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Managing of risks in agriculture: Benefits of conservation of forest resources in Anambra State, Nigeria

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Forest management offers a promising alternative to depletion of forest resources. Continuous degradation of the forest reserve base has major effects on other segments of the economy. This includes reduction of forest cover leading to erosion and soil degradation. This study assessed the roles of farmers in conservation of forest resources; benefits of conservation of forest resources in the area and reasons for loss of forest resources in the area. Multi-stage sampling procedure was used to select 120 respondents for the study. Data were analysed with the use of descriptive statistics. Results show that reasons for loss of forest resources in the area included: Excessive farming (M=2.8) and rapid urbanisation (M=2.0). Roles of farmers in conserving forest resources were: avoidance of illegal hunting and poaching (M=3.0), practicing continuous forestation (M=3.2) and prevention of bush burning in forest areas (M=3.3). Benefits of conservation of forest resources in the area included: Protection of forest cover (M=2.3), prevention of climate change (M=2.4) and retaining economic benefits from the forest (2.5). Hence it was recommended that there should proper planning for farming and urbanisation for conservation of forest resources in the area.

Key words: Risks, conservation, forest.

INTRODUCTION

Risks in agriculture manifest in diverse forms. Risk can be defined as exposure to variability in future outcomes (Miller et al., 2004). The key fact driving risk is that such outcomes are uncertain. The risks that farmers face result from numerous sources of change or uncertainty. Some of these are related directly to the farm business and would not exist were it not for the farm. Others are related to our involvement in a farm business as individuals (Miller et al., 2004). The economic stability of an entire rural area can be jeopardized by crises caused by different types of natural disasters and risks, from climatic events to livestock or plant diseases. Economic crises caused by the changes of market conditions may also endanger farm's viability. It is well known that forest contribute a lot to local livelihood. Forests are fundamental to food security and veritable storehouses of biological diversity and forest products, which are the mainstay of many households. These products play

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significant roles in the lives of rural people. They also reduce the vulnerability of the agricultural section to adverse natural and socio-economic factors and other risks and above all strengthen self reliance. However it is faced with degradation induced by many factors.

These factors are varied and caused by many agents. The demand for welfare and social infrastructure, and high good requirement were always at the expense of the fertile forests land. The pressure by man, animals and environmental agents on forests has made the soil become quickly impoverished and unable to sustain agricultural production. These also result to unprecedented and alarming threats to biodiversity throughout the world especially forestry resources. Deforestation in the tropics accounts for up to 20% of global emissions of carbon dioxide, making it the second most important contributor to climate change after the combustion of fossil fuels and the largest source of greenhouse gas (GHG) emissions in the developing world (Houghton, 2005). Food and Agriculture Organisation's (1998) states that forest degradation takes different forms, particularly in open forest formations, deriving mainly from human activities such as overgrazing, over-exploitation (for firewood or timber), repeated fires, or due to attack by insects, diseases, plant parasites or other natural causes such as cyclones. However, forests have an important role to play in global hydrological cycles, affecting rainfall patterns and temperature regimes.

Deforestation or loss of vegetation or the selective exploittation of forests for economic or social reasons is very common in Nigeria. In most areas major losses have been recorded in vegetation, forest complexity (diversity), or in germplasm (quality). The deforestation rate in the country is about 3.5% per year, translating to a loss of 350,000 to 400,000 ha of forest land per year and recently, it was shown that forests now occupy about 923,767 km^2 or about 10 million ha (Ladipo, 2010). This is about 10% of Nigeria's forest land area and well below FAO's recommended national minimum of 25% and between 1990 and 2005 alone, the world lost 3.3% of its forests while Nigeria lost 21% (Ladipo, 2010). Also, according to Adeyoju (2001), the total forest estate which stood at 10% of the country's land area in 1996 is now less that 6%. Also, interdependence between population and environment has been endangered and broken down as problems and risks of deforestation, soil erosion, flooding and pollution increases. Hence, there is need for risk management through conservation of forest resources.

