FOREST RESOURCES AND ENVIRONMENTAL SUSTAINABILITY: A FOOD SAFETY NET TO RURAL YOUTH FARMERS IN NIGERIA (A REVIEW)

AYINDE, JULIUS OLATUNDE

Department of Agricultural Extension and Rural Development, Faculty of Agriculture, Obafemi Awolowo University, Ile-Ife, Nigeria.

jayinde@oauife.edu.ng; tundeyjoy@yahoo.com; +2348035719389

ABSTRACT

This article reviewed forest resources and environmental sustainability as a food safety net to rural youth farmers in Nigeria with the aim of documenting the challenges and prospects of these concepts towards food production for vulnerable groups in the country. The forestry sector is highly important in the Nigeria's economy, given the fact that forests supply not only timbers and nutritious fruits but also fibres, fire woods and other non-timber forest products for industrial and non-industrial uses, which enhance households' income and food availability. Moreover, they provide a number of ecosystem services (habitat, biodiversity, carbon storage and so on), which, although sometimes without direct commercial value, are essential both locally and globally as a source of food safety net for vulnerable groups (youth, women and others) living in rural areas. Evidently, the forest ecosystem comprises of two components (abiotic and biotic). This article explores the concept within the context of specific disciplinary areas and sets forth for a basic understanding of the term "environmental sustainability" as an expansion of common perception of the nature of human activity. It also connects the ecological concept of interdependence of man and his environment; serve as a source of information for environmental and agricultural development managers which may enhance food production based on the reviewed policies and programmes. However, these might eventually ensure quality policy formulation in area of forest management, and possibly encourage youth involvement in forest conversation programmes of government and non-governmental organisations that focused on food production in the country, in nearer future.

Keywords: Forest resources, environmental sustainability, food safety net, rural youth farmers.

INTRODUCTION

A forest is a complex ecosystem which is predominantly composed of trees, shrubs and is usually a closed canopy. Forests are storehouses of a large variety of life forms such as plants, mammals, birds, insects, reptiles and so on. Also, the forests have abundant microorganisms and fungi, which do the important work of decomposing dead organic matter thereby enriching the soil. The forest ecosystem has two components – the non-living (abiotic) and the living (biotic) component. Climate, soil type is part of the non-living component while the living component includes plants (trees, shrubs, climbers, grasses and herbs), animals and other life forms (Chilalo and Wiersum, 2011). Depending on the physical, geographical, climatic and ecological factors, there are different types of forest: like evergreen forest (mainly composed of evergreen tree species, that is, species having leaves all throughout the year) and deciduous forest (mainly composed of deciduous tree species, i.e., species having leaf-fall during particular months of the year). Each forest type forms a habitat for a specific community of

animals that are adapted to live in it (Food and Agriculture Organization of United Nations (FAO), 2013, 2020; World Bank, 2016). However, forestry is the science and craft of creating, managing, playing, using, conserving and repairing forests, woodlands, and associated resources for human and environmental benefits. Forestry is practiced in plantations and natural stands. The science of forestry has elements that belong to the biological, physical, social, political and managerial sciences (Forestry Focus, 2018; FAO, 2020).

Society and the global economy are dependent and closely linked to forests. Data from the FAO (2015) show that more than 1 billion people depend on forests for their livelihood and forest ecosystems play a critical and essential role in climate stabilization and consequent improvement of quality of life, protection of water sources, food supply, timber and medicinal products, while maintaining much of the world's biodiversity. Both urban and rural population depends on forest in Nigeria (World Bank, 2016). Trees are the main source of energy and provide timber for roofing and building. In rural areas, the extensive benefits derived from forests include grazing, hunting, shade, forest foods in the form of tree leaves, wild fruits, nuts, tubers and herbs, tree bark for medicinal purposes and non-wood products such as honey and gum. In addition, the commercial lumber industry is a small but growing source of employment (Chilalo and Wiersum, 2011; FAO, 2015).

