Farmers' Perception of the Effects of Land Degradation on Agricultural Activities in Ethiope East Local Government Area of Delta State, Nigeria

Oluwole Matthew AKINNAGBE (✉)
Ejovwoke UMUKORO

Summary

One of the most serious problems currently affecting agricultural productivity in developing countries of the tropics, including Nigeria, is land degradation. This study assessed the farmers' perception of the effects of land degradation on agricultural activities in Ethiopia East LGA of Delta State. A multi-stage sampling technique was used in the selection of the respondents. A total of 60 farmers were randomly selected through the use of structured interview schedule. The data were analyzed using frequency, percentage and mean statistic. The results of the study revealed that, the major causes of land degradation as perceived by the farmers in the area included: accelerated erosion ($\bar{x}$ =1.87), deforestation ($\bar{x}$ =1.72), non-adoption of adequate soil conservation measures ($\bar{x}$ =1.37), administrative and institutional problems ($\bar{x}$ =1.70) and exploration of crude oil ($\bar{x}$ =1.70). The perceived major effects of land degradation on agricultural production were: decrease in farm land available for cultivation ($\bar{x}$ =3.85), reduction in farm yields/output ($\bar{x}$ =3.82) and loss of nutrients/organic matter ($\bar{x}$ =3.81). To restore, sustain and enhance the productive and protective functions of the land in the area, the study recommended soil productivity restoration approaches {application of manure ($\bar{x}$ =2.00), mixed cropping ($\bar{x}$ =1.92), crop rotation ($\bar{x}$ =1.18)} and effective stakeholders participation in land use planning and management ($\bar{x}$ =1.78).

Key words

effects, land degradation, agricultural activities, Delta State, Nigeria

Department of Agricultural Extension, University of Nigeria, Nsukka, Enugu State, Nigeria
✉ e-mail: wolexakins@yahoo.com

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Introduction

The importance of natural resources, especially land to agriculture and rural development is well recognized. Land is the basic natural resource that provides habitat and sustenance for living organisms. Africa is endowed with enough land to undertake small and large scale activities to strengthen household security, national development, trans-boundary cooperation and regional integration to transform trade, and create new opportunities for sustainable development that is sensitive to the environment and social and economic issues (Bangladesh, 2001). 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 (Titilola and Jeje, 2008).

Land, being limited in supply is pressured and competed for by several uses. The intensification of cultivation resulting in the opening up of new lands exposes the top soil to the elements of degradation and alters the natural ecological conservatory balances in the landscape (Senjobi and Ogunkunle, 2010). Land degradation, a decline in land quality caused by human activities, will remain high on the international agenda in the 21st century. In the developing countries like Nigeria where a large proportion of human population depends almost entirely on land resources for their sustenance, there is increasing competing demand for land utilization such as grazing, fish pond construction, quarrying, crop farming amongst others. People can be major asset in reversing trend towards degradation (Eni *et al.*, 2010).

According to Federal Office Statistics (1995), about 50 percent of the active labour force is engaged in one form of agricultural activity or another, with yam, cassava, plantain, maize, cocoyam and vegetables as the predominant food crops in the area. However, owing to the hydrographic conditions of the State only a fraction of the land size is cultivated with crops. Cropping patterns are mainly sole cropping, mixed cropping and intercropping, while farming practices are traditional, and the use of crude implements such as hoe and cutlasses predominate. Agricultural production is on a small and subsistence scale, with small farm holdings.

According to Akamigbo (2005), land degradation assume varying dimensions depending on one's location. In Nigeria, for example, inhabitants of the coastal areas are not as worried by the fear of desert encroachment as those who reside in Borno, Sokoto, Katsina and Kano states of Nigeria, just as they worry about oil pollution and spillage, coastal erosion and flooding in Niger Delta of Nigeria. Sheet erosion is nation-wide while gully erosion is most severe and dense in certain southern states of Anambra, Imo, Abia, Enugu, Ondo, Delta and Akwa Ibom. Flooding occurs throughout Nigeria.

