



RESEARCH PAPER

OPEN ACCESS

The impact of socio-economic activities of rural dwellers on forest resources in Aniocha North Local Government Area of Delta State, Nigeria

Dickens E. Dolor^{*1}, Oghenekevwe A. Ohwo¹, Kesiena T. Ogeh¹, Laura O. Okonji²

¹*Department of Forestry and Wildlife, Delta State University, Abraka, Delta State, Nigeria*

²*Delta State Ministry of Agriculture and Natural Resources, Asaba, Delta State, Nigeria*

Key words: Forest reserves, Biodiversity conservation, Deforestation, Forest dwellers, Covid-19 pandemic

<http://dx.doi.org/10.12692/ijb/22.5.137-148>

Article published on May 18, 2023

Abstract

The socio-economic profile and activities of forest occupants on wise-use of forest resources in Idumuje-Ugboko Forest Reserve (IUFR) in Aniocha North Local Government Area of Delta State was examined. Sampling techniques (purposive, and multistage) were used to acquire information from 120 respondents with the aid of structured questionnaire and oral interview. Data generated were analyzed using frequency count, percentages, mean score and multiple regressions techniques. The result obtained showed that most respondents were males, had mean household size of 7 persons and were married. The result revealed respondents were engaged in multiple activities with farming being the most dominant. The respondents agreed that logging and grazing negatively impacted forest conservation in IUFR. The study also revealed that bribe/threat and poaching were recorded as the most serious clash in forest conservation during the pandemic era with mean scores of 3.24 and 3.32 respectively. It is recommended that multiple use forest management be adopted by forest dwellers of IUFR to allow for sustainable socio-economic activities and minimize conflicts in forest resources management.

* **Corresponding Author:** Dickens E. Dolor ✉ dedolor@delsu.edu.ng

Introduction

For the most vulnerable members of society, the forests acts as safety nets, providing food, sustenance, employment opportunities and income in times of scarcity, increasing resilience to shocks and recovery such as the current COVID-19 pandemic (FAO, IFAD, UNICEF, WFP and WHO 2021; World Bank 2021). Consequent upon the decline in forest resources and wildlife population, African countries have adopted the development of protected areas for biodiversity conservation, especially since 1970, encompassing 3.06 million km² of terrestrial and marine habitats (Down To Earth 2019). According to the Darwin Initiative for Survival of Species (2004), the African continent faces the greatest challenges in the sustainable management of protected areas despite, having a greater proportion of the world's conservation areas.

In the developing countries, the management of "protected area" is confronted with deforestation in the face of mounting pressures and problems from adjacent communities especially due to increasing population and drastic economic meltdown (Lambi *et al.*, 2012). Such pressure on forest resource from population growth often assume the form of a predictable linear increase in the demands which people seek for and resources so as to meet their legitimate livelihood needs and increased material aspirations.

According to FAO (2021), clear links between deforestation, forest degradation, climate change, emergence and surge of infectious diseases are emerging from research, with communities located near disturbed forests particularly at risk of exposure to these diseases. FAO (2021), stated further that experience with COVID-19 revealed that resilient communities (with secure land and forest rights, clear forest governance abilities and having incomes from forest products) were able to invest in health care, livelihoods and employment generation activities from forest resources during the pandemic even in total absence of government support.

As in other tropical region of the world, in Nigeria, most protected areas are in the savannah ecosystem.

These conserved forest protected areas (reserves) are set aside for the protection and propagation of wild vegetation and wild animal for preservation of objects, aesthetic geo prehistoric, archeological artifacts and other science interest for the benefits, advantages and enjoyment to mankind (Wahab *et al.*, 2014). It has been estimated that 20% of forest area has reduced due to the socio-economic activities of rural occupants mentioned above; further reports have indicated that many plant and animal species are currently endangered (IUCN 2013). Many communities who share a common boundary or located close to the buffer zone of some forest reserves tend to encroach into the forest natural resources for livelihood, wild plants and animals for food, for clothing, for fuel, medicine and shelter. This further reveals the close linkage of economy, identity, cultural and spiritual values, as well as the social organization of indigenous peoples to biological diversity and natural ecosystem (Langat *et al.*, 2016).

The urge for sustainable environments provides critical need for studies involving impact of forest occupants' activities on forest vegetation (Ogunloye *et al.*, 2004). Opportunities to be derived from such studies include prediction of stability and/changes to be expected as caused by different farming types of the different zones, possible ecological effects of changes and form and type of vegetation occurring in different zones. Adequate and reliable information is necessary for informed decision making in the Forestry sector for sustainable environment.

The Idumuje-Ugboko Forest Reserve (IUFRR), located in Aniocha North Local Government of Delta State, like other protected areas is confronted with ever increasing pressure on the land and resources. With the aim of increasing agricultural production, farmers make use of slash-and-burn techniques to remove the original vegetation, burning hundreds to thousands of hectares, and the consequence has been the excessive exploitation and depletion of natural resources. Although the conservation or protection of forest and wildlife resources is a laudable effort, the local populations, mostly landless farmers, a special socio-economic group whose members are amongst the

poorest in the country generally views these protected areas as government-imposed restrictions on their traditional rights, denial of their basic livelihoods and survival especially as the protected areas which are forests and wildlife sanctuaries were created without providing any alternatives whatsoever for the local or indigenous populations within and around the protected areas. The forest reservation, an administrative creation has become an unresolved problem which only gets bigger as the years go by (Lambi *et al.*, 2012).

