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Environmental Protection for Agricultural Production in Nigeria: Needs and Strategies

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Abstract

This study focused on environmental protection for agricultural production in Nigeria as well as the needs and strategies. The goals of sustainable agricultural production include: thoroughly incorporate natural process such as nutrient cycling, nitrogen fixation and pests-predators relationship into agricultural production process; increase in self-reliance among famers and rural people; and greater productive use of biological and genetic potentials of plants and animals' species, among others. Unsustainable agricultural practices result in low agricultural production, destruction of eco-system, and wide life, and so on. Causes of environmental degradation include: continuous farming system, overgrazing, bush burning, desertification, and many others. The causes of unstainable agricultural practices are rapid population growth, property rights, prices and government policy, poverty and so on. The strategies for sustainable environmental protection for maximum agricultural production in Nigeria would include; increasing production efficiency and diversification of production. Recommendations include massive training of farmers possibly through a well organized adult education programme.

Agriculture is an activity involving a close interaction with the environment. Millions of farmers and their families practiced agriculture under rain-fed conditions in diverse and risk prone environments. In a constant struggle to survive, farm communities have developed innumerable ways of obtaining food and fibre from plants and animals. Wider ranges of different farming systems have envolved each adapted to the local ecological conditions (Shoard, 1980).

Originally, agriculture depends on local natural resources, knowledge skills and institution. Diverse, site - specific farming systems carved out after a long process of

trial and error in which balances were found between farmers and its environment. Traditional farming system continues to develop in a constant interaction with local culture and ecology. As condition for farming changes, for instance, because of population growth or the influence of foreign values, the farming system was also changed. Then, the adaptation to new resource base (environment) was eventually destroyed as the society was depending upon its many farming systems. Farming societies disintegrated as a result of lack of local capacity to manage change and this led to several environmental degradations.

The direction of agricultural change may be much as it has been for years. But the magnitude of change and the potential implications for the environment have undoubtedly increased significantly in recent times. At the same time these changes have to be seen in a wider context of conflicting human priorities. On the other hand, many individuals in the developing countries are more directly concerned with questions of environmental quality and hence with the effect of modern agriculture on the cultural and semi-national eco-systems. Thus, there exists simultaneously pressure to modernize and intensify agricultural systems and an eagerness to minimize the effect of such systems on the environment.

In recent years, the negative environmental, and social impact of high external input on agriculture have become increasingly obvious. At the same time, many disadvantaged communities of small holder farmers are being forced to exploit the resources available to them so intensively that here too, environmental degradation occurs (Food and Agricultural Organization (FAO), 1992).

If these apparently contradictory aspirations are to be reconciled, then, it is essential to understand more clearly the way in which agriculture operates the factors that control farming decision and the ways in which the various components of the environment respond to the methods. In accordance with this, the farm planners and donors are desperately seeking new approaches to agricultural development which will benefit farmers over degradation of natural resources and if possible to improve these resources (FAO 1992).

Also, conventional science- based research and extension activities have to focus on modern agriculture with high level of external inputs e.g. agrochemicals, hybrid seeds, and fuel-based mechanization. Technologies have developed on research stations and experimental farms in better endowed areas and attempts have been made to transfer ready made technology packages to farmers. The primary aim of these efforts is to eliminate unsustainable agricultural practices in the environment and to increase food production.

The protection of the environment and the development of product are closely link. If we do not develop food production, we cannot protect the environment. It is possible to increase agricultural practices without damaging the environment.

Need and Goals of Agricultural Sustainability

Agriculture in the context of sustainability basically refers to the capacity to remain in production while maintaining the environment. Sustainable agriculture, an aspect of the economic and social development that meets the needs of the present without compromising the ability of the future generations to meet their own needs, an idea summed up in terms of sustainable development (Aduayi and Ekony, 1989). Two concepts are fundamental to the sustainable use and management of the earth's natural resources. First, the basic needs of humanity for food, clothing, shelter, and jobs must be met. This involves paying attention to the largely unmet needs of the world's poor, as a world in which poverty is endemic will always be prone to ecological and other catastrophes. Second, the limits to development are not absolute but imposed by present states of technology and social organization and their impacts on environmental resources and on biospheres ability to absorb the effect of human activities (David and Franicon, 1985). Both technology and social organizations can be improved to make way for a new era of environmentally sensitive economic growth.