The questions therefore are: What are the perceptions of the farmers on the effects of these activities on agriculture? What are the various causes of the land degradation in the area? What are various strategies adopted by farmers to cushion the effect of land degradation in the area?

Purpose of the study

The purpose of the study was to assess the perception of the farmers on the effects of land degradation on agricultural activities in Ethiope East Local Government Area (LGA) of Delta State, Nigeria.

Specifically, the study was designed to:

1) describe the socio-economic characteristics of the farmers;
2) ascertain the causes of land degradation in the area;
3) assess the perceived effects of land degradation on agricultural activities;
4) ascertain the strategies of reducing the effect of land degradation in the area.

Materials and methods

The study area: The study was carried out in Ethiope East LGA of Delta State, Nigeria. The LGA has a population of 200,942 persons made up of 101,596 males and 99,346 females (NPC, 2007). Ethiope East Local Government Area of Delta State, Nigeria is made up of semi-urban settlements of about 100,000 inhabitants, located between latitude 5°N - 6°S and longitude 5.5°E - 6.5°W. The area is characterized by tropical climate with rainy season lasting from March to November. The vegetation ranges from mangrove thick forest to mixed rain forest and grasslands. The inhabitants of the area are mainly indigenous farmers. Due to rainfall for much of the year (8-9 months) and human activity the soil is porous and moist with temperature range of 28-32°C.

Population and sampling techniques: All farmers in the area constituted the population for this study. Multi-stage random sampling procedure was used in the selection of respondents from the LGA. The first stage involves a purposive selection of six communities mostly affected by land degradation in the LGA. The second stage involves random selection of farmers. Community leaders from each of the six communities selected were asked to make a list of 20 full time farmers. From the list, 10 farmers were randomly selected, making a total of 60 respondents.

Instrument for data collection: Data for the study were collected from the respondents through the use of interview schedule. The interview schedules contained relevant questions based on each of the objectives. Content and face validity was carried out to ensure that the instruments collect the data they are meant to collect. This was done by lecturers in the Department of Agricultural Extension, University of Nigeria, Nsukka, before field administration.

Measurement of variables: Information on the socio-economic characteristics of the respondents was examined. These included age, sex, marital status, educational level, farming experience and household size. To ascertain the causes of land degradation in the area, respondents were provided with a list of possible causes of land degradation to tick from, on a 3-point Likert type scale (0 = not a cause, 1 = minor cause and 2 = major cause). The values on the Likert type scale was added to obtain 3 that was divided by 3 to obtain a mean score of 1.0. Then, any mean score equal or higher than 1.0 was perceived as a possible cause of land degradation, while a mean scores less than 1.0 was regarded as not a cause of land degradation in the area.

To assess the effect of land degradation on agricultural production, farmers were provided with a list of possible effects (e.g. decrease in farm output, loss of soil nutrients) and they were asked to indicate the extent to which they perceived these variables on a 5-point Likert-type scale (5 = to a great extent, 4 = to some extent, 3 = to a little extent, 2 = to a very little extent and 1 = to no extent). The values on the Likert type scale were added to obtain 15, and divided by 5 to obtain a mean score of 3.0. Any mean score, equal or higher than 3.0 was perceived as a possible effect of land degradation on agricultural production, while mean score less than 3.0 was not perceived as an effect.

To ascertain the strategies for improving degraded land in the areas; a list of possible coping strategies was provided on a 3 point Likert type scale (3 = very effective, 2 = effective and 1=not effective) for them to tick from and the extent of their effectiveness. The values on the Likert type scale was added to obtain 6 and divided by 3 to obtain a mean score of 2.0. Then, any mean score equal or higher than 2.0 was perceived as a coping strategy while, a mean score of less than 2.0 was not regarded as a coping strategy.

Data analysis: Data were analyzed using frequency, percentage and mean statistic. Statistical Package for Social Science (SPSS), version 11, was the package used for data analysis.

