Influence of Extension Education on Household Adoption of Forestry Conservation Practices in South Eastern Nigeria

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Abstract

Extension education programmes were observed to have positive impact on different sectors of the economy in developed societies. However, forestry and other natural resources sub-sectors in Africa and by extension, Nigeria still lag behind and its growth and development is nothing compared with other sub-sectors. This paper reports the influence of conservation and extension education programmes on the adoption of conservation practices by households in Anambra State, south-eastern Nigeria with the view to determining the impact of education on natural resources conservation and development. The study was targeted at household heads across selected communities in Aguata agricultural zone of Anambra State, Nigeria, using, village group meetings and two sets of structured and open ended questionnaires. Information was sought on respondents' participation levels in extension education and relative adoption rates of household level conservation practices. Data obtained were analysed using descriptive and inferential statistics. Awareness and education programmes considered include governmental and non-governmental conservation programmes earlier executed in the study area, Anambra State Agricultural Development Programme (ADP) extension services as well as conservation/forestry extension

training and education provided specifically for the study being reported. Respondents' consent to participating in identified conservation programmes in the study area was highest (91.6%) for conservation of trees that are located away from their residence. This was followed by training in poultry and wildlife domestication (90.4%). The least interest was expressed for arable and tree crop mix on the same land (10.8%). Also, planting of palm and exotic trees in the study area were found to have stemmed from the households' access to government extension services (χ^2= 7.3 and 4.6; df = 2) and the research organized through forestry extension education/ awareness training (χ^2 = 15.1 and 9.7; df = 1). Respondents' Participation in past conservation education programmes has impacted on poultry and wildlife domestication (χ^2= 8.16; df = 2), agri-silviculture (χ^2= 12.8; df = 2) and land management practice (χ^2= 4.8; df = 2) activities in the study area. Village level discussions showed that respondents' would readily adopt innovations, which are compatible with their traditional agricultural practices although such adoption will depend on the frequency of their exposure to innovative programmes. It was also found that Local conservation programmes and activities especially for the informal sector of the economy can be made more robust and better executed periodically and jointly too by public and private organisations and stakeholders.

Keywords: Extension services, education programmes, conservation practices

Introduction

Man has from pre-historic times engaged in various forms of agricultural and forestry practices to support his daily needs. In most countries of the world and particularly in most of the emerging economies; Bangladesh, Brazil, China, Egypt, India, Indonesia, Mexico, Nigeria and Pakistan, natural resources exploitation and use are germane to human survival. Prior to civilization, Africans had engaged in tree growing, compound farming, wildlife hunting and gathering of forest fruits and leaves as well as timber/wood conversion using local

methods (Rodgers, 2003). However, modern forestry practice in the tropics particularly in Africa is relatively novel compared to several other development-based activities that can be practised on a sustainable basis (Agnoletti, 2000). Also, trial uses and domestication of natural resources, which form the basis of sustainable resources management (SRM) at grassroots levels can be stepped up through unrestricted access to knowledge and information to households and communities, particularly small scale landholders and owners who according to Environmental Right Action (ERA) form central target in sustainable development programmes (Ayanwuyi, 2013; Nyewusira and Nweke, 2014).

In the light of the above, it is worthy of note that the contribution of government and private agencies as well as natural resources stakeholders is key to providing the stimulus and drive for sustainable development. Mapira and Mazambara (2013) reported the contribution of indigenous knowledge systems on most aspects of Africa's pre-independence development processes. This however, changed with the introduction of western orientation in the 1900, when impetus was given to modification of cultural and traditional lifestyles and practices (Murtala, 2013). One aspect of such modification is the perception of the environment as a resource that needs to be preserved and managed sustainably. This has broadened the scope of environmental consciousness and awareness through action-based programmes and projects especially those targeting local populations. Sequel to this, the forestry sub-sector and environment sector in general have in different times signed international codes and conventions directed at empowering people through education and policy to manage their environment in such a way that it benefits future populations. In spite of this, the forestry sub-sector in Africa still lags and its growth and development is not at par with other sub-sectors, especially agriculture. The need to assess the adoption of conservation activities and measures, which is viewed as a green economic development activity at household level therefore becomes apt.

