

Anthropological Interference on the Vegetation of Wassaniya Forest Reserve of Sokoto State Nigeria

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Abstracts: A participatory rural appraisal study was conducted using inclusion and exclusion criteria within twelve communities residing around Wassaniya Forest Reserve in Sokoto State Northern Nigeria, in order to ascertain the anthropological interference on the forest reserve. A multistage random sampling technique was adopted for selecting 120 respondents, from 3 villages out of 2 district each in two local government areas of Sokoto State. The results reveals different means of forest exploitation that were largely due to anthropological (human) interference. These includes collection of fuel wood, illegal hunting, sales of Non-timber forest products, over-grazing, uncontrolled bush-burning, carving of local farm implements, thatching and collection of charcoal for black smith. Other means of forest exploitation found includes but not limited to collection of fruits and food from the forest, collection of herbs for medicinal purposes, Tannings, Gums and resins. The overall dependency of all the communities on forest for their daily needs shows that there is urgent needs for actions to be taken so as to diversify their income, increase their awareness on the sustainable forest management in order to reduce the risk of deforestation and desertification and the adverse effects of global warming within the area.

Key Words: Anthropological, Interference, Floral, Composition and Reserve

1. Introduction

Nigeria is endowed with a variety of plant and animal species. There are about 7,895 plant species identified in 338 families and 2,215 genera. There are 22, 000 vertebrates and invertebrates species. These include about 20,000 insects 1,000 birds, 1,000 fishes, 247 mammals and 123 reptiles. (Osemeobo 1997, NFNBR 2001, Tiseer 2008, Bello 2005). However these natural resources are greatly altered by human activities such as indiscriminate felling of trees for agricultural production, fuel, medicines and domestic utensils or over grazing by livestock and wildlife, Poaching of wildlife etc. These have led to the degradation of the hitherto useful forest under intensive pressure of exploitation (Bello 2005, Adamu 2006, Allonso et al. 2001).

Causes of Biodiversity lost are largely related to human factors and land management systems. These ranges from economic policies, rising demand for forest products due to increase in population and cultural practices. Other reasons may include: weak laws operating in Nigeria, poor law enforcement and rapid urbanization, which have collectively made forest dependence unbearable (Ola-Adams and Iyabomo 1977). The sub-humid zone of Nigeria covers 455 000 km² or approximately half of Nigeria and a third of the zone in West Africa. Twenty percent of the zone is cultivated, and cultivation is expanding at 4.8% per annum at the expense of forested lands (Saleem 2013).

One of the main reasons for the depletion of Nigerian forests resources is the uncontrolled wood harvesting and forest fire which, according to Hanagam (2013),

which has led to the recruitment of forest guards by the Niger State public Administration to protect these natural resources. Another reason for the depletion is the people's low patronage of other sources of energy in Nigeria. The dependence on fuel wood as a source of energy reduces carbon storage and sequestration, increasing the cases of environmental degradation as consequences of the deforestation rate in Nigeria (Taiye and Olofin 2015). There was 10,762,702 ha of land as forest reserves in Nigeria, but due to logging, and collection of fuel wood and non-wood forest products, only about 130,446 ha are relatively undisturbed forest (Musa 2002).

Annual bush burning is still an integral part of peasant farming in Nigeria, but studies on the effects of this practice has been restricted to vegetation and soil physiochemical properties alone Badejo (1994). One of the challenges confronting agricultural sector in Nigeria is the impact of grazing livestock animals on crop production and on forested areas, especially in the Northern part of the country. This is a serious problem because Nigeria has a very high herd cattle population, majority of which are in the hands of pastoralist (Ajah 2012, Obadiah and Shakaro 2012).

2. Materials and Methods

2.1 Study Site

Wassaniya forest reserve is located between Tangaza and Gudu Local Governments of Sokoto State (Figure 1). It lies between Lat $13^{\circ} 36' 66.94''$ N to $4^{\circ} 93' 33.32''$ E. Long $13^{\circ} 48' 33.58.29''$ N to $4^{\circ} 68' 33.11''$ E as indicated by the National Atlas (1974). Some of the villages surrounding the reserve include Yartagimba,

Mulawa: Tungarnoma, Tungarfilani, Daiji, Marakenbori, Wassanniya and Jimajimi 1 and Jimajimi 2.

