Evaluation of Management Approaches of Selected Protected Area Types in Dry Region of North-East Nigeria

Ibrahim Umar, Hasabelrasoul Fadlelmula Mustafa, Mohamed Saeed Ahmed Zaroug, Mohammed Bello Abdullahi , Hammani Babangida

Abstract— **In response to global demand for conservation of biodiversity and ecosystem services, protected areas (PAs) were established as one of the major strategies to curtail deforestation and ensure conservation and sustainable development of biodiversity globally. North-Eastern Nigeria (made of six states) has different types of protected areas, with some managed by the federal government (National parks), some by state governments (Game reserves), some by Local governments (Forest reserves) and some by communities. But these protected areas are under serious threats of human perturbation at different degrees; a factor that may be attributed to the in effectiveness of the management approaches. This paper investigated the management approaches of selected protected area types in the dry region of North-east Nigeria. Structured questionnaire was used as instrument for data collection and responses collated was analyzed using simple percentage and presented in descriptive statistical figures. Results indicated better management in National parks over the remaining systems of managements. Upgrading most of the remaining PAs to the status of National parks was suggested among other recommendations.**

Index Terms— **Biodiversity; Conservation; Management Approach; Protected Area.**

I. INTRODUCTION

Highlight In response to global demand for conservation of biodiversity and ecosystem services, protected areas (PAs) were established as one of the major strategies to curtail deforestation and ensure conservation and sustainable development of biodiversity [1] As at 2009, PAs are covering more than 12% of the total world land surface [2] and 13.5% of the world forests [3] Though the recently adopted Sustainable Development Goal to halt biodiversity loss by the United Nations Sustainable Development Goals 2015 has contributed in increasing the number of protected areas to become a central component of biodiversity conservation across the Globe [4] covering 15.4 per cent of the planet's

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terrestrial and inland water areas by 2014 [5] With all these, the effectiveness of biodiversity and forest conservation measures are under question as the rate of biodiversity loss is not decelerating [6] with some of the protected areas, themselves, not much spared from human encroachment mostly due to poor socioeconomic status of the adjoining community [7] It is therefore pertinent to note that increasing the number of PAs without strengthening the management approaches will not yield the desired result.

Various protected area types exist in Nigeria. There are thirty – three (33) existing National Parks and Game reserves occupying total area of 4,293.778 hectares constituting 4.65 percent of the total land area of the country, and 445 existing gazetted forest reserves which make up about 10.3 percent of the total land area [8]. Some of the typical national parks are Yankari ,Kainji Lake,   Cross River,   Old Oyo, Gashaka-Gumti, Chad Basin, Okomu, and Kamuku National parks. Notable forest reserves in Nigeria includes Shasha River forest reserve andOmo forest reserve in Ogun State, Sakpoba forest reserve andOkomu forest reserve in Edo State, Mamu River forest reserve in Anambra State, Afi River forest reserve in Cross River State, Oba Hills forest reserve in Oyo State, Sanga River forest reserve in Plateau State, Anara forest reserve in Kaduna State, Zamfara forest reserve in Zamfara state [9]

North-Eastern Nigeria has different types of protected areas spread all over the six states that makes up that geopolitical zone. Some of these PAs are managed by the federal government (National parks), some by state governments (Game reserves), some by Local governments (Forest reserves) and some by communities. Some notable protected areas in the zone includes Gashaka-GumtiNatioal park in Adamawa/Taraba states, Chad Basin National park in Borno state, Yankari Game reserve (YGR) , Lame-Burra Game reserve and Maladumba Lake and forest reserve in Bauchi state, Sambisa forest in Borno state, Kanawa, Wawa-Zange and Lembi forest reserves in Gombe state, to mention but a few. But these protected areas are under serious threats due to human perturbation. The principal factors responsible for this destruction are poverty, culture of using firewood as cooking fuel, herdsmen encroachment for fodder, as well as quest for arable land due to predominant subsistence type of farming supported by little agricultural inputs to boost productivity of land, therefore, compelling for shifting cultivation to acquire virgin land. But a big question

that remained unanswered is 'does the management approaches of these PAs conform to international standards, with good design, and adequate planning, sufficient funding and logistics, with agreed policies and procedures that will yield the desired outcome of objectives for the PAs? Unless the management systems of the PAs are strengthened and special consideration given to the social problems of the adjoining communities, the integrity of these PAs will remain threatened.Evaluation of management effectiveness is defined as the assessment of how well a protected area is being managed, i.e. the extent to which it is protecting values and achieving goals and objectives [**10**]

In most African countries, indigenous woodlands provide both urban and rural populations with the greatest proportion of their fuel requirements, where firewood is harvested from both live and dead sources [**11**]; [**12**]. In Nigeria, firewood accounts for nearly 80% of the energy consumption [**13**]; [**14**], yet no concerted effort by government is in place to provide alternatives to fuel wood for domestic purposes, especially in the rural areas [**15**]; [**16**]. This is one major factor for deforestation in Nigeria as a whole and northern-eastern Nigeria in particular.

The vegetation of Northern eastern Nigeria is predominantly of Sahel and Sudan Savannah type due to low annual rainfall in the area. The zone is characterized by average annual rainfall of less than 600 mm bordering on the Sahara Desert [17]. This area faces a lot of threats ranging from deforestation for cooking fuel, overgrazing by livestock and Agricultural practices that fail to conserve soil. This has put five out of the six states that makes up the zone under (11) Northern states of Nigeria that are referred to as'frontline state' as far as desertification is concern. These include, Adamawa, Borno, Yobe, Bauchi, Gombe, Jigawa, Kano, Katsina, Zamfara, Sokoto and Kebbi [**18**]; [**19**]; [**20**]. The first five are part of the six states that constitutes the North-eastern states,only Taraba state is yet to be classified among them. The UN Food and Agriculture Organization report of 2005has it that Nigeria has the world's highest deforestation rates of primary forests which pose a threat of losing all of its primary forests within a few years [**21**]; [**22**]. In view of this, we tried to evaluate the management approaches of selected PAs in North-east Nigeria so as to recommend the most effective in the zone for conserving and sustaining the remaining forest resources of the zone.