Risk management in agriculture is an essential tool for farmers to anticipate, avoid and react to shocks. An efficient risk management system for agriculture will preserve the standard of living of those who depend on farming, strengthen the viability of farm businesses, and provide an environment which supports investment in the farming sector (Miller et al., 2004). Forest management offers a promising alternative to depletion of forest resources. It involves controlled and regulated harvesting combined with silvicultural and protective measures to sustain or increase the commercial value of subsequent stands and it relies on natural regeneration of native species. Although varied in their approaches and methods, forest management systems seek to protect forest cover, ensure the reproduction of commercially important species containing economic, social and environmental benefits from the forest. It does not mean that mankind should drastically reduce or stop the consumption of forest resources. As long as mankind maintains a reasonable consumption rate and treats the forests with benign care, replenishment rate of forest resources would be higher than the consumption rate of mankind (Tai, 2004). Thus, it will be able to keep a healthy cycle [of the natural resources], prevent permanent loss of the natural resources and improve our living environment.

Forest conservation could be seen as actions taken in management of a forest that result in maintenance of the possibilities for future forest related benefits (Wollenberg et al., 2001). In principle, local people own the forest, but the management and control of forest, reserves, which cover around three quarter of forest area, is rested on the state governments (ITTO, 2005). Before the colonial era the former eastern Nigeria had successfully managed their forest resources with little or no threat to the environment. This was checked by using traditional institutions such as the family (kinship) religions, town unions, clubs, clan and kindred meetings among others. Participatory resource management is often seen as an appropriate solution to reducing resource degradation and it is generally assumed that it would ensure the equitable and sustainable use of environment resources. Through local participation, nearby communities would be engaged as stakeholders in managing the resources thus ensuring commitment to long term management goals (Chukwuone, 2007). Forest conservation world over is changing from the traditional forest management approach with technical details and absolute concentration on trees, to managing the forest in a way that ensures greater benefit flow to all stakeholders especially the forest communities (Forest Association of Nigeria, 2003). Also the UNFCCC Subsidiary Body for Scientific and Technical Advice (SBSTA) made suggestions for 'Reducing emissions from deforestation in developing countries' at the thirteenth Conference of the Parties in Bali, Indonesia in December 2007 (Saunders, et al., 2008).

Despite the existing conservation measures for management of forest resources, uncontrolled deforestation especially in eastern Nigeria, continuously leads to accelerated soil erosion and other problems. Population pressure has also aggravated gully erosion problem of Anambra State such that almost all local government areas of the state are affected through gradual removal of uniform depth of soil or gullies, which cut deep down slope.

In view of the above, the forests have been subjected to degradation, exploration, utilization and careless destruction. Also the trees in the forest within the study area are volunteer trees and consequently have considerably faced extinction and perhaps diminished in quantity and quality to such extent that it is inadequate for rural needs, hence posing environmental, biological, cultural, medical and nutritional problems. Hence, there was need to answer the following questions: What are reasons for loss of forest resources in the area? What are the roles and methods of farmers in conserving forest resources in the area? and What are the benefits of conservation of forest resources in risk reduction in the area? These questions gave rise to the objectives of the study.

Objectives

The objective of the study was to investigate the ways of managing of risks in Agriculture and ascertain benefits of conservation of forest resources in Anambra State, Nigeria. The specific objectives were to:

1. Ascertain reasons for loss of forest resources in the area;
2. Identify roles and methods of farmers in conserving forest resources in the area and
3. Ascertain benefits of conservation of forest resources in the area.

METHODOLOGY

The study was carried out in Anambra State, Nigeria. Multi-stage sampling procedure was used to select 120 respondents from existing farmers' organisation. Data were collected through the use of interview schedule. The population of the study comprised all the people engaged in forestry activities. Anambra State is made up of three senatorial zones, namely: Anambra North, Anambra Central and Anambra South with seven local government areas (LGAs) allocated to each zone (www.igbofocus.co.uk). In the first stage, Two out of the three senatorial zones were purposively selected for the study (Anambra North and Anambra South). One Local Government Area (LGA) was purposively selected from each selected zone (Awka South LGA-Anambra North Zone and Orumba South LGA- Anambra South Zone) while two communities each were also purposively selected from each LGA (Awka South LGA-Enuorji and Adabebe communities, Orumba South LGA- Umuchu and Umuomaku communities). The reason for purposive selections was because of the existence of traditional forests in those areas. A list of 40 people engaged in forestry activities was compiled in each community based on their villages and hamlets/kindred from which 30 respondents were randomly selected giving a total of 120 respondents for the study. Data were analysed with the use of descriptive statistics (percentages and mean scores).