Most of the inhabitants are Peasant farmers, Cattle rearers and Local wood carvers all of whom are dependent on forest resources for raw materials. The relief is within the Sokoto plains, characterized by flat lands broken by Sokoto and Rima rivers and their tributaries (SERC 2008, Abegunde et.al 2001, Abubakar et.al. 2011).

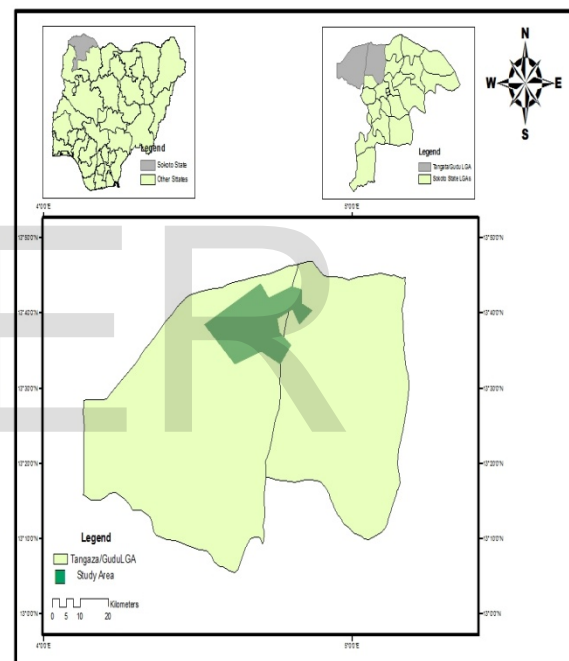


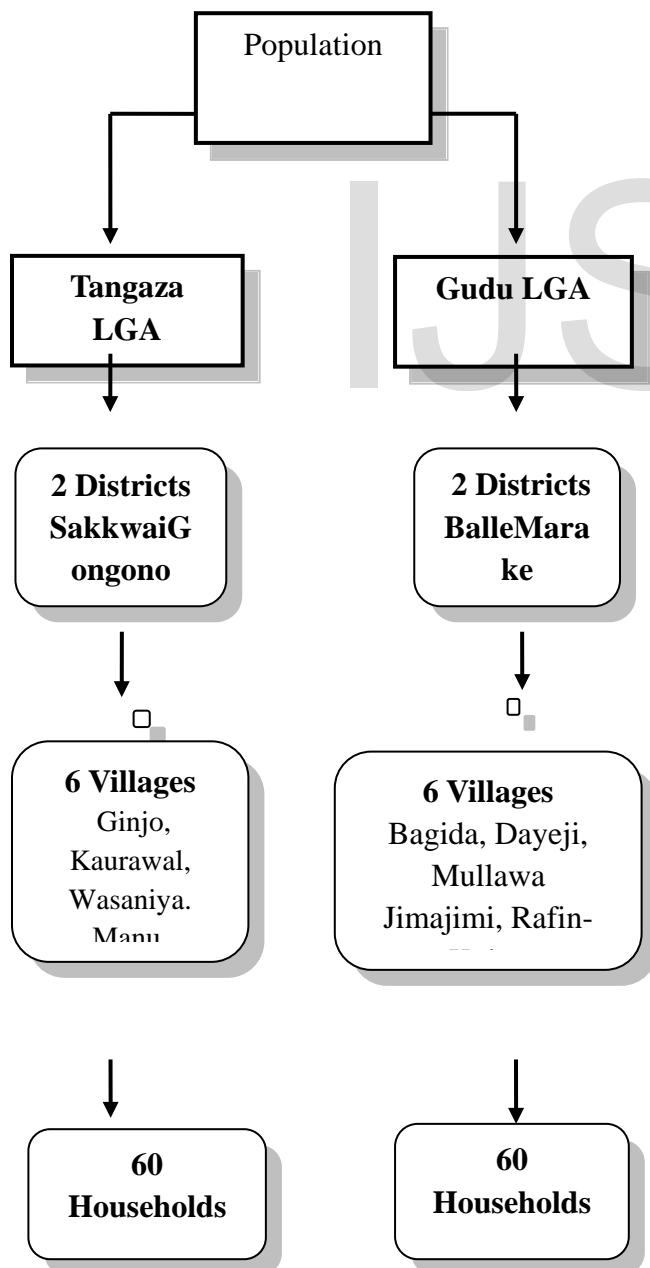
Figure 1: Map of the Study Area with Insight of Tangaza Gudu LGA, Sokoto State and Nigeria

