



## RESEARCH PAPER

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## The effect of shifting cultivation practice on sakponba forest reserve, Edo State, Nigeria

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### Abstract

The study assessed the effect of shifting cultivation practices by farmers in Sakponba Forest Reserve, Edo State. Twenty percent (20%) of the total communities surrounding Sakponba forest reserve were randomly sampled in selecting the respondents for the study. Two hundred (200) shifting cultivators using structured questionnaire, oral interviews and focal group discussion with identified groups were used as instrument for gathering information. Descriptive statistics such as frequency and percentages was used to analyse the data obtained. The study revealed that males (68.5%) participated more in shifting cultivation practice which was their major means of livelihood. The food crops produced majorly include cassava, maize, plantain, vegetable, sweet potatoes and pineapple. The cultivation period was 3-4 years (36.5%;27.5%) while the fallow period was within the range of 1-4 year (73.5%). The benefits of the practice were clearly on sustain food production and income. The socio-economic drivers and the negative impacts were deforestation, soil erosion. Low income and poverty. The major factor responsible for the practice includes low productivity of land, high yield production, scarcity of fertile land and culture. Ways to improve the willingness of farmers to adopt agroforestry system as an alternative to shifting cultivation consist of educating farmers by extension agents and amendment of land-use act. Awareness creation program to the local community about the importance of agroforestry was recommended.

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## Introduction

In recent years, there is increasing evidence of the impacts of forest depletion on the environment, such as climate change, loss of biodiversity, watershed degradation and consequent downstream effects (FAO 2006). It is therefore necessary to concentrate researches on activities that would mitigate the deleterious effects of forest depletion and discourage agricultural practices that could further worsen the already critical situation. Shifting cultivation has various definition based on different circumstances, with relatively the same meaning (Mertz *et al.*, 2009; Kerkhoff and Sharma, 2006). Shifting cultivation is said to be one of the unsustainable land uses contributing significantly to environmental degradation in Nigeria (Luoga, 2000; Zahabu, 2008). Therefore, forests in general and tropical forests in particular have been receiving increasing attention from the world community (Miah and Islam 2007).

It has been evolving since 10,000 BC in a wide range of distinct socio-economic and ecological conditions (Thomas *et al.*, 2013). The duration of the fallow period is variable, but it must be long enough for woody vegetation to become dominant (Mertz *et al.*, 2009). Few studies which have been conducted were based on assessment of the impacts of shifting cultivation on biodiversity and carbon in high forests (Mwampamba, 2009) and other researches were based on general overview of the contribution of shifting cultivation to deforestation in Kitulangalo Forest Reserve (Luoga, 2000; Nduwamungu *et al.*, 2012). Eaton and Lawrence (2009) found that repeated shifting cultivation further depressed carbon stocks in live above ground biomass and coarse woody debris and carbon fluxes in litter.

This study, therefore intends to assess the effect of shifting cultivation practices at sakponba Forest Reserve, Edo State with a view to encouraging the adoption of agroforestry system towards meeting food security.

## Materials and methods

The study was conducted in Sakponba forest reserve which is situated in the humid tropical rainforest zone

of Nigeria. It lies on latitude 6° 04' N and longitude 5°32' E. The forest reserve is located in Orhionmwon Local Government Area of Edo State. Sakponba forest reserve is divided into two main areas by River Jamieson, Area BC 29 and BC 32/4. It is gridded into 176 compartments. Out of these, 101 are located in BC 29 and 75 in BC 32/4. The mean annual rainfall is 2162mm, the wettest period is between July and September while the driest is between December and January; the relative humidity is generally high averaging 71% in the afternoon. The maximum and minimum temperatures are generally low from 26-16°C.

### *Sampling Techniques and Data collection*

Respondents were selected from the adjoining communities in Sakponba forest reserve which are Iguomokhua, Eubosa, Ageka or Ona and Oben communities. 50 respondents from each surrounding community were randomly selected for the administration of questionnaires.