Extension education programmes in different disciplines and sectors as observable in developed societies reveal massive changes, which have impacted on different sectors of their economy (Ekpere,

1991). Some reports and reviews of sectoral growth have shown gaps, which can be traced to poor/low capacity for adoption of new technologies and innovations by some population groups on the one hand as well as planning and content of such technology/development activities on the other hand (FAO, 1988). Unlike the large scale capital intensive projects of different governments to mitigate the widespread natural resources losses, low cost strategies like public awareness and education have proven to be one formidable fallback option for success in sustainable development and programmes directed at the grassroots (Ezezika and Adetona, 2011).

Africa recorded comparatively lower but sustainable rate of growth in various agricultural sub-sectors during her pre than post-independence era (Simenson, 2008). Thus, this study assessed the impact of extension awareness/enlightenment on the adoption of conservation practices by households as a measurable aspect of sustainable development in natural resources conservation. Findings are expected to justify further investment in the sector. Research outputs will lay credence or otherwise to numerous local conservation and development programmes of governments and non-governmental organisations (NGOs) and their contents for possible replication or modification.

Study area

The study was conducted in three communities (namely), Umuchu, Ekwulobia and Igboukwu in Aguata agricultural zone of Anambra State, Nigeria. Anambra State was a major port of arrival of the colonial masters in eastern Nigeria en route the Niger River (Ekechi, 1972). This historical significance has placed the area on the map of locations of interest in gauging development trends arising from colonization. Anambra State is located between latitude 6^{o} 75′N and longitude 7^{o} 06′E. Before the advent of the Europeans, the Eastern region of Nigeria was organised into kingdoms administered by traditional rulers and local chiefs. Desk reviews and reconnaissance of development trends in the area revealed that post-independence development has been driven by both the public and private sector including some conservation and training programmes.

Political changes in Eastern Nigeria have seen the emergence of five States (Abia, Anambra, Enugu, Ebonyi and Imo) out of the two States (Anambra and Imo) in the old Eastern region after independence. Anambra State has an average land area of 486,500ha with per capita land size of 4.126ha (NBS, 2009). Forest area per capita in Anambra State is 0.008ha (FGN, 2007). Records have also shown that literacy rate in Nigeria as at 1950 was 15.6%. The National Population Commission (NPC) reposes that in 1991 (after over 40 years), the literacy rate in Nigeria was just 33.0% while NBS (2010) reported 56.9% adult literacy in 2010 (50 years after independence). Despite the progressive advances in literacy rate (education) and economic growth reported by different authorities, Nigeria is yet to record self-sufficiency in food, fibre (wood) and other forest products supplies. Part of the culpable reasons is that the public sector (government) controls most of the production-based activities in different sectors, which are also poorly managed. For instance, the forestry sub-sector is controlled by government and administered through the Department of Forestry which is grossly underfunded (Adegeye and Azeez, 2006). Again, Erakhrumen (2007) highlighted shallow curricular content of the few existing forestry departments in tertiary institutions in Nigeria. Furthermore, unlike other agricultural disciplines, there is low popularization of forestry extension as a programme of study in the tertiary institutions.

Apart from this, average forest cover is lowest in eastern Nigeria (Nzegbule, 2008). As an indirect consequence of these, the bulk of interventionist programme of government in eastern Nigeria is channelled towards ecological rehabilitation projects particularly erosion control and land stabilization (SEEDS, 2010). Thus, the need for a multi-stakeholder conservation effort and participation in the region cannot be overstressed.

Methodology

The study was conducted by a team comprising rural sociologists, forestry/conservation extension experts and facilitators. The study targeted indigenous resident population in the selected communities and different techniques were employed at different stages of the research. First, the team engaged in different levels of group meetings (Village Group Meetings) with the residents, followed by

administration of semi-structured questionnaires. Lastly, the project conducted focus group discussions with some selected village heads to obtain further information and clarifications on pertinent issues meriting further probe from the discussions.