Results and discussion

Socio-economic characteristics of the respondents

The results in Table 1 revealed that, greater proportion (43.4%) of the farmers were between the age range of 51 and 60 years, while 28.3% of them were between 41 and 50 years of age. Those that fell within 61-70 years accounted for 18.3%. The remaining 10.0% fell between 31 and 40 years of age. The average age of the respondents was 53.7 years. This implies that the farmers are old. Also, majority (53.3%) of the farmers were females, while the remaining 46.7% were males. This implies that women were more involved in agricultural activities in the area. Greater proportion (35.0%) completed primary school education, while 25.0% had no formal education. About 22% and 10% of the respondents attempted and completed primary school education, respectively. Only 3.3% had tertiary education. It implies that, the farmers could read and write.

Data in Table 1 further revealed that, 35% of the farmers had been in farming business for more than 21 years, while 25.0% had between 16 and 20 years of farming experience. The table further revealed that 20.0% of the farmers had between 11 and 15 years farming experience while only about 18% and 3% had between 6 and 10, and 1 and 5 farming experiences, respectively. The average farming experience was about 19 years. This implies that, the respondents are experienced farmers; hence they have acquired enough farming experience needed to perceive the effect of degradation on farming activities in their area, over the years.

Data in Table 1 also revealed that, majority (66.7%) of the respondents had between 1 and 5 persons, while the remaining 33.3% had between 6 and 10 persons in the family. The average family size was 7 persons. This implies that, the farmers had a large family size in the area, which could reduce the demand for hired labour as members of the farm families could carry out some of the farming and non farming activities. Also, Table 1 further revealed that, majority (96.6%) of the farmers had less than 2 hectares while only 3.4% had between 2.1 and 4 hectares of land for farming. The average farm size was 1.2 hectares. This shows that they are small scale farmers, which is a typical feature of rural farmers in Nigeria.

Table 1. Percentage distribution for respondents according to socio-economic characteristics

Socio-economic characteristics	Frequency (n=60)	%	$\bar{x}$
Age (years)			
31 – 40	6	10.0	
41-50	17	28.3	53.7
51-60	26	43.4	
61-70	11	18.3	
Sex			
Male	28	46.7	
Female	32	53.3	
Marital Status			
Single	2	3.3	
Married	49	75.0	
Widowed	10	16.7	
Divorced	3	5.0	
Education level			
No formal education	15	25.0	
Primary school attempted	3	5.0	
Primary school completed	21	35.0	
Secondary school attempted	13	21.7	
Secondary school completed	6	10.0	
Tertiary institutions	2	3.3	
Farming experience (years)			
1-5	2	3.3	
6-10	10	16.7	18.9
11-15	12	20.0	
10-20	15	25.0	
21 years and above	21	35.0	
Family size (number)			
1 - 5	40	66.7	7
6 and above	20	33.3	
Farm size (hectare)			
0.1 - 2	58	96.6	
2.1 - 4	2	3.4	1.2

Causes of land degradation

The data in Table 2 showed that the major causes of land degradation in the area was erosion ($\bar{x}$ =1.87). This study is in support of Mbagwu (2003). According to him, about 85% of the causes of land degradation worldwide are due to soil erosion by wind and water. Rainfall is the most important climatic factor in determining areas at risk of land degradation and potential desertification. Rainfall plays a vital role in the development and distribution of plant life, but the variability and extremes of rainfall can lead to soil erosion and land degradation. If unchecked for a period of time, this land degradation can lead to desertification. The result in Table 1 further shows that flooding and water logging ($\bar{x}$ =1.38) was also perceived as the cause of land degradation in the study area. Water logging is caused by restricted infiltration of water into the soil. This lowers land productivity through rise in ground water close to the soil surface.

Other causes of land degradation included: deforestation ($\bar{x}$ =1.72); increased intensity of farming ($\bar{x}$ =1.63), burning of vegetation ($\bar{x}$ =1.52), non-adoption of adequate soil conservation measures ($\bar{x}$ =1.37) and overgrazing by animals ($\bar{x}$ =1.23).

