Journal of Sustainable Development in Africa (Volume 10, No.2, 2008)

ISSN: 1520-5509

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ENVIRONMENTAL DEGRADATION AND ITS IMPLICATIONS FOR AGRICULTURAL AND RURAL DEVELOPMENT: THE ISSUE OF LAND EROSION

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Introduction

The importance of natural resources, especially land to agriculture and rural development is well recognized. However, in many developing countries, natural and human resources constitute the principal economic assets for development and reduction of poverty. Unlike in advanced and industrialized countries, the function of land as a production resource is still very crucial. The economic fortune of most developing countries, including Nigeria, however, revolves, largely around the exploitation and use of land resources especially in the primary industry such as, agriculture. Consequently, land and land use policy are important in economic and social development. The analysis of the future demand for food and agricultural raw materials as well as trends in their supplies have shown clearly that greater and rapid increases are needed over and above past trends if the goals of improved nutrition and economic development and poverty reduction are to be achieved. However, achieving increased production will require that the productive land for agriculture be expanded and intensively utilized.

Improved utilization of land will lead directly to expansion of production as well as improve the opportunity for the use of other farm inputs, thereby increasing output and poverty reduction.

The policy options of effective use of the land will also involve both development of new land and the improvement and better utilization of those already in use. Within the country as a whole, the relative importance of land resources varies greatly between regions and agro-climatic zones. Hence for immediate impact on food production, emphasis should, at the onset, be on the better utilization of land under exploitation for food production and poverty reduction.

In recent times, environmental problems of land degradation have become a matter of critical concern for Nigeria. The available evidence is mounting that sound and sustainable environmental management is essential for maintaining the natural resources base upon which nations depend for their continued agricultural and rural development. The coming generations will also depend on these resources. The changing environmental problems have heightened our awareness of the danger posed to the food and agricultural sector of Nigeria. These problems include: tropical deforestation, soil erosion and desertification. The Nigerian government has been investing on conservation measures such as watershed projects, reforestation scheme, building amelioration components into project, strengthening environmental institutions and finally introducing appropriate regulatory measures.

In the absence of rational and conscious sustainable exploitation of the physical and natural resources, irreplaceable and probably irreversible damages will inevitably result. This will be catastrophic for food production and rural development. We have

always viewed the problems of poverty mainly in the context of economic constraints. Yet, eroding soil, deteriorating rangeland, dwindling forests and falling water tables, which are results of environmental mismanagement, are testimonies to the related crisis of ecological degradation. To reduce poverty via agriculture and rural development we, need to understand the importance of land degradation problems to the Nigerian economy. Hence, sustainable environmental-friendly agriculture and rural development should be the overriding issue in future planning and this, among other requirements, demands adequate knowledge of, sensitivity towards natural resources management and public participation and consultation.

Objectives

This paper assesses the effect of land degradation on agricultural and rural development efforts in Nigeria and its relationship to poverty related issues. Specifically, the paper:

- (i) Examines the land use pattern in Nigeria;
- (ii) Discusses causes of land degradation in the country;
- (iii) Examines the effect of land degradation on agriculture and rural development;
- (iv) Considers the objectives and strategies of agricultural and rural development; and
- (v) Proposes policy to protect the environment and hence improve agricultural productivity, food security and poverty reduction through increased production.

Methodology

The method employed in this study is to consult and collect relevant secondary information from available sources. Information is collected from Federal Office of Statistics (FOS), Central Bank of Nigeria (CBN) and other sources.

Land Use Pattern and Land Degradation in Nigeria

Land Use

As of 1985, only a little over 33.0 percent of the total land surface in Nigeria was used for cultivation. Also some 3.0 percent was used as a permanent pasture, while about 16.0 percent was under forest. The balance of about 8.0 percent was not used for any agricultural purpose.

Arable land represents 30.6 percent of the land utilised for agriculture. Greater part of production comes from this land. This amount of land is also responsible for employment in rural area and in the agricultural sector. Moreover, most investments in agriculture are related to this land area. The whole of the arable land is not however utilised each year since a substantial amount is left fallow for one year or more. Because of this, low cropping intensity prevails. The low cropping intensity of the existing arable land has been estimated at about 35 – 50 percent (Aribisala). The low cropping intensity provides an avenue for raising output per acre. Fallow is beneficial for soil and as such cannot be completely eliminated without making sure that the alternative cropping system meets the beneficial objectives of the fallow system. Therefore, any move towards a more intensive system of land use would entail major investment in the improvement of land (and water) resources and the use of modern inputs. Utilization of marginal land and reduction in fallow period has been aggravated in some part of the

country as a result of population pressure. The effect is soil erosion leading to serious drainage, deterioration of water resources and damage to the land.

