



DETERMINING THE SAFETY NET FUNCTIONS OF FOREST ON RURAL HOUSEHOLDS' WELFARE IN SELECTED STATES OF SOUTH-WESTERN NIGERIA

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ABSTRACT

Forests are considered "safety nets" in that people draw on available natural resources to meet emergency shortfalls and to keep them from being worse off in times of need. This study determined the forest safety net functions in relation to rural households' welfare in selected states of South-western Nigeria. Specifically, the study evaluated the role of forest products that have so far, served as safety nets in sustaining the rural livelihoods. A multi-stage random sampling approach was adopted in selecting 450 respondents (206 males and 244 females) for the study. Simple descriptive statistics such as frequency and percentages were used to describe the socio-demographic characteristics of the respondents while Foster-Greer-Thorbecke (FGT) model and budgetary analysis were used to determine the safety nets impact of forest on the welfare status of the households and the investment worth of the forest related enterprises (FREs). FREs were categorized based on their rate of return on investment and their respective profitability Index (PI) into high income yielding (HIY), middle income yielding (MIY) and low income yielding (LIY) enterprises. For every ₦1000 invested on HIY, ₦243 on the average was realized as profit on the aggregate while ₦184 on the average and = ₦125 on the average were realized as profit on MIY and LIY enterprises respectively. On the aggregate, the average investment worth for the region was ₦127, 022 while its profitability index was 0.192. Policy measure such as micro lending programs, creation and crafting of a veritable market for the products and other incentives to assist the poor forest based entrepreneurs should be given a needful attention and priority

Keywords: forest, safety net, rural households, welfare, South-western Nigeria



INTRODUCTION

Forest resources are inextricably linked to development processes such as peace, stability, livelihood security, human health, and economic growth (Nkem *et al.*, 2010). Forests are considered "safety nets" in that people draw on available natural resources to meet emergency shortfalls and to keep them from being worse off in times of need (Belcher, 2015). Natural forests in Nigeria are being destroyed by various forms of land use, such as agriculture, grazing and construction activities as a result of rapid urbanization leading to desertification and degradation of the environment (FAO, 2007).

In Nigeria, about 60 - 70% of the forest-dwelling indigenous people source their primary means of livelihood from forests (Richardson *et al.*, 2011). The danger in the traditional safety net functions of forest in South-western Nigeria is the potential disorder and exacerbation of vulnerability of the poor majority owing to the systematic disappearance of what constituted the safety nets (Imasuen *et al.*, 2013).

There has been conflict of interests between the exploration of the forest resources for safety net among rural households and the need to conserve the forest for sustainable management. Hence, there should be a point of symmetry between using forests as a source of livelihood at the same time conserving these forest resources. Thus, forest management policies should be linked with the rural household livelihoods that are mostly dependent on forest resources. It is against this backdrop, this study determined the forest safety net functions in relation to rural households' welfare in South-western Nigeria. Specifically, the study evaluated the role of forest products that have so far, served as safety nets in sustaining the rural livelihoods.

MATERIALS AND METHODS

This research work was carried out in selected state of South-western region of Nigeria. The South-western region is one of the six geo-political zones in the country (Agunwamba *et al.*, 2009). The area lies between longitude 30° and 7°E and latitude 4° and 9°N and thus, west of the lower Niger and south of the Niger Trough. The states that make up the South-west region include: Osun, Oyo, Ogun, Lagos, Ondo and Ekiti states (Figure 1). The total land area is about



191,843 square kilometers (Agunwamba *et al.*, 2009). The selected states where data were collected include: Ogun, Osun and Oyo States (Table 1).