Table 2. Mean score of respondents perceived causes of land degradation

Causes of land degradation	Mean ($\bar{x}$)	SD
Increasing intensity of farming and cultivation	1.63*	0.55
Burning of vegetation	1.52*	0.53
Overgrazing by animals	1.23*	0.50
Construction works (e.g. road, infrastructure)	1.45*	0.64
Deforestation	1.72*	0.45
Exploration of crude oil	1.70*	0.49
Non adoption of adequate soil conservation measures (e.g. crop rotation)	1.37*	0.78
Desert encroachment	0.05	0.22
Solid compatibility by tractor	0.20	0.40
Earthquakes	0.15	0.36
Administrative and institutional problems	1.70*	0.53
Accelerated erosion (water and wind)	1.87*	0.34
Climatic change	1.40*	0.58
Topography of the terrain	0.70	0.80
Flooding and water logging	1.38*	0.66

* Causes

People exert tremendous pressure on the forests, particularly close to settlements for firewood, roofing and household furniture and these have resulted in depletion of forests and degradation of forestland in the area. Also, occurrence of frequent forest fires has been a major cause of degradation of forestland in many parts of the Nigeria. Apart from destruction of vegetation, high intensity forest fires alter the physical-chemical and biological attributes of the surface soil and leave the land prone to erosion and lowering of soil quality. Overgrazing removes the vegetation cover that protects soil from erosion. High population density is not necessarily related to land degradation. Rather, it is what a population does to the land that determines the extent of degradation. Most of the farmers over the years adopted bush burning as a means of clearing their farm.

Administrative and institutional problems ($\bar{x}$ =1.70) is another perceived cause of land degradation. Destructive and poorly conceived land tenure policies that undermine old-age land management mechanism. Lack of ownership and tenure security undermines innovative technology adoptions and deinvestment in land management initiatives. There is inadequate budgetary allocations and lack of poorly articulated regulations on implementation of policies; inadequate capacity to enforce policies as well as lack of commitment and political will undermine management of land degradation. Also, networking is lacking among the stakeholders and there is failure to share vision; there is increased duplication of efforts leading to increased inefficiency and failure to create a critical mass of expertise around land degradation management issues.

Data in Table 2 further showed that exploration of crude oil ($\bar{x}$ =1.70) contribute to land degradation in the area. The exploration of crude oil in Delta state of Nigeria has created the problem of oil pollution and degradation of farm lands. All these human activities have combined to deplete the earth's resources, degrade the environment and cause loss of biodiversity. According to Etuonovbe (2009), leaking pipelines, running through villages, farms, creeks and rivers in the Delta state, are a major source of pollution, sickness and economic ruin for the people. Farmland polluted by oil is rarely rehabilitated, destroying livelihoods. Fish contaminated by oil cause sickness among the people and further economic ruin as fish stocks decline.

Construction work like building of new roads and other infrastructures ($\bar{x}$ =1.45), also cause land degradation. Urbanisation and industrialisation are exerting pressure on the environment and on the natural resources of the country. The building of new roads and other infrastructure in the LGA as a result of oil exploration activities could affect the structure of the soil, hence could lead to soil erosion and water logging, thereby causing land degradation and making it unfit for agricultural purpose.

As indicated in Table 2, climate change ($\bar{x}$ =1.40) causes land degradation. It is quite obvious that the ever increasing levels of greenhouse gas emissions, which cause global warming, has its biggest impact on agriculture. The current catastrophic incidences of climate change recorded the world over present new challenges to agricultural production in the developing countries and particularly in sub-Saharan Africa.