Table 1: Nigeria Distribution of Land by Major Uses (000 hectares)

	1970	1975	1980	1985
Total Area	92977	92977	92977	92977
Land Area	91077	91077	91077	91077
Arable/Perm. Crops	29900	30000	30385	31085
Arable land	27420	27500	27850	28550
Permanent Crops	2450	2500	2535	2535
Permanent Pasture	19843	20750	20900	20990
Forest wood	19400	17900	16383	14900

Source: FAO production yearbook 1989 issue

Land Degradation in Nigeria

Land degradation refers to a temporary or permanent decline in the productive capacity of the land, or its potential for environmental management (Scherr, 1996; p3). Alternatively, land degradation can be defined as "the decline in the biological productivity or usefulness of land resources in their predominant intended use..." (Gretton and Salma, 1996, p.27)

There are several causes of land degradation most of them stemming from excessive human pressure or poor management of the land. These include:

- (i) Overgrazing on rangeland,
- (ii) Over cultivation of cropland,
- (iii) Water logging and salinization of irrigated land and
- (iv) Deforestation
- (v) Inappropriate agricultural technique such as the use of heavy equipment on fragile soils, and
- (vi) Poor civil engineering practices.

Some type of land degradation such as gully and advanced salinization are, for all practical purposes, irreversible. In these cases, the long-term biological and environmental potential of the land has been compromised. Displacement of soil material is also irreversible, although its long-term effects on productive capacity depend on the depth and quality of soil remaining. Most types of soil degradation, however, can be prevented or reversed by, for example, adding nutrients to nutrient-depleted soil, rebuilding topsoil through soil amendments, or re-establishing vegetation, the practicality of rehabilitating degraded landscapes depends on the costs relative to the value of output or environmental benefits expected.

In Nigeria erosion constitutes a major form of environmental degradation. NEST (1991), identified five principal types of soil erosion in Nigeria, namely, sheet erosion, rill erosion, gully erosion, coastal erosion and wind erosion. In terms of the area affected and the threat to agriculture, sheet erosion is considered to be the most serious type in Nigeria. However, NEST (1991), however observed that gully erosion is the most

observable, best documented, and most frightful type in Nigeria even though, gully erosion occupies the smallest proportion of eroded land in the country. The total area taken up by gullies is certainly less than 0.1 per cent of the country's 924,000 sq. km. The number of gully erosion sites is dauntingly large and the size of some individual gullies is astonishingly enormous.

Causes of Land Degradation in Nigeria

Factors, direct and indirect, giving rise to resource deterioration are complex. The most important factor appears to relate to land clearance for agriculture and for other economic purposes i.e. mining, desertification and traditional land ownership. Vegetation all over Nigeria has been severely depleted in the last 50 years, and this in turn served as the driver for further land degradation. Among the factors responsible for land depletion are:

- Increasing population pressure: for instance the population of Nigeria of about 15 million in 1931 rose to an estimated 30 million in 1952 and to about 140 million in 2007. There is need to cultivate more land under the extensive shifting cultivation system to feed the increasing people. This system of cultivation more than any other factor has resulted in the encroachment of forest estates and occasionally to outright deforestation especially as 90 per cent of the rural people depend on forest and woodland for fuel.
- The establishment of plantation agriculture: for instance cocoa which was introduced into the country in early 20th century has covered a large part of central Western Nigeria where it displaced the climax vegetation; other plantation crops include rubber, kolanuts and oil-palm.

- Severe pressure on the forest for timber and non-timber forest products, with the forest being depleted at an estimated rate of about 3.5 per cent per annum.
- The incursion of cattle herders into Southern Nigeria and setting uncontrolled fires to the Savannah woodland now turned into park Savannah, to obtain tender grass for their cattle in the dry season.
- Uncontrolled urban expansion in to the country-side; and
- The building of new roads and other infrastructure.

A study carried out by FORMECU (1988) showed the following salient features about vegetation depletion in Southern Nigeria:

- More than 60 per cent of the land area mapped dominantly as trees woodland/shrubs in 1976/78 had changed by 1993/95; 75 per cent of areas covered by trees, mainly Southern Nigeria changed to agriculture land, while about 50 per cent classified as dominantly shrubs and grasses also changed to agriculture.
- Between 1976/78 and 1993/95, the total plantation projects in Southern Nigeria doubled to 5982 km², while area of undisturbed forest decreased by 50 per cent (13,837 km²), while disturbed forest decreased by 30 per cent (4417 km²) probably due to logging.
- Urban areas more than doubled from 2083km² to 5444km².
- Between 1978 and 1995, 2.2 million ha of forest were converted primarily to agriculture.