Village Group Meetings were held with cross-sections of household heads (or representatives) at their village halls to obtain relevant background information on past conservation education and development programmes as well as knowledge gained in the programmes. Next, two sets of questionnaires were administered to the households (respondents). The first set of questionnaire covered respondents' socioeconomic data, conservation practices adopted, followed by exposure/participation in past conservation education/ awareness as well as access to government extension service at least five (5) years prior to the survey.

Next, the respondents were engaged by the forestry/ conservation extension research team members. Different aspects of forestry activities, their benefits and returns with pictorial demonstrations were analysed while question and answer sessions were taken at the end of the exercise. During each of the above sessions, respondents were given light refreshment as incentive to secure their full attention and active participation. The second set of questionnaire was designed and administered to assess level of respondents' interest in various household-level conservation practices as a result of forestry/ conservation extension training and awareness. Thereafter, respondents were allowed to take home the second set of the questionnaire to digest the research training received. Questionnaires were later completed and returned through designated links-persons in their respective villages. Out of a total of 150 sets of questionnaires administered after the extension exercise provided by the research, 115 were completed and returned.

Data obtained were analysed using both descriptive and inferential statistics. Means and percentages (descriptive), as well as chi-square (inferential) were used in the analysis. Chi-square tested the degree of dependence of conservation and awareness programmes

respondents participated in with conservation and forestry development practices adopted by respondents over time.

Results and discussion

Socioeconomic variables of the respondents

More than half (71.0%) of the respondents were males (Table 1). Also, almost half of the respondents' (49.6%) were aged between 46 and 65 years while just 23.5% were between ages 24 and 45 years. The age distribution of the respondents put a strong question mark on their productive ability, since most of them are on the verge or already above productive age. The perennial difficulty of African governments as well as concerned groups and individuals to effectively blend modern scientific knowledge acquisition with application of indigenous conservation practices especially in the area of afforestation may rear its ugly head in the study area. As earlier mentioned, though age distribution may limit productivity in the study area, the observed mean age of 51.3 years (Table 1) lends credence to assumed residents' acquisition of sufficient indigenous knowledge and local experience on the progress and development trends before and in post-independence Nigeria (1960 to date) at least around their communities.

Marital status distribution among respondents' is skewed (68.7%) towards those that are married. Those unmarried are just 14.8% of the entire population that were interviewed. On literacy (Table 1), about 48.0% could read and write in English language, suggesting that they had acquired some level of western education. However, about 16.5% of the respondents' had no formal western education (illiterate). Also worthy of note is that from discussions with respondents, 34.8% rely on informal, indigenous knowledge for most of their daily activities and so would not affirm or deny their literacy status. From 1900 up to 2006, population of Nigeria has soared from about 8,500,000 to over 140 million respectively. This population surge has perceivable attendant impacts on agricultural land which are already fragmented and almost exhausted. From the result (Table 1), more than half of the residents in the area (54.0%) tend to settle for medium sized number of households (5 – 10 persons) against large households (>12) which obtained during the colonial and pre-independence era. Comparatively, higher literacy

rate and reduced household size are presumably manifestations of adaptive survival instincts in response to economic changes and competitiveness in resources distribution and control.

Table 1: **Socioeconomic background of the respondents (N= 115)**

Variables	Category	Frequency	
Gender	Male	82	71.3
	Female	27	23.5
	No Response	6	5.5
Age	24 – 30	4	3.5
	31 – 45	23	20.0
	46 – 65	57	49.6
	>65	12	10.3
	No Response	19	16.5
	Mean	51.3	
Marital Status	Single	17	14.8
	Married	79	68.7
	No Response	19	16.5
Literacy Rate	Literate	56	48.7
	Illiterate	19	16.5
	No Response	40	34.8
Household size	<5	25	21.7
	5-10	62	53.9
	>10	19	16.5
	No Response	9	7.8
	Mean	7.4 (Approx.=7)	
Religion/Denomination	Anglican	35	30.4
	Catholic	28	24.3
	Other Christians	17	14.8
	Traditional religion	8	7.0
	No Response	27	23.5