The perceived effects of land degradation on agricultural activities

Data in Table 3 shows that the major perceived effects of land degradation on agricultural activities were decrease in farm land available for cultivation ($\bar{x}$ =3.85) and reduction in farm yields (output) ($\bar{x}$ =3.82). Many researchers have reported of the decrease in crop yields as a result of land degradation caused by erosion. Erosion can cause yield reductions of 30 to 90% in some root-restrictive shallow lands of West Africa (Mbagwu *et al.*, 1984; Lal, 1987). Yield reductions of 20 to 40% have been measured for row crops in Ohio (Fahnestock *et al.*, 1995) and elsewhere in Midwest USA (Schumacher *et al.*, 1994).

The productivity of some lands in Africa (Dregne, 1990) has declined by 50% as a result of soil erosion and desertification. Yield reduction in Africa (Lal, 1995) due to past soil erosion may range from 2% to 40%, with a mean loss of 8.2% for the continent. There are also serious (20%) productivity losses caused by erosion in Asia, especially in India, China, Iran, Israel, Jordan, Lebanon, Nepal, and Pakistan as noted by Dregne, (1992). In South Asia, annual loss in productivity is estimated at 36 million tons of cereal equivalent valued at US$5,400 million by water erosion, and US$1,800 million due to wind erosion (United Nation Environment Programme {UNEP}, 1994).

Land degradation also leads to loss of nutrients/organic matter ($\bar{x}$ =3.81) as perceived by the farmers. Loss of soil nutrient and on farm losses through land compaction is a problem on its own, but it also leads to other environmental problems. 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. Productivity declines may be due directly to soil degradation, through depletion of soil nutrients, soil toxicity, or soil water holding capacity, or indirectly, through infestation of degraded soils by persistent weeds that reduce yields.

Entries in Table 3 further show that, land degradation increase population pressure on land ($\bar{x}$ =3.58), threaten food security (x=3.62) and could lead to unsustainable agriculture and development thereby precipitating starvation and poverty ($\bar{x}$ =3.23).

In areas with high population densities and fragile ecosystem, inappropriate land management increases loss of productivity of resources of poor and urban population and in turn affects their food security and livelihood. Land degradation affects the poor much more than the rich. Degraded lands not only produce less, but they demand more resources to manage. The poor are vulnerable because they farm marginal areas: rely more on the intrinsic quality of their soils and landscape; have fewer capital assets to improve their land or invest in conservation technologies; tend to migrate to seek urban based income, denying their land the necessary labor to manage the resources in a sustainable way and have less resources to be resilient in the face of major problems such as drought, floods and diseases. The cumulative effect of land degradation on agricultural productivity is food insecurity and increase in hardship and poverty. Report by Lal and Okigbo (1990) shows that in West Africa, especially in areas with high land degradation, more than 30% of the children died before the age of five. These are children from poor families who do not have the resources of production.

Other perceived effects of land degradation on agricultural production as indicated by the respondents include, decrease in fishery resources as a result of river ponds and lake pollution ($\bar{x}$ =3.73), destruction of wildlife and vegetation ($\bar{x}$ =3.67), and loss of pastures land ($\bar{x}$ =3.75). Farmland degradation may also have important negative effects off the farm (economists refer to such effects as "externalities"). Examples include deposition of eroded soil in streams or behind dams; contamination of drinking water by agricultural chemicals; diversion of water sources from other users by irrigation; health problems or property damage caused by wind-eroded soil; or loss of habitat due to degradation of agricultural lands.

Farmers were also of the view that, land degradation could lead to loss in value of land ($\bar{x}$ =3.72). This finding is in line with the report by Europeans Commission on Agriculture (European Commission for Agriculture {ECA}, 2006). The report observes that land abandonment resulting to land degradation can substantially reduce the value of land. This is by decreasing of agricultural (and other) values attributed to the land, the loss of infrastructure related to agriculture and forestry, e.g., rural roads, irrigation systems etc. and may decrease its potential for tourist and recreational activities. Significant land value depreciation leads to land abandonment and out migration, which can also lead to further isolation and marginalization of vulnerable rural population. This is the true situation in Africa and has contributed to an unbalanced demographic structure, the loss of knowledge and tradition of land management, the disappearance of social and community values and structures as well as increased health issues including depression and alcoholism.