II.   OBJECTIVES OF THE STUDY

This study was designed to evaluate the management systems of the selected PAs insemi arid region of North-east Nigeria with the view to recommend the most effective approach for the conservation of forest resources of the area. It has the following specific objectives:-

1) Evaluating the cardinal framework of the design of each selected PA
2) Assess the elements of planning for the management of each PA
3) Determine the efficiency of parameter of input for managing the PAs
4) Evaluate the management process adequacy of each PA
5) Assess the delivery outcome intended for each PA

III.   MATERIALS AND METHOD

A.   Study Area
Site Sampling

Four PAs were randomly selected, based on their management approaches, using purposive sampling technique. These were Gashaka-Gumti national park (Managed by federal government), Yankari Game reserve (managed exclusively by state government), Kanawa forest reserve (managed jointly by state and local government), and Maladumba Lake and forest reserve (though managed by state and local government, it has both lake and forest resources). The latter PA type was considered because there was no community forest or exclusively local government managed forest in the region.

Gashaka-Gumti National Park (GGNP)

GGNP Is the largest protected area in Nigeria, and it has an area of about 6670 km^{2}It cut across Adamawa and Taraba states in North east Nigeria. It is located on 06º58' -08º05' N and 11º10' N-12º13' E co-ordinates [**23**]. The park was established in 1991 with the name, Gashaka-Gumti; derived from two of the region's oldest and most historic settlements, Gashaka village in Taraba State and Gumti village in Adamawa State [**24**]. The annual temperature range is approximately 21º- 32.5°C (69.8º- 90.5°F). It is characterized by dry and rainy seasons, with rainy seasonfrom April to October having annual precipitation around 1897 mm of rainfall, and the dry season, which occurs between Novembers to March with high temperatures that can be higher than annual temperature range(Anonymous, 2008). Topography of the park can be divided into two; the undulating Gumti sector in the north and the hilly to mountainous Gashaka sector in the south, where elevations rise to 2,419 meters at Gangirwal(also called 'Chappal Wade') which is Nigeria's highest altitude [**25**]

Gashaka-Gumti is located on land underlain by pre-Cambrian Basement Complex. The pre-Cambrian Basement Complex and the Ifewara fault line have previously contributed to the movement and formation of geology and landforms in the area [24]. Landslides occur because of sedimentary rocks that are in the area. The sedimentary rocks are known to be mineralized with lead and zinc [24]

Vegetation in North-eastern area of the park shows savanna woodlands, typically Sudan and Guinea savanna woodlands with species of *Brachystegiaeurycoma* and *Berliniagrandiflora*   [**24**]. To the eastern part,highlands withmontane grasslands and shrub lands occur within the mountainous regions of the park. The canopy of the montane forest is rarely closed, allowing for rich vegetation on the floor. The tallest trees are often stragglers, like the *Ficus* and other species of fig. Within and near the highlands, vast lowland rain forests, tropical and subtropical moist broadleaf forests begin to take over. The rainforests are dense, hot, and humid. The forest vegetation is dominated by woody species,

mainly tall trees [24]

Yankari Game Reserve (YGR)

Yankari is located within Duguri, Pali and Gwana districts of Alkaleri Local Government Area of Bauchi state. It is located at latitude 9^0 50'N and longitude 10^0 30' E, lies in the southern part of Sudan savannah in the north-eastern part of Nigeria. The reserve's tourist centre (Wiki camp) is situated 71 km from Dindima, off Bauchi- Gombe road with its main entrance at Mainamaji village, 29 Km from Dindima [26]. The Game reserve was designated in 1956 and opened to public in 1962 and has become one of the most popular eco-destinations in West Africa today. Gaji River divides the park into two but that is not the only source of water in the reserve. It features five warm springs namely; Wikki, Dimil, Gwana, Tudun-Maliki and Mawulgo water springs with Wikki as the largest and most fascinating site in the park with a constant temperature of 31.1^oC all year round. Yankari is a region of rolling hills, mostly between 200m and 400m with Kariyo Hill having the highest point of 640m [27]. Two major habitats- types namely dry Savannah Woodlands and Riperian vegetation occur which includes areas of Fadama (Floodplains). Annual rainfall in the reserve is between 900mm and 1,000mm and rainy season is from May to September while dry season from October through April. Mean temperature ranges between 18 - 35°C [27]

The park lies on Kerri formation, of Tertiary age, which composed of sandstone, silt stones, kaolite and grits. Underneath this lies the Gombe formation, of Cretaceous age, composed of sandstones, silt stones, and ironstones. The valleys of Gaji, Yashi and Yuli Rivers are filled with Alluvium of more recent age. Sandy loan and clayey soils of riverine alluvium occur in the valley of the Gaji, Yashi and Yuli Rivers. To the east of Gaji valley is a 5-7 Km wide band of poor sandy soils that support a shrub Savanna formation [28]. Dry savanna woodland and riparian vegetation characterized the reserve with common woodland trees found includes *Afzelia africana, Burkea africana, Pterocarpus erinaceus, Isoberlinia doka, Monotes kerstingii, Combretum glutinosum, Detarium microcarpum and Anogeissus leiocarpus*. The shrub layer of the vegetation is dominated by *Gardenia aqualla* and *Dichrostachys glomerata*while *Hyparrhenia involucrate* and *Hyparrhenia bagirmica* are the dominant grasses. In the riparian forest, *Khaya senegalensis, Vitex doniana, Acacia sieberiana, Tamarindus indica, Borassus aethiopum* and *Daniella oliveri*are the common trees. Characteristics of Yankari are large monodominant stands of *Pteleopsishabeensis* which grows 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*spp are the dominant trees, while tangles of *Mimosa pigra*dominate the shrub stratum. [26]

Kanawa Forest Reserve (KFR)

KFR was gazette on 31/01/1953 and covers an area of 513 km^2. Upon establishment, it has a land mass of 41 hectares [29], but due to acquisition of surrounding farm lands by the Gombe state government for its expansion, it now occupies an area of 53 hectares [30]. It is located between longitude 10^0 16'N and latitude 11^0 18' E along Gombe – Biu road, 10km

from Gombe in Yamaltu/Deba local government area of Gombe state [31]. Gombe is the center of North-eastern Nigeria. It is also characterized by wet and dry seasons. Wet season is between April and October with annual rainfall of 850mm-1200mm while dry season is between November and March. Temperature can exceed 40^{0}C in March-May. The land is characterized by low swampy plain, rugged hill of granite and sandstone, volcanic plugs and plateau developed on sedimentary and volcanic rocks, ranging from Dadiya-Filiya syncline, Tangale peak of 1,270m and the Bima hills. The soil is underlined by sedimentary rocks which consist of Yolde formation, Gombe formation and Pindiga formation. These formations, comprises varied lithollogies, ranging from fine to medium and coarse grained sandstones, silt and clay. The area forms par Gongola basin of the upper Benue trough of Northern Nigeria [32]. The vegetation has a mosaic pattern. Around the hilly part of the reserve can be classified as dense Sudan savannah; then marshy vegetation; lowland rainforest vegetation near the Poli stream; grassland with tall grasses; and thorn vegetation in the drier part of the forest [30]. Tree species in kanawa forest includes; *Acacia spp, Anogeisus leiocarpus, Combretum spp, Detarium microcarpum, Entanda africana, Prosopsis africana, Raphia sudanica, Sterculia setigera,Vitex doniana, Vitaleria paradoxum, Khaya senegalensis, Parkia biglobosa, Ficus spp, and Ximenia Americana* [31]