Despite the past improvements in food production, the most difficult challenges are just beginning. The world population will eventually reach 8 -13 billion people by the mid 21st century. Even currently, at the lowest estimate and given current inequitable access and rights to resources there will be a need for agricultural production to increase substantially if current levels of nutrition are to be improved upon and maintained. Without very considerable growth, the prospect for many people in poor countries and regions of the world are bleak (Elliot, 1994).

During the past 50 years, agricultural development policies have been remarkably successful at emphasizing external inputs as the means to increase food production. This has produced remarkable growth in global consumption of pesticides, inorganic fertilizers, animal feedstuff and tractors and other machinery. These external inputs have however, replaced natural control processes and resources, rendering them more vulnerable; pesticides have replaced biological, cultural and mechanical methods for controlling pests, weeds and diseases; farmers have substituted inorganic fertilizer for livestock manure, composts and nitrogen fixing crops; information for management decision comes from inputs supplies and research rather than from local sources; and fossil fuels have replaced locally generated sources. The specialization of agricultural production and associated decline in mixed farm have also contributed to this situation; what were once valued internal resources have often become waste products (Coen and Ann,1984).

The basic' challenge for sustainable agriculture is to make better use of these internal resources. This can be done by minimizing the external inputs by regenerating internal resources more effectively or by a combination of both. A sustainable agriculture therefore, as a system of food or fibre production systematically pursues the following goals: (1) A more thorough incorporation of natural processes such as nutrient cycling nitrogen fixation and pests-predators relationship into agricultural

production process (Coen and Ann, 1984). (2) An increase in self- reliance among farmers and rural people. (3) A greater productive use of the biological and genetic potentials of plants and animals species. (4) A more equitable access to productive resources and opportunities and progress towards more socially just forms of agriculture. (5) A greater productive use of local knowledge and practices including innovation approaches not yet fully understood by scientists or widely adopted by farmers. (6) An improvement in the mixed cropping pattern and the productive potential and environmental constraints of climate and landscape to ensure long term sustainability of current production levels. (7) Profitable and efficient production with an emphasis on integrated farm management and the conservation of soil, water, energy and biological resources. (8) A reduction in the use of those off farm, external and nonrenewable inputs with greatest potential to damage the environment or harm the health of farmers and consumers and a more targeted use of the remaining inputs used in a view to minimizing variable cost (Coen and Ann, 1984).

When these components come together, farming becomes integrated with resources used more efficiently and effectively. Sustainable agriculture therefore, strives for the integrated use of wide range of pests, nutrients, soil and water management technologies. It aims for an increased diversity of enterprises within farms combined with increased linkage and flows between them. Waste from one component becomes inputs to another. Sustainable agriculture could mean a full in per-hectare yield of 10 -20% in the short term but with better level financial returns to farmers (Jules, 2001).

The Effect of Unsustainable Agricultural Practices on Environment

The primitive method and techniques employed by the farmers in the early agricultural practices to maintain soil fertility and increase food production, in their application, are detrimental to the environmental resources (Aduayi and Ekong, 1989).

Therefore, they are regarded as unsustainable agricultural practices. These unsustainable agricultural practices include the following: continuous farming system bush burning, application of agricultural pesticides, overgrazing, and desertification, shifting cultivation, deforestation and biological diversity, the use of poisonous chemicals in fishing (Aduayi and Ekong, 1989).

Causes of Environmental Degradation

1. **Continuous Farming System:** This is a system of farming whereby a piece of land is being subjected to simultaneous cultivation over long period of years, usually five or more years. This practice came into existence when the population pressure on land started increasing geometrically, which led farmers to abolish bush fallow system. This practice of putting the land to cultivation continuously makes the land to loose its fertility and hence destroy the structure and texture of the soil. Also, this system of farming exposes the soil to erosion, whereby all the nutrients and minerals in the soil are being washed away leaving the soil to a state of barrenness. In addition to these, some of the organisms like animals,

insects, plants and trees are destroyed in the process and hence adversely affecting the natural and semi-natural ecosystem (Aduayi and Ekong,1989).

