Economic evaluation of land tenure of Taungya farms in some local government areas in Edo State, Nigeria

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Abstract
Socio-economic consequences of unsecured land tenure right of taungya farm land which exposed farmers to random government eviction was the focus with objectives to determine the annual crop yield, economic benefits, land ownership, land rate, size of plot and associated problems. The study evaluated land tenure of Taungya farm in Edo State, Nigeria. Data were collected from primary and secondary sources. Multi-stage sampling method was used for the study; firstly 75% sampling intensity (SI) was applied in 8 LGAs namely; Ovia North East, Ovia South West, Etsako West, Uhumwuonde, Esan North East, Esan South East, Orhionmwon and Ikpoba-Okha, where Taungya system is practiced and secondly 50% SI on 253 Taungya farmers. The primary data were obtained with the use of questionnaire administered randomly to 127 respondents in six local government areas previously identified with the adopted sampling procedure. The data were analyzed with SPSS version 23. Results were tested with descriptive statistics summarized in tables and charts and inferential statistics with the use of analysis of variance (ANOVA) at 5% level of significant. The results showed significant difference ($P<0.05$) among the various locations of the farm land which was dominated by Taungya farm within forest land. The results showed that the state ownership stood at 69% while other forms of ownership identified were communal, traditional, and private ownership which accounted for 16%, 11% and 4% respectively. The results also showed that 60% of the respondents affirmed that their farm size ranged from 2-4 hectares, while 24% and 16% of the respondents had less than 2 hectares and 5-7 hectares respectively. The results showed that there was significant difference ($P<0.05$) in land rate per hectare among the various years under review. Land rate from the year 2020 till-date dominated the values witnessed in other periods under review. The results showed that financing from individual / personal savings stood at 54% while borrowing, government grant and loan accounted for 18%, 16% and 12% of respectively. The results revealed significant difference ($P<0.05$) among income from different arable crops and also among locations identified. It is recommended that government agent should engage in adequate monitoring so as to maintain sustainable tree plantation programme by ensuring that no Taungya farmer would have opportunity to stay more than maximum allowable period of 3 years in a piece of land.

Key words: land ownership, land rate, maximum allowable period, multi-stage sampling, taungya farm

Introduction

Taungya is a land use system in which rural farmers are allowed to cultivate agricultural crops for the first few years by planting tree seedlings among arable crop in an allocated piece of land for maximum of three years. Normally, food crops are cultivated for three years after which the shade from trees impedes further cultivation if the latter are not tampered with by the farmers (Agyeman *et al*, 2003). Aside, forest plantation establishment which is the long term benefit, taungya system has a positive influence on household economy because it provides food, energy and improve rural livelihood (Kalu *et al*, 2011and Nsien *et al*, 2010). The system not only improves food production, and also alleviates the wasteful land use associated with traditional agriculture which most often diminishes tree population and upsets ecological balance.

The insistence on continuous farming on limited land resources due to ever increasing human population results to more problems facing some agrarian communities in the state. Taungya system to a large extent solves problem of scarcity of fertile farm land and help in a unique way to ameliorate deforestation, degradation and addresses the general issues of land use pattern which is vital for soil and land conservation as well as poverty alleviation amongst the rural populace (ICRAF, 1993).

Land tenure determined by the State laws influences farmers' profit margins and land use decisions (Ehui *et al*., 1994; Lele and Stone, 1989). It plays one of the vital roles in affecting farmers' land-use decisions and also addresses the shortage of farm land in adjoining communities to forest reserves (Li *et al*., 1998; Feder and Nishio, 1999; Pandit and Thapa, 2003). It is important to note that in most cases, farmers are reluctant to make investments in land management or properly keyed into sustainable tree plantation investment since they do not have secured land tenure rights which make them vulnerable to random government eviction. As a result the farmer loses interest in sustainable land use but concentrate on short terms benefits at the cost of accelerating land degradation and deforestation (Feder and Nishio, 1999; Pouliot et al, 2012).

Insecure land tenure or the lack of land ownership also constrains the farmers' access to credit that is required for improved land practices (Rasul and Thapa, 2003). Land tenure systems have been a witness of truth in the agroforestry, one of the pathways to improve household income and economic development in most countries but negatively affected by land reforms which varied widely according to regions (Maxwell and Wiebe, 1998). The study focuses on annual yield, land rate, size of plots allocated to farmers, and problems militating against the adoption of taungya land tenure system to achieve sustainable tree plantation programme.