Maladumba Lake and Forest Reserve (MLFR)

MLFR is located in the Maladumba village area, approximately 18 km Southwest of Misau and 2 km east of Shelon village in Bauchi state [33]. Its climate is characterized by two distinct seasons; a short, wet season that span across May-September and a longer dry season from October-April. The Mean annual rainfall is about 800 mm. Mean temperatures range from 26°C during the harmattan to 34°C during the hot month of April and May. The dry season is dominated by dusty, north easterly Harmattan winds [33]. MLFR lies on sedimentary rocks of the Kerri- Kerri Formation. The Formation comprises lacustrine and deltaic-type sediments of Paleocene age deposited on the Basement Complex to a thickness of up to 200 m. The formation is predominantly arenaceous, consisting of loosely cemented sands and grits, clayey sandstones, massive clays and silts. Bands of ironstone and conglomerate occur locally. The Formation thins towards its surface unconformity with the Basement Complex in the area west of the lake. In this area, the River Jimin, the main tributary of Kari River, has incised through the formation to flow on crystalline rocks of the Basement Complex. The soils in the area are deep sandy clay and loamy sands [34] Vegetation of MLFR is nothing much different from the Sudan savannah vegetation type. It is characterized by Open deciduous woodland with common species such as *Isoberliniadoka, Anogeissusleiocarpus, Balanites*spp. and *Combretum* spp. The region has been much affected by farm land acquisition, fire and cutting for wood and charcoal and presently threaten much by Fulani herdsmen seeking for fodder. Most of the remaining natural habitat is found only in the protected area, but there are larger blocks of relatively intact vegetation in the eastern part of the zone. There are gallery forests along rivers and grasslands often

dominated by *Hyparrhenia*(elephant grass) that stand up to   3–4 m in height [**35**].
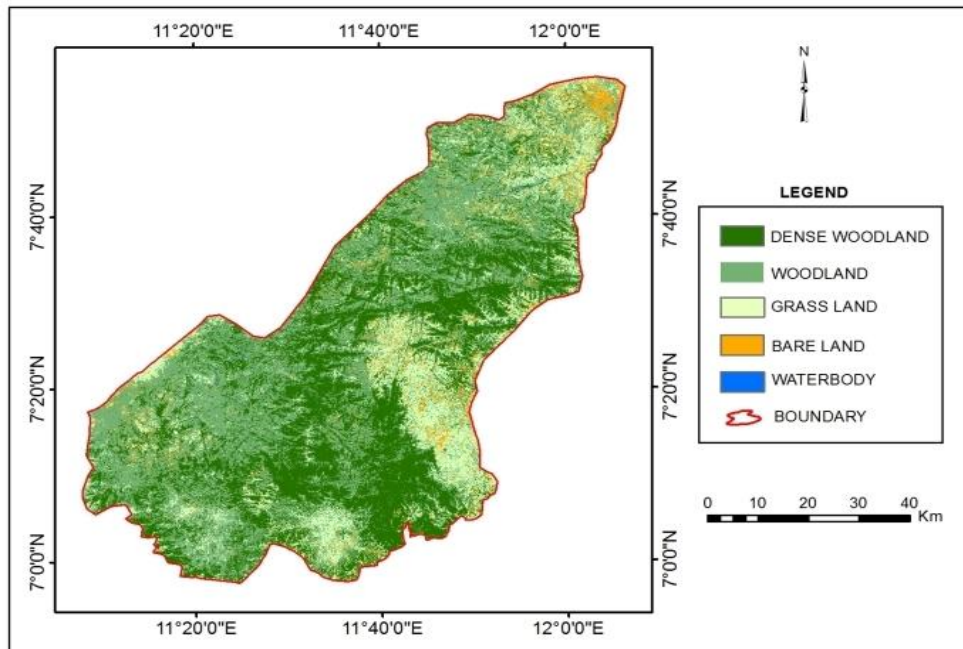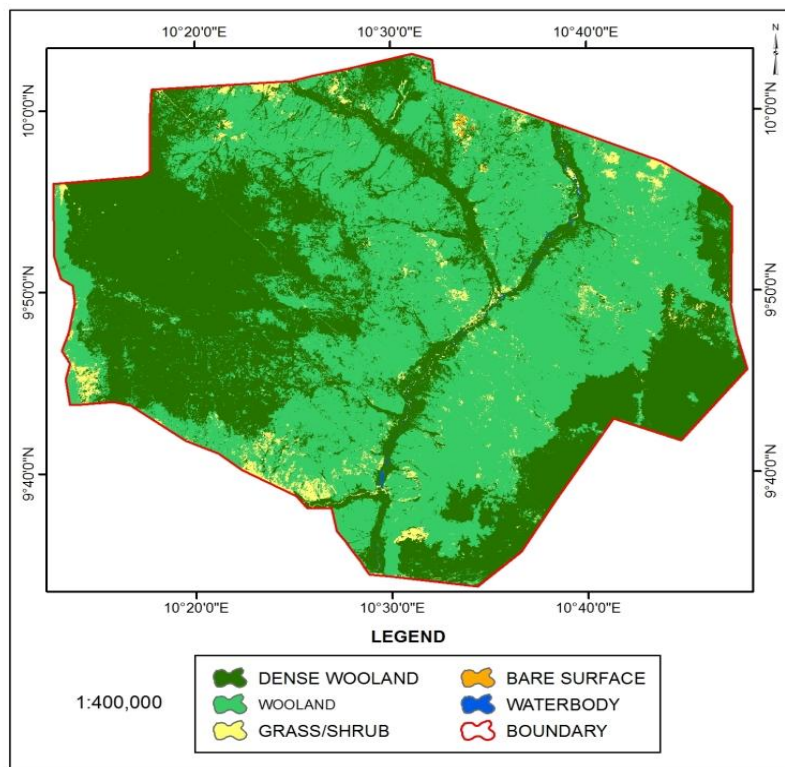