Forest occupants heightened socio-economic activities in IUFR of Delta State has been a major threat and is an ongoing phenomenon leading to degradation of natural resources, thereby resulting to biodiversity loss. The donor communities (Idumuje-Ugboko and Igbodo) of the government forest reserve are located close to forest reserves and their socio-economic activities and other neighboring communities like Anioma, Idumuje-unor, Idumuogo, Issele-uku, Obomkpa, Obior, Onicha-olona, Isa-ogwashi, Ogbenei camp, Onicha-ugbo, Onicha-uku, Ubulubu, Ukwu-nzu, Awohimi camp and Aniofu camp is under investigation to check the level of encroachment taking place in the reserve and possible implication of their socio-economic activities on the reserve management. The Federal Government has, over the years, attempted to generate baseline data on the state of our forests including their use. This study provided data for a better understanding of forest resources condition, level of environmental degradation, and degree of forest depletion.

This study has addressed the following objectives, examine the:

- i. socio-economic characteristics of rural occupant in IUFR
- ii. socio-economic activities performed in IUFR of Delta State.
- iii. effect of rural occupant socio-economic activities on forest conservation
- iv. elements of access to forest
- v. forest conservation confrontations from the socio-economic activities in IUFR.

The following Hypothesis was tested:

Ho: Socio-economic actions of forest occupants do not significantly influence forest resources conservation in IUFR.

Materials and methods

Study area

The IUFR, established in 1962 under the then Bendel State, cover a landmass of approximately 135 square kilometers or 2582 ha with coordinate 6°22'0" N and 6°24'0"E. The reserve is located in part of Aniocha North, Ika Northeast in Delta State and part of Edo State. It is encompassed by Idumuje-Ugboko, Idumuje-Unor and Aniofu in Aniocha North and Igbodo, Ekwuoma, Mbiriin in Ika Northeast Local Government Area (LGA) and Ewohimi and Ekponin communities in Edo State. It is therefore an inter-state Forest Reserve. However this study is restricted to the Delta State area of IUFR.

It is a rainforest reserve with an annual temperature of 25.9°C and an average precipitation of 1792mm. The trees species found in the forest area include; *Tectona grandis* (Teak), *Miliaceae excelsa* (Iroko), *Gmelina arborea*, *Entandrophragma cylindrica* (Sapelewood), *Khaya ivorensis* (Mahogany), *Triplochiton scleroxylon* (Obeche), *Terminalia superba* (Afara), *Eleais guineensis* (Oil palm), *Magnifera indica* (Mango), *Bambusa vulgaris* (Bamboo), *Hevea brasiliensis* (Rubber) with two rivers namely Iyi-Odo and Iyi Tom-tom and an abundance of wildlife. The IUFR has an area of 135 km² and a population of approximately 30,000 at the 2006 census.

Sampling procedure and sampling size

The study employs a survey and multistage procedure. A purposively sampling was used to pick two LGA (Aniocha North and Ika Northeast Area) housing the reserve for the study (Stage 1). Two communities were randomly selected from each LGA making an aggregate of four communities from the six communities in the study area (Stage 2). In stage 3, 30 households were chosen randomly from each of the 4 communities making aggregate of 120 respondents. The stages and sample selection are shown in Table 1.

Table 1. Sampling techniques and size selection for the study.

SL	Stage 1	Stage 2	Stage 3
	L.G.As	Communities	Households
1	Aniocha North	Idumuje-Ugboko	30
		Idumuje-Unor	30
2	Ika North	Igbodo	30
		Ekwuoma	30
Total			120

Data Collection

The primary data for this study were collected with the aid of interviewer administered questionnaire on 120 selected households. Data on the socio-economic characteristics of forest dweller (age, sex, marital status, educational status, household size, access to: forest, logging, fuel wood collection, NTFP collection, forest recreation) and socio-economic actions (farming, logging, livestock production, fuel wood extraction, NTFP collection, deforestation, fishing, trading, grazing, hunting) were collected.

Data from published reference books, journals, scholarly articles, and internet in other to have a broader knowledge of the study were secondary data sourced.

Data Analysis

Objectives i, ii and v were examined by descriptive statistics, objective iii was realized using a four type Likert scale. The expressed hypothesis was achieved using logistic regression.

Model Specification

The logistic model adopted is given as;

$$Z(1/0) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \epsilon \dots(1)$$

The parameters are as explained in Dolor *et al.* (2022).