### *Primary data*

Primary data was collected through interview session and questionnaire. Interviews (and semi-structured) with village head, technical officials and local authorities was done in order to obtain additional information on the reasons and consequences of shifting cultivation practice, and the policies of government organizations at the research site.

Household survey was purposively done by sampling 200 shifting cultivators (households) and questionnaire was administered to obtain information on the practice. This included questions on the underlying drivers of shifting cultivation, i.e., household size, income, assets, credit behavior, land size, livelihood strategies typology, etc.

### *Data Analysis*

Data obtained was analyzed using descriptive statistics such as frequency and percentages.

## Results and discussion

The demographic characteristics of the respondents in the study area were presented in Table 1 below. On gender basis, (68.5%) of respondents were males

while (25.5%) and (25%) were within the age of 51-60 and 41-50 years which could mean that more males were likely to be farmers and (50.5%) (i.e age group 41-60 combined) may actively be involved in farming.

The results indicated that males participated more in the practice of shifting cultivation than females in the study area. The sex of households shifting cultivators may determine the level of involvement of household individuals, the kind of activities engaged in the farm and type of crop cultivated. Farming has always been a household business, where every member participated in one activity or the other.

Women and children have been known to participate in less rigorous activities on the farm because agricultural practices limited their shifting from one land to the other. This finding agreed with Sekumade and Oluwatayo (2011), and Ayanlere *et al.*, (2018) who reported that farming activities tend to be dominated by males in the agrarian society.

Age has been identified as one of the factors that affected labour as well as farm productivity. It determines the quality and quantity of work a farmer can do and the ease with which agricultural innovations were accepted (Fatoba, 2011; Ojeleye, 2015). The result in this study indicated that few youths were involved in shifting cultivation practice. This finding corresponded with Ayanlere *et al.* (2018) who noted that people tended to reduce in energy as they advance in age and may no longer be capable of providing the type of effort required by rudimentary farming. Only about 16 percent of the respondents were less than 30 years of age while 18 percent were less than 40 years of age.

The Nigerian National Youth policy (2009) defines youth as adult between the age of 18 and 35 years. This result may clearly indicate that youths participated less in agricultural activities in the study areas. This was probably due to the fact that youth in the study areas were affected by rural – urban drift in search of better greener pastures. Majority of the respondents representing (54.5%) were married. (23.5) of the respondents were divorced while (12%)

were single and the rest which represents (10%) were widowed. It is generally believed that marital status may be used to assess level of adult's sense of responsibility. This may be unconnected to the fact that marriage has been linked to being financially and socially stable in the rural communities.

Majority (61.5%) of the respondents had primary education, (21%) had secondary education, and (14.5%) had no formal education while only (3%) of the respondents had tertiary education. Education gives room for self - development and exposed the farmer to greater opportunities.

It assisted the farmer to test, accept innovative idea and improve ideas available to him. It also enhanced farmers' ability to make decisions on production and farm management activities (Fatoba, 2007).

The major occupation of the respondents in the study area was farming representing (63%). This was followed by trading with (21.5%) while the rest of the respondents were artisans representing (15.5%).

Household size between 6 -10 had the highest number of respondents representing (49%) followed by household size greater than 11 with a percentage of (34.5) while household size of 1 – 5 had the least with 33 respondents representing (16.5%). Household size to a large extent determined labour supply particularly in small scale farming.

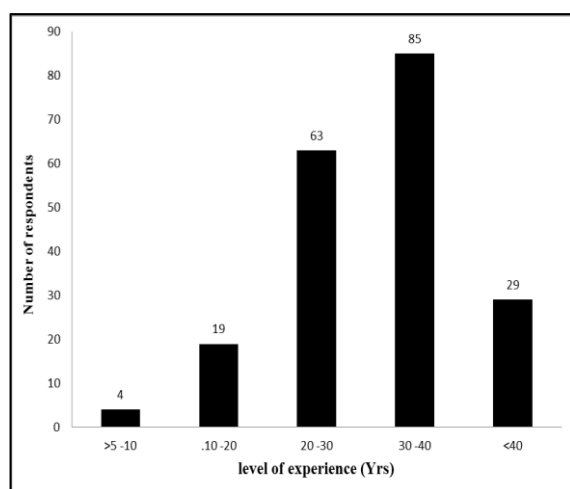
It may in turn indicate the quantity of crop output a given household may likely produce considering availability of family labour (Balogun and Yusuf, 2014).