As of now, only 2 per cent of Southern Nigeria is covered by rainforest, and if the present rate of destruction persists, this forest will disappear by 2020 AD (FAO quoted by UNDP, 1996).

Table 2 shows, for example, the causes of erosion as perceived in a village in Obake, Ekiti State. Government policies can also lead to misuse of resources. For example, tax policies, market control, relative fuel pricing, and land use control are just some of the complex policy choices that can indirectly affect resource use.

Table 2: Causes of Erosion in Obake as Identified by Respondents.

Causes of Erosion	No. Of Respondents	Percentage of Respondents		
1. Flood	14	43.75		
2. Heavy Rainfall	20	62.50		
3. Topography	26	81.25		
4. Soil Structure	1	3.13		
5. Soil Texture	-	-		
6. Land Cultivation Practices	3	9.38		
7. Continuous Cropping	-	-		
8. Bush burning	1	3.13		
9. Over-population	-	-		
10. Others (lack of vegetation cover.)	1	3.13		

Source: Titilola, S.O. et al. 1996

Effect of land Degradation on Agriculture and Rural Development

Land degradation has far reaching effects on the earth surface and therefore on man. One of the effects is loss of soil nutrient and actual soil loss. This is a problem on its own, but it also leads to other environmental problems. A study in the Kampe basin in Kwara State showed that of the 30.00km² studied by a group of consultants, 4.44km or 14.8% is affected by severe gullying and sheet wash (Progress Engineers, 1980).

According to Lal (1976), soil loss due to erosion prompted by poor land use practices could be as much as 15 tons per hectare per year on a bare ploughed soil in Western Nigeria. About 850,000 hectares of land are badly affected annually or rendered useless for agricultural purposes and human settlement. This means that a large number of people are denied food annually. The consequences of soil erosion are thus severe and no effort should be spared in fighting it.

Accelerated soil erosion manifested in form of sheeting and gullying has devastated a significant part of the entire country. For instance, as of 1997, there were about 2000 active gullies nationwide covering about 18,517km², these may now be in excess of 2200 with wider coverage. Even as far back as 1978, of the 75,488km² of South-eastern Nigeria, accelerated erosion affected 53,028km² or 71.25% of which 15,450km² or 20.46% was affected by intense degree of sheet erosion while active gullies covered 121km² or 1.6% of the area (Ofomata 1978). There are widespread soil erosion, soil impoverishment, and loss of farmlands to erosion in Imo, Abia, Anambra, Cross River, Akwa Ibom, Enugu, Bayelsa and Kaduna States. A large number of gullies exist even under forest and plantations on the cretaceous formations in south-western Nigeria. Several states in the North are savaged by erosion especially Kwara, Kogi, Plateau and Gombe States. The area around Ejiba in Oyi River Basin in Kwara is a veritable bad land. In Kogi, the Nupe sandstone is severely gullied and dissected. The sandstone in the vicinity of Ako Plateau in the upper basins of Gombe River tributaries is severely eroded.

Apart from soil loss, erosion drastically affected the physico-chemical properties of the soil still left *in situ*. The soils suffered a significant depletion of

- Clay in the A horizon
- Metallic cation particularly magnesium and calcium
- Nitrogen, organic carbon and available phosphorus
- Cation exchange capacity.

Table 3 shows the situation around Ejiba in Kwara State

Table 3: A comparison of the average values of the analysed physical and chemical properties of the soils in Ejiba area, Kwara State

Soil	Soil Layer	Soil Layer Eroded Soils		Uneroded Soils		Differences	
Element		X	X	0			
		0					
% Coarse	Surface layer	18.60	17.10	1.7	0.9	N.S. @ 1%	
sand	(SL)	5.7					
	Sub surface layer	20.03	17.90		1.1	"	
	(SSL)	6.1	2.8				
% Fine	SL	61.20	54.60		2.3	"	
sand		5.2	6.6				
	SSL	55.70	47.70		2.3	"	
		8.7	8.1				
% Silt	SL	13.90	17.10		1.2		
		5.0	7.9				
	SSL	11.24	16.80		6.5	Significant @	
		8.7	3.3			0.1%	
% Clay S	SL	6.30	11.30		4.0	"	
		2.6	3.5				
	SSL	13.30	17.7		1.3	N.S. @ 1%	
		7.9	8.1				
pН	SL	6.20	6.30		0.7	"	
		0.3	0.4				
	SSL	5.90	6.00		1.7	"	
		0.4	0.5				
Na	SL	0.08	0.10		2.0	"	
		0.03	0.04				
	SSL	0.08	0.12		2.3	"	
		0.03	0.05				
K	SL	0.26	0.35		1.5	"	
		0.09	0.18				
	SSL	0.26	0.32		0.6	"	
		0.28	0.15				
Mg	SL	1.92	3.10		2.6	Significant @ 1%	
		1.02	1.20				
	SSL	1.74	2.43	1.00	1.5	N.S. @ 1%	
		1.35					