2.2 Methodology

A multistage random sampling technique was applied for study to select units of analysis, i.e., households/respondents (Figure 2). In multistage random sampling, the sample is selected in stages

where the sampling units are sub-sampled from larger units previously chosen (Mamoona 2009). The population was divided in several stages and randomly sampled at each stage to draw the sample. The sampling started from the highest hierarchical level with 33% of the total, i.e., Local Government areas, secondly to the districts, thirdly to villages and finally the households which were sampled at the last hierarchical level in the randomly chosen from the study area.

Figure 2: Flow Charts of sampling respondents for questionnaire administration



An inclusion and exclusion criteria was used in selecting the respondent as treatments in the study. In every village the village head was asked to provide a list of people engaged in certain occupations that are related to forest exploitation which serve as a sampling frame. To avoid bias every person in the list have equal chance of being selected using simple random sampling technique. Exclusion comes in because people that travelled out or were not residing from the villages at the time of conducting interview were asked to be automatically excluded.

3. Data Analysis

Descriptive statistic and Analysis of variance (ANOVA) was used in analysing information generated on the Socio-demographic characteristics, income and expenditure statement as well as the different activities related to forest exploitation as in the structured questionnaires by using Statistical Analysis System (SAS 2003). Where treatment means were found to be significantly different will be separated using Duncan's New Multiple Range Test (DNMRT) as describe by Gomez and Gomez (1984).

4. Results and Discussions

4.1 Farming

Farming activities accounts for 98.3% of the respondent's primary occupation, selling of farm and forest products is 8% in the secondary occupations of the respondents, just to show how highly involve these people are in agriculture and forestry. This is

the reason why from the study conducted, farming encroachment has been on the increase. The secondary occupation varies depending on the households. But 37% of the respondents were engaged on livestock grazing which is another form of forest exploitation. 12.5% are in forestry products 11.7% in off-farm activities 17.5% in petty trades, tailoring meat selling, driving etc. by every standard the human activities of the rural population of people living around the reserved area had been dependent on the forest. The results were in conformity with Mamoon 2009 and Musa 2002. Ola Adams 2015, Saleem 2013 and Iqbal-swati 2004 all share the same trends in their findings about the primary occupations of rural communities with relation to farming.

4.2 Livestock Ownership and Grazing status

Most of the local population of the inhabitants surrounding the forest reserve own livestock which translate that they are involved in grazing. 1-5 cattle is owned by 47%, 1-5 camel is owned by 10%, 6-10 Sheep and goats 40.0%, 1-5 donkey were owned by 15.8% and 6-10 poultry were owned by 35.8% (Table 1). But a significant difference was recorded on the number of animals owned by household, the value of chi-square(X^2) index was 77.09 for cattle owned, 128.98 for sheep and Goats, 6.69 for donkeys, and 80.81 for poultry in all these the P value is $= > 0.001$. Bolaji-olutunji 2010, and Papoola 2006 reported a related scenario with regards to livestock ownership

Table 1: Number of Livestock Owned by Respondent

S/	Numbe	Cattl	Came	Shee	Donke	Poultr
N	r	e	l	p	y	y

and grazing activities that agreed with the results of this study. But Nkoyaet. al. 2004 and Rauf and Adetunji 2012, were sceptical and have a different view as to grazing as well as livestock ownership which contradict this results.

4.3 Intensity of Grazing by Villages

Different villages responds differently with the intensity of grazing they practiced. Intensive grazing is a means where by less supplements were given to the livestock as they are mostly taken out to graze out-side in the forest reserved area. The results shows that this type of grazing is practiced at Bagida, Dayeji, Tunnigara, Manu and Yartagimba Villages. Semi intensive grazing is practiced by all villages except at Masallaci. Peripheral grazing is carried out at Bagida and Dayeji mostly in cattle and Sheep fattening where livestock is kept and feed at home allowing zero grazing outside (Table 2).