Fig. 1 showed the distribution of farming household experience in the study area. The finding revealed that 85 respondents represented (42.5%) had farming experience between 30-40 years followed by 63 respondents have 20 -30 years' experience, 29 respondents had 40 years and above farming experience, 19 respondents had 10 -20 years while only 4 respondents representing (2%) had less than 10 years farming experience.

**Table 1.** Distribution of the Shifting Cultivator Households by Socio–economic Characteristics in the Study Area.

Variables	Frequency	Percentage (%)
<b>Gender</b>		
Male	137	68.5
Female	63	31.5
Total	200	100
<b>Age</b>		
21 – 30	32	16
31 – 40	36	18
41 – 50	50	25
51 – 60	51	25.5
>60	24	12
Total	200	100
<b>Marital Status</b>		
Single	24	12.0
Married	109	54.5
Widowed	47	23.5
Divorced	20	10.0
Total	200	100
<b>Religion</b>		
Christianity	137	68.5
Islam	37	18.5
Others	26	13.0
Total	200	100
<b>Educational status</b>		
No formal education	29	14.5
Primary	123	61.5
Secondary	42	21
Tertiary	6	3
Total	200	100
<b>Occupation</b>		
Farming	126	63
Trading	43	21.5
Others	31	15.5
Total	200	100
<b>Household size</b>		
1 – 5	33	16.5
6 – 10	98	49
Above 11	69	34.5
Total	200	100

Source: Field Survey, (2019).



**Fig. 1.** Households shifting cultivation farming experience in Sakponba Forest Reserve.

Source: Field Survey, ( 2019).

The result of the level of farming practice in the study area showed that 87 respondents representing (43.5%) household of shifting cultivators were mainly subsistence farmers this was followed by semi-commercial with 55 respondents (27.5%) and commercial (un- mechanized) farmers with 31 respondents (15.5%). The lowest was estimated for commercial (Mechanized) farmers with 27 respondents (13.5%) as shown in Table 2. The results clearly indicated that the farmers in the study area were purely agrarian farmers. This may be as a result of having little or no idea or access to agricultural innovations such as agroforestry as well as having insufficient resources or income and access to credit. The findings corresponded with Zanna (2010) and

Salvia (2007) which stated that millions of small-scale farmers were entrapped in self-reinforcing cycle of poverty, low income leading to low investment and acknowledged better understanding of agricultural innovations such as agro forestry.

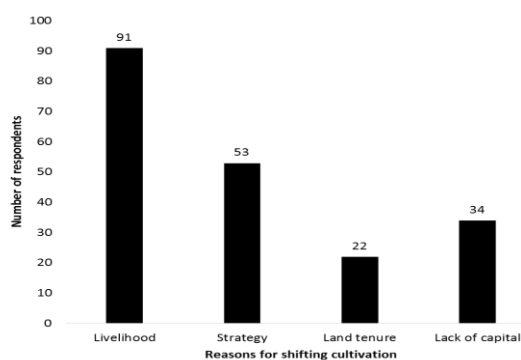
**Table 2.** Respondents level of farming in the study area

Variables	Frequency	Percentage
Mainly subsistence	87	43.5
Semi- Commercial	55	27.5
Commercial (un-mechanized)	31	15.5
Commercial (Mechanized)	27	13.5
Total	200	100

Source: Field Survey, (2019).