Results of the study also presented Christianity as a form of belief system prevalent across the area. The results (see Table 1) revealed that over 65.0% were christians adherents of different denominations in the study area, which attest to the sharp and rapid replacement of African Traditional Religion (ATR) with Christianity

unlike the case before colonialism. Some sacred grooves and evil forests reported in most literatures as originally existing across the study area had disappeared and their rapid losses can be linked to the acceptance and popularity of the Christian faith across the study area (Emeasoba, 2013).

Conservation awareness and capacity of the residents for development

Meetings with the community members indicated that conservation awareness and development programmes had been executed by public and private organisations. Some notable conservation programmes in the study area include but not limited to the Soil Conservation Scheme (SCS) by Colonial Welfare and Development Fund (1950) as well as the Ecological Disaster Relief Programme (EDRP) by National Ecological Fund (1989). Others were the Nigerian Erosion and Watershed Management Programme (NEWMAP) by the Federal Government of Nigeria; Women in Development and Environment (WiDE) programme led by Worldwide Network Nigeria (1997) as well as the Habitat Conservation Programme (HCP), an arm of the World Igbo Environment Programme (WIEP) in 2007.

Table 2: **Respondents' household land holdings, level of participation in conservation education programmes and access to government extension services (n=115)**

Variables	Category	Frequency	Percentage	Mode
Estimate of size of household land (ha)	<1.0	41	35.7	<1.0
	1.0 – 2.5	28	24.3	
	2.5 – 5.0	10	8.7	
	>5.0	6	5.2	
	No Response	30	26.1	
	Mean	1.85		
Participation level in past programmes in the area	Not at all	22	19.1	Active participation
	Low participation	16	13.9	
	Active participation	45	39.1	
	No Response	32	27.8	
Accessed government extension service within last 5 years	None	55	47.8	None
	Less than 10 times	14	12.2	
	More than 10 times	9	7.8	
	No Response	37	32.2	

Table 2 shows respondents' level of participation in all the past conservation education and awareness programmes in the study area. One outstanding local development programme respondents recalled in the study area was the WIEP massive awareness programme put up by an NGO in 2007. Nonetheless, not less than 20.0% of the respondents reported having different frequencies of contact and knowledge from government extension agents over the past 5 years. On respondents' involvement in local conservation training, about 40.0% active participation was recorded, indicating the comparative levels of drive, which community-based programmes' can have on indigenous population. Discussions with selected village heads also revealed that NGO activities in the study area had more penetrating effect on the average community members. This may be why more respondents (53.0%) participated in local-based education and awareness

programmes anchored mostly by NGOs compared to government extension services (23.0%). Invariably, the impact of NGO in improving local contents in the study area cannot be overemphasized. This would have a far reaching and multiplier effect on the level of success of externally-driven community development projects and empowerment programmes in the study area. However, strategic collaboration among private, government and non-governmental bodies involved in natural resources conservation and knowledge extension would provide more satisfactory outputs and results for sustainable development, given the import of government agencies at mobilizing international support for development activities.

The results also give the mean size of land owned by the respondents, which is less than 2ha (1.85ha.). In the 1900s, average land size of households in SE Nigeria as documented in Federal Office of Statistics in 1970 is about 5.66ha (Uwakoye, 2007), indicating over 60.0% decrease. Analysis of household livelihood systems and natural resources management at the grassroots level indicated that continental and national policies relating to equitable land access and reforms in tenure and property holdings appear to be a mirage and at the detriment of natural conservation goals (UNDP, 2006). The downward trend in some key household production indices and development of the informal sector are limiting the sustainability and realization of already set overall national development goals. Thus, land tenure across Africa needs holistic reform in line with current globalization trends if the continent is to catch up with sustainable development opportunities, most especially those associated with land use. Thus, in Anambra State, there is a more precarious challenge to formulate a practicable community and household land use and access initiative in addition to a commensurable extension programme, which can stimulate or drive significant local development in the mid and long run.

