them own livestock and the only place where vegetation exists during dry season is the park. Also most of them are farmers putting pressure on the park land for their farming activities, this probably could be due to increase in population and hunger for land to expand their agricultural activities. This is in line with the findings of Uloko and Yager, (2017) that increased in population leads to more demand for social and economic engagements, particularly land for agriculture. Survey and findings has it that, the park has a good number of *pterocarpus erineceus* (commonly known as Madrid), the tree species alongside other trees were logged for foreign exchange and furniture making. This probably is one of the major reasons why destruction of biodiversity and its habitat is much in the park leading to fauna migration, soil erosion intensity, deforestation, land degradation and modification of vegetation structure. This however, causes a downward trend in the range condition, biodiversity decline and reduced ecotourism activities of the park. This agrees with the reports of Meduna *et al.,* (2009); Aramide *et al*., (2012); Chanie and Tesfaye (2015) that habitat destruction and fauna loss leads to downward trend in range condition and reduced tourists' participation.

Despite the fact that the support zone communities are aware of the benefits of biodiversity conservation, their negative activities

continue unabated, although other factors too contribute to biodiversity decline such as lack of manpower, insufficient funding, insecurity and improper resource management. This however makes work ineffective and gives room for negligence. This agrees with the results of Ijeomah *et al.*, (2013), and Alarape *et al.*, (2015) that lack of incentives and staff management make work ineffective.

The study revealed that there was variation in the numbers of arrest made, tourist inflow and revenue generation in GGNP from 2007 to 2016. The fluctuation in number of arrests could be due to the position and actions the management of the park took after the offenders have been arrested. This agrees with the finding of Saidu, (2017) that arrest is a major tool of law enforcement in Nigerian protected area but has not been a deterrent to illegal activities due to frequent releases of offenders and wildlife penalties imposed by current wildlife law. Inspite of the current state of the park there are periodic visit to the park especially in 2014 to its full capacity and gradual decrease from 2015 to 2016. 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 feature Meduna *et al.*, (2009). 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 (Elringham, 1984). For the revenue generated, the highest value recorded from 2013 to 2016 was a reflection of the number of tourists' inflow and probably money acquired through arrest. This is in line with the findings of Yager *et al.*, (2015) that tourist patronage can boost the revenue of any wildlife protected area that involved in recreation and educational activities.

CONCLUSION AND RECOMMENDATION

It is a fact that protected areas play an essential role in conservation of biodiversity in general for the survival of mankind. For effective long-term rangeland productivity and management of these protected areas, there is the urgent need to tackle the existing challenges to meet the current realities in the country. Nigeria protected areas and ecotourism 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. Increase funding of National parks by the federal government to effect biodiversity conservation is very crucial and recruitment of rangers from communities bordering the park, who are very much familiar with the park terrain will endear the support of local communities to the conservation effort of the Government.

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