Land degradation lead to loss of the aesthetic values of natural beaches ($\bar{x}$ =3.32). Petroleum prospecting with its attendant oil pollution problems such as spills, oil well blow-out, oil blast discharge, improper disposal of drilling mud create problem of loss of the aesthetic values of natural beaches due to unsightly oil slicks; damages in marine wildlife, modification of the ecosystem through species elimination and the delay in biota (fauna & flora) succession; and decreases in fishing resources (Isirimah, 2003). Furthermore, acid precipitation due to gas flaring degrades fresh water and forests in coastal areas through ecosystem heat stress.

Table 3. Mean score of respondents on perceived effects of land degradation on agricultural production

Perceived effects	Mean ($\bar{x}$)	Standard deviation
Reduction in farm yield (output)	3.82*	0.75
Decrease in farm income	3.80*	0.75
Loss of nutrients/organic matter	3.81*	0.50
Destruction of soil structure	3.12*	0.71
Reduction of animal growth	2.92*	0.72
Unsustainable agriculture and development thereby precipitating starvation and poverty	3.23*	0.67
Increase in cost of production as a result of additional money spent in controlling degraded land	3.72*	0.55
Decrease in fishery resources as a result of river ponds and lake pollution	3.73*	0.54
Decrease in farm land available for cultivation	3.85*	0.40
loss of the aesthetic values of natural beaches	3.32*	0.70
Loss in value of land	3.72*	0.55
Destruction of wild life and vegetation	3.67*	0.51
Threaten food security	3.62*	0.58
Loss of pasture land	3.75*	0.47
Increase population pressure on land	3.58*	0.64

* Perceived effect

Table 3 further shows that, land degradation increase the cost of production as a result of additional money spent in controlling degraded land ($\bar{x}$ =3.72), and decrease farm income ($\bar{x}$ =3.80). The level of poverty of many farmers is such that they cannot accept the consequence of reduced yields. Instead, they must attempt to maintain their food supplies from the degraded land, by means of increased inputs. This is now widely the case where attempts are made to combat soil fertility decline by increased inputs of fertilizers. Another response is to attempt to maintain livestock numbers despite a reduced carrying capacity of pastures, thus leading to a vicious circle of further degradation. This finding is in support of studies carried out in some countries that showed that the cost of land degradation is enormous. According to Lal (1998), it is estimated that the total annual cost of erosion from agriculture in the USA is about US$44 billion per year, about US$247 per ha of cropland and pasture.

Other effects of land degradation on agricultural production as perceived by the farmers include: destruction of soil structure ($\bar{x}$ =3.12) and reduction of animal growth ($\bar{x}$ =2.92). The soil structure of most of the oil region in Nigeria has been tampered. The current global warming trend hinders livestock production and reproduction by reducing animal weight gain and dairy production. Incidence of pest and disease have increased over the past few years as a result of climate change, hence this will definitely affect the livestock. Also, to avoid some losses as a result of this, some farmers prefer not keeping livestock.

Strategies of improving degraded land

Data in Table 4 shows the mean scores of farmers on strategies of improving degraded land. From the farmers' point of view, use of organic manure ($\bar{x}$ =2.00) was perceived as strategies of improving degraded land. This finding is in line with Mbagwu (1984) findings that, application of 5% poultry manure,

Table 4. Mean score of perceived strategies of improving degraded land

Cropping strategies	Mean ($\bar{x}$)	Standard deviation
Use of organic manure	2.00*	0.00
Bush fallow	1.38*	0.58
Crop rotation	1.18*	0.56
Shifting cultivation	0.92	0.42
Proper and adequate use of fertilizers and line	0.98	0.29
Construction of contour ridge	1.12*	0.45
Intercropping practices	0.92	0.56
Irrigation	0.57	0.74
Avoidance of bush burning	1.28*	0.49
Alley cropping and agro forestry systems	1.72*	0.49
Erosion control measures like terracing, controlling	1.98*	0.43
Practicing mixed cropping	1.92*	0.27
Mounting an awareness campaign on the proper use of agricultural land	1.88*	0.37
Effective stakeholder participation in land use planning and management	1.78*	0.52

* Strategies

compost manure, rice husk and saw dust as amendment are more effective in restoring degraded lands than a combination of high doses of 120, 30 and 120 kg ha^{-1} NPK in Nigeria.