Figure 1: Map of GashakaGumti National Park
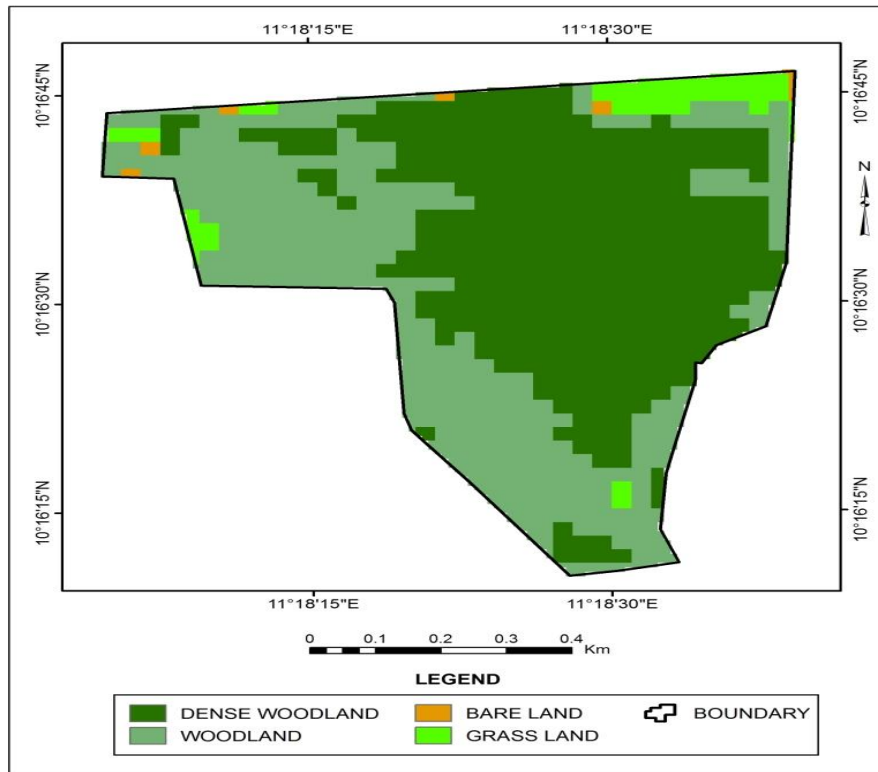

Figure 2 : Map of Yankari Game Reserve
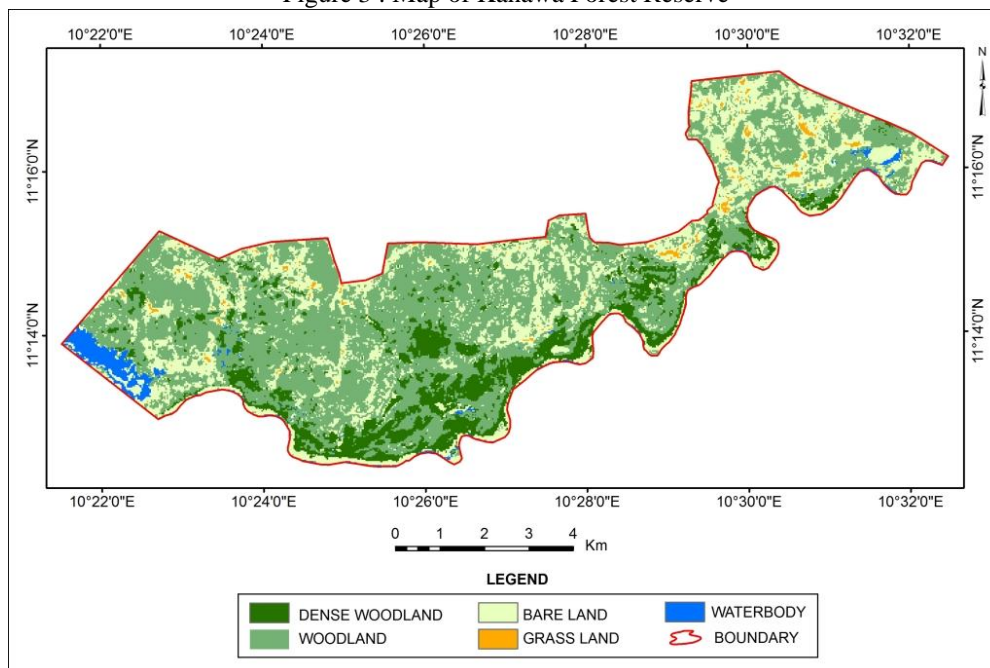
Figure 3 : Map of Kanawa Forest Reserve

Figure 4 : Map of Maladumba Lake and Forest Reserve

IV.   INSTRUMENT FOR DATA COLLECTION

An IUCN-WCPA framework for assessing management effectiveness of protected areas was adopted [**10**] and modified to develop a structured questionnaire for data generation on management approaches in the four selected PAs. The questionnaire comprised of twenty question items. It was divided into five parts namely Design, Planning, Input, Process adequacy and Delivery/Outcome. On each of the question item, two columns were provided for the respondent to tick on 'YES' if agreed with the statement, or 'NO' if not agreed. The questionnaire was translated into the common local language of the study area (Hausa) for easy comprehension and correct response.

V.   PROCEDURE FOR DATA COLLECTION

Twenty-five questionnaires were distributed in each of the selected PA (100 in all). Respondents included staff of forestry department ministry of environment and forestry members of staff in local government secretariats that work directly under the PAs, in case of forest reserves. For Game reserve and National park, where field staff and management staff were found within the PA, ministry members of staff were excluded so as to have response from those working directly under the PA (rangers, tourist's guides,

administrative staff etc.). The researchers visited each of the PA and administered the questionnaires based on self selection method of sampling (Those present at the time of administering the questionnaire). Two weeks was given for responding to the questionnaires, after which the researches went back and retrieved the questionnaires for collation and subsequent analysis

VI.   METHOD OF DATA ANALYSIS

Simple percentage was used as tool for data analysis. Results obtained were projected in descriptive statistics as bar charts.