In order to ascertain the respondents' roles and methods of conservation of forest resources, the respondents were asked to tick the roles and methods on a 5-point likert type scale of strongly agreed (SA), agreed (A), disagree (D), strongly disagree (SD) and undecided with nominal values of 5, 4, 3, 2 and 1, respectively. The respondent mean score were obtained for each response option. A cut off point of 3.0 was used to indicate the major roles and methods used by the respondents. Also, to ascertain the respondents' perception of the reasons for loss of conservation of forest resources and benefits of conservation, the respondents were asked to tick the possible reasons for loss and benefit on a 3-point Likert type scale of: major reason/major benefit (3), minor reason/minor benefit (2) and not a reason/benefit at all (1) with nominal values of 3, 2 and 1, respectively. The respondent mean score were obtained for each response option. A cut off point of 2.0 was used to indicate the major reason for loss and major benefits of conservation according to the respondents.

RESULTS AND DISCUSSION

Reasons for loss of forest resources in the area

Entries in Table 1 show that the major reasons for loss of forest resources according to the respondents were excessive farming (M=2.8), insufficient economic incentives for conservation (M=2.5), inadequate resources for monitoring system (M=2.5), inadequate technical support for conservation of forest resources (M=2.3), limited government investment in forest conservation (M=2.3), illegal logging and poaching (M=2.3), burning of forest areas (M=2.2), existence of land-use and infrastructure planning (roads, new settlements) that does not take into account protected areas (M=2.1), rapid urbanization (M=2.0), climate change and global warming (M=2.0), population growth and density (M=2.0) and decreasing soil fertility (M=2.0). This implies that clearing of forest area as a result of excessive farming is the major reason for loss of forest resources among other reasons.

This is in line with Contreras-Hermosilla (2000) who stated that shifted cultivators, private and government logging companies, mining and oil and farming corporations, forest concessionaires and ranchers clear forest lands or selectively exploit forests for agricultural expansion, to subsist, formining, to obtain forest products and fuelwood, etc. Similarly, agricultural concerns clear large tracts of forest lands in Malaysia and Indonesia to establish agro-industrial plantations (Kartodiharjo and Supriono, 2000). Also according to Boon et al. (2009), the factors causing the depletion of the forests include excessive legal and illegal logging, unsustainable farming methods, annual bushfires, surface mining and infrastructural development. Underlying these deforestation driving forces are forest policy failures, unrealistic forest fee regimes, external prices of timber, weak institutional structures, and population pressures (Food and Agriculture Organisation, 2001). Government policies for forest conservation are either inactive insufficient. Powell (2009) opined that there is deficiency in comprehensive and specific policies to encourage development of forestry practices. This implies that forest resources are faced with risks and are not conserved mostly due to human activities in forest areas and in most cases, forest degradation does not show as a decrease in the area of woody vegetation but rather as a gradual reduction of

Table 1. Distribution of respondents according to reasons for loss of forest resources in the area.

Reasons	Mean (M)
Excessive farming	2.8*
Insufficient economic incentives	2.5*
Inadequate resources monitoring system	2.5*
high level of poverty among community members	2.5*
Inadequate technical support for conservation of forest resources	2.3*
Limited government investment in forest conservation	2.3*
Illegal logging and poaching	2.3*
Burning of forest areas	2.2*
Land-use and infrastructure planning (roads, new settlements) does not take into account protected areas	2.1*
Rapid urbanisation	2.0*
Climate change and global warming	2.0*
Population growth and density	2.0*
decreasing soil fertility	2.0*
Excessive harvest of resources	1.9
Insufficient training and education for forest conservation	1.9
Unpriced forest goods and services	1.9
Inadequate conservation laws	1.8
Pest and diseases	1.6
Floods	1.6
Cattle ranching and overgrazing of forest areas	1.6
Limited local people participation in management of resources	1.5
Limited awareness on need for conservation	1.3

*Major reasons for loss of forest resources in the area.

biomass, changes in species composition and soil degradation. Also, unsustainable logging prac-tices can contribute to degradation if extraction of mature trees is not accompanied with their regeneration or if the use of heavy machinery causes soil compaction or loss of productive forest area. Therefore there is need for sensitization of farmers, researchers and government on the benefits of conservation of forest resources.

