



## Local Livelihood of Adjoining Communities in Yankari Game Reserve, Bauchi-Nigeria

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### Authors' contribution

This work was carried out in collaboration between all authors. Author IU designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author LA collected data from the field and collated the data while Author MBA managed the literature searches, analyses of the study and performed the statistical analysis. Author AGE effected corrections and wrote the final manuscript. All authors read and approved the final manuscript.

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### ABSTRACT

**Aim:** To Investigate the local livelihood of Adjoining communities of Yankari Game Reserve (YGR) Bauchi, Bauchi state-Nigeria.

**Study Design:** Survey design was used for the study.

**Place and Duration of the Study:** Study was conducted in four communities bordering the protected area between January and March, 2014.

**Methodology:** Structured questionnaire was used on twenty (20) households in each of the four communities (N= 80) to generate data on socio-economic characteristics of the communities. Data was analyzed using simple percentage and Pearson correlation.

**Results:** The study revealed predominant youth population in the communities (43.7-49.1%) with

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high illiteracy level (50.7-84.1%) and farming as the major occupation (75-90%). Very low income was observed with monthly earnings between N5, 000 – N10, 000= (about \$31-\$62) per month per household. 90-100% households use firewood as means of energy for cooking and heating and 75-95% of households live in mud/thatch houses that require frequent reconstructions with woods. There was no significant relationship, statistically, between education and income in all the communities except Mainamaji that showed slight inverse relationship ( $P$  0.055). On occupation and income, only Mainamaji suggested positive relationship ( $P$  0.273).

**Conclusion:** Socio-economic status of the support zone communities is, generally, very low.

*Keywords: Livelihood; protected area; adjoining communities; socio-economic characteristics.*

## 1. INTRODUCTION

The world's forest lost has done away with almost half of the earth's forest cover in the last 8,000 years from 62 m Km<sup>2</sup> to about 33 m Km<sup>2</sup> with majority of the loss occurring in the last three decades [1]. In line with the aforementioned, various biodiversity agreements, strategies and conventions for sustainable developments were promulgated with establishment of forest reserves and other protected land and sea areas as measures for biodiversity conservation.

Protected areas were institutionalized by the World Conservation Union (IUCN) in 1962, and defined as 'an area of land or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective measures' [2]. However, in Africa generally and Nigeria in particular human degradation is posing a serious concern to the success of this conservation strategy due to economic hardship and poor means of livelihood which is imposed on the common man mostly due to poor governance.

The deterioration of many protected areas is, more often than not, a direct result of anthropogenic perturbations, mostly driven by high poverty levels and a rapidly expanding rural population [3]. Livelihood comprises of all capabilities, assets (both material and social) and activities required for a means of living. But livelihood will be sustainable only when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both at present and in the future and yet not undermining the natural resource base [4]. Sustainable development is currently being pursued in the context of an increasingly globalised world, but it is continuously jeopardized by poverty. Poverty, as defined by World Bank, is a pronounced deprivation of well-

being related to lack of material income or consumption, low levels of education and health, vulnerability and exposure to risk, lack of opportunity to be heard and powerlessness [5].

Sustainable development continues to be a principal policy goal of many institutions in development more now than at any previous time, as the last decades has witnessed development reversals and accelerated environmental degradation in many places of the world. The global challenge of sustainable development lies in complex interdependencies of environment, social and economic development [6].

Yankari Game Reserve (YGR) is one of the forests designated as conservation areas in Nigeria. But conservation areas in Nigeria were established through enforcement and compulsory expulsion of local settlers [7]. These local communities that were separated from the natural resources, skills, traditional roles, social standings and means of livelihood mostly jeopardize the success of this conservation. As such, the successes of such conservation strategies depend so much on the surrounding communities (Abdulhameed, 2002. Unpublished PhD Thesis, ATBU Bauchi, Nigeria). Currently there are over 100,000 protected areas worldwide [8] which majority of them are located in the tropics and it is a known fact that most of the tropical countries are characterized by poor economy, limited institutional frame work, rapidly expanding rural population and poor infrastructural development due to poor governance [3]. Protected areas have often been called into question for their limited effectiveness in protecting the biodiversity [8]. Their failure is most often because of the fact that the protected areas are surrounded by matrix of human-land use types and dense human populations consisting of subsistence communities [3].