2. **Over-Grazing:** The process of feeding the animal on a pasture land (mostly grasses) is called grazing. Therefore, overgrazing came into existence when there is persistent and continuous feeding of animals on a particular place of pasture land. This act seriously exposes a land to both natural and physical dangers, through soil and wind erosion due to continuous trampling and eating away of grasses. Not only that, some micro-organisms are deprived their habitats. In tropical Nigeria for example overgrazing leads to loss of farm crops by these animals feeding on them instead of feeding on grasses (Omoruyi, Orhue, Akerobo, and Aghimien, 1991).

3. **Shifting Cultivation:** The shifting cultivation is the practice of farming on a piece of land for some years and them abandoning it for another piece of land. It helps to replenish the fertility of the soil in a natural way. It prevents and helps to control erosion. But this system has been condemned by many as it is responsible for increasing land classified as waste land for primitive culture. It was a remarkable innovation, beginning a revolutionary transition from a food gathering to food production (F.A.O, 1992).
Under this period, land is left for fallow within a specific period of time, like 3-4 years. In the traditional system, its use is adjusted to the inherent soil properties with longer fallow periods for poorer soils.

However, as population increases, land becomes scarce and the fallow period is shortened and more intensive use is made of the land. All forms of shifting cultivation have varying impacts or damage on environment. Environmental eco-systems are damaged when shifting cultivation system is practiced on land because there is ignorance or carelessness of the cause with which the eco-system can be damaged and failure to adjust practices accordingly or when the people although aware of the damage are forced to exploit the eco-system in order to survive.

4. **Bush Burning:** In the absence of modern machinery for clearing farmlands any simple method that can be substituted for clearing is practical by farmers. One of such method is the burning of vegetation in the forest and savannah zones. At the end of the burning, plant ash is left on the soil. This system of farming provides for some degradation of soil bare and hence the ash provided is lost through washing out during rainfall and through erosion. The soil structure is affected through this practice of farming (Omoruyi, Orhue, Akerobo and Aghimien, 1991).

5. **Desertification:** Desertification involves impoverishment and depletion of vegetation cover, exposure of soil surface to wind, organic and nutrient

content and deterioration affecting soil structure and water retention capacity. This is mostly as a result of cover stocking and removal of plant cover (Jules, 2001). Cultivation encourages the lose of fertile topsoil (Reppetto, and Rolmes, 2001).

6. **Excessive Artificial Fertilizer Application:** Farmers appreciate artificial fertilizer for their fast effect on crops growth and relative ease of handling during application. Only after sometime do farmers and scientists begin to discover some of the limitations and effects of artificial fertilizer on the environment. They increase decomposition of organic matter leading to degradation of soil structure, higher vulnerability to draught and lower effectiveness in producing yield. Unbalance application of auditing mineral Nitrogen fertilizer may lower the availability of phosphorous to plants.
   Continuous use of artificial fertilizer leads to depletion of micronutrients like Zinc, Copper, Molybedenum, Iron, Manganese, Boron which may influence plant, animal and human health. As these micro nutrients are not replaced by artificial fertilizer, production eventually decline and the occurrence of pests and diseases increase (F.A.O, 1992).

7. **Application of agrochemicals:** This is the modem agricultural practice being adopted by the farmer to destroy pests that cause damage to their crops. In the recent time, it has been discovered that pesticides kill not only organisms such as natural enemies of pests but also other useful soil orgainisms. The incidence of pest attacks and secondary pest attacks may increase after pesticides have killed natural enemies (David and Franicon, 1988).

8. **Deforestation and Biological Diversity:** The environmental impacts of the depletion of forest have many facets. There is straight forward loss of the sustainable system of wood production which may be followed by soil erosion, if the loss of tree cover is not replaced by a sustainable land management system.
   Deforestation is a threat facing wildlife because their natural habitant is being destroyed and the fragmentation of habitants into parcels too small for wildlife population to use. Wildlife is an important biological, economic and recreational resource that can be maintained through careful management. The practice has also brought many species of plant to extinction (David, and Franicon, 1985).

9. **The Use of Poisonous Chemicals in Fishing:** The use of poisonous explosive substances in catching and cropping fishes and other aquatic animals from the seas depletes the *fishing* stock by killing both the cropable size ones and the fingerlings and also rendering the water unfit for other aquatic lives and dangerous for human use (Elliot, 1994).