Methodology

Study Area

The study was carried out in Edo State, Nigeria. The State situates between latitude 06º and 7º20'N and longitudes 05º44'8 and 06º45'E. The state is bounded in the East by Anambra State, in the north by Kogi State, in the West by Ondo State and in the south by Delta State (FORMECU, 1999). The relief ranges from flat to gently undulating with elevation progressing northwards from approximately 50m to 300m. The landscaping is interrupted by an east sandstone scarp found in some portions of the state. It extends from Benin City to Uromi with elevation exceeding 200m in the eastern part of the state (FORMECU, 1999). There are two major seasons in a year comprising rainy and dry seasons. The former starts from March to November while the latter starts from November to February, (Okoro, 2002). There are three classes of soil in the state, which consists of rainforest, wetland and savanna soils. Rainforest soils are very deep and moderately deep, well drained and composed of sandy loam (Soil Survey, 1990).

The seasonal rain fall distributions in the state is between 1250 and 1500mm. the state is mostly covered by moist tropical forest with lowland rainforest covering 76.5% of the total land area of the state (FORMECU, 1999). The distribution of rainfall is markedly bimodal, with a lower peak in July and August (Resources Inventory and Management Limited, 1992). The mean temperature varies between 25ºC in the south and 34ºC in the North while the relative humidity ranges from 79 to 90% (Beak and Geomatics, 1999).

Sampling methods

Recognizance visits were made to Edo state Forestry Department and Area offices in Ministry of Environment to elicit information concerning the total number of local government areas where taungya farming is being practiced in Edo state forest reserve as well as the total number of taungya farmers in the area.

Multi-stage sampling method was used in the study. Firstly, 75% sampling intensity was applied to 8 local government areas where taungya farming was practiced in the state in order to randomly select 6 local government areas namely; Ovia North East, Etsako West, Uhunmwuonde, Esan North East, Orhionmwon and Ikpoba-Okha. Secondly, 50% sampling intensity was applied to 253 taungya farmers in the selected local government areas to obtain 127 respondents for the study (Table 1).

Table 1: Locations and Sampled respondents in the Study Area

75% SI LGAs	TNF	50% SITF
Ovia N. E.	58	29
Etsako W.	35	18
Uhunmwuonde	50	25
Esan N. E	30	15
Orhiomwon	54	27
Ikpoba-Okha	26	13
Total	253	127

Key:
SI LGAs: Sampling intensity for local government areas
TNF: Total number of taungya farmers
SITF: Sampling intensity for taungya farmers

A total of 127 copies of questionnaire were administered randomly to the respondents in all the locations selected for this study.

Data collection

Data was collected through primary and secondary sources. The primary data was collected through the administration of questionnaire to the taungya farmers. The questionnaire was used to elicit information from then Tungya farmers in the study area. Personal interview and group focused discussion with the respondents was also carried out to get more information on land tenure, land rate, absence of tenure right, government revenue, household income, employment of farm labour and associated challenges. Field assistants were deployed with the use of local dialects for ease of communication during the course of study. The secondary data was collected from records, documents and reports from Forestry Department and Area Offices, Ministry of Environment, Edo state , as well as literatures, Journals, and internet.

Data analysis

Data collected were analyzed using descriptive statistics of frequency and percentages summarized in tables and charts and inferential statistics with the use of analysis of variance (ANOVA) at 5% level of significance. Duncan Multiple Range Test was used to separate the means of variables that was significant at 5% level.

Results and Discussions

The results from this study showed significant difference ($P<0.05$) among the various locations of the taungya farm land, which further revealed that farms within forest land dominated other locations considered in the study (Table 1). The findings are indicative of the fact that farmers apparently have a preference for government land for taungya farming due to the simplicity of tenancy which is more attractive and advantageous than undertaking such an activity within other forms of land ownership system. The findings agrees with the view expressed by Ogundele and Okoruwa, (2006) who reported that government owned land system influences farmers' decisions for farming activities which are most often attractive to farmers. It is apparent that land security has the tendency of influencing farmer willingness to adopt farming system in a safe farm land location and also key into forest plantation development strategy.

The results revealed significant difference ($P<0.05$) among the various period spent on a given plots of land, which was dominated by 4-6 years (Table 3). The observation revealed that some taungya farmers remained in the allocated plots beyond the maximum allowable period of 3 years.