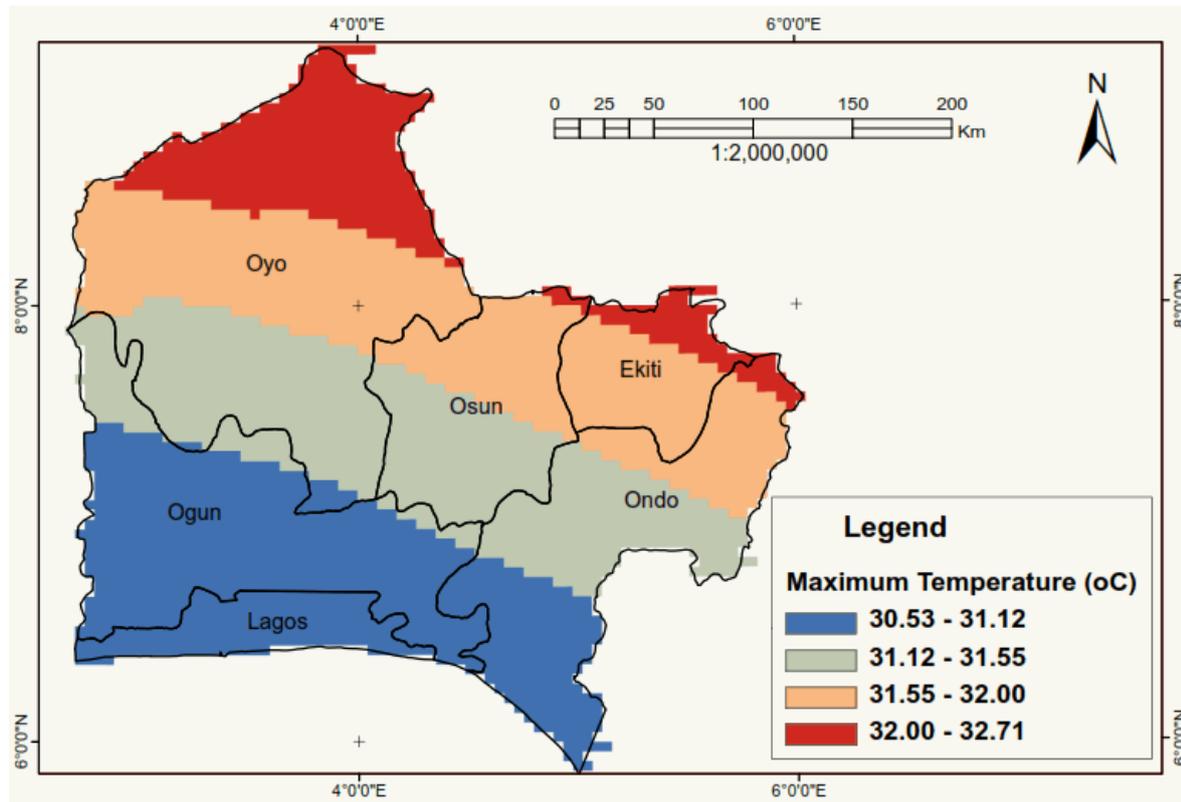


Figure 1: Map of South-west Nigeria

Table 1: Description of respondents based on LGAs and villages

State	LGAs	Villages	No. of respondents
Oyo	Afijio	Elepe	25
	Itesiwaju	Ariyo	25
	Ori Ire	Akute	25
	Kajola	Isemi	25
	Akinyele	Alabata	25
	Ibarapa North	Opomu	25
Osun	Ori Ade	Aba Lawani	25
	Isokan	Alara	25
	Boripe	Idi Osan	25
	Atakumasa	Odesomi	25
	Ejigbo	Isoko	25



Ogun	Ede North	Elero	25
	Ado Odo/Ota	Agbojedo	25
	Odigbo	Agunla	25
	Ewekoro	Akinbo	25
	Obafemiowode	Asore	25
	ImekoAfon	Araromi	25
	Ifo	Itoki	25
Total			450

Source: Computed by the Author, 2016

A multi-stage random sampling approach was adopted in selecting 450 respondents (206 males and 244 females) for the study. At first stage, three states (Oyo, Ogun and Osun states) were randomly selected from the five states that make up the South-west region excluding Lagos state due to its cosmopolitan and less forested nature. In the second stage, eighteen Local Government Areas (LGAs) distributed among the three selected states (six LGAs in each state) were purposively selected based on their potentials in forestry. For the third stage, one forested village was randomly selected in each selected LGA across the eighteen LGAs while the fourth stage involved the random selection of twenty-five households from each village. A total of 450 households' heads were interviewed through structured questionnaire.