The low economic status, poor education on the importance of conservation as well as imposition

of restriction on the areas rather than sustainable development of the areas mostly results in conflicts between park authorities and indigenous locals. This is because the locals have long histories of association with the land and the resources cater for their cultural, health and economic needs in times of agricultural and economic hardships [9]. As such, increase in pressure on Yankari Game Reserve from adjoining villages of the Reserve for demand of fuel wood and quest for more arable land has been reported (Abdulhameed, 2002. Unpublished PhD Thesis, ATBU Bauchi, Nigeria). Therefore, the relationship between protected areas and local communities around them is a key factor in the long term conservation of natural resources particularly vegetation in which local participation is indispensable (Abdulhammeed, 2002. Unpublished PhD Thesis, ATBU Bauchi, Nigeria). Poverty due to poor governance is endemic to Africa [3] and there is a positive correlation between poverty and deforestation [10]. With the world's 2.8 billion people living below \$2 per day [11] there is every possibility that financial hardship on adjoining communities will have a serious effect on the forest resources of Yankari Game Reserve.

Understanding the implication of low income communities neighbouring protected areas prompted World Bank to introduce the 'local empowerment and environmental management project' (LEEMP), project aimed at reducing the dependency of local people on the resources of protected areas. However, lack of proper supervision and political selfishness has succeeded in wrong implementation of the program in Yankari and Maladumba forests, all in Bauchi state Nigeria [12].

Findings from this study will benefit Bauchi state government in understanding the socio-economic status of the support zone communities so as to map out strategies for empowerment programmes to alleviate or reduce poverty on adjoining communities. These will poster good relationship among the communities and the management of the Game Reserve towards its conservation policies.

### 1.1 Objective of the Study

This paper studied the livelihood status of adjoining communities of Yankari Game Reserve with the sole objective of determining the socio-economic status of the local communities living close to the Game Reserve.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

Yankari Game Reserve is a large wildlife park located in the south-central part of Bauchi State, in northeastern Nigeria. It covers an area of about 2,244 km<sup>2</sup> (870 mi<sup>2</sup>) and is home to several natural warm water springs, as well as a wide variety of flora and fauna. It is located at latitude 9° 50' N and longitude 10° 30' E, lies in the southern part of Sudan savannah zone of the country (Fig. 1). The reserve's tourist centre (Wikki camp) is situated 71 km from Dindima, off Bauchi- Gombe road with its main entrance at Mainamaji village, 29 Km from Dindima.

Yankari is located within Duguri, Pali and Gwana districts of Alkaleri Local Government Area of Bauchi state [13].

The Reserve was designated in 1956 and opened to public in 1962 and has become one of the most popular eco-destinations in West Africa. The Park is bisected by Gaji River 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 flavours the reserve's beauty. Wikki has a constant temperature of 31.1°C all the year round which makes it the most fascinating sites of the reserve. Yankari is a region of rolling hills, mostly between 200 m and 400 m with Kariyo Hill having the highest point of 640 m [1]. Two major habitat- types namely dry Savannah Woodlands and Riperian vegetation occur which includes areas of Fadama (Floodplains). Annual rainfall in the reserve is between 900 mm and 1,000 mm and rainy season is from May to September. Mean temperature ranges between 18 - 35°C [14].

### 2.2 Study Procedure

Reconnaissance survey to identify villages around Yankari Game Reserve as well as village stations and code lines earmarked by the Game reserve was conducted. The survey revealed seventeen adjoining villages surrounding the reserve within a distance of 10 km namely; Maina-maji, Yalwan-Duguri, Dagudi, Gaji-Gamu, Duguri, Dogon-Ruwa, Bogwas, Rimi, Gale, Sarkin-yaki malla, Yalo, Walakerol, Jada, Mai'ari, Kwala, pali, and Kuka. Out of the seventeen adjoining communities identified during the reconnaissance survey, skip sampling technique

was employed taking one village after every other two villages to sample six villages namely Maina-Maji to the north, Gaji-Gamu to the northwest, Bogwas to the Southwest, Sarkin-Yaki Malla to the southeast, Jada to the east, and Kwala to the northeast of the Game reserve. Balloting [15] was used to select Kwala (4.1 km, 10° 2' N, 10° 36' E with Elevation 265 m) ; Maina-Maji (3.7 km, 10° 3' N, 10° 17' E with Elevation 477 m); Bogwas (approx. 1 km, 9° 33' N, 10° 29' E with Elevation 226 m) and Gaji-Gamu (1.9 Km, 9° 42' N, 10° 17' E with Elevation 326 m) were considered for this study.