CEC	SL	4.16	8.25	4.3	2.4	Significant @ 1%
		2.86				
	SSL	33.12	6.10	2.5	3.2	N.S. @ 1%
		2.07				
% Base	SL	99.9	99.70	0.8	0.8	"
saturation		0.3				
	SSL	98.50	99.25	1.09	1.3	"
		1.7				
% Nitrogen	SL	0.085	0.17		3.5	Significant @
		0.035	0.075			1.0%
	SSL	0.074	0.13		3.4	"
		0.026	0.05			
% Organic	SL	1.15	1.79		3.5	"
carbon		0.52	0.38			
	SSL	0.52	0.95		4.2	**
		0.265	0.19			
P ppm	SL	2.79	2.28		0.7	N.S. @ 1%
		1.98	1.65			
	SSL	3.41	1.20		3.1	Significant @
		2.20	1.21			1.0%
x Mean, o	Standard deviation,	N.S. – Not sign	nificant			
Source: Jeje	e, et al, 1983.					

Soil erosion also leads to the proliferation of unaesthetic badland topography and the lowering of the water table. As most of the eroded materials are deposited in natural lakes, ponds, and reservoirs, soil erosion leads to serious pollution and siltation of water bodies. The rivers are also not spared from rapid siltation. Thus, the need for dredging many rivers in the Delta region is significantly associated with the intense erosion activities in the hinterland.

Challenges of Environmental Management in Agriculture and Rural Development

Objectives and Strategies of Agricultural and Rural Development

Agricultural development, a subset of economic development, implies a sustained increase in the level of production and productivity over a reasonable length of time and the subsequent improved well-being of rural dwellers as reflected in their

higher per capita income and standard of living. Rural development relates not only to a sustained increase in the level of production and productivity of all rural dwellers, but also leads to a sustained physical, social and economic improvement of rural communities. In order to achieve the broad goals of agricultural and rural development, the Nigerian government usually focuses on specific objectives, including: provision of adequate food, fiber and industrial raw materials, and employment and foreign exchange generation. The goals of rural development embrace in addition a systematic improvement of the other institutional, physical and social infrastructures in such rural communities.

In an effort to attain increased agriculture output, the following strategies have been adopted.

- (a) Increasing the aggregate area under cultivation;
- (b) Increasing the productivity of cultivated land;
- (c) Using high yielding varieties of seeds;
- (d) Using irrigation to bring more land under cultivation;
- (e) Using more fertilizer;
- (f) Increasing the use of plant and livestock protection arrangements;
- (g) Adopting multiple cropping, thus increasing the total area cultivated.

Whichever strategy is eventually adopted usually derives its sustenance from the use of land and such a strategy in turn affects the physical, chemical and socio-economic structure of the environment.

Challenges to the Agriculture Sector

The agricultural sector in Nigeria faces several challenges. First, it must provide food for at least an estimated 140 million people every year. Second, a large and increasing share of the increase in food production must originate from higher yields per unit of land. Third, the increasing production capacity must be sustainable, that is, the additional food must be produced at the same time as the future productive capacity is enhanced. Fourth, the agricultural sector must provide employment for a rapidly increasing labour force, either directly or indirectly through linkages with nonagricultural sectors, and thus serve as the lead sector for general income growth and poverty alleviation. In addition, the immediate challenge is reducing food insecurity among the people who do not have access to enough food for a healthy and productive life (Anderson, 1993). Nigeria with a high population growth rate of over three per cent per annum is seriously confronted with the above challenges. While the challenges identified by Anderson (1993) can be simply summarised to mean increasing population pressure on the agricultural sector, it is important to note that even though Nigeria appears to be liberally endowed with land resource, the country is beset with a great environmental degradation problem in the nature of soil erosion.

Farmers on the existing land can however still increase their output considerably by proper management and intensive utilisation of existing resources as indicated in Table 4.