Levels of Awareness and Adoption of Conservation Practices by Households

Respondents' consent to participating in identified conservation programmes in the study area (Table 3) was found to be highest (91.6%) for conservation of trees that are located away from their residence. This was followed by training in poultry and wildlife domestication (90.4%).

The least interest was expressed for arable and tree crop mix on the same land (10.8%). Also, worthy of note is the interest to participate in conservation of trees closer to respondents' residence (47.0%) compared to those farther off (Table 3). This and the lack lustre interest in agrisilvicultural practice said a lot about respondents' awareness of the import of green to their environment. It may also be responsible for the growing displacements and incessant dislodging of some residents by gullies in the study area.

Table 3: **Impact of respondents' participation, access of government extension services and forestry extension education on identified conservation programmes in the study area**

Identified Conservation programmes and activities	**Participation in past conservation education programme (N=83)**	**Accessed government extension service within 5 years (N=78)**	**Forestry extension education/ awareness (N=115)**
	Freq.	Freq.	Freq.
Planting palm tree	43(51.8)	37(47.4)	72 (62.6)
Planting exotic fruit trees	-	52(67.0)	79 (68.7)
Raising woodlots	-	-	42(36.5)
Planting medicinal herbs	-	-	49(42.6)
Poultry, snailery, grasscutter /wildlife domestication	75 (90.4)	18(23.1)	51(44.3)
Planting ornamental shrubs	-	-	13(11.3)
Combining food crops production with growing improved tree crops	9 (10.8)	46(59.0)	33(28.7)
Apiculture	-	22(28.2)	-
Conserving existing trees away from surroundings	76 (91.6)	59(75.6)	97(84.3)
Conserving existing trees around the surroundings	39 (47.0)	23 (29.5)	51(44.3)
Adopting appropriate agricultural land management practices to minimize erosion	42 (50.6)	41(52.6)	102(88.7)

Values in parenthesis are percentages of responses

On access of government extension services, the study (Table 3) revealed that government extension services covered all identified conservation programmes except planting of ornamental trees, raising woodlots and planting medicinal trees. The forestry extension education that was put up mainly for this study also covered all identified conservation programmes in the study area except training or education in apiculture. However, while majority of the respondents took interest in sustainable land management practice (88.7%), the least interest was expressed for the planting of ornamental shrubs (11.3%). Also, worthy of note was that even after extension education (Table 3), less interest was accorded conservation of trees closer to residents' (44.3%) compared to those away from home (84.3%). However, forestry extension education was found to rouse appreciable interest (Table 3) in the planting of exotic fruit trees (68.7%), palm trees (62.6%) and medicinal herbs (42.6%) as well as in wildlife domestication (44.3%) and raising woodlots (36.5%). This suggested that respondents' are not entirely averse to natural resources conservation but may have traditional ways of attending to it, the cognisance of which those designing extension education for this part of Nigeria need to take.

Table 4: **Summary of chi-square (χ^2) test of dependence of identified conservation programmes in the study area on respondents' participation, access of government extension services and forestry extension education**

Identified Conservation activities	**Participation in past conservation education and awareness programmes**	**Access to government extension service within past 5 years**	**Forestry extension education/awareness**
Variables	**χ^2 Value (df=2)**	**χ^2 value (df=2)**	**χ^2 value (df=1)**
Planting palm tree	0.571	7.343*	15.144*
Planting exotic fruit trees	-	4.640*	9.663*
Raising woodlots	-	-	0.085
Planting medicinal herbs	-	-	0.101
Poultry, snailery, grasscutter/wildlife domestication	8.157*	2.800	0.003
Planting ornamental shrubs	-	2.800	-
Combining food crops production with growing improved tree crops	12.769*	13.012*	12.906*
Apiculture	-	0.048	-
Conserving existing trees away from surroundings	3.018	5.389*	4.470*
Conserving existing trees around the surroundings	3.283	3.708	3.921*
Adopting appropriate agricultural land management practices to minimize erosion	4.843*	6.348*	8.947*