Chi-square statistics: The chi-square examined the questions based on the four point Likert scale. It is given as

$$\chi^2 = \sum \frac{O_i - E_i}{E_i} \dots (2)$$

Where:

C = Degree of freedom

O = Observe value

E = Expected value

Below are the responses value of the Likert scale:

1 = Strongly agree

2 = Agree

3 = Disagree

4 = Strongly disagree

A cut-off point of 2.5 was used following Dolor *et al.* (2020). Serious constraint exists if mean is greater than the cut-off point and vice versa.

Results and discussion

Results

The frequency distribution of respondents according to socioeconomic characteristics is shown in Table 2. The result revealed that most (34.2%) forest dwellers fell within the productive age range of 41-50years with an estimated average age of 46 years.

Both sexes (men and women) were actively involved in the various socioeconomic activities in IUFR with men having about 60% involvement. Most (70.8%) forest occupants were married.

A large proportion of respondents (58.3%) fell within the 5-8 person household size with an average of seven persons per household. Religious status of forest dwellers (Table 2) revealed that majority (85.8%) were Christians, 4.2% belong to the Islamic religion while 10.0% belong to traditional religion.

Education wise, about 70.8% of respondents had formal education at primary (20.8%), secondary (15.8%) and tertiary (34.2%). Majority (35.0%) of the sampled population were civil servants, farmers (33.3%), trader (15.8%), while 13.4% were business men and women. The distribution of respondents by experience in forest activities as shown in Table 2 indicates that there was an influx of new entrants into IUFR in recent times.

This is represented by about 59.2% who had from 0-10years of experience as the majority. This was followed by about 20.8% with experience of 11-20years, 10.8% had experience of 21-30years, 2.5% had experience of 41-50years with an average of 14 years in forest activities.

Table 2. Demographic Characteristics of Respondents.

Variable	Frequency	Percentage	Mean/mode	Variable	Frequency	Percentage	Mean/mode
Age				Occupation			
20-30 years	10	8.3		Farming	40	33.3	
31-40 years	33	27.5		Trading	19	15.8	
41-50 years	41	34.2		Civil servant	42	35	
51-60 years	23	19.2		Business man/woman	16	13.4	
61-70 years	12	10		Others	3	2.5	
71-80 years	1	0.8		Total	120	100	Civil servant
Total	120	100	46	Experience in forest activities			
Sex				0-10 years	71	59.2	
Male	72	60		11-20 years	25	20.8	
Female	48	40		21-30 years	13	10.8	
Total	120	100	Male	31-40 years	8	6.7	
Marital status				41-50 years	3	2.5	
Single	19	15.8		Total	120	100	14 years
Married	85	70.8		Distance from forest			
Widow	8	6.7		0-5km	28	23.3	
Divorced	6	5		6-10km	57	47.5	
Separated	2	1.7		11-15km	34	28.3	
Total	120	100	Married	above 16km	1	0.8	
Household size				Total	120	100	8.6km
1-4 persons	24	20		Visits per annum			
5-8 persons	70	58.3		0-100 times	96	80	
9-12 persons	25	20.8		101-200 times	5	4.2	
Above 13 persons	1	0.8		201-300 times	6	5	
Total	120	100	7 persons	Above 300 times	13	10.8	
Religion				Total	120	100	70 times
Christianity	103	85.8		Earnings from forest activities			
Islam	5	4.2		₦0-₦500,000	73	60.8	
Traditional	12	10		₦501,000-₦1,000,000	32	26.7	
Total	120	100	Christianity	₦1,001,000-₦1,500,000	0	0	
Educational level				₦1,501,000-₦2,000,000	8	6.7	
No formal education	35	29.2		₦2,001,000-₦2,500,000	2	1.7	
Primary	25	20.8		₦2,501,000-₦3,000,000	2	1.7	
Secondary	19	15.8		Above ₦3,001,000	3	2.5	
Tertiary	41	34.2		Total	120	100	₦652,086
Total	120	100	Tertiary				

The distribution according to number of visits to the forest by forest dwellers shows that majority (80.0%) of forest occupants visited the reserve up to 100 times per annum, 4.2% visited the forest 101-200 times per annum while 10.8% visited the forest more than 300 times per annum. About 60.8% of forest occupants earned less than ₦500,000 per annum, 26.7% earned ₦501,000.00 to ₦1,000,000.00 per annum, 6.7% earned income within the range of ₦1,501,000.00 to ₦2,000,000 per annum while 2.5% earned above ₦3,000,000

per annum. The result also revealed that the average annual income of forest occupants was ₦652,086. Socio-economic activities of IUFR occupant (Table 3) shows that farming (97.5%), logging (70.0%), trading (63.3%) and hunting (51.7%) were prevalent in IUFR area.

Socio-economic activities on individual involvement level of forest occupants in IUFR (Table 4) reveals that 81.7% of forest occupants indicated farming as the major socioeconomic activity on individual

involvement level. About 41.7% of respondents indicated that trading in NTFPs and logging (4.2%) during the lockdown period of COVID 19 was their main socioeconomic activity on individual involvement level.

Table 3. Socioeconomic Activities Practiced By the Forest Dwellers.