Table 4: Nigeria: Actual and Potential Yield of Main Food Items (in kg/ha)

Crop	Actual Yield	farmers'	Possible Yield	Possible Percent (%) Increase
Sorghum	750		1500	100
Millet	750		1000	33

Maize	850	2000	135
Cowpeas	250	800	220
Rice	1300	3000	130
Yam	2000	12000	71
Cassava	8000	15000	87

Source: First Things First: Meeting the basic needs of people of Nigeria, ILO JASPA, 1981 p. 91.

Adequate knowledge of the nation's resources is absolutely essential in order to determine the general direction of its future economic development. Effective utilization of natural resources will require (a) knowledge of the existence of the resources (b) their classification (c) their evaluation and (d) utilization. Lack of effective utilization of Nigeria natural resources is handicapped by several factors including inadequate technology, rural infrastructure, and mobilisation of human resources. Technology is very crucial in ascertaining what type of resources a country has and in what quantity in order to determine if it is economically profitable under existing conditions for exploitation. In Nigeria today, the knowledge to identify and properly utilize land resources is far from adequate. Even, for those resources required for local agricultural production, such as water and soil, our knowledge is still far from satisfactory.

The economic fortunes of nations are inextricably bound up in the state of their natural resources, particularly with the quality, quantity and sustainable use of soil, water, forest and agricultural products. Overexploitation of these resources, coupled with only limited appreciation of their complex-interdependence has led to misuse and depletion of renewable resources. Use rates in most instances have been based on unsustainable practices. The results of such actions include soil erosion, salinization water pollution, reduced water supply, further deforestation and other biomass losses and desertification. These various losses in the short run affect the economic welfare of

the individual and of the nation today and in the future may constrain further development efforts. The various losses, therefore, have economic implications of great significance. The economic significance of natural resource degradation [NRD] will show up directly in losses of input to the welfare of individuals (i.e increase poverty) and that of the nation. The impact at the national level includes:

- Reduced agricultural yield,
- Added impetus for rural-urban migration,
- Depletion of natural assets that are the basis of industrial activities both for local and export markets.
- Increased poverty level.

The deterioration of natural resources has serious economic and social consequences. It is capable of affecting the economic development in the following ways:

- It reduces the capacity for production growth and employment,
- Increases the production costs,
- It is capable of reducing the income generating potentials of people in the affected areas, which may lead to migration with further socioeconomic consequences.

Natural resources planning therefore become important in order to use resources sustainable. Given the rapid growing population, a critical issue in recent years will focus on how to make the best and sustainable use of the available land and other resources. Historically, natural resource base has been instrumental, in addition to

human resources, for development purposes. The issue is critical especially where large populations and government revenue depend on agriculture and exploitation of resources *Consequences of the Mismanagement of the Environment*

As already noted, the typical forms of agricultural related environmental degradation often observed in Nigeria are deforestation, and soil erosion. However, in few places, deforestation has been caused by the demand for new land for farming, building needs and timber harvesting and collection of non-timber forest products; while erosion is caused by the farming systems adopted, inappropriate road construction and maintenance methods associated with the farming systems. The impact of agricultural environmental degradation frequently transcends the agricultural areas. The general impact includes loss of flora and fauna, decline of surface and underground's water supply and food resources. Land resources must, therefore, be managed in ways to provide a basis for sustained development. In discussing the relationship between ecological deterioration and economic decline, Brown and Wolf (1985) reviewed evidence from soil scientists, agronomists, meteorologists and economists. The conclusion was that sustained overuse of biological systems can set in motion changes that are self-reinforcing and in which each stage of deterioration hastens the onset of the next. At the final stage, however, biological production is destined to collapse. Families will no longer be able to provide enough food for themselves and livestock. A massive exodus from rural areas begins. Famine becomes widespread and peasants' lack of income is compounded by absolute shortage of food.

In spite of the acknowledged and important role of land in agricultural production and productivity in the economy, adequate attention is not often given to the

proper use of land. This view stems from the observation that several activities inimical to the efficient land use and exploitation of the environment are often embarked upon. These include: Firstly, inappropriate farming systems and technologies leave the soil worse off. Currently as a result of overpopulation, the traditional fallow system is proving inadequate for food and industrial raw materials production. With increase population, the traditional fallow period required for the regeneration of the nutrient status of the soil is shortened because of pressure on land. Equally, increased demand for livestock products has inevitably resulted in overgrazing. Secondly, the desire to obtain mineral resources in the shortest possible time in order to realize adequate financial resources has resulted in the environmentally dangerous exploitation of mineral resources such as petroleum, tin and gold. Thirdly, certain government policies have adversely affected the Nigerian environment. In particular, the absence of a policy compelling exploring and extracting mining industries to reinvest and repair the soil appears to be one area calling for urgent attention.