Table 2: Distribution of taungya farm land in the study area

Locations	WCL	WRL	WFL
Ovia N. E.	9	5	15
Etsako W.	5	3	9
Uhunmwuonde	7	4	14
Esan N. E	5	2	8
Orhiomwon	8	5	11
Ikpoba-Okha	4	2	7
Mean	6.3^{b}	3.5^{b}	10.7^{a}

Key:
WCL= within Communal Land, WRL= within Rented Land and WFL= within Forest Land.

Table 3: Period spent on a given plots of land for taungya farming (Yrs.)

Locations	≤3	4-6	>6
Ovia N. E.	12	14	3
Etsako W.	6	10	2
Uhunmwuonde	8	13	4
Esan N. E	5	8	2
Orhiomwon	7	14	3
Ikpoba-Okha	4	7	2
Mean	7.0^{b}	11.0^{a}	2.7^{c}

The findings reveal that majority of the farmers spend over and above mandatorily allowable farming period of three years which make it possible for the existence of taungya farmers between 4-6years period on a given plot of land to assume a dominant feature. Unfortunately, the decision to stay beyond the stipulated maximum period of three years violates the rule of engagement for Tungya farming.

Figure 1 shows that 60% of the respondents affirmed that their farm size ranges from 2-4 hectares, while 24 and 16% of the respondents noted that they had less than 2 hectares and 5-7 hectares respectively.

The findings revealed that there are variation of farm sizes allocated to different respondents, this depends to a large extent on income status of various individuals. In fact, farm size is a function of economic, social and environmental considerations which enable a farmer to make informed decision to avoid being overwhelmed by pressure due to inadequate proportional factor inputs. The results showed significant difference ($P<0.05$) in land rent per hectare among the various years under review. Land rent observed between 2020 to-date dominated every other years considered in the study (Table 4).

The findings revealed a regular increase from the start of year 2000 - 2003 with an astronomic proportion in 2012-2015 which corroborate the views expressed by Asafo (2024) who noted that the cost of land in major cities in Ghana has risen by 450% under the past 13 years ranging

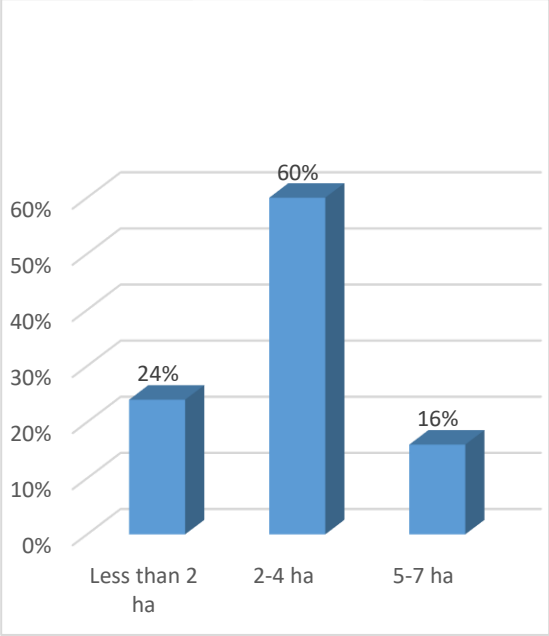

Figure 1: Size of land allocated to taungya farmers

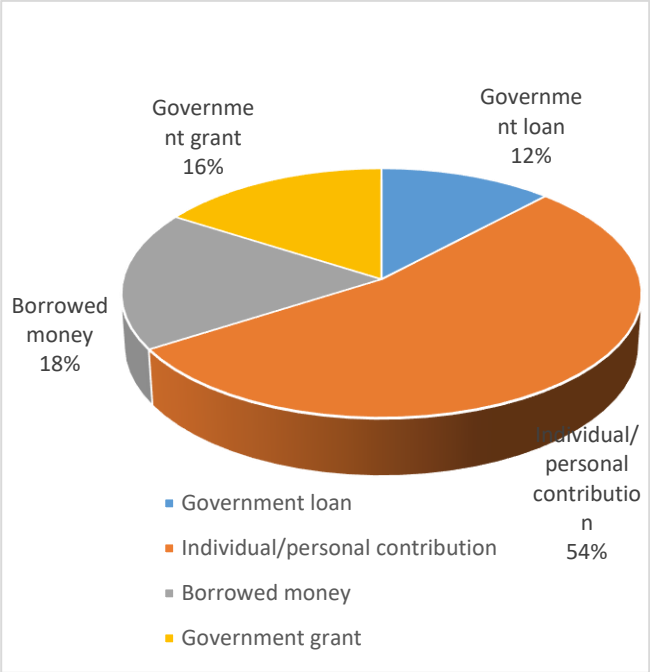

Figure 2: Sources of finance for taungya farming

from 2005 to 2018. Evidently, this agrees with the view of Jayne, *et al* (2021) that land prices are rapidly increasing throughout Africa because of smallholders' participation in land rental and purchases. This trends could have some correlation with changes in cost of living and social overhead and that the increase of land complex marketability and its distributional effects which are poorly understood. This could also be due to microeconomic variables such as rent increase, population rise, cost of living, inflation which might have influenced the land rent per hectare and the demand for land for other purposes aside taungya.