Variables	Frequency	Percentage (%)
Logging	84	70.0
Farming	117	97.5
Livestock production	58	48.3
Fuel-Wood Extraction	46	38.3
NTFP Collection	34	28.3
Deforestation	36	30.0
Fishing	30	25.0
Trading	76	63.3
Grazing	23	19.2
Hunting	62	51.7
Total	Multiple response	Multiple response

The information in Table 5 shows the effect of socioeconomic activities on IUFRR conservation. The respondents agreed that Farming ($\bar{x} = 2.83$), Livestock production ($\bar{x} = 2.78$), Fuel-Wood Extraction ($\bar{x} = 2.81$), NTFP Collection ($\bar{x} = 2.57$), Fishing ($\bar{x} = 2.6$), Trading ($\bar{x} = 2.76$) and Hunting ($\bar{x} = 2.86$) positively influenced forest conservation according in IUFRR with a rejection of the null hypothesis. The result from Table 5 further show logging ($\bar{x} = 2.36$), deforestation ($\bar{x} = 2.31$) and grazing ($\bar{x} = 2.46$) negatively influenced forest conservation in IUFRR. The various confrontation faced in IUFRR conservation reveals that poaching (\bar{x}

= 3.32), using bribe and threat ($\bar{x} = 3.24$), encroachment ($\bar{x} = 3.19$), timber smuggling ($\bar{x} = 3.00$), forest land conversion ($\bar{x} = 3.00$), illegal allotment of forest land ($\bar{x} = 2.98$), operation without license ($\bar{x} = 2.95$), theft ($\bar{x} = 2.93$), arson ($\bar{x} = 2.90$) were of serious concern (Table 6).

The relationship between the forest dwellers access to forest and their socioeconomic characteristics is presented in Table 7. An R^2 value of 0.37 shows that only 37.0% of forest occupants access to forest was explained by socioeconomic elements. However three variables namely age, gender, and household size had significant relationship with access to forest by forest dwellers. Age and gender have negative relationship with accessibility to forest by forest occupants ($z = -2.01$, $P < 0.05$; and -2.73 , $P < 0.01$). Household size had a positive and significant relationship with forest dwellers access to forest ($z = 2.49$, $P < 0.05$).

Table 4. Activities on Individual Involvement Level.

Variables	Frequency	Percent
Logging	5	4.2
Farming	98	81.7
Livestock production	26	21.7
Fuel-Wood Extraction	12	10
NTFP Collection	14	11.7
Deforestation	5	4.2
Fishing	10	8.3
Trading	50	41.7
Grazing	11	9.2
Hunting	20	16.7
Total	Multiple response	Multiple response

Table 5. Effect of Socio-economic Activities on Forest Conservation.

Variables	Very Negative (1)	Negative (2)	Positive (3)	Very Positive (4)	Score	Mean	Ranking
Hunting	13	23	52	32	343	2.86	1 st
Farming	8	33	51	28	339	2.83	2 nd
Fuel-Wood Extraction	15	13	72	20	337	2.81	3 rd
Livestock production	12	26	58	24	334	2.78	4 th
Trading	14	31	45	30	331	2.76	5 th
Fishing	17	24	69	10	312	2.6	6 th
NTFP Collection	13	42	49	16	308	2.57	7 th
Grazing	13	53	40	14	295	2.46	8 th
Logging	21	55	24	20	283	2.36	9 th
Deforestation	39	33	20	28	277	2.31	10 th

Cut-off mean = 2.50, (≥ 2.50 = positive; < 2.50 = negative)

Table 6. Forest Conservation Confrontations.

Variables	Not Very Serious (1)	Not Serious (2)	Serious (3)	Very Serious (4)	Score	Mean	Ranking
Poaching	3	12	49	56	398	3.32	1 st
Using Bribe, Threat Etc	1	16	56	47	389	3.24	2 nd
Encroachment	3	12	64	41	383	3.19	3 rd
Timber Smuggling	10	22	47	41	359	3.00	4 th
Forest Land To Conversion	7	21	57	35	360	3.00	4 th
Illegal Allotment of Forest Land	9	22	52	37	357	2.98	5 th
SIL	11	24	43	42	356	2.97	6 th
Operation Without License	6	26	56	32	354	2.95	7 th
Theft	9	20	61	30	352	2.93	8 th
Arson	7	31	49	33	348	2.90	9 th

Cut-off mean = 2.50, (≥ 2.50 = serious; < 2.50 = not serious)

Table 7. Elements of Accessibility to Forest.

Variables	Coef.	Std. Err.	Z-ratio	Sig. (p value)
Constant	-0.359	2.181	-0.16	0.869
Age	-0.764	0.380	-2.01	0.044**
Gender	-1.830	0.671	-2.73	0.006***
Religion	0.097	0.393	0.25	0.806
Educational level	-0.034	0.234	-0.14	0.885
Household size	0.294	0.118	2.49	0.013**
Number of observations	120			
Logistic Regression Chi square	52.89			
R ²	0.365			
Prob>Chi ²	0.000			

Dependent variable: access to forest,

R² = 0.365, ** = Significant at 5% level, *** = significant at 0.01

The following strategies of conflict resolution were provided by the IUFRR forest dwellers as means of avoiding conflict.