The absence of adequate policies has adverse consequences on the environment and the performance of the agricultural and rural sectors. One important area where misuse of the environment is obvious is in the reduction of the quality of the land. A shortened fallow period leads to over-cropping, soil erosion, degradation and impaired quality and quantity of crop yield. Given impaired or reduced soil quality and reduced productive land, agricultural production and productivity in particular are endangered. This invariably impairs the ability of farmers to realize their socio-economic objectives. In essence, mismanagement of the environment leads to the following:

Fall in production and productivity,

- Fall in the income generating capacity of the people and the nation,
- Impaired ability of the economy to generate increased employment,
- Inadequate industrial raw materials, and
- Lowered ability for investment in the economy.

A study on the economic effects of soil erosion in Nigeria by Titilola, et. al. (1996), established that the major factors responsible for erosion on Nigerian farms include ecosystem disequilibria arising from population pressure on land, and fragile soil. Soil erosion is however aggravated by such factors as the farming system, soil management practices and rural poverty. The impact of land management is illustrated by comparison of eroded and non-eroded farms in Efon-Alaye as indicated in Table 5. The effect on farm size, farm output and value of output are deemed serious for the community and implication for the Nigerian agricultural societies. Erosion has:

- (a) Reduced the areas farmed to about one third of the original size
- (b) Reduced physical output to about two third and
- (c) Reduced the monetary value as well.

Table 5: Comparative Indicators for Eroded and Non-Eroded Farms, (1993)

Indicator	Eroded Farms		Non-Eroded	Farms
1. Average Farm Size (Ha)	2.83		3.75	
2. Major crops cultivated	Maize		Maiz	e
	Cassava		Cassa	va
	Yam (Some Cocoa and Kolanut		Yam	
			Cocoa	ı
			Kolan	ut
			Oil Pa	ılm
3. Input Costs (N)	N/Farm	N /Ha	N/Farm	N /Ha

(a) Labour:-					
i) Hired	2145.42	782.45	790.47	210.59	
ii) Family	1906.87	695.45	663.28	176.61	
(b) Seeds	1404.03	512.06	593.53	157.86	
(c) Fertilizer	200.00	50.00	1462.48	390.00	
(d) Herbicides	-	-	480.77	128.21	
(e) Pesticide	300.00	85.71	-	-	
Total	5256.32	2125.67	3989.53	1063.27	

Source: Survey Data, 1994

The implication of this result for agricultural land management in Nigeria is that farmers and other rural resource users are important actors in the management and prevention of erosion. Given the economic situation, under which they operate they place more emphasis on short time planning, essentially minimizing risk and maximizing income. They can therefore, be motivated in soil conservation effort and erosion control when they perceived erosion to be less of a threat to their livelihood. The measures that will adequately encourage resource management must

- a) Be profitable in the short-run;
- b) Include some aspects of existing farming system practices; and
- c) Not require farmers to donate their most limiting resources.

Effect of Land Degradation on Food Security and Poverty Reduction

Land is the most important agricultural production input. Ownership affects land use, farming systems, institutional structures, ecological conditions, adoption and use of technology, food production and self-sufficiency, and overall wellbeing of the rural and urban population. Poverty and resource misuse is linked because of the pattern of land distribution. The rich usually have access to land, which is less prone to degradation or

erosion, while the poor farmers continue to till a marginal resource base despite increase in their number.

Projected population increases superimposed on exiting land holding patterns will result in an incredible increase in poverty derived pressure on the environment with accelerated erosion, deforestation and desertification. Land use coupled with the effort of small farmers is the key instruments for achieving sustainable increases in yield and productivity. However, insecurity of tenure, especially among small-scale farmers, has been known to act as a disincentive to the conservation of resources, including reforestation and soil conservation projects. This is so because farmers are not willing to make necessary investments for which they may be unable to reap future benefits. Of all social reforms, land distribution is perhaps one of the most difficult to initiate and see through but without it, resource conservation and hence food security and poverty elimination will not be met and sustained.

In Nigeria, the linkage of the threat of continued soil erosion to productivity, income generation, and poverty alleviation and more importantly to the future generation resulting from the consequences of mis-use or inadequate land management practices is illustrated in figure 1 below. With approximately 98 million hectares, Nigeria is liberally endowed. However, soil erosion constitutes a major threat to land resources in several parts of the country. This limits utility of land that adversely affects food supply and food security at national and household level. The severity of the effects of soil degradation is perhaps better appreciated when cognisance is taken of the fact that some communities in Nigeria have had over 10% of their land mass wasted by gully erosion and other types of erosion (Titilola *et al*, 1996).

