THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Addressing Land Degradation in Northern Nigeria to Alleviate Rural Poverty

Obaisi Alaanuloluwa Ikhuoso
Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria

Abstract:
Land degradation is a crucial challenge affecting developing countries and it has been predicted to become a severe limitation and restriction in the near future (Chisholm and Dumsday, 1987; Eckholm, 1976; USAID, 1979; Ward, 1979; Brown and Wolf, 1984; Bennett, 1931; Barbier and Burgess, 1992; Pimentel et al., 1995). Wellbeing has been linked with growths in dependence on ecological resources (e.g. Shackleton and Shackleton, 2012), and because the livelihoods of the poor appear to depend most directly on the supply of ecological services.
The objective of this paper is to investigate the problems of land degradation and rural poverty in Nigeria and also, explain the link between rural poverty and land degradation in the region. This paper will suggest new and long lasting solutions to the problem of land degradation in Northern Nigeria.
The study was done by analysing secondary source data, a lot of the analysis was solely based on the published report of the United Nations Convention to Combat Desertification (UNCCD). The study revealed the rate of poverty in Nigeria has generally skyrocketed since 2000 (with an average 60% of the total population). Study showed that the amount of people living underneath the country's poverty line of $1 per day is greater in the areas affected by land degradation. The percentage of people living below the poverty line was greater between the years 2004 and 2006. Rapid increase was also noticed between the year 2005 and 2006 in the number of people living in the affected areas and rural areas.
This study recommends that government should enact policies that protect the land and spread awareness about the problem of land degradation.

1. Introduction

Land degradation is a crucial challenge affecting developing countries and it has been predicted to become a severe limitation and restriction in the near future (Chisholm and Dumsday, 1987; Eckholm, 1976; USAID, 1979; Ward, 1979; Brown and Wolf, 1984; Bennett, 1931; Barbier and Burgess, 1992; Pimentel et al., 1995). Few past studies revealed that almost 80% of rangeland and dryland forest areas, 30% of tropical forests and about 50% of all irrigated farmland in developing countries are categorised as degraded (Leonard et al., 1989). Some other studies also revealed that, in developing countries, land degradation and abandonment can result in 50% of land being lost. This includes potentially productive agricultural land (Cleaver and Schreiber, 1992; Barbier, 1997). The loss of agricultural land would be disastrous to every sector of the economy therefore affecting the lives of the people who reside in the region.

As it is common knowledge that land is a vital and compulsory factor in farming, the effects of land degradation and the exhaustion of soil resources have very serious economic consequences for low-income countries and poor rural areas of the world (Barbier, 1998), as a lot of these economies solely rely on agriculture for food, growth and development. This is particularly true of the situation in Africa, where agricultural production is central to the livelihoods and growth of the rural population, as the rural regions depend on the agricultural sector (Barbier, 1998). The susceptibility of developing countries dependent on agricultural activities and pastoral activities to the effects of environmental degradation can also be attributed to shortages of human capital and financial capital. It has severely restricted the countries' abilities to attempt and try out other economic activities when the resource base fails to sustain them (Warford and Partow, 1990). The agricultural sector of most African countries have been over-exploited due to this fact.

Land loss and degradation is a worldwide problem that needs to be addressed urgently. This paper will focus on the problems of land degradation and land loss in Northern Nigeria as it is a major cause of rural poverty in the region. It will carefully look into the causes and reasons for these various land losses, what previous steps have been taken to solve the problem and ultimately make a proposal for likely solutions to the problem.

This study investigates the causal factors of farmland degradation in the northern zone of Nigeria and their associated on-site effects and consequences. This approach is necessary because empirical research on the economic costs of land degradation in the developing world are confined largely to analysis at the level of individual farms or watersheds (Barbier, 1998).

1.1. Definitions of Land Degradation

There are many available definitions of land degradation. The general definition of land degradation is that it is the reduction in the ability of the soil to support crop/plant production [(Blaikie and Brookfield, (1987)] and as a transformation in land forms that renders the land less productive for the activities of mankind [(Wasson, (1987)]. Forms of land deterioration sometimes is seen in erosion, salinization, waterlogging, land cover reduction/removal, nutrient loss, change in structure of soil, and soil pollution. The focus in each situation is on the biological and physical results with the land-use systems, and this is viewed as the most important cause of land degradation.

UNEP defined land degradation as the lessening of the soil's current potential ability to yield quantitative or qualitative products or outputs due to one or more degradative processes (UNEP, 1982, 1984) also, land degradation is the steady decline in the biological productivity of land and its resources in their predominant purposed use rising from certain human activities and actions. Land degradation entails soil degradation and variations in the local landscape and vegetation due to human activities (Gretton and Salma, 1996).