- i. Maintaining/obeying the laid down rules and regulations guiding the forest area.
- ii. Individuals/groups should obtain permission from the government or forest guard before engaging in any forest activities.
- iii. Discourage the act of arson i.e setting fire on the farm/forest in order to cause damage to pests.
- iv. Sensitization of stakeholders, it is incumbent to manage effectively our natural resources, whenever this truth is made to the managers, we will be in a position to know what is expected of us as a good citizen.
- v. To resolve issues of conflict, all stakeholders should be brought together in round table and conflicting issues discussed.
- vi. Land tenure system should be encouraged to avoid these conflicts.
- vii. To carry out activities which do not distort the reserve like cutting of trees, arson.

Discussion

The increased percentage of young adults in IUFRR is similar to Ohwo *et al.* (2023) result with the Okomu National Park support zone communities in Edo State, Nigeria. This means that forest dwellers are in their prime age and are actively engaged in forest exploitation activities. Marla (2011) observed that the younger the household member, the more active their participation in forest resources exploitation.

The high number of males might be attributed to hard task (such as, felling of trees, clearing of thick vegetations, setting of traps for wild animals) (Nair and Rutt 2009), risk of forest activities as well as their role in providing for the homes as the head of the house (Derks *et al.*, 2020). The high number of married people engaged in forest activities is attributed to the responsibility of meeting the basic needs of their household (Paul, 2020). Scherr *et al.* (2004) discovered that most forest occupants in southern Nigeria had an average family size of seven people. Ntege-Nanyeeya *et al.* (1997) observed that household

size was important in providing rural farmers with labour required for agricultural activities.

Wahab *et al.* (2009) observed that greater percentage of forest occupants in Osun State had formal education. Engagement of respondents in various activities did not prevent them from carrying out forest activities despite other sources of income (ILO 2020). The increased number of persons into the forest corroborates reports of Derks *et al.* (2020) in Germany forest estate. The infrequent visit to IUFRR by high proportion of forest occupants shows the seasonality in forest resources availability and exploitation. Also, most visitors were farmers who visit during planting, weeding and harvesting phase of farming. This finding supports that of Adebosin *et al.* (2013) and The United Nations (2020). The average annual earning maybe sufficient to maintain their household needs as the household size is relatively small. Moreover they also have additional income as civil servant and from other businesses. This supports the observation of the committee of Forestry (FAO), (2020).

The various socioeconomic activities of respondents is in accordance with the findings of Tranquilli *et al.* (2014); Adejumo (2017); Ohwo and Ogoha (2017); Escobar (2020); Ohwo *et al.* (2023); who stated that most forest dwellers engaged in farming activities in order to provide food for their households, logging to earn income and hunting to meet the protein need of their household respectively as an immediate response to carter for their livelihood during the pandemic era.

The high cost and inaccessibility to food during the lockdown period in Nigeria stimulated the massive involvement of forest occupants in subsistence farming within the reserve. This was further heightened by the total absence of monitoring and protection of the reserves by Forest guards. This observation correlates the reports of (FAO, 2020b, Ohwo and Nzekwe-Ebonwu 2021). The intense trading in NTFPs and logging accounts for more exploitive relationship of forest occupants and protected areas as their economic activities during the

lock down as COVID 19 response measures centered on forest resources globally as reported by Hockings *et al.* (2020) and Ohwo *et al.* (2023).

The positive influence of social economic variables in forest conservation in IUFRR shows the several connections between forest and rural dwellers wellbeing. Globally, farming and food security are tied to forests and trees providing various plant and animal based products (meat, medicinal herbs, mushrooms and fish) (FAO 2020c). Bush meat and fish are the basic sources of protein, fat and micronutrients (Coad *et al.*, 2018). Over 2.4 billion people in remote and developed towns utilize fuelwood or charcoal for cooking (FAO 2014), with an estimate of 60.0% rural Africans depending on fuelwood for energy. Trade in wood and non-wood forest products are the main sources of rural income, providing money to buy. About 1.2% of the global workforce is involved in commercial sale of fuelwood and charcoal to urban cities (FAO 2017). In times of pandemic such as the recent COVID-19 events, forest income for rural households served as the main income source (FAO 2020c). Though the null hypothesis was rejected, it shows that there is an element of control in the harvest of these resources in IUFRR in Delta State. This observation reflects the position of the committee on forestry report as drafted by FAO (2020d). The Committee recognized the importance of forests and sustainable forest management in supporting the socio-economic and overall recovery during and from the COVID-19 pandemic. The negative influence of logging, deforestation and grazing on forest conservation in IUFRR implies that increase in such leads to reduction in conservation of forest resources as observed by Sunderlin (2005) and Tranquilli *et al.* (2014) that logging and grazing negatively affects forest estate conservation in developing countries.