Causes of Unsustainable Agricultural Practices

This section reviews some of the causes of farmer' unsustainable agricultural practice on the environment. The causes are: population growth, property rights, prices, poverty and government policy.

1. **Population Growth:** It is a scientific believes that increased population level, increase the likelihood of unstained natural resources use (environment). They cause additional demands for subsistence goods which will put pressure on renewable resource stock as well as intensifying the demands made on exhaustible resources. There will not only be additional pressure on currently sustainable agricultural land but production may also expand on to previously unexploited marginal land that cannot support the new forms of production needed. We do not explore the implications of this production pressure further but note the point by (Rapetto and Rolmes, 2001), that the extent of resources degradation is much greater than what can just be justified by appealing to application growth and that there are other important causes as well.

2. **Property Rights:** Possibly the most influential single idea in the management of natural resources is that of the "tragedy of common". As propounded by Harden (1968), the existence of common property resources will increase exploitation, for personal gain, even though the aggregate action of all such possible means that the productivity of the common fails. In fact, an important distinction has to be made between common property and open access resources. In open properties resources, there is an identifiable body of users who have exclusive rights (Jules, 2001).

3. **Prices and Government Policy:** The role of price in resource degradation is not clear out and as a source of some conflict in the intensive. One preposition is that, it is the lack of prices for non-market goods that cause them to become over exploited. This is the common view on pollution and leads to policies that suggest tradable likeness, essentially creating a market price for the goods. Alternatively, a tax or subsidy should be played on inputs that demand or enhance the reflecting of commodity prices on resources use is infact more difficult to identify for agriculture. (Elliot, 1994).

Needs and Strategies for Environmental Protection for Agricultural Production in Nigeria

Despite all the problems and effects mentioned, the unsustainable agricultural practices can still be ameliorated or even solved through the use of some strategies that are discussed below to sustain the environmental resources (Elliot, 1994).

1. **Increasing Efficiency and Productivity:** This can be done through a more sustainable use of resource including labour, improved access to new technologies, the proper use of biological inputs and cycles and on-farm processing.

Productivity and efficient gains can lead to better environmental protections. For example, increase productivity on the farm has a direct and beneficial effect on both forestry and agriculture. It reduces pressure on farmers to convert forest land to agricultures which has been the main cause of deforestation for several decades. It may also slow down the rate of migration to coastal areas; many farmers who find themselves unable to make a living on land migrate to coastal area where they attempt to make a living from fishing. This inputs further pressures on already threatened fish stock (David, and Franicon, 1985).

2. **Promotion of Diversity:** Two different types of diversity can be promoted in the search for sustainable agricultural practices: Diversity of production and diversity of economic activities (F.A.O, 1992). The first is achieved by matching cropping patterns, livestock enterprises, aquaculture system, fishing methods and forestry management practices with natural resources potentials and limitations. The second results from combining farm, forestry and fisheries production with processing the products produced and from combining on-land-off-farmjobs (F.A.O., 1992).

Combining crop, livestock, forestry and fisheries enterprises can also enhance efficiency and productivity. For example, mixing a deep rooted plant with shallow rooted one can increase nitrogen efficiency of nutrient intake, interbreeding a legume bean crop with tuber crop can increase nitrogen levels-selecting resistant plant varieties and paying careful attention to pest life cycle and interaction with other microorganisms can reduce losses due to pest and hence unit reliance on pesticides (Coen and Ann, 1984).

Conclusion

Conclusively, unsustainable agriculture should be discouraged by the government so as to be able to maintain environmental resources for the present and future generations and this could be achieved by educating the farmers on the effect of unsustainable agricultural practices of the environment by employing extension agent who will help disseminate this information to the farmers and educate them further on sustainable agricultural practices. Also Government must adopt economic social and agricultural polices that encourage sustainable behaviour. Therefore, laws and decrees must be promulgated so that these unsustainable practices are prevented.

Recommendations

Farmers should be encouraged by Government to register for adult education training, to enable them have the knowledge and appreciate the natural resource endowed to us by God. There should be employment of more capable hands of extension agents to teach farmers the use of natural resources.

Environmental protection agencies should be strengthened to leave up to their responsibility.

There should be establishment of agro-service centers for hiring of farm machines. Government should also provide farm inputs such as chemicals, farm tools and machines to farmers.

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