Fig. 2 showed the root cause of shifting cultivation practice in the study area. The result showed that 91 (45.5%) respondents favoured livelihood to be the most prominent cause of shifting cultivation and this is followed by local agricultural practice strategy adopted by farmers with 53 (26.5%) respondents, lack of capital had 34 (17%) respondents and land tenure had the least respondents with 22 (11%) respondents in the study area.

This study revealed that shifting cultivation practice remained a major means of livelihoods and food security of the people in the study areas despite its shortcomings. This finding is line with the reports of Dalle *et al.* (2011), Parrota *et al.* (2012) who stated that traditional land-use practice remains central to the livelihoods, culture and food security of millions of people in rural remote settings.



**Fig. 2.** Response to the reasons for shifting cultivation in Sakponba Forest reserve.

Source: Field Survey, 2019

Table 3 showed that the highest cultivation period of farm land and fallow period in the study area was 3 years with (36.5%) and this was followed by 4 years with (27.5%). Cultivation periods of 2, 5 and 6 years had percentages of (15.5), (11.5) and (5.5) respectively. 1 year of cultivation before shifting had the lowest percentage of (3.5). The result implied that the farmers mostly cultivated the land for more than 2 years before moving to new piece of land for their agricultural activities. This finding agreed with Azagaku and Anzaku (2000) who observed that increased soil nutrients depletion and low crop yield among farmers in Sub-Saharan Africa was a result of continuous cultivation without replenishment of depleted soil and posed serious challenges to producing enough food and other agricultural products to sustain livelihoods in the rural areas and met the need of the urban population (World Bank, 2014). The longest fallow period of farmlands in the study area was between 1 -4 years posing (73.5%) and this is followed by 5 - 9 years with (22.5%) and least was estimated for 10 - 15 years with (4.5%) as shown in Table 3. This study indicated that the length of the fallow period varied in the study area. Also, it is in line with the findings of Mertz *et al.* (2009) that the duration of the fallow period was variable, but it must be long enough for woody vegetation to become dominant. The short fallow period observed in this study maybe due to land shortage.

**Table 3.** Response to the cultivation of land and fallow period in Sakponba Forest reserve.

Cultivation Period (Year)	Frequency	Percentage (%)
1	7	3.5
2	13	15.5
3	73	36.5
4	55	27.5
5	23	11.5
6	11	5.5
Total	200	100
Fallow Period		
1 - 4	147	73.5
5 - 9	45	22.5
10 -15	9	4.5
Total	200	100

Table 4 showed the response to benefits of shifting cultivation practice in the study area. Food security had the percentage of (25.5) and this was closely followed by increase in income with (23.5%).

Sustain crop production had mean value of (21.5%), sustainability and flexibility had (13.5%), rejuvenating soil productivity had (9%) while control pest and disease had (4.5%) and the least was recorded for fuel wood gathering with (2.5%) representing 5 respondents. The result showed that the respondents viewed shifting cultivation as a remarkable form of organic farming that is self-sustaining and offered economic security in the study areas. This finding is in line with the study of Schroth *et al.*, (2004) who noted that in tropical developing countries, the practice of shifting cultivation has been reported sometimes to be synonymous with poverty and low productivity of land.

**Table 4.** Response to benefits from shifting cultivation practice in the study area.

Variables	Frequency	Percentage (%)
Food security	51	25.5
Rejuvenating soil productivity	18	9
Sustain crop production	43	21.5
Fuel -wood gathering	5	2.5
Income	47	23.5
Control pest and disease	9	4.5
Sustainability and fertility	27	13.5
Total	200	100

Table 5 showed the factors that influenced the practice of shifting cultivation in the study area. The study revealed that (30.5%) of farmers agreed that low productivity of land was mostly responsible for the adoption of shifting cultivation. High yield production was responsible for (22.5%), fertility and culture (19.5%), poverty with (12.5%), scarcity of land (6.5%) while government policy had mean value of (3.5%). The lowest factors influencing adoption of shifting cultivation were recorded for land tenure system and inaccessibly to fertilizer with both factors having (2.5%).