The various confrontations and their intensity were high especially as the alternative means of survival of forest occupants were not accessible during the response measure of stay at home order in Nigeria. This affirms reports of Lambi *et al.* (2012), Escobar (2020) and mc Neely (2021) who revealed that

without alternative source of livelihood, forest occupants engaged in various conflict generating activities. These conflicts underpin the conservation objective IUFR in Delta State. Agbogidi *et al.* (2007) traced the persistence of conflicts identified above to lack of commitment to goals of partnership between stakeholders in the use and management of forest resources in Delta State.

They stated further that recognizing the long term rights of local forest communities, adequate funding, evolving effective conflict management strategies, research and capacity building among forest dwellers is essential to striking a balance in the face of continuous expansion of human enterprise, shrinking forest resources and diminishing environmental service. Ohwo *et al.* (2023) observed similar reports in Okomu National Park Edo State.

The negative relationship in element of accessibility to forest implies that increase in the age of forest dwellers and increased number of female folks in IUFR leads to a decrease in forest dwellers access to forest as borne by the negative sign of the coefficients. The negative relationship of age in respondents' accessibility to forest corroborates the report of Marla (1999); Suleiman *et al.* (2017) and Unongo *et al.* (2019). The authors reported that the older the household member, the more difficult it is for them to get into the forest. Mohammed, Osei-Fosu and Yusif (2017) and Suleiman *et al.* (2017) observed that male participates more in forest activities when compared to the female folks reason being the risk and tedious nature of forest related work.

The positive sign of the coefficient implies that an increase in household size will lead to an increase in forest dwellers access to forest. Inoni (2009), Research and Kapinga (2015), Suleiman *et al.* (2017), Unongo *et al.* (2019) Mohammed *et al.* (2017) argued that most rural households in developing countries depend on forest for their livelihood. Increased household size provides enough labour for various agricultural and forest exploitation activities and forest resources utilizations which led to deforestation.

The identified method of conflict resolution showed that stakeholder involvement is critical in the management of protected areas. The IUFR was not an exception. The report of Ivana *et al.* (2008) supports this observation.

Conclusion and recommendation

The dependence of forest dweller on resources from IUFR was evident in Delta State, Nigeria. However socioeconomic activities of logging, deforestation and grazing negatively influenced forest conservation. The various sources of conflicts (theft, encroachment, arson, timber smuggling, operating without license, forest land conversion, illegal allotment of forest land, using bribe, threat and poaching) were perceived as serious issues affecting the objective of conservation in IUFR. The access to IUFR was influenced positively by household size and negatively by age and gender. The recognition of the long term rights of the local communities to access forest resources and appropriate sensitization of forest occupants to principles of sustainable forest resources utilization, and the involvement of able bodied and energetic youths will foster successful wise use of the forest estate is therefore recommended by this study. This is especially important considering the positive value of the forest during lockdown in the pandemic era.

Reference

- Adebosin WG, Adebayo AA, Ashagidigbi WM, Ayanwale AA.** 2013. Determinants of Farmers' Demand for Micro Finance: A Case Study of Rural Communities in Nigeria. *Journal of Economics and Sustainable Development* **4(5)**, 22-28.
- Adejumo AA.** 2017. Impacts of Forest Plantation Management on Forest Dwellers in South-western Nigeria. *Journal of Forestry Research and Management* **14(1)**, 1-22. www.frin.gov.ng/frin1/journals.html Accessed 08 Jul. 2022
- Agbogidi OM, Ofuoku AU, Dolor DE.** 2007. Role of community forestry in sustainable forest management and development: a review. *ASSET* **7(1)**, 44-55.

Coad L, Fa JE, Abernethy K, Van VN, Santamaria C, Wilkie D, El-Bizri HR, Ingram DJ, Cawthorn D, Nasi R. 2018. Towards a Sustainable, Participatory and Inclusive Wild Meat Sector. Conference of the parties to the Convention on Biological Diversity, fourteenth meeting, Sharm El-Sheik, Egypt 17-29th November 2018. Item 20 of the provisional agenda, Accessed pp. 1-181. <https://www.cbd.int/doc/c/8ca9/8f95/d06a6f4d99339baebd13648a/cop-14-inf-07-en.pdf>

Darwin Initiative for the Survival of Species.

2004. Conservation Management Training and Capacity Building in Sub Saharan Africa. International Centre for Protected Landscapes and the Centre for Environment, Agriculture and Development. Project Reference Number 162-13-002. Annual Report pp. 1-12.

Derks J, Giessen L, Winkel G. 2020. COVID-19 induced visitor boom reveals the importance of forests as critical infrastructure. In *Forest Policy and Economics* **118**, 102253 <http://dx.doi.org/10.1016/j.forpol.2020.102253>

Dolor DE, Ohwo OA, Chukwumaeze C, Egunatum EA. 2022. The impact of socioeconomic variables of fringe forest dwellers on forest resources conservation on Egbema Forest Reserve in Imo State, Nigeria, *Journal of Biodiversity and Environmental Sciences (JBES)* **21(6)**, 1-10.