VII.   RESULTS

A.   Design

Responses on elements of the design of the PAs indicated unanimous opinion (100%) on having the protected areas in their community is important to them. But on how much are governments (federal. State, or local government) committed to the protected area, GGNP (Federal governments) had the highest response (88%) with MLFR having the least (52%). However, involvement of other stakeholders in promoting the conservation strategy of the PAs, GGNP and YGR showed more involvement of stakeholders (72% & 68% respectively) over KFR and MLFR (20% & 12% respectively). Response on whether the PAs assist their adjoining community on cooperate social responsibility projects, all the responses were below average. Though GGNP (48%) took the lead and MLFR (12%) had the lowest value, all the responses are less than 50%

B.   Planning

Parameters to measure planning of the PAs indicated all the PAs has clearly stated legal status of the PAs with all responses above 80%. But on having clear management plan in place, GGNP had the highest (84%) while MLFR showed lowest record of responses (52%). Responding having clear boundaries, GGNP dominated with 96% while MLFR trails with 52% lowest record. Only GGNP affirmed with over average (56%) on whether size is affecting the management of the PAs, but KFR and MLFR had 16% each. The responses on whether the PAs have no border community conflicts show almost same values for GGNP, YGR and KFR (40%,

48% & 52% respectively), but MLFR had the highest record of no conflict (88%).

C.   Input

This is the measure of what the PAs has in place to ensure protection of the PAs in terms of manpower and logistics. GGNP is the only PA that had over average of the responses (52%) on adequate staff, with MLFR having only 08%. The same goes on availability of forest guards where GGNP had 44% as the highest and MLFR had 04% as the least value. All the studied PAs had poor logistics (transport, communication equipment and finance) available for effective monitoring (44%-04%). But values for staff training availability indicated GGNP distinguishing itself with as high as 92% with MLFR having lowest (08%).

D.   Process Adequacy

Question item on whether agreed policies and procedures for managing this Area is in place showed all the PAs have over average percentage scores but response on agreed management procedures for this protected Area is being followed indicated highest score (68%) in GGNP with the lowest (28%) in MLFR. International best protected Area management practice is not followed in all the PAs because the highest affirmative response was only 32% in GGNP with as low as 04% in MLFR. Responding on 'management system for this protected Area needs to be improved' showed all the PAs scored over 70%.

E.   Delivery/Outcome

Question on 'management system of this protected Area has prevented encroachment' showed highest percent (68%) in GGNP whereas MLFR indicated the lowest value (28%). Response on Management is ensuring Sustainability had GGNP and YGR having 88% and 80% respectively while MLFR had only 36%. Asked on whether objectives for managing this PAs has been achieved indicated GGNP and KFR having 52% and 48% respectively, and MLFR had only 16%

Table 1: Summary of Responses on Management Approaches of Selected PAs

S/N	Characteristics	GGNP	YGR	KFR	MLFR
A	**Design**				
i	Importance to Community	100	100	100	100
Ii	Involvement of Government	88	76	56	52
iii	Other Stakeholders involvement	72	68	20	12
Iv	PA Assistance to Community	48	36	16	12
B	**Planning**				
I	Clear Legal Status Stated	92	84	80	80
Ii	Clear Management Plan in Place	84	72	64	52
iii	Clear boundaries	96	88	76	52
iv	Size Affects Management	56	48	16	16
iv	No Adjoining community Clash	40	48	52	88
C	**Input**				
i	Adequate staff Available	52	28	20	08