The results revealed the various sources of finance for the taungya farm, which was affirmed that 54% of the respondents obtained their finance for taungya farm from individual/personal contribution, while,18, 16 and 12% of the respondents affirmed that their finance source were from loans, government grant /assistance and government loan respectively (Figure 2).

The findings reveal that it is apparent that taungya farmers have inadequate access to credit facilities, hence they depend largely on individual and personal contribution to finance their taungya farming activities. This findings agrees with the report of Starfinger (2021), in his report on financing smallholder tree planting in Thailand, he noted that lack of forestry specific financial service and cash flow constraints attributed to the long gestation period of trees as well as absence of conventional collateral to obtain loan are always identified as key impediments to investment in large rotation timber plantation grown as cash crops.

The results also showed significant difference ($P<0.05$) in income from various arable crops locations under review (Table 5). The income from yam sales dominated the income from other arable crops, while the income from arable crops in Ovia north east local government area had the highest price value compared to other locations. The findings indicated a higher value of income generated from the sales of yam across the locations considered in the study. This ranged from ₦255,000 – ₦260,000 while cassava and maize had a slightly higher income with a significantly lower income than vegetable and plantain. This observation could be attributed to the increase in demand for the commodity in the study area which agrees with the report of Chamberlin and Ricker-Gilbert (2016) that price affects a smallholder-farm household's decision to be involved in land rental markets at whatever capacity.

The results revealed significant difference ($P<0.05$) in cost price among the various arable crops reviewed, and also among the locations reviewed in the study. The cost price of yam dominated the cost price of other arable crops, while the cost price of the arable crops in Ovia North East Local Government Area dominated every other location considered in this study (Table 6).

The findings revealed that there are general rule for growing arable crops identified in the study under review. However, the values and cultural practices associated with yam production are higher than other arable crops. Obviously, maintaining yam crop from the onset till maturity is complex and requires more capital outlay than other arable crops.

The results also revealed significant difference ($P<0.05$) in yield of the arable crops among the 3 years allowed for the taungya practice. The yield accruable to yam was higher when compared to other arable crops, while the yield of arable crops obtained in the first year differed significantly ($P<0.05$) from yields of other years (Table 7). Plates 1& 2: show arable crops with old cassava crop remaining in the tauagya system after one year of growing season. The observation indicated longer existence of cassava crops and newly yams in agro-ecological system in most taungya farms under review.

This implies that farmers obtained more yield from planting yam, cassava and maize. Obviously, the study further identifies higher yield in yam production from first year and diminishes towards the third year, with slight increase in cassava and maize while the lowest yield was recorded in vegetable. These findings disagree with the view expressed by Ayuke, *et al* (2004) who reported that crop yield grown on same piece of land decreases as the year goes by due to declining soil fertility. In addition, the progressive decline of yield as the year goes by is due to the fact that the fertility lies in the biomass in tropical soils.

The results (Table 8) revealed that inadequate monitoring (36%) as the major problem militating against taungya practice in the study area. This was followed by limited duration for land use/rent (24%), no government incentive (20%), and inadequate man power (18%). While the least problem militating the practice in the study area was lack of extension education (2%).