The chi-square (X^2) value for intensity of grazing by different villages is 68.39 $P = > 0.001$ which indicates a significant difference. Grazing intensity as reported in Ajah 2012, Obadiah and Shakaro 2012 and Saleem 2013 all agreed with the findings of this study. This was further elaborated in (NPAFS 2010) and has shown that most villagers participates in uncontrolled grazing of their livestock with greater intensity and causing a lot of forest degradation.

owned	and
	Goat

s						
1	0	23.3	89.2%	16.7	84.2%	32.5%
		%		%		
2	1-5	47.0	10%	5.0%	15.8%	9.2%
		%				
3	6-10	17.5	0.8%	40.0	-	35.8
				%		
4	11-15	0.8	-	17.5	-	6.7
				%		
5	16-20	5.8	-	6.7%	-	8.3
6	20-25	5.0	-	11.7	-	6.7
				%		
7	25-30	17.5	-	2.5%	-	-
8	Above 30	0.8	-	-	-	-

Table 2: Forest Exploitation due to Intensity of Grazing by Villages

S/N	Villages	Intensive %	Semi-Intensive %	Peripheral %	Others
1	Bagida	10	80	10	0
2	Dayeji	10	50	40	0
3	Ginjo	0	80	0	20
4	Jima-jimi	0	50	10	40
5	Kaurawal	0	50	0	50
6	Manu	0	60	0	40
7	Masallaci	0	0	0	100
8	Mulawa	0	60	0	40
9	Rafin-kubu	0	46	0	54
10	Tunnigara	10	70	0	20
11	Wassaniya	0	50	0	50
12	Yartagimba	3	54.6	5.4	37

4.4 Forest exploitation in form of Energy Source

Majority of the respondent 78.3% uses fire wood as their source of energy, all other energy sources are just used by 21.7% (Table 3). This singular act demonstrates a lot of dependency on forest exploitation for fuel in fire-wood, which has its detrimental consequences. Pearson Chi-Square(X^2) value for energy source was 165.04 where $P \Rightarrow 0.001$ this shows a significant difference in energy source by the inhabitants in the study area. Exploitation of forest for energy and timber was reported by Hanagam 2013, Taiye and Olofin 2015 and Bello 2010. Their reports has confirm that most village communities depend largely on fuel wood as a major source of energy in their household.

4.5 Illegal Hunting/Poaching Activities

Whereas 71.7% of the total respondent agrees that they do participates in hunting or poaching activities in the forest. Majority of the respondent uses most of their catches in their household and do not take it to the market. The catches they make varies between households (Table 4). The chi-square (X^2) value is 17.56 where $P = > 0.001$ indicating a significant

difference in the average cost of Monthly catches made by different household of the respondents. The results was in agreement with the work of Bolaji-Olutunji and Osadebe 2010, who describe hunting to be a major source of animal protein to the rural communities in Nigeria, and that it constitute a major threat to forest fauna with the incessant fires set by the poachers so as to drive out and chase the wildlife for catches.

Table 3: Sources of Energy

S/N	Energy Source	Percentage%
1	Kerosene	5.00
2	Fire wood	78.3
3	LNGP	4.2
4	Charcoal	12.5
5	Pods Leaves Residues	-
6	Wasteland resources	-
7	Private Forest	-

Table 4: Average Cost of hunting Catches by Household

S/N	Annual cost of Catches (N) I USD= 190N	Percentage%
1	1-1000	2.5
2	1001-2000	20
3	2001-3000	20.8
4	3001-4000	14.2
5	Above 4000	13.3

4.6 Fire incidence

Fire incidence was highly witness by inhabitants of Jima-jimi, Tunnigara, Bagida and Yartagimba villages probably due to the proximity of this villages to the forest reserve. It was lest observed at Masallaci, Manu, Wassaniya and Dayeji due to the fact that the

inhabitants were pre-occupied by farming than poaching activities as shown in their secondary occupational charts (Table 5). The chi-square(X^2) value of fire incidence was 68.95 which means that $P = > 0.001$, and this shows a significant difference in the number of forest fire incidence in the study area. Badejo 1994, Isichieet. Al. 1995 and Bolaji-Olutunji and Osadebe 2010 reported that uncontrolled bush burning had contributed greatly in forest degradation. They also ascertain that illegal poaching could be the primary reason of forest fires.