This finding clearly indicated that the farmers were seeking for better option of restoring soil fertility levels of depleted soil nutrients which is crucial to increasing their agricultural productivity. Also, it corroborates the findings of Namgyel *et al.* (2008) who stated that shifting cultivation practice physically exposed the soil for planting, eliminates competing plant cover, and improves soil fertility by leaving it less acidic and with a greater availability of nutrients.

**Table 5.** Response to factors that influenced the practice of shifting cultivation in the study area.

Variables	Frequency	Percentage
Low productivity of land	61	30.5
Scarcity of land	13	6.5
Fertility and culture	39	19.5
High yield production	45	22.5
Government policy	7	3.5
Inaccessible to fertilizer	5	2.5
Poverty	25	12.5
Land tenure system	5	2.5
Total	200	100

Table 6 showed the respondents associated with membership of group/association. The findings revealed that a large proportion (86.5%) of the farming households belonged to one agricultural group or other. About (13.5%) of respondents sampled were not members of any group or association. Those (60.5%) who belonged to agricultural groups were mostly members of government funded groups like Fadama Users Group (FUG), Root and Tuber Expansion Programme (RTEP). Twenty percent (21%) belonged to agricultural- based mutual supports groups like Cassava Growers Association while others (18.5%) were members of agricultural groups.

It was revealed during focus group discussion with identified groups that those who belonged to groups have advantages over those who do not. The discussion showed that most times, farmers in the study area enjoyed benefits from government and banks only if they were identified with a particular group.

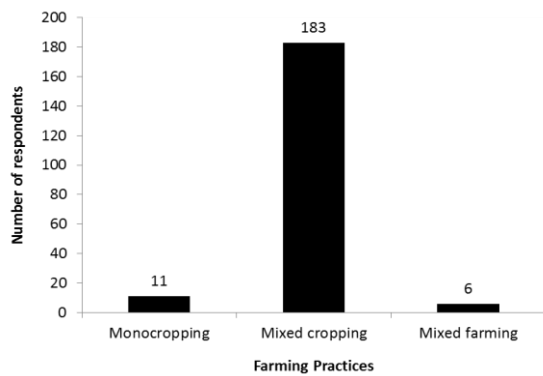
**Table 6.** Response to membership of Farmers Association and types of group.

Membership	Frequency	Percentage (%)
Participation	173	86.5
Non – Participation	27	13.5
Total	200	100
<b>Association (Group)</b>		
Government funded group	121	60.5
Agric. Based mutual support group	37	18.5
Agricultural cooperatives	42	21
Total	200	100

Source: Field Survey (2019).

Table 8 showed agricultural practices in the study area. The three agricultural practices in Sakponba Forest reserve were mono-cropping, mixed cropping and mixed farming. Mixed cropping had the highest

respondents with (91.5%), mono-cropping had (5.5%) of respondents while mixed farming had the least respondents with (3%). The result showed that mixed cropping is the most popular farming practice in the study area. The few respondents engaged in mixed farming were few migrants Fulani cattle grazers grazing in the study area. Also, the respondents that engaged in mono-cropping had more than one (1) farm locations. This finding agreed with the report of Raynold *et al.* (1995) who stated that most farmers engaged in mixed cropping because it is used as a strategy to ensure that, if one crop fails, another crop can survive due to differences in crop cycles, rooting depths and water requirements. It also served as a source of manure in revitalizing the lost fertility and offers the highest return on farm business (Adam and Yusuf, 2014 and AgriInfo, 2015).



**Fig. 3.** Agricultural Practices Options in Sakponba Forest Reserve.

Source: Field survey, (2019).