In each of the selected communities, twenty households were randomly selected by balloting and a structured questionnaire was administered [5] on the household via the head to collect data on the socio-economic status of the household. The questionnaire was validated by an expert at school of Education, Federal college of Education (Tech.), Gombe as well as by a statistician for possible and easy data collation. Prior to the data collection, a pilot study was conducted at Maina-Maji with three questionnaires [3] to detect whether some question items will be difficult to respond to by

the respondents. Such problematic questions were modified.

### 3 RESULTS AND DISCUSSION

Findings on the socio-economic status (Table 1) revealed population of the area as characterized by predominantly youth population with highest 49.1% between 0-15 yrs in Gajigamu and least of 43.7% at Bog was of the same age bracket. Middle-aged group, which can be regarded as youth still (16-35 yrs), constitute the second majority in the four communities studied with 34% at Gajigamu. This agreed with the findings of Musa et al. [16] that observed youth (16-35 yrs) constituting 64% of the population of Mansur community close to Yankari. This signifies population increase in the communities which, by implication, calls for increase in demand for food, shelter and other means of livelihood. With low off-farm employment opportunities in the area, this population will exert for pressure on resources of YGR as Withemeyer [17] observed that increase in population near wildlife-rich area increases demand for more land for livelihood maintenance.

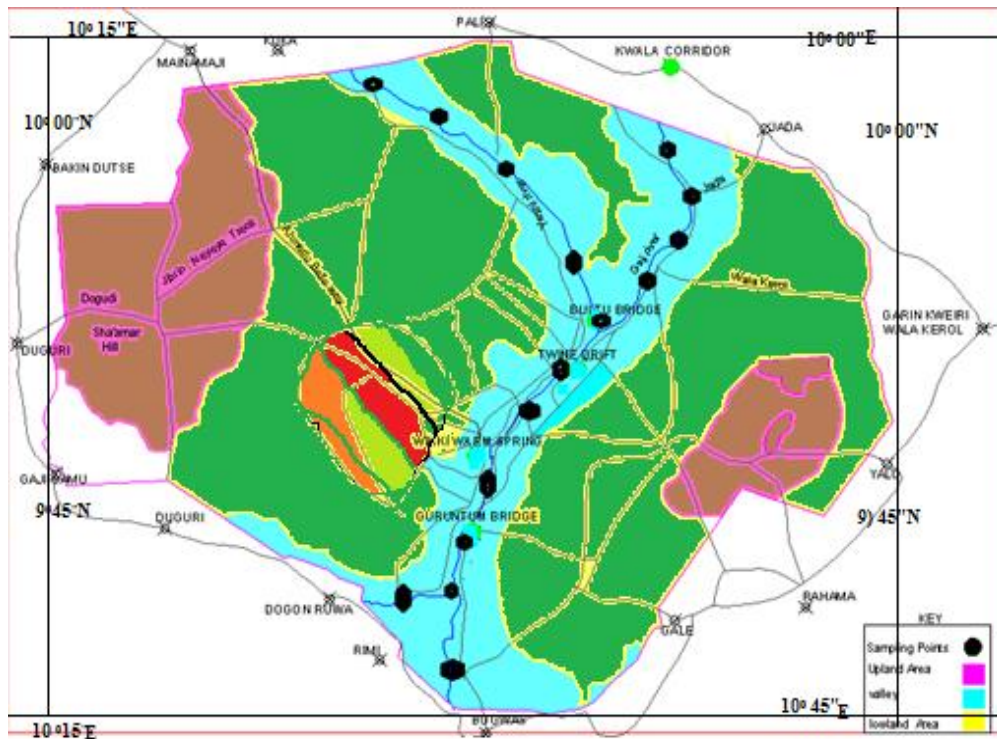


Fig. 1. Map of yankari game reserve showing the study sites

**Table 1. Socioeconomic characteristics of kwala, mainamaji, gajigamu and bogwas communities near YGR (%)**

S/N	Characteristics	Kwala	Mainamaji	Gajigamu	Bogwas
a	Age (Yrs)				
i	Young (0-15)	46.3	48.8	49.1	43.7
ii	Middle aged (16-35)	32.5	27.8	34.5	32.8
iii	Elders (36 and above)	21.2	23.4	16.4	23.5
b	Education				
i	Primary School	27.5	20.4	17.5	3.8
ii	Secondary school	15.6	1.5	5.3	2.7
iii	Tertiary School	0.6	2.5	0.0	0.0
iv	Qur'anic Education	5.6	7.6	7.7	9.4
v	illiterate	50.7	68.0	69.5	84.1
c	Occupation				
i	Civil service	10	10	0.0	0.0
ii	Farming	75	80	90	90
iii	Trading	15	5	5	10
iv	Hunting/Fishing	0	5	5	0
d	Income per Month				
i	Above N20, 000=	15	25	5	10
ii	N11, 000 - N20, 000=	0	45	35	40
iii	N5, 000 - N10, 000=	60	30	40	45
iv	Less than N5, 000=	25	0	20	5
e	Domestic Animals				
i	Cows	10	25	30	30
ii	Goats/sheep	40	25	40	25
iii	Chicken/Duck	45	30	15	30
iv	Non	5	20	15	15
f	Source of Feeds				
i	Yankari Game Reserve	0	20	0	0
ii	Community farm	100	80	100	100
g	Number of Meals per day				
i	Three	100	100	80	90
ii	two	0	0	20	10
h	Is Number of Meals constant				
i	Yes	65	55	35	50
ii	Non	35	45	65	50
	Month with less meals				
i	Jan - April	0	0	8	10
ii	May - August	100	100	92	90