Data collected were based on socio-economic characteristics, forest income, forest management practices, strategies and so on .Simple descriptive statistics such as frequency and percentages were used to describe the socio-demographic characteristics of the respondents, to profile common forest based enterprises while FGT model was used to determine the safety nets impact of forest on the welfare status of the households that involved in forest income generating activities. Likewise, the study employed budgetary analysis to determine the investment worth of the forest related enterprises

The specifications of the models used are as follows:

a. Foster-Greer-Thorbecke (FGT, 1984). The FGT index is given by:

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^N \left[\frac{G_i}{Z} \right]^{\alpha} , (\alpha \geq 0)$$



Where a is a measure of the sensitivity of the index to poverty and the poverty line is z , the value of expenditure per capita for the i th person's household is x_i , and the poverty gap for individual i is $G_i = z - x_i$ (with $G_i = 0$ when $x_i > z$). Here, to determine the poverty line, the two-thirds of the mean per capita household expenditure of the sample was taken as the poverty line.

b. Gross Margin

$$GM \% = \frac{TR - TC}{TR} \times 100$$

Where GM= Gross Margin as a percentage

TR=Total Revenue

TC = Total Cost

RESULTS AND DISCUSSION

Profile of various forest related enterprises based on the rate of income yielding

This study considers average investment worth per person and the corresponding profitability indices (PI) of various forest related enterprises for easy determination of the level of households' subsistence income. Essentially, FREs were categorized based on their rate of return on investment and their respective PI into High Income Yielding (HIY = 0.200 PI), Middle Income Yielding (MIY = 0.150 PI) and Low Income Yielding (LIY = 0.150 PI) enterprises. Table 2 thus presents the profile the economic prominence of various forest related enterprises of sample households.

Table 2: Profile of forest related enterprises based on the rate of income yielding

S/N	Types of FREs	No. of HH	Average investment/person (₦000)	Profitability index on investment (PI)
High income yielding FREs (HIY)				
1st	Plank trading	26	460	0.285
2nd	Medicinal plants	29	305	0.267
3rd	Poles	12	201	0.265
4th	Wood carving	12	55	0.259
5th	Bush meat	13	270	0.240
6th	Honey	25	207	0.233
7th	Palm/Coconut oil	23	175	0.228



8th	Carpentry/furniture	19	234	0.225
9th	Basketry/Mat/bag making	14	112	0.220
10th	Fruits and vegetables	32	68	0.204
Average investment worth per person			208,700	0.243
Middle income yielding FREs (MIY)				
1st	Fish	28	99	0.196
2nd	Snail	20	70	0.192
3rd	Rattan & bamboo utilization	11	40	0.188
4th	Fuel wood collection & selling	30	81	0.185
5th	Charcoal production & selling	21	84	0.184
6th	Broom	22	118	0.160
Average investment worth per person			82,000	0.184
Low income yielding FREs (LIY)				
1st	Spices/ leaves & fibre	27	45	0.140
2nd	Chew stick	20	44.5	0.136
3rd	Shea butter	19	36	0.126
4th	Local wine	12	87	0.125
5th	Mushroom	6	30	0.123
6th	Locust bean	21	40	0.117
7th	Gum & dye	8	60	0.107
Average investment worth per person			48,929	0.125
Aggregate		450	127,022	0.192

Source: Calculated from field survey, 2016

Note: High Income Yielding FREs means HIY; Middle Income Yielding FREs means MIY; Low Income Yielding FREs means LIY while Profitability Index indicates PI.

For every ₦1000 invested on high income yielding FREs, ₦243 on the average was realized as profit while ₦184 and ₦125 on the average were realized as profit on middle income yielding and low income yielding FREs respectively. On the aggregate, the average investment worth for the region was ₦127, 022 while its profitability index was 0.192. Thus, for every one naira invested in furniture production in the study area ₦3.29 will be realized as profit which is an indication that the venture is viable. The study compares favourably with a study by



Okunmadewa *et al.* (2000) on sun-dried meat trading which had marketing efficiency of 1.14. Another related finding is Alao and Kuje (2012) on economies of small-scale furniture production in some part of Northern Nigeria. The study found that small-scale furniture production in the study area is profitable because of its high rate of return on investment (that is, RORI of 3.29%). Moreover, the study also conform with the findings of Awe *et al.* (2012) on Irvingia kernels marketing in Akure, Ondo State which stated that, for every one naira spent by the sellers, there was a return of 65kobo. Likewise, this finding gave a strong support for the earlier works by Azeez *et al.* (2011; 2015) where similar approach was used and 10% and 75% of the total investment worth were realized respectively as profits for any ₦1 spent on the 4 investments. Therefore, forest related businesses are profitable ventures with higher market efficiency in South-western region Nigeria.

Further, in terms of income yielding propensity, plank trading, medicinal plants, poles, wood carving, bush meat, honey, palm/coconut oil, carpentry/furniture, basketry/mat/bag making and fruits and vegetables belong to HIY enterprises. The MIY enterprises include: fish selling, snail collection and selling, rattan & bamboo utilization, fuel wood collection & selling and broom marketing. Also, LIY enterprises are: Spices/ leaves and fibre, chew stick, shea butter, local wine, mushroom, locust bean and gum & dye enterprises in that order.