Also, insufficient economic incentive for conservation is a major reason for loss of forest resources. Labor, capital and input for instance are needed for efficient forest con-servation practices. Shortage of these hinders adoption of these practices especially for different tasks in forest conservation especially seedling production, tree establishment and management. The human capacity, infrastructures and institutional supports for forest practices are usually not as well developed as for annual crop technologies (Gladwin et al., 2002). Also according to Powell (2009), lack of suitable infrastructure to sort, grade, and stabilize and add value through processing to non tree forest products (NTFPs), other specialty crops and niche production hinder the practice of forest conservation.

Roles and methods used by farmers in conserving forest resources in the area

Table 2 comprises the roles and methods use by farmers in conservation of forest resources in the area. The roles played by farmers in order to conserve forest resources in the area included: Prevention of clearing of forest area for agricultural purpose (M=3.3), prevention of bush burning in forest areas (M=3.2), provision of forest guards for forest preservation (M=3.2), imposition of fines/sanctions on illegal exploiters (M=3.2), practicing continuous forestation (M=3.2), making laws against indiscriminate felling of trees (M=3.1), involvement of local people in the conservation movement (M=3.1), making laws against clearing of forest area for settlement (M=3.0), prevention of illegal hunting or poaching (M=3.0) and prevention of grazing in the forest area (M=3.0). This implies that the most important of the major role played by the farmer is prevention of clearing of forest areas for agricultural purposes and the respondent try as much as possible to leave forest resources protected.

Also, methods used by the farmers include: adopting agro-forestry practices (M=3.1), group formation (M=3.1), use of good participatory approaches (M=3.0), involvement of local leaders (M=3.0), use of improve technologies like forestation techniques forest laws and policies (M=3.0), provision of group labour (M=3.0) and use of age grade to control exploitation of forest resour-ces (M=3.0). This finding is in line with the opinion of Dosskey et al. (2011) that farmers practice agroforestry by integrating trees into agricultural systems to aid the management of the agricultural components. According

Table 2. Distribution of respondents according to roles and methods used in conserving forest resources in the area.

Roles of farmers	Mean score (M)
Prevention of clearing of forest area for agricultural purpose	3.3*
prevention of bush burning in forest areas	3.3*
Provision of forest guards for forest preservation	3.2*
Imposition of fines/sanctions on illegal exploiters	3.2*
practicing continuous forestation	3.2*
Making laws against indiscriminate felling of trees	3.1*
Involvement of local people in the conservation movement	3.1*
Making laws against cleaning of forest area for settlement	3.0*
Prevention of illegal hunting or poaching	3.0*
Prevention of grazing in the forest area	3.0*
Making source trees sacred	2.7
Investing in forest conservation not seeing the forest as only source of generating revenue	2.4
Educating their people on the benefit of conserving forest resources	2.3
Encouragement of alternative sources of energy use other than wood	2.1
Methods used for conservation of forest resources	
Adopting agro-forestry practices	3.1*
Group formation	3.1*
Use of good Participatory approaches	3.0*
Involvement of local leaders	3.0*
Use of improve technologies like forestation techniques, forest laws and policies	3.0*
Provision of group labour	3.0*
Use of age grade to control exploitation of forest resources	3.0*
Collaborations with extension agents	2.2
Collaboration with research institutes	2.0
Engaging in trainings	2.0
Collaboration of farmers in Funding	2.0
Individual approach	2.0

to FAO (2013), when designed and implemented correctly, agroforestry combines the best practices of tree growing and agricultural systems resulting in most sustainable use of land. The trees are planted or retained as farm trees and interplant with arable crops, in close proximity to the homestead where they are protected. Also, the farmers form groups and use participatory