Down To Earth. 2019. More than half of forest wildlife declined since 1970: WWF. Forests. More than half of forest wildlife declined since 1970: WWF (downtoearth.org.in), newsletter published 14th August 2019 Accessed available at <https://www.downtoearth.org.in/news/forests/more-than-half-of-forest-wildlife-declined-since-1970-wwf-66164>

Escobar H. 2020. Deforestation in the Brazilian Amazon is still rising sharply. *Science (New York, N.Y.)* **369(6504)**, 613-614. <http://dx.doi.org/10.1126/science.369.6504.613> PMID: 32764049.

FAO. 2014. State of the World's Forests 2014, enhancing the socioeconomic benefits from forest Rome. [also available at <http://www.fao.org/3/a-i3710e.pdf>] Accessed 02 Jan. 2022 pp 1-133.

FAO. 2017. Sustainable woodfuel for food security. A smart choice: green, renewable and affordable. Working paper. Rome. pp 1-42

FAO. 2020a. Committee of Forestry twenty fifth session: UN decades: Family farming and ecosystem restoration: Building back better including in response to Covid **19**, 5-9 October, 2020 COFO, 2020/7.2 pp 1-9.

FAO. 2020b. Committee of Forestry twenty fifth session: State of the world's forest- key message, 5-9 October 2020, COFO/2020/4.1 pp 1-7.

FAO. 2020c. Committee of Forestry twenty fifth session: Transforming agriculture and food systems: Halting deforestation and promoting sustainable production and consumption of forest products, 5-9 October, 2020 COFO/2020/7.1 pp 1-5.

FAO. 2020d. Committee of Forestry twenty fifth session, FAO programme of work in Forestry under the reviewed strategic framework, 5-9 October, Italy, COFO/2020/REP 5, pp 1-9.

FAO, IFAD, UNICEF, WFP, WHO. 2021. The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. Rome, Italy FAO.

Hockings M, Dudley N, Elliott WA, Ferreira MN, Mackinnon K, Pasha MK, Phillips A, Stolton S, Woodley S, Appleton MR, Chassot O, Fitzsimons JA, Galliers C, Kroner RE, Goodrich JM, Hopkins J, Jackson W, Jonas HD, Long B, Mumba M, Parrish JD, Paxton M, Phua C, Plowright RK, Rao M, Redford KH, Robinson J, Rodríguez CM, Sandwith T, Spenceley A, Stevens CM, Tabor G, Troëng S, Willmore S, Yang A. 2020. Editorial Essay: COVID-19 and protected and conserved areas. *PARKS* **26**, 7-23.

- ILO.** 2020. Impact of COVID 19 on the forest sector. June 2020 (ILO Sectorial Brief). https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/briefingnote/wcms_749497.pdf Accessed 02 Jul. 2022 pp 1-7
- Inoni OE.** 2009. Effects of forest resources exploitation on the economic well-being of rural households in Delta State, Nigeria. *Agricultural Tropica et Subtropica* **42(1)**, 20-27.
- IUCN.** 2013. The International Union for Conservation of Nature red list of threatened species. <http://www.iucnredlist.org/photos/2013> . Accessed 15 Jan. 2020
- Ivana G, Vojislav M, Dragan N.** 2008. Conflict management in protected areas: The Lazar Canyon natural monument, Eastern Serbia, *The International Journal of Biodiversity Science and Management* **4(4)**, 219-229 <https://doi.org/10.3843/Biodiv.4.4:5>
- Lambi CM, Kimengsi JN, Kometa CG, Tata ES.** 2012. The Management and Challenges of Protected Areas and the Sustenance of Local Livelihoods in Cameroon, *Environment and Natural Resources Research* **2(3)**, 10-18 <http://dx.doi.org/10.5539/enrr>.
- Langat DK, Maranga EK, Aboud AA, Cheboiwo JK.** 2016. Role of forest resources to local livelihoods: the case of East Mau Forest Ecosystem, Kenya. *International Journal Forest Resources*, 10(1155/2016/4537354).
- Marla RE.** 1999. Social value of specialty products to rural communities. In: Josiah, Scott J., ed. *Proceedings of the North American Conference on Enterprise Development Through Agroforestry: Farming the Forest for Specialty Products*. Minneapolis, MN pp 25-32.
- McNeely JA.** 2021. The world after covid-19: early lessons nature and covid-19: The pandemic, the environment, and the way ahead, *Ambio* **50**, 767-781, <http://dx.doi.org/10.1007/s13280-020-01447-0>
- Mohammed J, Osei-Fosu AF, Yusif H.** 2017. Factors influencing households' participation in forest management in the Northern Region of Ghana. *Independent Journal of Management & Production (ijm&p)*, **8(4)**, 1324-1340 <http://dx.doi.org/10.14807/ijmp.v8i4.631>
- Nair CTS, Rutt RL.** 2009. Creating forestry jobs to boost the economy and build a green future. *Unasylva* **60(3)**, 3-10.
- Ntege-Nanyeenya M, Mugisa-Mutetikka M, Mwangi WN, Verkuijl H.** 1997. Assessment of factors Affecting Adoption of maize production Technologies in Iganga District, Addis Abba, Ethiopia. An Assessment of Factors Affecting Adoption of Maize Production Technologies in Iganga District, Uganda (cimmyt.org) Accessed 15 Jan. 2022, pp 1-36.
- Ogunlayo AJ, Adeola AO, Ojo LO, Aduradola AM.** 2004. Impact of farming activities on vegetation in Olokemeji Forest Reserve, Nigeria. *Global Nest: The International Journal* **6(2)**, 131-140.
- Ohwo OA, Nzekwe-Ebonwu NF.** 2021. Impacts of rural community on the forest estate in Ugbolu, Oshimili North Local Government Area, Delta State, Nigeria. *Journal of Forest* **8(1)**, 45-60 <http://dx.doi.org/10.18488/journal.101.2021.81.45.60>
- Ohwo OA, Ogoha E.** 2017. Contributions of sawn-wood trade to livelihood sustenance in Sapele Local Government Area of Delta State, Nigeria, *Journal of Agriculture and Food Environment* **4(1)**, 37-46.
- Ohwo OA, Dolor ED, Gbigbi TM, Ikpoza EA.** 2023. Adaptive strategy of countryside residents in Okomu National Park (ONP) support zone community of Edo State, Nigeria. *International Journal of Biosciences* **22(2)**, 239-247.
- Ologbon CE.** 2012. The Status and Tasks of Rural Women in Nigeria: A Case Study of Alagbaa Village, Oyo State, Nigeria **2(1)**, 45-153.