Educationally, all the four communities revealed low literacy level with a corresponding high illiteracy of 84.1% in Bogwas and 69.5% in Gajigamu. Bogwas showed only 6.5% literacy. In all the communities, secondary education was the highest except in Mainamaji where 2.5% tertiary education was recorded which is in line with the findings of Musa et al. [16] that reported 3% tertiary education in Mansur community, a village adjoining YGR. This low literacy level means only few will be aware of the relevance of conservation and will therefore have little tolerance to conservation policies due to ignorance of its importance as Abdullahi et al. [14] reported only 36.7% responses of adjoining

communities on knowing that YGR is a conservation unit which is essential for healthy environment. The terminal result of low knowledge on importance of conservation will mean more perturbation on YGR for means of livelihood by the adjoining communities.

Farming stem out as the predominant occupation in the communities studied with a record of 75-90% in all the communities. Musa et al. [16] also reported farming as the major occupation in Mansur community. Other occupations identified were trading (highest 15% in Kwala), Civil service (10% each in Kwala and Mainamaji) and fishing/hunting (5% each in Mainamaji and

Gajigamu). With subsistence type of farming, as observed during reconnaissance survey, only more lands will be wasted with a resulting low productivity. This means more quests for arable land (Abdulhameed, 2002. Unpublished PhD Thesis, ATBU Bauchi, Nigeria), with the increase in population as observed in high youth population, and consequently more pressure on YGR as reported by Mohammed et al. [18] that YGR lost 287 sq km of its land between 2001 to 2007. Unless high income generation factors for support zone communities are thought by management of YGR, more pressure will continue to mount on forest resources of the Game Reserve.

Findings revealed low income in the study area with majority of the households earning between N5, 000= to N10, 000= (about \$31 -\$62) per month with 60% highest response at Kwala. This concord with World Bank's findings (in 5) which reported almost half of world population lives below \$2.0 per day. 45% highest response was recorded at Mainamaji on income between N11, 000= to N20, 000= per month (about \$69 - \$125). Only Mainamaji recorded as high as 25% responses for households earning over N20, 000=, a factor that can be attributed to higher literacy level (2.5% tertiary education) and highest percent of civil servants (10%) in the area.

Keeping domestic animals, traditionally, is considered economic supplement in times of hardship in the area. In the event of agricultural failure, households can sell the animals to earn money. The higher the animals kept, the more secured is a household. However, majority of the households kept goats/sheep (highest 40% at Kwala & Gajigamu) and chicken/Ducks (highest 45% at Kwala). Though Bogwas and Gajigamu indicated little higher cow ownership (30% each) over Mainamaji (25%) that had the highest economy, this may not be unconnected with the need of the cows for agricultural purpose rather than means of cash security as these two communities recorded the highest responses (90% each) on farming as their major occupation.