Concept of Environment

According to FAO (2015), Forestry Focus, (2018), World Bank (2016), Amaka *et al.*, (2016), Timmer, (2012), and Timmer and Akkus, (2008), understanding and use of the word "environmental" quite often tends to be associated with some kind of human impact on natural systems. This context distinguishes it from the word "ecological," which can be characterized as a concept of interdependence of elements within a system. The environment can be defined as a sum total of all the living and non-living elements and their effects, which influence human life. While all living or biotic elements are animals, plants, forests, fisheries, among others, the non-living or abiotic elements include water, land, sunlight, rocks, and so on. Forest functions are: supply of renewable and non-renewable resources; sustains life through provision of the sun, soil, water, air which are essential for human life and biodiversity; assimilation of waste through production and consumption activities that generate waste and enhances quality of life through provision of natural beauty like rivers, mountains, deserts and so on for man enjoyment (FAO, 2020). Renewable environmental resources are those resources which can never be exhausted or depleted with their continuous use and continuous supply of renewable resources which include water, trees among others, while non-renewable resources are those resources which get exhausted with their extraction and use, which are coal, petroleum, iron ore and so on (FAO, 2020).

Environmental sustainability

Environmental sustainability refers to the long-term maintenance of valued environmental resources in an evolving human context. The best way to define and measure sustainability in the environmental view point is to focus on natural resource depletion and whether the current rates of resource use can be sustained into the distant future (FAO, 2016). According to

Orsato (2016), natural environment has the capacity to maintain the living conditions for people and other species (for example clean water and air, a suitable climate). It is the aspect of the environment that produces renewable resources such as water, timber, fish, solar energy and functioning of society. Despite non-renewable resource depletion, it provides the quality of life for all people and beautify the environment. Threats to these aspects of the environment mean that there is a risk that these things will not be maintained. For example, the large-scale extraction of non-renewable resources (such as minerals, coal and oil), or damage done to the natural environment can create serious threats to declining in quality, destruction, or even extinction (Amaka *et al.*,2016,; FAO, 2016; World Bank, 2016).

According to Orsato (2016), traditionally, when environmental problems arise, environmental managers work out how to reduce the damage or wastage caused by such challenges. However, it is not always easy to work out exactly when and where threats will have their effects and often the impacts are hard to reverse. Therefore, environmental managers adopt strategies such as enhanced natural ecosystem health, greener economy and sustainable living among others, with the aim to prevent damage being done in the first place (FAO, 2015). A full sustainability programme needs to include actions to prevent threats and impacts from arising, actions to protect the environment from threats and damage, and restoration to reverse damage already done. Due to the risk of irreversible loss of the resources or qualities of the environment that people value, people questioned the word sustainability; and whenever there are such risks, there is a degree of urgency to take action.

Environmental sustainability programmes include actions to reduce the use of physical resources, the adoption of a 'recycle everything/buy recycled' approach, the use of renewable rather than deplorable resources, the redesign of production processes and products to eliminate the production of toxic materials, and the protection and restoration of natural habitats and environments valued for their livability or beauty (FAO, 2016).
According to FAO (2016), these sustainability programmes need to operate on an adequate scale and need to continue operating reliably for as long as the threats continue. Some of the issues that pose major environmental sustainability problems include: destruction of the living environments (habitats) of native species; discharge of polluting chemicals and other materials into the environment; emission of greenhouses gases into the atmosphere that can cause climate change; and depletion of low-cost oil and other fossil fuels.

Nigerian Rural Youth Farmers and Challenges of Environmental Sustainability in Nigeria

Nigerian rural youth farmers are mainly smallholder farmers, farming at a subsistence level. This makes it difficult for them to cope with changes in the prices of inputs and lowers their ability to adopt new technologies, thereby resulting in reduced overall production. Changing weather patterns as a result of climate change have played a part in reducing food supply, for instance flood and drought in the Southern and Northern part of the country leads to substantial losses in production and income (Amaka *et al.*, 2016 and Orsato, 2016).