|					
ii	Adequate Forest Guards	44	40	16	04
	Communication, Transport & Finance				
iii	Available	20	24	08	04
iv	Staff Training Adequate	92	76	12	08
D	**Process Adequacy**				
i	Agreed management Policies in Place	64	60	54	50
ii	Management Procedures are followed	68	56	36	28
iii	International best practice followed	32	24	08	04
iv	Management system needs improvement	80	84	72	92
E	**Delivery /Outcome**				
i	Management prevented encroachment	68	36	40	28
ii	Management is ensuring Sustainability	88	80	52	36
Ii					
i	All Management Objectives Achieved	52	28	48	16
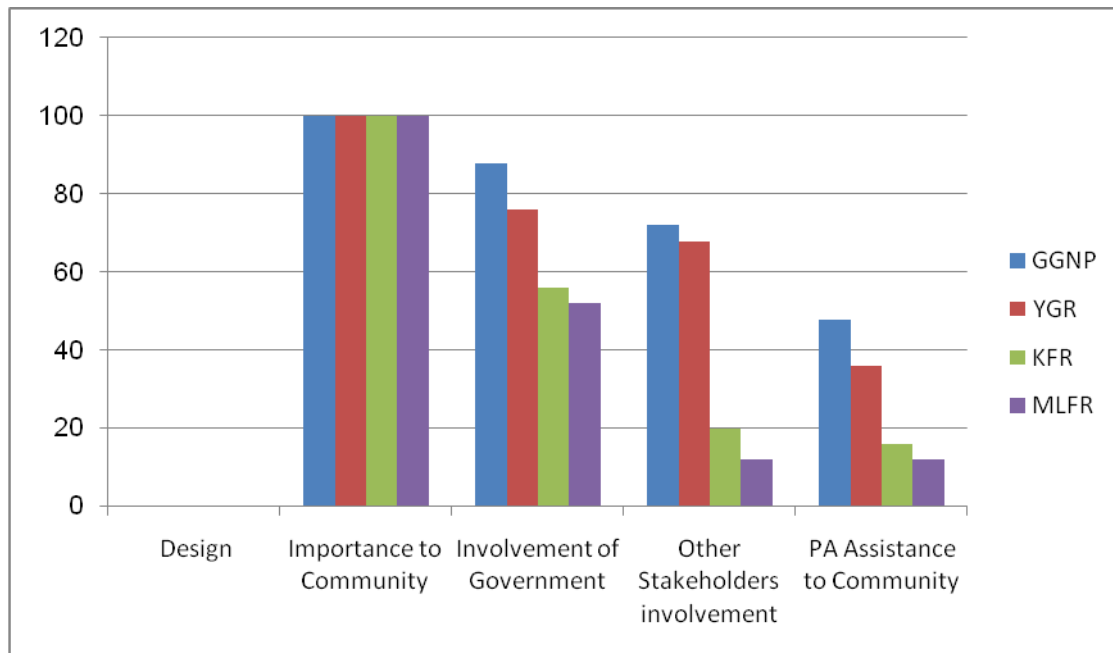
Figure 5: Responses on Design of the PAs
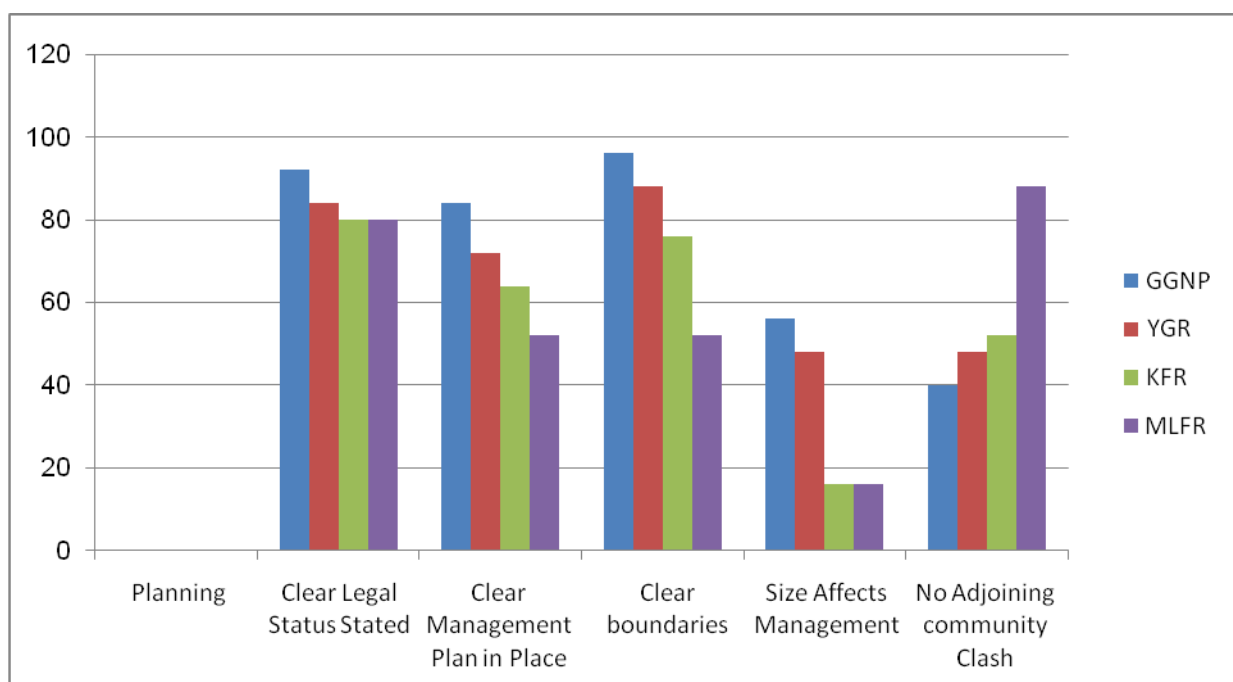
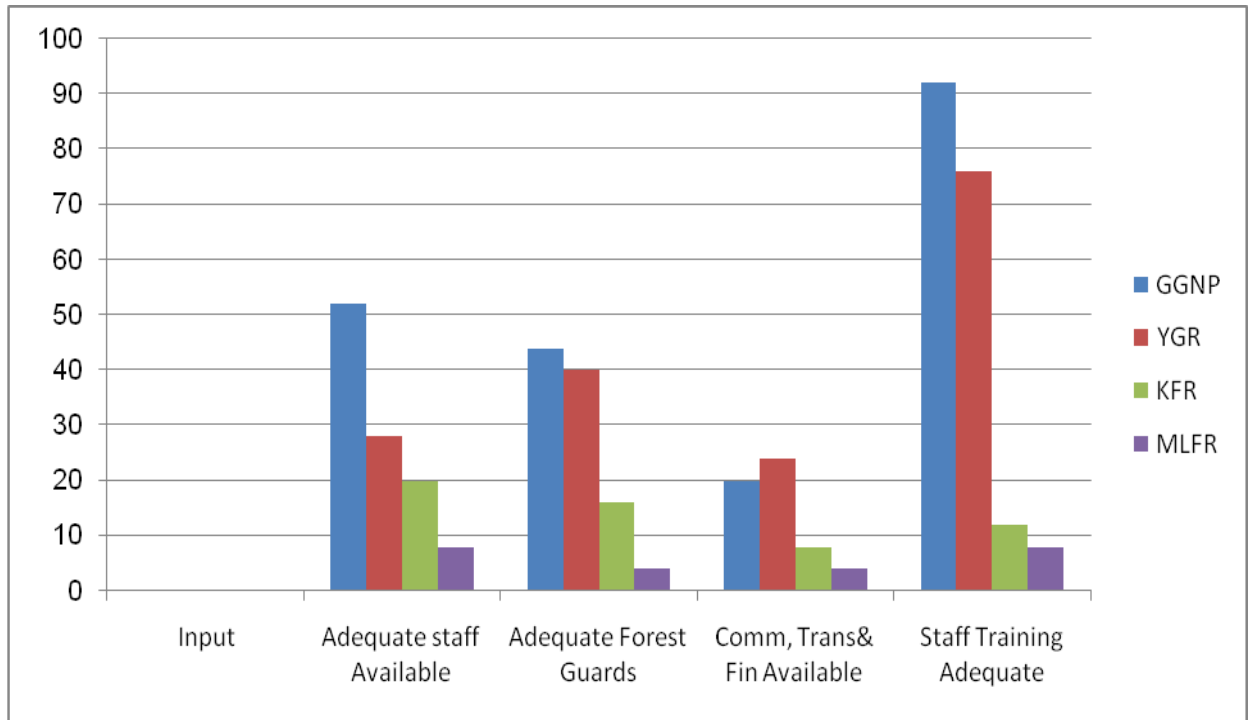Figure 6: Responses on Planning of the PAs