Among the high income yielding enterprises, plank business (0.285 PI) was the most lucrative and worthwhile venture among all FREs in the region since it has recorded highest profitability index. One of the reasons for this might be due to the fact that planks are produced in different dimensions that are priced differently in the market. For instance, industrial round wood, sawn wood, and wood panels and several by products such as fire wood, saw dust etc. are obtainable from the plank business and might be an additional advantage for the entrepreneurs. So, this suggests that timber processing business in form of plank has certain anti-poor characteristics than other forest related enterprises in the region (Table 2). This finding supported the argument of Fazli *et al.* (2010) who put forward that timber is one of the major forest resources that are important sources of income among local households. The Author reiterated that plank has a better market value because of its use in home construction and the furniture industry. Planks are



sold to local shopkeepers and carpenters who run commercial furniture businesses in the area. Moreover, timber contractors buy planks from local sellers and transport it to cities, where it fetches very high prices.

Another possible justification for the lucrateness of plank business is that some poor are denied access to timber wealth mainly because of its high investment worth which might be too exorbitant for the poor to venture into. Essentially, plank processing and sales even at small and medium-scale level require relatively much capital, technology, and skills mostly for fairly specialised consumer markets (Williams, 2004).

The second most prominent and lucrative business in the study site is medicinal plants (0.267 PI). Some of the likely explanations that can be advanced for this outcome might be due to the fact that most rural people across religious brackets utilised medicinal plants in form of trado-medicine or alternative medicine. Thus, the study recognises the impartial stands of religion in utilising medicinal plants most especially when fetish beliefs are not attached to its usage. Traditionally, through provision of medicinal products, forests commonly serve as frontline interventions for household health care for the majority of people (Colfer *et al.*, 2006).

Furthermore, other prominent and lucrative FREs include; poles (0.265 PI), wood carving (0.259 PI), bush meat (0.240 PI) among others in that order. These HIY enterprises can be undertaken at small and medium scale levels. According to Alao and Kuje (2012), the viability of small and medium scale forest enterprises (SMFEs) like furniture industries is very enduring based on their findings on economies of small-scale of furniture production in some part of northern Nigeria.

Still, engaging in some MIY businesses such as fish (0.196 PI), snails (0.192 PI), rattan and bamboo utilization (0.188 PI) fuel wood selling (0.185 PI), charcoal production trade (0,184 PI), and broom (0.160 PI) might need to be combined with some other lucrative ones to boost their sales just as the case for the medicinal plants sellers as earlier noted.

Arising from the above, there are two perspectives providing evidences for engaging in FREs relative to its potentials to households' income. First is the fact that returns from some FREs are high and capable of improving the household well-being. This argument is in line with the view



of Neumann and Hirsch (2000) who posited that trading of medicinal and aromatic plants (MAPs) in the Gorkha District, Nepal; harvesting of tagua in Ecuador and the emergence of basket making for tourist and export markets in southern Africa are economically viable to undertake because they all yielded high returns.

On the other hand, some FREs yield very low returns and could not substantially cater for the living of the households. For instance, spices/ leaves & fibre (0.140 PI), chew stick (0.136 PI), shea butter (0.126 PI) local wine marketing (0.125 PI), mushroom (0,123 PI), locust bean (0.117 PI) and gum and dye (0.107 PI). This agreed with the argument of Neumann and Hirsch, (2000) who argued that some NTFPs harvested for sale in Port city of Belém yielded a very low remuneration and rattan harvest in Central Kalimantan; Indonesia suffered high return due to low encouragement.

In sum, while being mindful of the high economic returns from some FREs, requisite attention should be given to those high income yielding FREs in order to explore the economic potentials inherent in them. However, that is not to say that those low return ones should be wrecked or neglected. Instead, more incentives are required to their marketers so as to boost their respective businesses.

Households' poverty status

The section gives credence to the observed rural households' poverty incidence status. The results showed that 64% of the rural households in the region are living below the poverty line (Table 3).