According to World Bank (2016) poverty is the major problem of food accessibility, availability and utilization. Poverty leads to insufficient income needed to meet basic household needs. There are also other political and socio-economic problems leading to food insecurity and these are discussed as follows:

Government Policy: Nigeria depended so much on agricultural productivity for its revenue until the exploration of oil in 1970s. The oil boom led to the negligence of the non-oil sectors especially the agricultural sector which used to be the major source of revenue for the country. The attention given to agriculture reduced drastically, farming reduced drastically, rural youth farmers' needs were not attended to, and the worst of all was that research and development in the sector slowed down causing stagnation in food production. Government policies with regard to agricultural production were rapid with plans hastily put together and little or no participation from those who are engaged in agricultural productivity. Moreover, policy change that championed increased incentive for rural youth farmers for improved local food productions were neglected. Urban and community farming and even home gardening were no longer encouraged as land agents made it too difficult for people to obtain land for agricultural productivity (Amaka *et al.*, 2016 and Orsato, 2016).

Agricultural Practices: The type of farming system prevalent in Nigeria is the traditional subsistence farming. This system is characterized by use of simple farm tools, small farm holdings, restricted access to credit facilities and low agricultural inputs, inadequate storage facilities, insecure markets for post-harvest products and exploitation of rural youth farmers by the middlemen. In terms of technology, Nigeria is still lagging behind when compared to other nations in Europe and Asia. Due to poverty and illiteracy, rural youth farmers do not have access to adequate modern communication system with which they can access information regarding new technologies. Also, there are few extension officers to transfer new technology to the rural youth farmers. Funding for agricultural research is still low in Nigeria. In addition, heavy importation of food crops affects productivity of rural youth farmers because the small-scale rural youth farmers' productivity cannot compete with the imported crops (FAO, 2015; World Bank, 2016).

Population Increase: The demand for food exceeds the supply of food because the rate of growth of population is higher than the growth in agricultural productivity. Also, the large population continues to relocate to the urban areas in search of white-collar jobs which do not exist. This rural-urban drift of the youth makes it difficult for the country to be food secured (Orsato, 2016; World Bank, 2016).

Environmental Issues: Flood, drought and desertification are environmental issues hindering availability of food in Nigeria. Climate change affects food supply through loss of farmland, fluctuating food prices, increases in food borne illnesses and other food utilization issues (World Bank, 2016). The recent environmental degradation through deforestation and flooding has wide negative implication for food production. For instance, in 2012 the country witnessed an unprecedented rainfall as a result of extreme weather. The rainfall resulted in severe flooding causing

loss of agricultural crops, livestock and human lives. According to Ezenekwe *et al.*, (2013), the estimated loss of the country's GDP was worth N2.6 trillion. In the same period, share of agriculture value added to total GDP declined from 23.89 percent in 2010 to 22.05 percent in 2012 (World Bank, 2016).

Other environmental factors that may affect food security includes soil degradation, soil pollution and deforestation. Also, air and water pollution from industrialization threaten both human and natural resources to an extent that food securities capabilities are damaged.

Corruption: Corruption in Nigeria has been on the increase leading to money budgeted for public utilities being siphoned for private use by the corrupt politicians. This leads to neglect and decay in infrastructure especially rural infrastructure where majority of the rural youth farmers practise farming. For instance, we have seen situations where money meant for importation of fertilizers is siphoned (Amaka *et al.,* 2016 and Orsato, 2016).

Food Safety Net and Rural Youth Farmers

Social safety nets refer to cash or in-kind transfer programmes which seek to reduce poverty through redistributing wealth and/or protect households against income shocks. Food safety nets are a subset of social safety nets and aim to assure a minimum amount of food consumption and/or protect households (rural youth farmers') against shocks to food consumption. Both social safety nets and food safety nets seek to assure a minimum level of well-being, a minimum level of nutrition, or help households manage risk, though often using different definitions or indicators of household or individual wellbeing. While poverty and food insecurity are not necessarily the same phenomena, much overlap exists in terms of indicators. Social safety nets usually rely on different measures of poverty. Food safety nets may utilize these same measures or those more directly related to food insecurity (FAO, 2015, 2016; Orsato, 2016; World Bank, 2016).

Remedies to achieving a Food Safety Net from Forest and Environmental Sustainability in Nigeria.