Figure 7: Responses on Input in the PAs
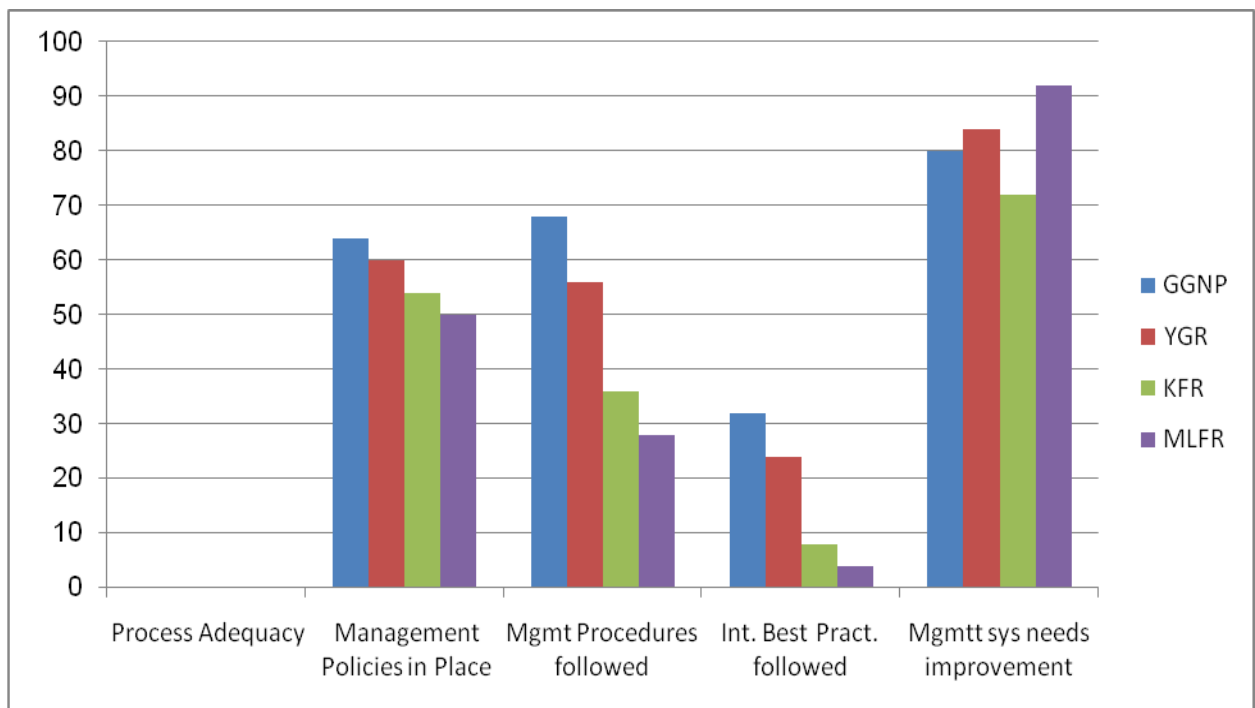

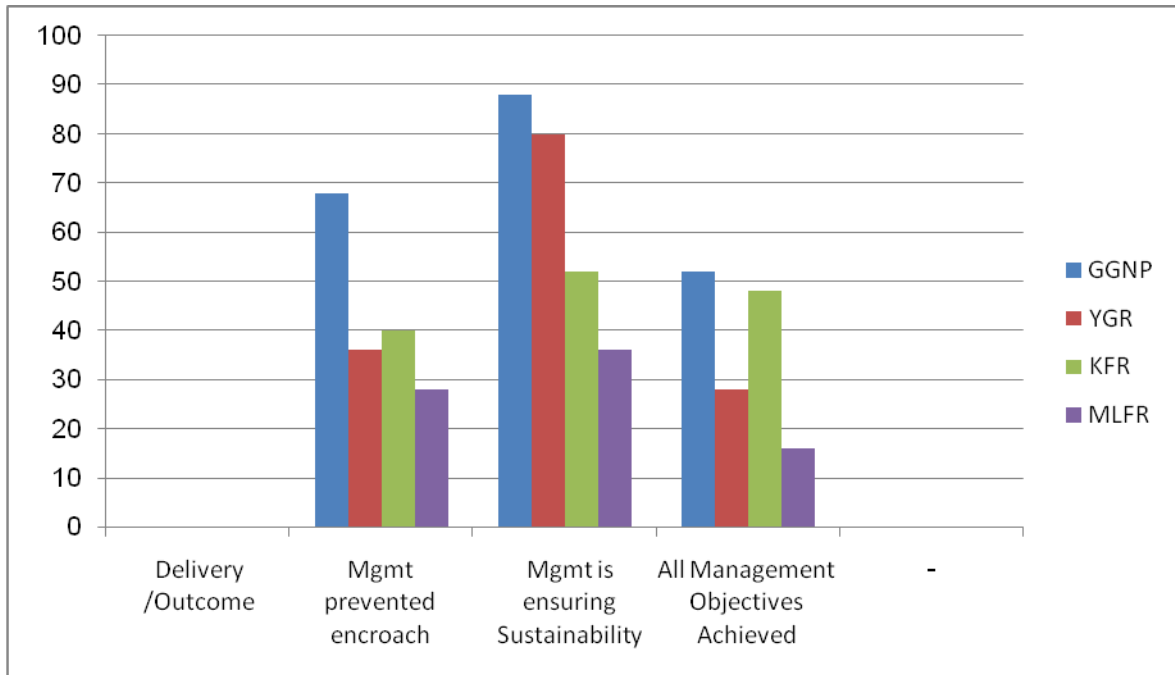Figure 8: Responses on Process Adequacy in the PAs

Figure 9: Responses on Outcome/Delivery of the PAs

VIII.   DISCUSSION

A.   Design

A protected area that suffers from fundamental design flaws is unlikely to be effective, however efficiently the managing body operates [10] that is why elements of design of the PAs were measured.. Responses on having the protected areas in their community is important (100% on each PA) was not unexpected, since in most African countries, indigenous woodlands provide both urban and rural populations with the greatest proportion of their fuel requirements, and other basic rural settlements domestic needs [11]; [12]). But on how much are governments (federal, State or local government) committed to the protected area, GGNP which is managed by Federal government indicating the highest response (88%) clearly shows how effect federal government management is better than states or local governments management approaches. This concurred with the findings of [36] that PAs owned by national governments are the best managed. This was further buttressed by the lowest commitment in MLFR having the least (52%) which enjoys state and local government funding. However, on involvement of other stakeholders in promoting the conservation strategy of the PAs, GGNP and YGR showed close responses (72% & 68% respectively) over KFR and MLFR (20% & 12% respectively). This shows closeness of federal and state governments in attracting stakeholders to partner in conservation in the north-east region. A good example was the local empowerment and environmental management project (LEEMP), a World Bank assisted project aimed at reducing the dependency of local people on the resources of PAsthat assisted30 communities adjoining Yankari Game Reserve (Then was national park), Lame-Burra Game Reserve and Lake Dumba with N67m in 2006 [37]; [38] has it that partnership of stakeholders outside the boarders of PAs must be solicited during planning and management of PAs for effective management. Even the fifth WPC in Durban, recommended governments at various levels, NGOs, local communities and civil society organizations to participate in a process referred to as *benefit beyond boundaries* for PAs to succeed [39].However, response on whether the PAs assist their adjoining community on cooperate social responsibility projects indicated below average which was an indication that lots needs to be done regardless of any type of management system in that part of the country, since that gesture minimizes park-community conflicts.