The economic status and growth of a nation depends on its land resource strategies to sustain agriculture and other development efforts. However, major land resource components such as the soil, forest and water are being threatened by degradation, which largely results from activities of man. The challenge is how to ensure the existence of land resource in suitable quality and quantity for sustainable agricultural production. In addition, there is need to rejuvenate existing lands since land is a limited resource. The problem of erosion is the result of the effects of other agents of land degradation. The one related primarily to agriculture, viz: vegetation clearance and mechanised land preparation is discussed next.

Vegetation clearance includes felling of trees for timber and fuel, clearing for farming and loping of trees and shrubs for browse by nomads. A cover of vegetation is the first defence against runoff and erosion on agricultural lands. Any soil protected by a right amount of vegetation or vegetation litter is not likely to erode no matter how hard and how long it rains. This is because standing vegetation dissipates the velocity and disperses raindrops thereby allowing the soil to absorb the rain without stirring the soil particles. Vegetation litter on the soil provides additional absorbent surface while attenuating the impact of raindrops. Cultivated crops provide an intermediate protection between bare soil and complete vegetation.

Throughout the country, preparation of land for farming involves selective cutting down of trees and shrubs and burning of woody vegetation. Mature trees of economic value are preferentially preserved until they pass their economic yielding ability. However, the recent trend towards clear-felling, stumping and levelling large tracts of land with heavy machinery and equipment for arable cropping poses serious

problems of wind and water erosion. The disturbed soil surfaces are readily washed while the removal of topsoil presents another problem of reduced soil fertility and productivity. There is urgent need for due caution in the choice of equipment for land clearing as well as the technique of land clearing in order to minimize hazards of erosion and depletion of fertility through loss of fertile top soil. Excessive use of heavy machinery involving the pulverization of otherwise fragile sandy soils and continuous cultivation which has replaced shifting cultivation in the densely populated areas of the country subjects the soil to annual cycles of water and wind erosion. Equally dangerous is the use of heavy machinery on heavy clayey soils. This causes compaction of the soil and reduces aeration and water infiltration to the great disadvantage of the growing plant crops.

The linkage between land degradation and rural poverty has been stressed in recent times. Mellor (1988) discussed the links between environmental problems and poverty. The assault on the environment in developing countries is perpetuated by poverty. In Nigeria, 80 to 90 per cent of the poor live outside cities. Half of these rural poor live on resources with the potential to increase production and income in environmentally friendly ways. Increasingly, however, as development raises incomes in the more productive region of these countries rural poverty tends to concentrate in environmentally fragile areas.

Population growth, poverty alleviation, natural resource sustainability and agricultural growth and food security are the critical issues militating against Nigeria's development. These issues are complex, intricately linked and they constitute the critical issues of development objectives. Continued increases in the efficiency with which land

are used in agriculture are essential for the promotion of economic growth, higher living standard, especially in countries like Nigeria where agriculture is a major part of the economy. Because of the population pressure, increasing demand for food is putting substantial pressure on the environment. If not properly managed, productivity is lost through soil erosion and salinalisation. Consequently, environmental management of farming will have to improve considerably in order to ensure increased food sufficiency and sustainability.

Nevertheless, two factors need to be considered in order to ensure agricultural /food security and environmental protection. These are: poverty, which is the issue at the root of much food insecurity. Rural poverty, particularly in the context of land scarcity and high population density may promote abusive land use practices giving rise to environmental degradation. Second, the provision of right incentives to farmers and others for the use of agricultural practices that is economically and environmentally sustainable.

The most crucial on-farm effects of land degradation are the declining potential yield of agricultural products. Lower agricultural yield has implications for food supply, food security and national development. Also, land degradation necessitates the use of higher level of chemical input in order to maintain yield. This has cost implications to both producers and consumers. If not properly used, the chemical input could itself lead to environmental problems. In some areas of Nigeria, especially in the erosion-prone areas of the eastern part of Nigeria, serious land degradation, such as Agulu-Nanka and environs lead to temporary or permanent abandonment of land. This has implications for

agriculture and food supply in the area, thus leading to rural/urban migration and other urban problems. Fig. 1 illustrates the various implications of misuse of land.