It should be noted that food production is only a means to an end. Solution to achieving sustainable food safety net must include reduction in the level of poverty because income must be improved to enable people meet the basic necessities of life, including food. However, reduction in poverty level takes a long time to be achieved; therefore, immediate solvable solutions must be taken, as asserted by Amaka *et al.,* (2016), FAO (2015), Forestry Focus (2018), Timmer (2012), Orsato (2016) and World Bank (2016). They are as follows:

Improved Agricultural Productivity: Different projects/schemes have been established by successive governments in the country in order to improve agricultural productivity, but they have failed because of poor policy implementation. Agricultural productivity can be improved through encouragement of research. Research Institutes should be funded so as to encourage innovation and participatory research. Through researches, foreign technology can be modified and adapted to Nigerian' situation (Amaka *et al.,* 2016 and Orsato, 2016). Also, creative indigenous

technological innovation to solve emerging agricultural challenges can be invented and utilized to improve agricultural productivity. Inorganic fertilizers and chemicals can be replaced with alternatives (organic manures) which are environmentally friendly. Besides, extensions services should be encouraged and strengthened to carry out their statutory responsibility of transfer of new technologies to rural young farmers. Locally made, low-cost fabricated technologies should be made available to rural youths to process harvested farm produce to eliminate postharvest losses. Adequate storage facilities should be provided to prevent wastage and loss, thereby increasing their income

Agricultural Biodiversity: Improved agricultural biodiversity through improved agricultural practices will also increase food supply. Large scale farming involves planting one type of crop on a large piece of land, but with improved farming practices, and planting of different genetically improved crop types, can enhances rural youth farmers' income, thereby enhancing their food availability (Orsato, (2016). In addition, mono-cropping might also expose crops to both pests and diseases which increases the use of organic fertilizers and pesticides that erode soil biodiversity. In order to achieve sustainable food production, Nigeria rural youth farmers as well as government should embrace this modern food production technique that comes in form of agricultural biodiversity aimed at increasing livestock and crop production.

Environmental Management: Efforts to increase productivity have led to pressure on natural resources (forest inclusive) as well as environmental damage. There should be effective management of the environment by reducing the rate of deforestation. Trees should be planted as often as possible especially in the desert. Providing habitat for agricultural pests and increasing resilience to shocks and long-term climate change can help in the improvement and management of natural resources. Tree planting should be encouraged because forest trees outside the forest helps in protecting soil and water resources, promotes soil fertility and provides protection from extreme weather events (FAO, 2015; World Bank, 2016).

Policy Changes: Sustainable food production can be achieved if the government adopts inclusive growth in its development efforts. Development should be participatory and environmentally friendly. People-centered agricultural development puts the rural youth farmers/other rural dwellers first and attacks poverty with opportunities and education. It requires involving the rural people in decision making stages of agriculture productivity. The inability of government to involve these sets of people in defining and designing projects has led to the failure of some of these projects. There should be well-designed social protection systems – such as risk insurance scheme and community empowerment, to help households sustain their resilience to shocks (FAO, 2015; Orsato, 2016)

Clear distinction between Farm and Forestry: According to FAO, (2013), the term 'farm forestry' came into much more common use in Australia after the first Farm Forestry Program began in 1993. Before then, the term 'agroforestry' had enjoyed prominence for several years, and

benefited from having an international scientific definition, viz: land use systems in which woody perennials (trees, shrubs among others) are grown in association with herbaceous plants (crops, pastures) and/or livestock in a spatial arrangement, a rotation or both, and in which there are ecological and economic interactions between the tree and the non-tree components of the system. Government policies and programmes must clearly differentiate between industrial plantations, public native forest management and farm forestry, so that they are properly targeted. While there are common issues, the lumping of all types of forestry together tends to blur the issues which are important to farm forestry (FAO, 2015; World Bank, 2016).