4.7 Possible Causes of Forest Fire

Natural disasters Poaching and carelessness are the main reason for forest fire out breaks in the forest reserve. Masallaci and Dayeji did not agree that natural causes are the main reason for forest fire outbreaks, but responses from all other villages has indicated that natural disasters contributes a lot to the fire incident in the forest. The inhabitants of Kaurawal, Wassaniya, Manu, and Masallaci did not agree with poaching to be a main cause of forest fires, as against the responses of all other villages residing close to the forest reserve. While Dayeji and Kaurawal did not agree that fire outbreaks in the forest reserve was as a results of carelessness which contradicts the responses of all the rest of the inhabitants of the surrounding villages that agrees with it to a varying degrees (Table 6). The chi-square (X^2) value is was 56.74, this shows that $P = > 0.001$ which demonstrates that there is a significant difference on the causes of fire incidence in the study area. Bolaji-Olutunji and Osadebe 2010 reported that illegal poaching is the major sources of uncontrolled forest fires. Badejo (1994) was of the view that even though natural

causes such as thunderstorm and lightening can be a source of forest fires illegal poaching play a significant role in bush burning, this also agreed upon and reported by Isichie et. Al. 1995.

Table 5: Fire Incidence was Witness by Villages

S/N	Villages	One %	Two %	Three %	Four %	Not Witness %
1	Bagida	10	30	0	30	30
2	Dayeji	30	10	0	0	60
3	Ginjo	40	40	0	10	10
4	Jima-jimi	30	60	0	10	0
5	Kaurawal	0	10	0	0	90
6	Manu	20	20	0	0	60
7	Masallaci	10	0	0	0	90
8	Mulawa	10	30	10	10	40
9	Rafin-kubu	10	30	0	10	50
10	Tunnigara	40	40	0	0	20
11	Wassaniya	0	20	10	0	70
12	Yartagimba	30	40	0	0	30

Table 6: Possible Causes of Forest Fire

S/N	Villages	Natural %	Poaching %	Carelessness %	Not Available %
1	Bagida	20	10	40	30
2	Dayeji	0	40	0	60
3	Ginjo	10	40	40	10
4	Jima-jimi	20	50	30	0
5	Kaurawal	100	0	0	90
6	Manu	30	0	10	60

7	Masallaci	0	0	1	90
8	Mulawa	20	20	10	50
9	Rafin-kubu	10	20	20	50
10	Tunnigar a	20	10	20	20
11	Wassaniya a	10	0	20	70
12	Yartagimba	10	40	20	30

4.8 Rescue Operations in Fire out breaks

Possible causes of fire in the forest had been attributed to natural disasters 13.3%, poaching activities responsible for 21.7%, carelessness of the inhabitants surrounding the forest area 18.3%. Rescue operations were 53.3% by communal efforts, 46.7% by the State Fire Service Department (Table 7). The chi-square (X²) value for rescue operations on fire incidence in the study area was 38.04 meaning that P => 0.001 and that there was a significant difference on the way fire incidence is being confronted in the study area.

4.9 Forest Exploitation by Secondary occupations

Secondary occupations by the villagers are other means of forest exploitation, they includes the sales of non-timber forest products as in the raffia palms used for local mats, practiced at Ginjo at Wassaniya villages. Cattle rearing is practiced in all the villages but more prominent at Bagida, Dayeji, GinjoKaurawal and Yartagimba. Carving of simple farm implements practiced by inhabitants at Bagida, Dayeji, Ginjo and

Jima-jimi. Thatching (roofing) of the local houses practiced in all the villages but professionalised by villagers at Bagida, Dayeji, Manu, MassalaciMulawa, Rafinkubu and Tunnigara. Black smith at Bagda, Ginjo, Kaurawal, Masallaci Mullawa and Rafinkubu.