Responses on the source of feeds for the animals indicated nearby bush (80-100%) in all the communities. This may be as a result of fear of easy visibility of herds by forest guards if the animals are taken directly into the rather than human being sneaking into the reserve for other forest resources (e.g. construction and fire woods).

A record high (80-100%) of three meals consumed by households per day indicated subsistence type of farming since majority of households (35-60%) attested that the meals are not constant throughout a year. Further justification to this is evident in Gajigamu and Bogwas. Though predominantly farmers by occupation, only 35-50%, respectively, of households had constant meals throughout a year. The months with fewer meals predominantly were May-August in all the four communities. This can be attributed to the period of agricultural operation, far away from the last harvest, when little of the last produce is left at hand due to subsistence nature of farming as earlier reported. To make up for the shortfall in number of meals per day, there is every tendency that forest resources, such as fuel wood and construction wood, will be resorted to as means of income when sold. Since reconnaissance survey prior to the research as reveal serious deforestation in the area, Yankari Game Reserve, being the only forested area, will face all the threats in terms of forest degradation to support the financial predicaments and thus, a serious impact of poverty on forest resources.

Comparison between education and income in the four communities (Table 2) indicated negative and weak correlation, implying that there is no significant relationship, except for Mainamaji that showed fair relationship ( $P$  0.055). This showed that the two are inversely related, as one increases the other decreases. Though income level is higher at Mainamaji, its education tends to decline which by implication means the more money acquired, the less efforts in educational development. As youths get more income, they tend to elevate their social life to the detriment of educational development. This was evident in the low secondary school graduates (Table 1) compared to kwala and Gajigamu. With respect to occupation and income (Table 3), however, Kwala was the only community that showed inverse relationship, though not significant ( $P$  0.441), which points to low income from the predominantly farmers (but low percentage) as the major occupation. Gajigamu and Bogwas indicated positive but weak relationship, with 90% farmers, showed that the occupation positively correlates with their income but not significantly. Mainamaji on the contrary showed positive and fair relationship ( $P$  0.273) which means as farming and civil service increases, so does the income.

**Table 2. Correlation between education and Income in the four communities**

<b>Correlation</b>	<b>P- value</b>	<b>Decision</b>
Education Kwala Income Kwala	0.797	Negative and Weak
Education Mainamaji Income Mainamaji	0.055	Negative and Fair
Education Gajigamu Income Gajigamu	0.595	Negative and Weak
Education Bogwas Income Bogwas	0.326	Negative and Moderate

**Table 3. Correlation between occupation and Income in the four communities**

<b>Correlation</b>	<b>P- value</b>	<b>Decision</b>
Occupation Kwala Income Kwala	0.441	Negative and Weak
Occupation Mainamaji Income Mainamaji	0.273	Positive and Fair
Occupation Gajigamu Income Gajigamu	0.539	Positive and Weak
Occupation Bogwas Income Bogwas	0.419	Positive and Moderate

#### **4. CONCLUSION AND RECOMMENDATIONS**

In the light of the present findings, it is logical to conclude that socio-economic status of the support zone communities of YGR is very low. This low economic status might be one of the principal factors contributing to the deforestation in African's protected areas, as observed by Mohammed, et al. [18] that YGR lost 287 sq km of its land between 2001-2007 alone. It is worthy to note that a perfect correlation was observed between poverty and deforestation [10]; also, improved forest management of a protected area requires attention to the livelihood of its adjoining communities as observed by same.

The following recommendations are therefore suggested-

- 1) Bauchi state Government should focus on empowering adjoining communities to YGR through provision of alternative livelihood assets such as fossil fuel substitute for fuelwood and non-wood construction materials substitute for wood as YGR remain one of the few natural ecosystems in Nigeria that enhance ecological processes and life support systems
- 2) The World Bank assisted Local Empowerment and Environmental

Monitoring Project (LEEMP), which was extended to few communities around YGR, must be pursued with all vigour, and state governments should venture with all seriousness through counter funding and adequate supervisions

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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