Chi-Square: 1df = 3.84; 2df = 5.99
*Values are significant at 0.05 probability level

As shown in Table 4, planting of palm and exotic trees in the study area were found to be impacted by access to government extension services (χ^2= 7.3 and 4.6; df = 2) and the research organized forestry extension education/awareness training (χ^2 = 15.1 and 9.7; df = 1). As observed by FAO (1994), the long gestation period for tree growth is a major reason for disinterest in tree growing among people. Extension training on technological and scientific innovations in tree genetic improvement organised specifically for this study has proved to be a useful tool in driving respondents' interest in the growing of palm and exotic fruit trees in the study area. From discussions, growing of tree crops could be encouraged by governments through provision of free tree seedlings and other inputs on a continuous basis in order to sustain respondents' interest in forest conservation activities or practice in the study area.

Apart from these, experience and knowledge accrued through residents' access to government extension service in addition to forestry /conservation extensionists' services during the study influenced their interest in palm planting. This is same with conserving existing trees away from the surroundings. Opinions from focus group discussants also confirmed that residents' exposure to and contacts with extension experts were instrumental to their adoption of conservation-based activities. Orisakwe and Ozioma (2011) had earlier iterated rate of adoption of agroforestry technology as dependent on the involvement of local farmers who are influenced by frequency of contact with extensionists. Experience has shown that most improved palm seedlings and exotic fruits have potentials of fruiting and maturing in less than 5 years and the produce can generate significant income and also serve as a source of employment for jobless youths.

Participation in past conservation education programmes has impacted on poultry and wildlife domestication (χ^2= 8.16; df = 2), agrisilviculture (χ^2= 12.8; df = 2) and land management practice (χ^2= 4.8; df = 2) activities in the study area (Table 4). Also, worthy of note is that while access to government extension services and forestry extension education had impacted conservation of trees away from respondents' homes (χ^2= 5.4 and 4.5; df = 2 and 1), it is only the latter that had impacted conserving trees that are farther from respondents' homes (χ^2=

3.9; df = 1). Thus, irrespective of the education status of the respondents', conservation practices of tolerating the conservation of trees around homes and surroundings should be included in sustainable household land use practice education as a follow up extension service programme in the study area. The lesson that could be drawn from this is that participation or awareness programmes alone would not keep the tempo of any development project. Rather, the designing of a well-articulated and properly funded extension services would be more apt. Invariably, forestry conservation practice in south-eastern Nigeria will be boosted if conservation awareness programmes can be backstopped by effective and efficient extension services.

Land stabilization against erosion incidence, beautification and shade provisions using trees are also laudable practices which desire community acceptance and promotion in the near future. There were conservation practices which recorded spectacular disinterest by respondents for adoption. These include raising woodlot, planting medicinal herbs, livestock and grasscutter domestication, growing ornamentals and beekeeping. The above are important conservation practices which have the potential to improve aggregate forest cover and improvement of the livelihood of households in the region. Local community conservation programmes will be more successful if packaged and executed by different conservation experts and those whose programme contents have robust and varied forestry components.

Conclusion

Public education through enlightenment and awareness has a crucial role to play in stimulating community and household natural resources conservation practices. Although indigenous residents may be seen as weak and less receptive to new technologies and innovations, locally compatible practices and appropriately designed household-level conservation activities with proper and periodic follow-ups will improve the success of local-based programmes. Funds and investments, which go into mitigating ecological disasters, will be better utilized for rural livelihood improvement when directed at natural resources conservation and development activities. Such will stimulate significant and sustainable development in households and community

conservation practice most especially where synergy can be forged between government and non-governmental extension and rural development agencies. Also, worthy of mention is the need to take the issue of local materials seriously in extension contents for natural resources conservation and environmental awareness education.

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