According to FAO (2020) and World Bank (2016), farm forestry differs from industrial-scale forestry in that the scale of planting is smaller, site fertility can sometimes be higher due to fertilization or other land uses, and there is a larger proportion of edge trees and ongoing interaction between trees and agricultural uses. Sites, species, and tree spacing being used for farm forestry often differ from those traditionally used in plantation production. A major criticism of the approach taken by state forest agencies in promoting private forestry, especially to rural youth farmers and other smaller growers, was of the implicit assumption that farm forestry should look just like conventional industrial plantation forestry, noting that farm forestry was more than forestry on farms for industrial wood production. Industrial plantation monocultures have traditionally been established for the singular, legitimate goal of maximizing wood fibre production for industrial usage. While it is possible to conceive of farm forestry as a kind of subset of plantation forestry, with many similarities, the differences are still substantial. Not just the ownership of the land or the trees, but ownership of the decision to do it and how it is done. Farm forestry is about choice. It is about rural youth farmers choosing to commit their resources to the development and management of forests, among other things for commercial return (World Bank, 2016).

Rural youth farmers may choose to plant conventional plantations for industrial wood, manage their native forests for farm timber, prune their shelterbelts and wildlife corridors for high value saw logs, grow oil for salinity control, or even lease their land to forestry companies. If a farmer makes the decision to participate in forestry, then, for us, it is ‘farm forestry. Farm forestry is not about finding farmland that is appropriate for conventional forestry plantations. It is about the development of forestry opportunities that are appropriate for rural youth farmers. Farm forestry is not about getting rural youth farmers to hand over their land to foresters. It is about foresters handing over their knowledge, skills and tools to rural youth farmers. Also, farm forestry is not about more people and land supporting forestry, it is about forestry supporting more people and more land (FAO, 2015; Orsato, 2016; World Bank, 2016).

Influence of Forest Resources and Environment on Agricultural Food Production to serve as Safety Net for Rural Youth Farmers

Agricultural food value chain covers activities ranging from food production to consumption. Depletion and contamination

of natural resources occurs throughout the agricultural food chain. Pollution and food contamination related to the misuse of production technologies and processes, as well as from the misuse of products aimed at increasing agricultural yields and facilitating food conservation and have significant environmental consequences (Barrett, 2010). There are a number of important factors in agricultural food production and consumption that have significant impacts on the environment and human health. These factors include: soil biodiversity, water use and pollution, energy use, climate change, chemicals usage, desertification, and food safety and biotechnology (FAO, 2015; Forestry Focus, 2018; Orsato, 2016; World Bank, 2016).

Sustainable agriculture (including forest management) involves the successful management of agricultural resources to satisfy human needs while maintaining or enhancing environmental quality and conserving natural resources for future generations (Orsato, 2016). Improvement in agricultural sustainability requires, alongside effective water and crop management, the optimal use and management of soil fertility; and soil physical properties. Management practices alter soil conditions and the soil community of micro-, meso- and macro-organisms. The structure of soil communities is largely determined by the ecosystem characteristics and land use systems. For example, soil compaction, poor vegetation and the lack of presence of plant litter on the soil surface results in reducing the number of soil arthropods. Management strategies, including tillage, crop rotations and use of plant residues and manure, change soil habitats and the food web can alter soil quality, or the capacity of the soil to perform its functions (Butler, 2009; FAO, 2013). The goal of efficient agriculture is to develop agro-ecosystems with minimal dependence on agrochemical and energy inputs, in which ecological interactions and synergy among biological components provide the mechanisms for the systems to sponsor their own soil fertility and crop production functions (Barrett, 2010). The mix of soil organisms in the soil also partially determines soil resilience, and the desirable ability of a given soil to recover its functions after a disturbance such as fire, compaction and tillage (Barrett, 2010 and Amaka *et al.*, 2016).

The improved environment management maintenance of forest, soil biota and its diversity contribute both to the needs of rural youth farmers, especially in maintaining productivity and increasing returns from labour and other inputs, and enhance national interests through maintaining a healthy and well-functioning ecosystem in terms of water quality, preventing soil erosion and land degradation (FAO, 2013; Orsato, 2016; World Bank, 2016).

CONCLUSION

Forest resources which enhance environmental sustainability and their subsequent harvesting play crucial role in rural livelihood diversification, providing a major source of food and income for rural youth farmers. Thus, it acts as a both social and food safety net, particularly when there is a short fall in agricultural production to minimize risk and fill the gap of food shortage, thereby reducing poverty and hunger. The adverse effect of exploitation of forest resources is the depletion of the forest resource base (deforestation), climate change and erosion.