Paul A. 2020. Risk of hunger pandemic as coronavirus set to almost double acute hunger by end of 2020. World Food Programme Insight. Risk of hunger pandemic as coronavirus set to almost double acute hunger by end of 2020 | World Food Programme (<https://www.wfp.org/stories/risk-hunger-pandemic-coronavirus-set-almost-double-acute-hunger-end-2020>) Accessed 15 Jan. 2022

Research S, Kapinga A. 2021. Impacts Of Redd+ Activities To Rural Communities' Livelihoods: Evidence From Kondo Advancing Redd+ In Kolo Hills Forests Project In Tanzania. Afribary. Retrieved from <https://afribary.com/works/impacts-of-redd-activities-to-rural-communities-livelihoods-evidence-from-kondoa-advancing-redd-in-kolo-hills-forests-project-in-tanzania> Accessed 08 Jul. 2022 pp 1-118.

Scherr SJ, White A, Kaimowitz D. 2004. A new agenda for forest conservation and poverty reduction: Making market work for low income producers. Forest Trends. A new agenda for forest conservation and poverty alleviation: making markets work for low-income producers (sprep.org) Accessed 15 Jan. 2020 pp 1-174

Suleiman MS, Wasonga VO, Mbau JS, Suleiman A, Elhadi YA. 2017. Non-timber forest products and their contribution to households income around: Falgore Game Reserve in Kano, Nigeria. Ecological Processes **6(23)**, 1-14.

Sunderlin, WD. 2005. Livelihoods, Forests and Conservation in Developing Countries: An Overview, World Development **33(9)**, 1383-1402

Tranquilli S, Abedi-Lartey M, Abernethy K, Amsini F, Asamoah A, Balangtaa C, Blake S, Bouanga E, Breuer T, Brncic TM, Campbell G, Chancellor R, Chapman CA, Davenport TRB, Dunn A, Dupain J, Ekobo A, Eno-Nku M, Etoga G, Furuichi T, Gatti S, Ghiurghi A, Hashimoto C, Hart JA, Head J, Hega M, Herbinger I, Hicks TC, Holbech LH, Huijbregts B, Kühl HS, Imong I, Yeno SL, Linder J, Marshall P, Lero PM, Morgan D, Mubalama L, N'Goran PK, Nicholas A, Nixon S, Normand E, Nziguyimpa L, Nzoo-Dongmo Z, Ofori-Amanfo R, Ogunjemite RB, Petre C, Rainey HJ, Regnaut S, Robinson O, Rundus A, Sanz CM, Okon DT, Todd A, Warren Y, Somme V. 2014. Protected Areas in Tropical Africa: Assessing Threats and Conservation Activities. PLoS ONE **9(12)**, 114-154.

United Nations. 2020. Financing sustainable forest management: A key component of sustainable COVID-19 recovery. United Nations Forum on Forests Secretariat in UN DESA (Policy Brief, 88) pp 5.

Unongo EA, Yanjo ET, Bogbenda A. 2019. Analysis of Effects of Forest Resources Exploitation and Their Utilization on the Socio-Economic Well-Being of Rural Households in Benue State, Nigeria. IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) **12(6,1)**, 62-68
<http://dx.doi.org/10.9790/2380-1206016268>

Wahab MKA, Adewumi AA, Ojo SO. 2009. Assessment of socio-economic activities and sustainable development in Oba hill forest reserve, Osun State, Nigeria. E3 Journal of Environmental Research and Management **5(5)**, 81-86

World Bank. 2021. Forests and Terrestrial Ecosystems (Landscapes). © 2021 The World Bank Group, All Rights Reserved. <https://www.worldbank.org/en/topic/forests> [Accessed 15 May 2021]