Benefits of conservation of forest resources

According to Boon et al. (2009), the past two decades have witnessed increased attention by the world community to the issue of conservation and a wise use of forest resources. These resources are of great importance to millions of people, especially those whose livelihoods directly depend on them. Forest resources play a key role in protecting the environment and are of tremendous importance to the sustainable development of every society. Hence the uncontrolled and unsustainable methods of harvesting natural resources being employed by forest resources exploiters, investors, government agencies, individual and community members which predispose forest to risks urgently need to be checked. The benefits of conservation of forest resources were ranked by the respondents. Means of retaining economic benefits from the forest (M=2.5) ranked first, while prevention of climate change (M=2.4), protection of forest cover (M=2.3) and improvement of employment (M=2.2) ranked second, third and fourth respectively (Table 3). Other benefits included that conservation of forest resources helps to improve employment (M=2.2), improve the local climate (M=2.0), provides source of additional income (M=2.0), improve sources of forest fruits and vegetables (M=2.0). The minor benefits include that it helps to improve constant access to medicine and herbs (M=1.9), enhances soil conservation (M=1.9),generate money invested in other projects (M=1.8), aid carbon sequestration (M=1.8), provide bio-fuel and bio-energy (M=1.8), conserve biodiversity (M=1.6); improve microclimate (M=1.6), enhance water use efficiency by erosion control(M=1.5) and enhance soil fertility (M=1.5).

This implies that conservation of forest resources have tremendous benefits. According to Contreras-Hermosilla (2000), forests provide local and global unmarketable

Table 3. Distribution of respondents according to benefits of conservation of forest resources in the area.

Benefits	Mean	Rank
retaining economic benefits from the forest	2.5	1st
prevention of climate change	2.4	2nd
protection of forest cover	2.3	3rd
Improve employment	2.2	4th
improving the local climate	2.0	5th
Provides source of additional Income	2.0	6th
Improve sources of forest fruits and vegetables	2.0	7th
Improve constant access to medicine and herbs	1.9	8th
Enhances soil conservation	1.9	9th
Money generated from sustainable forest conservation is invested in other projects	1.8	10th
Aids in carbon sequestration	1.8	11th
Provision of bio-fuel and bio-energy	1.8	12th
Biodiversity conservation	1.6	13th
Microclimate improvement	1.6	14th
Enhancing water use efficiency by erosion control	1.5	15th
Enhance soil fertility	1.5	16th

benefits which may accrue to distant consumers and any loss of these benefits must be considered costs. For example, a slash and burn farmer does not pay for the global cost of increased carbon dioxide released into the atmosphere or for the increased costs of protecting dams downstream that result from his actions, nor for the loss of biodiversity or aesthetic resources associated with the forest he exploits (Contreras-Hermosilla, 2000). These costs are important for society as a whole and the private agent of forest decline. Forest conservation helps to prevent loss of forest resources.

CONCLUSION AND RECOMMENDATION

Forest resources are vital for existence rural communities. The study assessed the roles, methods and benefits of farmers in conservation of forest resources. Changes within a forest class, from closed to open forest, will negatively affect the stand or, in particular, lower its production capacity and constitute forest degradation. Also, forest degradation implies a major loss of forest productive capacity, even where there is little defo-restation as such. The study identified numerous benefits and means of forest conservation. It well established that forests provide varieties of food, fibre and medicine for humans as well as employment opportunities and income and also help in soil protection and erosion control. However this benefits derived from forest areas are been endangered by human exploitations and activities.
Hence it was recommended that:

1. Forest resources should be conserved as much as possible to enhance sustainable provision of benefits accruable from forest.
2. Trainings and extension services on improved forest management techniques should be provided for farmers.
3. Farmers and government should collaborate and provide adequate fund and facilities to the conservation of forest resources.
6. Appropriate government and forestry policies should be enacted to encourage conservation of forest resources.
7. Loggers and poachers should be encouraged to effectively control and minimise wastage of forest resources.

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