Conclusion

The study provides an anlysis of land tenure of taungya system with focus on the role it plays in afforestation and influence on the livelihood of smallholder household. Observation revealed that there are no unifornity in the length of time a taungya farm remains in a plot of land across the LGAs indicating variations in the distribution of taungya farm land in various locations in the and period they lasted. The state ownership of the land predominate other forms of ownership apprently due to peoples' preference to government owned land. This is because government owned system influences farmars'decision in farming activities which is most often atractive. The farm size which depicts farmholding is small between 2-4 hectares per individual taungya farmer. The period spent on an allocated plots differs among localities with the period that ranges between 4 to 6 years., indicating that the mandatory allowable period of 3 years is not strickly adhered to or due to compromise exhibited by offiicers in-charger. The land rate per hectare has been on regular increase for the past 22 years, that is from the year 2000 to 2022, while the highest increase took place between 2020 and thereafter. However the major source of income for financing the taungya farming is from individual/personal contribution. Annual income from yam sales dominated income from other arable crops and also income realized in Ovia North East local government area dominated income in every other locations considered in the study. The yield of arable crops in taungya system varies within the years of the mandatorily allowable period of three years. First year yield dominated the yield of subsequent years due to high soil fertility witnessed in the first which declines as the years progress and also due to the nature of tropical forest soils where fertility lies in the biomass. Inadequate monitoring is the predominant problem militating against taungya land tenure system because the arrengement needs to provide sufficient security for sustainable tree plantation programme while ensuring that the rights of farmers are maintained.

Plates 1 & 2: taungya farm along with arable crops

Table 4: Land rate per hectare in Edo State (₦/ha)

Locations	Year					
	2000-2003	2004 -2007	2008-2011	2012-2015	2016-2019	2020 Above
Ovia N. E.	2000	2500	2500	5000	6000	10000
Etsako W.	1500	2000	2500	3000	5000	7500
Uhunmwuonde	2000	2500	2500	5000	6000	10000
Esan N. E	1000	2000	2000	3000	4500	6000
Orhiomwon	2000	2500	2500	5000	6000	10000
Ikpoba-Okha	2000	2500	2500	5000	6000	10000
Mean	1750^{d}	2333^{d}	2417^{cd}	4333^{c}	5583^{bc}	8917^{a}

Table 5: Annual income from arable crops (₦'000)

Locations	Maize	Vegetables	Yam	Plantain	Cassava	Mean
Ovia N. E.	100	50	260	80	120	122.0^{a}
Etsako W.	78	35	220	60	100	98.6^{c}
Uhunmwuonde	80	40	250	70	110	110.0^{bc}
Esan N. E	70	30	230	40	105	95.0^{c}
Orhiomwon	90	45	250	65	110	112.0^{b}
Ikpoba-Okha	98	50	255	75	115	118.6^{ab}
Mean	86.0^{c}	41.6^{e}	244.2^{a}	65.0^{d}	110.0^{b}	

Table 6: Cost of arable crops per annum (₦'000 ton^{-annum})

Locations	Maize	Vegetables	Yam	Plantain	Cassava	Mean
Ovia N. E.	45	24	120	35	60	56.8^{a}
Etsako W.	36	17	110	30	45	47.6^{c}
Uhunmwuonde	40	20	120	35	50	53.0^{ab}
Esan N. E	35	15	112	20	50	46.4^{c}
Orhiomwon	50	22	115	30	45	52.4^{b}
Ikpoba-Okha	48	24	120	30	57	55.8^{a}
Mean	42.3^{c}	20.3^{e}	116.2^{a}	30.0^{d}	51.2^{b}	

Table 7: Yield of arable crops per hectare in Taungya practice (tons)

Year	Maize	Vegetables	Yam	Cassava	Mean
1st	7.0	3.8	14.0	11.0	9.0^{a}
2nd	5.0	3.2	11.5	9.0	7.2^{ab}
3rd	3.5	2.3	8.0	7.5	5.3^{b}
Mean	5.2^{b}	3.1^{b}	11.2^{a}	9.2^{a}	

Table 8: Problems militating against the taungya practices in the study area

Variables	Frequency	Percentage
Inadequate monitoring	45	36
Duration for land use/rent is limited	30	24
No incentive from government	25	20
Inadequate man power	22	18
Lack of extension education	5	2
Total	124	100

References

Agyeman, Y. K.; Marfo, K.A.; Kasanga, K. R. Dano, E.; Asere, A. B.; Yeboah, O.M. and Agyeman,F.(2004). Revising the taungya plantation system: Newrevenue-sharing proposal from Ghana, Unasylva 54: 40-43.

Ayuke, F.O., Rao, M.R., swift, M. J.Oponodo-Mbai, M.L.(2004). Effect of organic and inorganic nutrient sources on soil mineral Nitrogen and maize yield in Western Kenya, In: managing Nutrient cycle to sustain soil Fertility in Sub-Saharan Africa, Batimo, A. (eds),Academy of Science publishers (ASP), 65-76.

Beak Consultants and Goematics International Inc (1999). Forest resource study, Nigeria: Market Assessment and pricing policies. Report submitted to FORMECU, Abuja, 18-19.