Table 3: Decomposition of poverty by states and socio-economic characteristics

State	Poverty incidence (P ₀)	Poverty gap (P ₁)	Poverty severity (P ₂)	Amount required to eliminate poverty (₦ /month)
Oyo	0.4968	0.2484	0.3532	4,553
Osun	0.7203	0.5272	0.4415	9,664
Ogun	0.6055	0.4865	0.3095	8,918
Total for region	0.6369	0.6559	0.5051	12023

Source: Calculated from field survey, 2016

Note: - The poverty gap adds up the extent to which individuals on average fall from the poverty line, and expressed as a percentage of the poverty line $[(P_1) \times N18331]$

By decomposing across states within the study area, the incidence of poverty indicates that the proportion of households living below poverty line is noticeably the highest in Osun state followed by Ogun state where 72 per cent and 61 per cent of rural households' average monthly expenditures respectively were not up to N18, 331. Oyo state was thus recorded lowest of about 50 per cent in terms of poverty head count index.

These findings thus suggest that there are some slight improvements in living standard of forest indigenous households in Oyo state compare to other two states probably due to the fact that Oyo state has a very high forest regeneration inclination compare to any other South-western states in the region (Faleyimu *et al.*, 2013). It might also be that forest indigenous households in Oyo and Ogun states usually maximise their entrepreneurship potentials and proclivities in FREs which led to some levels of improvements in their wellbeing more than their counterparts in Osun state.

The poverty gap index (P₁) measures the extent to which individuals fall below the poverty line (the poverty gaps) as a proportion of the poverty line. It provides information regarding how far away households are from the poverty line. This measure captures the average sum of the differences between the poverty line and actual consumption levels of all people living below that line. It also reflects the per capita cost of eradicating poverty. In other words, it gives the total resources that would be required to bring every poor person up to the poverty line.



The sum of these poverty gaps gives the minimum cost of eliminating poverty, if transfers were perfectly targeted. Table 4 therefore revealed the minimum cost required to bring these poor households to the poverty line across states. For example, in Oyo state, the poverty depth (P_1) value of 0.2484 will require ₦4,553 (that is, 0.2484 multiplied by ₦18331) per household per month to close the poverty gaps in the state while a sum of ₦9,664 (that is (P_1) $0.5272 \times$ ₦18331) is needed to bring the households in Osun state to the poverty line. Likewise in Ogun state, individual household would require a sum of ₦8, 918 on average (that is, (P_1) $0.4865 \times$ ₦18331) to eliminate poverty in that state. In total, average of ₦12023 ($0.6559 \times$ ₦18331) will be required for forest households in the region to eliminate poverty.

Essentially, if each respective state could mobilise resources or receive transfer of resources equal to corresponding percentages of poverty line for every household and were perfectly targeted and appropriately allocated to the poor in the amount needed so as to bring each household up to the poverty line, it is expected that poverty could be at least eradicated, even though in theoretical term.

The squared poverty gap index [(also known as the poverty severity index, (P_2))] averages the squares of the poverty gaps relative to the poverty line. It is a measure of a distributional sensitive index that can detect the expenditure distribution among the poor. It is one of the FGT classes of poverty measures that allow one to vary the amount of weight that one puts on the income (or expenditure) level of the poorest members in society. The FGT poverty measures are additively decomposable. It is also possible to separate changes in the FGT measures into a component resulting from rising average incomes, and a component resulting from changes in the distribution of income.

Table 3 revealed that the severity of poverty (P_2) among households surveyed are 0.3532, 0.4415, and 0.3095 in Oyo, Osun and Ogun states respectively. This indicates that poverty is more severe in Osun state followed by Oyo state but less severe in Ogun state. These results reflect a measure of poverty that takes into account inequality among the poor within the forest households and the amount of weight put on the income (or expenditure) level of the poorest



forest household varies since all forest households of a given state may not have equal standard of living.

This therefore suggests that the economic harshness was intense among forest households in Osun state but less in Ogun state. In other word, the sensitivity of the index to poverty (a) is greater in Osun than that of Oyo and Ogun states in that order. Part of the possible reasons that may be advanced for this scenario was perhaps due to the enhanced forest related business activities in both Oyo and Ogun states as earlier stated and perhaps because of their proximity to commercial cities especially Lagos state which is widely considered as the commercial nerve centre of the country.

Impact of forest income on households' welfare for each state

Regionally, in terms of poverty headcount measure, almost 68% of the households are regarded as poor in conservative income measure (that is, with exclusion of forest income), whereas the inclusion of forest income reduces the headcount poverty to 64%, a relative drop of 4% (Table 4).