Farmers were also of the opinion that practicing mixed cropping ($\bar{x}$ =1.92), crop rotation ($\bar{x}$ =.1.18) and bush fallow ($\bar{x}$ =1.38), will help to minimize the effect of land degradation. Crop rotation, mixed cropping and relay cropping provide a protective cover, reduce the rate of soil moisture loss through evaporation from soil surface, improve soil organic matter, total nitrogen, cation exchange capacity, infiltration and water retention capacity. According to Asadu *et al.* (2004), *Leuceana spp* can fix 300-400 kg ha-1 N annually. Data in Table 4 further revealed that, construction of contour ridge ($\bar{x}$ =1.12) will help to minimize land degradation. When contour ridges are constructed, it helps to prevent surface water run-off / erosion and leaching.

Also, mounting of an awareness campaign on the proper use of agricultural land ($\bar{x}$ =1.88) and avoiding of bush burning ($\bar{x}$ =1.28) will help in reducing the effect of land degradation. There is a need to increase awareness of land degradation. These issues of land husbandry need to be integrated broadly into educational programmes as well as in rural extension services. Technical information about land improvement options needs to flow more quickly and widely among land users. Greater integration between rural land use sectors (such as forestry, agriculture, and agribusiness) and between disciplines (such as economics and soil science) is needed in developing extension programmes. Methods developed by local farmers as well as those developed through scientific research should receive greater recognition and dissemination.

Data in Table 4 further revealed that there should be an effective stakeholders participation in land use planning and management ($\bar{x}$ =1.78). Land use planning in the past was based mainly on input from technical experts and federal government policy-makers, land use regulations and restrictions were the principal planning instruments. These planning models were generally not successful. They often ignored local interests (leading to noncompliance or resource expropriation), overlooked possibilities for technical or organizational innovations to resolve conflicts between environment and production objectives, and led to plans that remained static in the face of dynamic economic and environmental change. New paradigms emphasize participatory land use assessment and planning. These facilitate joint assessment of land degradation problems and possible solutions by different users and develop negotiated plans of action. Public agencies or an outside neutral agent may perform the role of facilitator.

Alley cropping and agro forestry systems ($\bar{x}$ =1.72) could help to minimize the chances of soil degradation. Combination of both alley and cropping agroforestry is a form of land use where trees (like *Eucalyptus camaldulensis, Aciobatarii, Leucaena lucocephala)* are combined with crops or pastures or both in time and space. The application of this technique reduces the length of exposed bare surface area, which could serve as shelter. The falling leaves from the tree (after decay) help to return organic matter to the soil that would help in the growth of the crop planted while the trees prevent water and wind erosion. The system could be used as an alternative to slash-and burn as well as field-fallow agricultural systems.

Conclusion

Land degradation will remain an important global issue for the 21st century because of its adverse effect on agronomic productivity, the environment, and its effect on food security and the quality of life. If the present diminishing availability of productive land resources continues unabatedly and uncheck mated, then the survival of African population will be seriously threatened as noted by Ezeaku and Davidson (2008). Therefore, to restore, sustain and enhance the productive and protective functions of the land in the area, farmers were of the view that, the use of organic manure, practicing mixed cropping, crop rotation, mounting of an awareness campaign on the proper use of agricultural land, effective stakeholder participation in land use planning and management and practicing alley cropping and agro forestry systems would go a long way to reduce the degradation level of the soils. Also, improving the spread of information, through widely linked, user-friendly information systems for farmers on land management would help in reducing land degradation.

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acs76_21