Therefore, policies aimed at sustainable utilization of the natural resource (forest) base for the benefit of present and future generations should be put in place by development stakeholders. This would involve the development of strategies for the control and protection of critical private forest areas and forest reserves, enforcement of relevant legislation and regulations, reforestation, and sustainable harvesting of products in natural forests. In addition, establishment of agro-forestry systems; and effective protection and conservation of plants and wildlife are required. To ensure environmental sustainability in Nigeria as a whole, stakeholders should as a matter of urgency increase its budgetary allocations to the environmental sector of the economy. This is with a view to boost its potential, attract local and international investors, and enhances its benefits to vulnerable groups in the country.

REFERENCES

Amaka, G. M., Kenechukwu O. O. and Olisa D. M. (2016). Achieving Sustainable Food Security in Nigeria: Challenges and Way Forward. 3rd International Conference on African Development Issues (CU-ICADI 2016). http://eprints.covenantuniversity.edu.ng/6653/1/icadi16pp182-187.pdf

Barrett, C. B. (2010). Measuring Food Insecurity. *Science*, Science 327, 825 (2010); DOI: 10.1126/science.1182768. https://www.researchgate.net/publication/41424901

Butler, Brian P. (2009). "Ecological Balance: The Greater Goal of the Environmental Manager" (2009). Thesis. Rochester Institute of Technology. Accessed from : https://scholarworks.rit.edu/theses

Chilalo M. and Wiersum, K. K. (2011). The Role of Non-Timber Forest Products for Livelihood Diversification in Southwest Ethiopia. *Agriculture and Forestry*, 3(1): 44 – 59.

Ezenekwe, C., Uju, W. and Chukwuma, D. (2013). Does Agriculture Matter for Economic Development? Empirical Evidence from Nigeria. J*ournal of Finance and Economics*, 1(1): 61 – 77. **DOI:10.12735/jfe.v1i1p61**

Forestry Focus, (2018): "Seed Origin - pinga Forestry Focus". *Forestry Focus*. Retrieved April5, 2018. https://en.wikipedia.org/wiki/Forestry

Food and Agriculture Organization of the United Nations (FAO) (2016). State of the World's Forests 2016. Forests and agriculture: land-use challenges and opportunities. Rome. September 28, 2017.

Food and Agriculture Organization of the United Nations (FAO) (2015). Climate change guidelines for forest managers. FAO Forestry Paper 2015, 172. Available online: http://www.wribrasil.org.br/pt/node/40982#sthash.36liAE3w.dpuf. Assessed on 17 September 2015.

Food and Agriculture Organization of the United Nations (FAO) (2013). The State of Food Insecurity in the World: The Multiple Dimensions of Food. http://www.fao.org/contact-us/licence-request/en/

Orsato, R. (2016). Competitive environmental strategies: when does it pay to be green. *California Management Review* 48(2): 127-143.

Timko J. A., Waeber, P. O. and Koza, R. A. (2010). The Socio-Economic Contribution of Non-timber Forest

Products to Rural Livelihoods in sub-Sahar Africa. Knowledge Gap and News Directions. *International Forestry Research*, 12(3): 284 – 294.

Timmer, C. P. and Akkus, S. (2008). The structural transformation as a pathway out of poverty: Analytics, empirics and politics. *Working Paper Number 150.* Washington, DC: Center for Global Development, Washington, DC. Akkus is Research Assistant at the Center for Global Development. Contact at ptimmer@cgdev.org and sakkus@cgdev.org.

Timmer, C. P. (2009). A World without Agriculture: The Structural Transformation in Historical Perspective. Washington, DC: American Enterprise Institute Wendt Distinguished Lecture. https://www.aei.org/research-products/book/a-world-without-agriculture-2/

Timmer, C. P. (2012). Behavioral dimensions of food security. *Proceedings of the National Academy of Sciences*, 109(31): 12315 – 12320.

World Bank (2016). World Data Bank (available at http://databank.worldbank.org/data/report.aspx?source=worlddevelopment-indicators). October 24, 2020.