Table 7 showed the effects of shifting cultivation in the study area. It revealed that (70.5%) of respondents strongly agreed that there were socio-economic implications on the application of shifting cultivation while (17.5%) disagreed and (12%) declined to comment. The result further showed that (45.5%) of the respondents agreed that shifting cultivation practice had both economic and ecological implication, (34.5%) respondents favoured ecological implication while (20%) settled for economic effects. It was further revealed during the focus group discussion with identified groups that the practices had negative impacts on environment such as deforestation, soil erosion and other downstream

effects thereby resulted in low income and poverty. This finding is in line with Kissinger *et al.*, (2012) who reported that among the drivers of land use change, agriculture has been identified as the main factor of deforestation accounting for around 60% of deforestation worldwide.

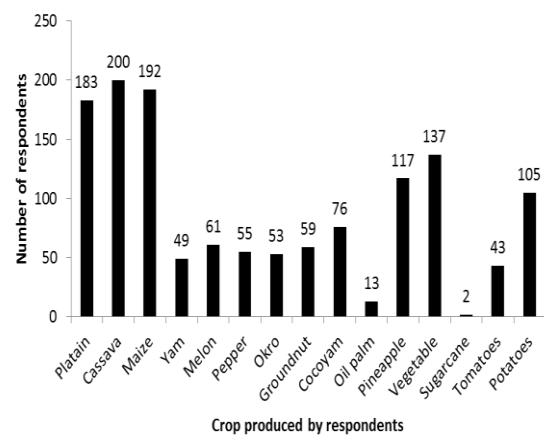
**Table 7.** Effects of shifting cultivation in the study area.

Variables	Frequency	Percentage (%)
Is there any socio-economic implication on the application of SC?		
Yes	141	70.5
No	35	17.5
No Idea	24	12
Total	200	100
Effects		
Economic	40	20
Ecological	69	34.5
All of the above	91	45.5
Total	200	100

Source: Field Survey, (2019).

Fig. 4 showed distribution of crops produced by the respondents in the study area. The result showed that all the respondents (200) engaged in cassava planting, maize (192), plantain (183), vegetable (137), sweet potatoes (105) and pineapple (117) while sugar cane had the least cultivation with (2) respondents.

Table 8 showed ways to improve the willingness of farmers to adopt agroforestry system as an alternative to shifting cultivation in the study area. The result showed that (18.5%) of respondents would love to partake in extension service through visits by Agric.



**Fig. 4.** Distribution of agricultural crop produced in the study area.

Source: Field survey, (2019).

Officer/Forest Officer and orientation to farmers through Radio/TV. Similarly, it showed that (17.5%) of respondents would love to be provided with credit loans while (16.5%) preferred the land tenure system to be reviewed. Creation of jobs for rural farmers pooled (14.5%), distribution of seedling to the farmers pooled (13.5%), Government policy pooled (11.5%) while the lowest were recorded for afforestation programme (3.5%) and improvement level of education of rural farmers (4.5%) respectively. This finding is in line with the report of World Bank, (2010) that despite series of efforts by NGOs to propagate agroforestry practices, however, their widespread adoption remains hindered by cultural and socio-political factors, including the insecurity of land tenure.

**Table 8.** Hints to encourage farmers to adopt agroforestry.

Variables	Frequency	Percentage
Extension service	37	18.5
Provision of credit loans	35	17.5
Creation of jobs to rural people	29	14.5
Government policy	23	11.5
Review of Land tenure system	33	16.5
Seedling for farmers	27	13.5
Afforestation programme	7	3.5
Improvement level of education	9	4.5

Source: Survey Field (2019).

### Conclusion

The study gathered relevant information on the effect of shifting cultivation in Sakponba Forest Reserve and more importantly determined the willingness of farmers to adopt agroforestry practice. The study was able to confirm that shifting cultivation has become a traditional practice by the farmers in Sakponba Forest reserve despite the fact that it is a protected area under Category II of IUCN (International Union for Conservation of Nature and Natural Resource) categories of protected area. The farmers lack knowledge of modern agriculture innovations such as agroforestry but they were willing to adopt the practice if educated by extension agents and had access to interest loan.

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