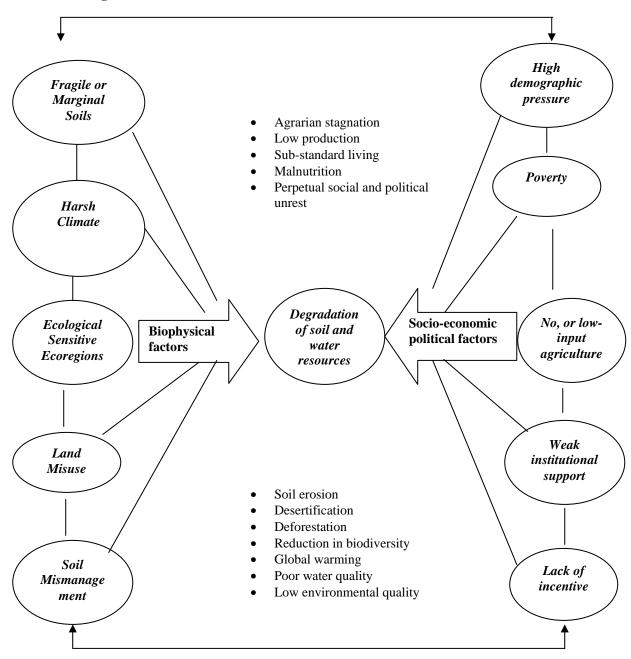
Policy Prescription

The appropriate policy response and action programs needed to address the problems identified above will include:

- (i) Increasing farm productivity per unit area so as to generate increased output with little increase in land area and consequently increasing food security. However, to minimise negative environmental impact, emphasis need be devoted to "environmental benign and sustainable technology". Examples includes minimum tillage, contour farming.
- (ii) Several conservation measures have been made to restore degraded land all over the country but so far most of these measures have only met with qualified success as the dynamics of land degradation are still to be clearly understood before successful measures can be taken against it. Thus, for a clearer understanding of the phenomenon and in order to formulate effective solutions, there is need to:
 - Have a comprehensive knowledge of the most degraded sites all over the country;
 - Carry out a detailed mapping of all these areas;
 - Formulate site specific solution to the problem of each degraded area; and
 - Monitor and map the southward progression of desertification.

(iii) National planning for land use requires a better knowledge than hitherto of the land resource base of the nation. The knowledge required will be with respect to those resources currently in use and unused. Also assessment of the resources would include the responsiveness of such land and water to additional production inputs. Assessment should include studies on soil vulnerability to erosion and other damages so as to plan different farming systems for the different ecological areas.

Fig. 1: Soil degradation is set in motion by fragile soils and harsh climate but accentuated by land misuse, soil mismanagement, and subsistence or resource – based and low – input agriculture.



SOURCE: Lar R. and Singh B.R. 1998

- (iv) Agricultural research and extension must focus less on mono-cropping technology and focus much more on above-mentioned technologies, adapting them to local conditions and making them available to local farmers.
- (v) Improved crop varieties, fertiliser and farm mechanisation technology to improve yield and maintain soil fertility must be devised. In the process, farmers can diversify also into high value crops for domestic and "probably export markets" in order to enhance rural income and improve food security through income stabilisation.
- (vi) Farmers will need adequate incentives to make their farm practice more profitable. To achieve this, farmers need appropriate marketing facilities, price and tax regime, exchange rate policies as well as investment of rural infrastructure, health and educational facilities. An integrated approach to planning water and land is needed because of their complementarities. Also, such development should not be divorced from the development of other input and services as these input and services are important to the optimal resource usage.
- (vii) The constraints on women's time must be eased and their productivity increased by initiative in research, extension, infrastructure development, rural technology and education. These can be achieved by improved farming and crop production technology and tools for women in addition to access to land and transportation.

(viii) The major energy source in Nigeria is the fuel wood. Therefore, the fuel wood problem must be addressed as the impact on soil degradation is enormous. Promote agro- forestry since it has a greater impact on the environment, the rural energy economy and women's time management.

Conclusion

It is important to realize *ab initio* that the effective response to land and other environmental problems call for a proper understanding of the problems, especially at the local level. In addition, it calls for improved incentive for farmers or other land users to care for their land and also improve their assets through adequate technological information and input. At the most efficient level, farmers are the managers and major stakeholders of the land as their livelihood depends on the sustainable use of the land. The issue of assisting the farmers to improve the quality and productivity of land, and subsequently food supply to the nation, must be taken seriously because the implications of land degradation have far reaching effects beyond farm level.

Finally, the issue of land degradation should be of concern to political leaders and the broader society because of its inter-generation implications. The nation that neglects its resource base will likely to have problems in future.

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