Chamberlin, J. and Ricker-Gilbert, J.E. (2016). participation in rural land rented markets in Sub-Saharan Africa: who benefits and how much? Evidence from Malawi and Zambia, *AM J. Agric. Econs*, 98 (5): 1507-1528.

Ehui, .W. Shiferaw, B and Holden, S. (1994). Soil erosion and smallholders' conservation decisions in the highlands of Ethiopia. *World Development* 27(4), 739–52.

Feder, Y. and Nishio .U.(1999). Rural Livelihood Benefits from Participation in Taungya Agroforestry System in Ondo State Nigeria. Journal of Small-Scale Forest Economic, Management and Policy 3(1): 131- 138.

FORMECU, (1999). **The Tree Tenure Factor in Agroforestry with Particular Reference to Africa. *Agroforestry Systems* 2: 229 – 251.**

ICRAF, (1993). Agroforestry for soil conservation. Science and practice of Agroforestry, 4 Wallingford, U K: CAB International and Nairobi: ICRAF, 276.

Jayne, T.S.,Chamberlin, J., Holden, S., Ghebbru, H., Ricker-Gilbert, J. and Place, F. (2021). Rising land commodification in Sub-Saharan Africa: Reconciling the diverse narratives. *Global Food security*, 30: 100565, https;//id.org/1oio6/gfs.2021-100565. https// doi.org/10.1016/j.gfs.2021-100565.

Lele, D and J.D. stone, (1989). Agroforestry and the future of food production in developing countries. *Impact of Science and Society* 142: 127 – 141.

li, K. G. and Lai, C. K. (1998). Asia-pacific agroforestry profiles, agroforestry systems research and development in the Asia-Pacific region. Asia pacific agroforestry network (APAN) field document no. 1. Bogor, Indonesia, 34-40.

Kalu, C; Oboho, E.G. and Ihama, O.E. (2011). Economic potential of taungya farming systemin Edo State, Nigeria. *Journal of Agricultural and social Research (JABR)*, 11(1):49-57.

Madukwe, P.R. (2004). "Directions in Tropical Agroforestry Research: Past, Present and Future,"*Agroforestry Systems*, 38 (1-3) (July 1997) 223-245.

Maxwell, E and Wiebe O.I. (1992). Are tropical agroforestry home gardens sustainable? *Agriculture Ecosystems and Environment*, 41: 189-207.

Nsien, I. B.; Yakubu, F. B.; Akinyemi, G. O.; Udo, G.E.;Ogunwate, O.A. and Adejoke, F. B.(2010). Agroforestry: a tool for developing national economy, Proc. of 33rd annual conf. of Forestry Association of Nigeria, held in Benin City from 25-29th October, 157-166.

Ogundele, O. O. & Okoruwa, V.O. (2006). Technical efficiency differentials in rice production technologies in Nigeria (AERC Research Paper 154). Nairobi, Kenya: *African Economic Research Consortium*. **38, (1-3): 223-245.**

Okoro S.P.A (2002). Forest product in Edo. In forest people and the environment, proceedings of a National Workshop organized by FANCONSULT and Edo State Chapter of Forestry Association of Nigeria. Head in Benin City, Edo State (Popoola I. Eds) 5th and 6th September, 295 -300.

Pandit, . S. J, and E.U Thapa (2003). Technology impact evaluation in agroforestry projects. *Agrofor. Syst*., 13: 235–257.

Pouliot, M., Treue, T.Obiri, B. D. and Ouedraogo, B (2012). Deforestation and limited contribution of forests to rural livelihoods in West Africa: evidence from Burkina Faso and Ghana, Ambio, 41 (7) 738-750.

Rasul, G. and Thapa G. B (2003). Shifting Cultivation in the Mountains of south Southeast Asia; Regional Patttterns and Factors influencing the change, land Degradation and development. 14, 495-508.

Soil Survey Division (1990). Soils of Nigeria, Soil Survey Division, Federal Department of Agricultural Land Resources (FDALR) Nigeria, Scale 1:100,000, 35.

Starfinger,M. (2021). Financing smallholder tree planting: Tree collateral and Thai Tree Banks; Collateral 2.0, Land use policy in press (5). DOI:10.1016/j.landusepol.2021.105765.

Wiersum, K. F. (1982). Tree Gardening and Taungya on Java: Examples of Agroforestry Techniques in the Humid Tropics. *Agroforestry Systems* 1: 52-70.