Table 4: Impact of forest income on households' welfare for each state

Poverty index	Oyo		Ogun		Osun		Region	
	With FREs	Without FREs						
Poverty incidence	0.49	0.66	0.61	0.76	0.72	0.77	0.64	0.68
P₀ differentials	0.17		0.15		0.05		0.04	
Poverty Gap index	0.25	0.49	0.49	0.59	0.53	0.72	0.66	0.73
P₁ differentials	0.24		0.10		0.19		0.07	
Poverty Severity index	0.35	0.54	0.31	0.49	0.44	0.62	0.51	0.69
P₂ differentials	0.19		0.18		0.18		0.18	

Source: Calculated from field survey, 2016



The poverty gap indices was conventionally measured to be 73% but reduced to about 66% with a drop of about 7% when forest income was included. Similarly, the inclusion of forest income reduces poverty severity measure from 69% (without FREs) to about 51%, a drop of 18%. This result means that forests has capacity of improving the livelihood of the poor particularly those that venture into forest income generating activities in the study site. This is not surprising, since most forest households found trust in forest income than in non-forest related enterprises. This result runs in conformity with the findings of Tangem (2012) who stated that small and medium scale forest enterprises have the potential to diversify rural livelihoods and alleviate poverty because they require only small initial investment to set up which can make them accessible and attractive to the poor and in turn diversify their economic opportunities and improve their livelihood security (UNFF, 2013). In the same vein, the results matched the findings of Kimaro and Lulandala (2013) on contribution of non-timber forest products to poverty alleviation and forest conservation in Rufiji District - Tanzania. Though, it is contrary to the findings of Fonta&Ayuk (2013) when measuring the role of forest income in mitigating poverty and inequality for the case of South-eastern Nigeria.

CONCLUSION

The average investment worth for forest related enterprises in South-westernNigeria was ₦127, 022 with profitability index of 0.192 on the aggregate. In other word, for every ₦1000 invested on FREs in the region, ₦192 was realized as profit. Thus, FREs are profitable ventures with higher market efficiency in South-western Nigeria.

Similarly, in terms of income yielding propensity, plank trading, medicinal plants, poles, wood carving, bush meat, honey, palm/coconut oil, carpentry/furniture, basketry/mat/bag making and fruits and vegetables belong to HIY enterprises. The MIY enterprises include: fish selling, snail collection and selling, rattan & bamboo utilization, fuel wood collection and selling and broom marketing. Also, LIY enterprises are: Spices/ leaves & fibre, chew stick, shea butter, local wine, mushroom, locust bean and gum and dye enterprises.



Using per capita consumption expenditure as a measure of living standard as being normally used in most poverty studies in Nigeria, about 64% (poverty incidence) of the rural households' average monthly expenditures were not up to ₦18, 331 in South-western Nigeria. Decomposing the poverty index across states within the study area, Osun state is the highest poverty striking state (72%) followed by Ogun state (61%) while Oyo state recorded the least (50%). The minimum cost required to bring these poor households to the poverty line (to eliminate poverty) across states are as follows: Osun state (₦9664), Ogun state (₦8918) and Oyo state is ₦4553. Total for the region is ₦12023.

In terms of impact of FREs on poverty status of the respondents by state grouping. With the inclusion of forest income, P_0 was reduced by a magnitude of 17%, 15% and 5% in Oyo, Ogun and Osun states respectively. Also, the inclusion of forest income reduces P_2 by a magnitude of 19%, 18% and 18% in Oyo, Ogun and Osun states respectively compared to when it was conventionally measured without forest income. These findings thus suggest that forest indigenous people in Oyo and Ogun states usually maximise their entrepreneurship potentials and proclivities in FREs which led to some levels of improvements in their wellbeing more than their counterparts in Osun state.

RECOMMENDATIONS

Arising from the above, policy measure such as micro lending programs, creation and crafting of a veritable market for the products and other incentives to assist the poor forest based entrepreneurs should be given a needful attention and priority.

The fact that forest based enterprises particularly those high income yielding and middle income yielding ones may have a role in poverty mitigation in South-western Nigeria, the entrepreneurs of the FREs should be motivated through policies that would liberalize open access to the forest resources. Although, careful implementation and a mix of forest-based approaches to poverty mitigation (such as selective exploration, forest regeneration, market access, micro lending opportunity among others) are necessary in this regard.



There should be some forest based poverty alleviation approaches (that is, increased opportunities for entrepreneurship and employment in forestry) that will be all inclusive and targeted mainly on the grassroots who have been economically disadvantaged in the region particularly in Osun State..

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