The results indicated that the Chi-square of association has indicated significant difference between the different villages and their secondary occupations. Chi-Square (X^2) value = 177.26, degree of freedom (df) = 88 and P value < 0.001 (Table 8). This indicates a significant difference on the ways by which forest is exploited in the study area. Cavendish(2001) reported that forest are exploited not only for local medicines but for orthodox pharmaceutical production of modern medicines. Chomitz and Kumari(1996) reported forest activities on food and fruits which when unchecked contributed to degradation of forest

Table 7: Rescue Operations in Fire out breaks

S/ N	Nu mbe r of F/B	Perce ntage	Causes	Perce ntage	Rescu e	Perce ntage
1	One	19.2	Natural	13.3	Communal	53.3
2	Twice	27.5	Poaching	21.7	State	46.7
3	Thrice	1.7	Carelessness	18.3		
4	Four times	5.8				
5	None	45.8				

Table 8: Forest Exploitation by Secondary Occupations

S/ N	Villages	Sales of NTFP %	Cattle rearing %	Carving %	Thatching %	Blacksmith %
1	Bagida	0	10	10	20	20
2	Dayeji	0	10	20	10	0
3	Ginjo	30	20	10	0	60
4	Jima-jimi	0	0	20	0	0
5	Kaurawa	0	20	0	0	20
6	Manu	0	0	0	20	0
7	Masallaci	0	0	0	10	20
8	Mulawa	0	0	0	10	40
9	Rafinkubu	0	0	0	20	20
10	Tunnigara	0	0	0	0	0
11	Wassaniya	10	0	0	0	0
12	'Yartagimba	0	10	0	0	0

4.10 Other Means of Forest Exploitation

These includes exploitation of forest and forest products for medicinal purposes which amounts to 21.6%, tannings 16.7 Gums and resins 9.2% (Table 9).

4.11 Dependency on Forest and Forest Products

The results has indicated that all villages are dependent on the forest and forest products, but Bagida, Rafinkubu and Wassaniya are more dependent with 100% to be followed by villages at Masallaci, Mulawa, Ginjo and Tunnigara (Table 10).

The chi-square (χ^2) value for dependency on forest and forest products was 43.56, this shows that $P > 0.001$ and that there is a significant difference on forest dependency by the different village communities on the study area.

Table 9: Other means of forest exploitation

S/N	Means of Forest Exploitation	Percentage%
1	Food and fruits	4.2
2	Medicinal purposes	21.6
3	Tannings	16.7
4	Gums and resins	9.2

Table 10: Dependency on Forest and Forest Products

S/N	Villages	Dependency %	Not Dependence %	N/A
1	Bagida	100	0	0
2	Dayeji	100	0	0
3	Ginjo	80	20	0
4	Jima-jimi	70	30	0
5	Kaurawal	60	10	30
6	Manu	80	10	10
7	Masallaci	90	10	0
8	Mulawa	90	10	0
9	Rafin-kubu	100	0	0
10	Tunnigara	80	20	0
11	Wassaniya	100	0	0
12	Yartagimba	60	40	0

5. CONCLUSIONS

It was revealed that anthropological interference has played a major role in changing the floristic composition of Wassaniya forest reserve. The fact

that most of the inhabitants surrounding the study area are peasant farmers and artisans leaving near poverty level indicates that their primary and secondary occupations are dependent on forest and forestry products. The farming system employed, as well as their grazing activities, their other activities like black smith, thatching, fruits and herbal medicines, carving of simple farm tools, gums and tannings are all products exploited from forest source. Illegal poaching as well as farming are the primary causes of indiscriminate bush burning.

Farming also leads to complete clear-felling of the short available trees before setting them on fire for a new farm to be established or an old one to be extended. All these activities are contributing to the reduction of the floristic composition which directly leads to the forest degradation. Since the people has to depend on the forest products, there is no way they can be completely prevented from having access to the forest. The most important thing then is to introduce them to sustainable forest management system whereby the future of the forest products as well as that of the coming generations will be enhanced. Participatory rural appraisal is an important method in forest inventory which can yield to a lot of interesting findings that can be fully utilised.

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