B.   Planning

On planning of the PAs, responses indicated all the PAs has clearly stated legal status of the PAs with all responses above 80%. But on whether management plans is in place, GGNP had the highest (84%) while MLFR showed lowest record of responses (52%). This is also a clear pointer to a more organized management approach on the side of the National park than others. Responding on having clear boundaries demarcated, GGNP dominated with 96% while MLFR trails with 52% lowest record. This was proven during reconnaissance survey by the researchers where clear monumental beacons were observed in GGNP as against GPS marked code lines in YGR and absence of even such in MLFR. The responses in GGNP on whether size is affecting the management of the PAs (56%) taking the lead over others is obvious as GGNP has a land mass of about 6,670 km^2 being the largest protected area in Nigeria [23] and the size of a reserve is believed to influences many aspects of its management [10]while KFR and MLFR having 16% concord with their size too;i.e. 53 hectares for KFR [30]. The responses on whether the PAs have no border community conflictsshow almost same values for GGNP, YGR and KFR (40%, 48% & 52% respectively), but MLFR had the highest record of no conflict (88%) which may be attributed to the less strictness of the management, as no apparent forest guards were seen in the PA by the researchers during

reconnaissance survey of the reserve. Since people venture in at will, certainly there would not be adjoining community conflict due that easy accessibility. But it should be noted that PA will face more devastating effect of human perturbation if is that easily accessible.

C.   Input

The level of resources available for management often has a major impact on effectiveness of the management system of PAs [**10**], therefore assessing parameters of input is of paramount importance. .Responses on availability of manpower and logistics for proper management of the PAs shows that GGNP had over average of the responses (52%) on adequate staff, with MLFR having only 08%. The same goes on availability of forest guards where GGNP had 44% as the highest compared to MLFR that had 04% as the least. All the studied PAs had poor logistics (transport, communication equipment and finance) available for effective monitoring with 44%-04%. These indices clearly signify low commitment of management systems of these PAs. However, GGNP displays little effort over the remaining PAs. Weakness of various governments in effective management of PAs was reported discouraging [**40**]; [**41**]; [**42**]. This was further evident in staff training programs where GGNP distinguishing itself (92%) with MLFR having lowest (08%). It is a known fact that with very little or no field staff and logistics, the success of any PA remains to be questioned. Globally many PAs lack financial and human resources, and legal framework for effective management [**43**]. Internationally, the estimated funding required for an effectively managed, comprehensive, adequate and representative park system is US$45 billion per year, while the actual sum provided by governments and other funding agencies in UK for example is only US$6.5 billion.18 [**10**]. In case of the PAs of North-east Nigeria, nothing close to that is obtained. To further suggest the importance of funding in successful management, [**44**] reported average budget per PA in Europe was eight times over that of Latin America, a factor that may be attributed to effective management of PAs in Europe over those of Latin America [**43**]

D.   Process Adequacy

Even well-planned and supported protected areas need sound management processes if they are to be effective [**10**] This was what informed assessing these indices. Analysis of responses on whether agreed policies and procedures for managing the PAs are in place showed all the PAs have over average percentage scores (64%-50%) , but response on whether agreed management procedures for this PAs is being followed indicated highest score (68%) in GGNP with the lowest (28%) in MLFR. This is an indication that GGNP has more committed management approach that follows formulated policies and procedures for its management compared to the remaining PAs. But international best practices for PA management are grossly violated in all the PAs with only 32% in GGNP that has better management system, and, as low as 04% in MLFR. This speaks volume on how PAs in North-east Nigeria operates far below standard in their management approaches. Obtaining the views of

respondents on 'management system for this protected Area needs to be improved' showed all the PAs scored over 70%, with MLFR standing at 92%. This opined that the respondents attested to the poor management system of the PAs in that region. It is on record that in evaluating effectiveness of PAs management, analysis of the adequacy of legislation and policy is needed if more than one type of protected area is being assessed [**10**]

E.   Delivery/Outcome

Outputs are the penultimate part of the assessment when evaluating management effectiveness; i.e. determining if protected area managers and other stakeholders achieved what they set out to achieve [**10**]. This formed the basis of this evaluation. Response on 'management system of this protected Area has prevented encroachment' showed highest percentage (68%) in GGNP with as low as 28% in MLFR. Though response on 'Management is ensuring Sustainability' had GGNP and YGR having 88% and 80% respectively only suggested the minds of the respondents in the context of their local perception. But when compared at global scale, much is desired. With MLFR having only 36% speaks volume on extreme laxity on the management of that PA even at local level of perception. When asked on whether objectives for managing this PAs has been achieved, the response in GGNP and KFR having 52% and 48% respectively as the highest, leaves no doubt on the failure of the management approaches of PAS in achieving the desired objectives of biodiversity conservation and sustainable development in North-east Nigeria. As such, much needs to be done in improving the management systems generally, even though, GGNP takes the lead as observed in these findings.

IX.   CONCLUSION

From the foregone discussions, it is logical to conclude that PAs are not properly managed in North east Nigeria when viewed in the context of international best practice. However, from the parameters measured, nationals parks seems to show little more efforts in better management system when compared to the management approaches of states and local governments. Since Biodiversity conservation through PAs is a collective responsibility by local and national governments, local communities, and private landowners, people investing in protected areas, whether through voluntary donations to NGOs or through government taxes, have a right to know how well these areas are being managed. Thus, the justification for monitoring the effectiveness of the management approaches of these PAs. As the total number of protected areas continues to increase, so does the need for proper accountability, good business practices and transparency in reporting [**10**] But evaluation of management effectiveness is only worth doing if its results are interpreted to identify some practical lessons and then act upon. At local, regional and global level, results can be used to adapt plans and practices, adjust resource allocation, revise policies and affirm good work being undertaken [**10**]

X.   RECOMMENDATIONS

We found it imperative to suggest the following recommendations:-

1. Field staff needs to be increased and staff welfare be standardized in all the management approaches of PAs in North east Nigeria
2. Funding needs to be taken serious, at least if not made to the world standard ofUS$45 billion per year
3. Clear border demarcation of PAs must be done so as to prevent encroachment by adjoining communities in their quest for farm land, especially were no buffer zone exists for the PA.
4. In the interim, federal government should take over more state and local government PAs (Game and forest reserves) since national parks are better managed than game and forest reserves

XI.   ACKNOWLEDGEMENT

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