For the purpose of this paper, the United Nations Convention to Combat Desertification (UNCCD, 1996) definition for land degradation will be adopted for use throughout this paper: Land degradation was described as the loss of biological productivity of the land which is as a result of farm processes or other factors such as erosion which leads to the deterioration of soil properties and loss of vegetation (Sivakumar and Ndiang'Ui,2007).

1.2. Defining Poverty

According to World Bank's definition of poverty, poverty is living below $1.25 a day (World Bank, 2015). In 2011, more than 80 percent of the severely poor resided in South Asia (399 million) and Sub-Saharan Africa (415 million) while also, 161 million resided in the Pacific & East Asia.

According to the United Nations, the majority of the people living on less than $1.25 a day reside in two regions: sub-Saharan Africa and Southern Asia. Since 1990, severe poverty rates have been slashed in half. While this is an exceptional achievement, one out of every five people living in developing regions still survive below $1.25 per day. (United Nations, 2015)

Poverty entails more than just the absence of income and resources to earn and make certain a sustainable livelihood. Poverty is expressed in many varying forms, the various forms poverty manifests include hunger and malnutrition, limited access to basic education and other basic services, social discrimination and debarring as well as the absence of contribution in decision-making. (United Nations, 2015)

According to Merriam-Webster's Collegiate Dictionary (1995), poverty is "The state of one who lacks a usual or socially acceptable amount of money or material possessions." This definition has two key and vital ideas. First, the definition of poverty will be different at various times and in various communities and the things that are "socially acceptable" in, say, Congo may vary from that in the U.S.A. And second, the focus is on the power to acquire goods and services (money) or on their ownership (material possessions) (Ravi and Lyn, 1999).

1.3. The Present State of Land Degradation Globally

Land degradation stands as a serious global environmental challenge. It has direct consequences on the daily source of income and livelihood of millions of people, with the greater percentage of them in penury and impoverished. Over 500 million hectares of dryland has been deteriorated. It adversely declines the world's capability to raise the production and output of food that is required to feed the vastly growing world population. Hence, it is crucial to sustain the health of the environment and also ensure that production landscapes are sustainable. This requires outlooks and perspective of land management that consider in detail all vital natural resource constituents, principally soil, biomass and water. (Naoko, 2015)

Almost 20% of the world land is suffering from severe land degradation and loss (Facts on Desertification, 2006; Reynolds et al, 2007). A large majority of the people who reside in drylands live in third world countries. They are reported to have the poorest conditions and also the highest infant death / mortality rates. (Facts on Desertification, 2006).

There is loss of nutrients and soil to make cultivation possible as a result of constant degradation. (Facts on Desertification, 2006). Farming in these areas is characterised by low output, which alongside unstable rain supply leads to a catastrophe, long drought periods (FAO, 2011).

The Millennium Development Goals (MDGs) has at the top of its priorities the elimination of poverty and hunger (World Health Organization, 2008). The number of people who are suffering from severe hunger has climbed up to 1.02 billion, and many rely on farming as their source of livelihood, therefore, the task ahead is to improve agriculture to increase yields and output so that the people can feed and have a source of livelihood (FAO, 2012).

- AIMS: To investigate and analyze the problem of land degradation in Northern Nigeria and provide possible solutions.

- OBJECTIVES
  - → To investigate the problems of land degradation and rural poverty in Northern Nigeria
  - → To explain the link between land degradation and rural poverty in Northern Nigeria
  - → To suggest a new and long lasting solution to the problem of land degradation in Northern Nigeria.

2. Literature Review

The relationship between land degradation and rural-poverty has been the focal point of intense research. Earlier research reveal different situations and has discussed the topic at large. This literature survey will review publications which considers that poverty leads to land degradation and vice versa.

2.1. History of Land Degradation

According to Gisladottir & Stocking (2005), the origins of global response to land degradation can be traced to the 1977 United Nations Conference on Desertification, which took up a Plan of Action to Combat Desertification. This Scheme turned out to be unsuccessful and widely disregarded, with just little support from both the Western or Third World nations, and way lower support from would-be sponsors. Hence, the United Nations Environment Programme (UNEP) put into motion a worldwide consultation to make sure that land degradation would be introduced as part of the next major environmental conference along with ways for funding. Initially launched at the Rio Earth Summit in 1992, the UN Convention to Combat Desertification (UNCCD) was established in December 1996 and immediately 50 signatory countries had approved the conference. The UNCCD lagged not only in formal ratification, but also in access to finance. A Global Mechanism (GM) was created, its sole purpose was improve management, mobilize and coordinate funds for solving the problem of land degradation. Developed countries involved in the convention committed themselves to making help available to Third world countries to execute National Action Plans, to ensure the availability of funds, and to garner new resources (Pagiola, 1999).

2.2. Poverty as a cause of Land Degradation

While we know that land degradation leads to poverty as part of its eventual consequences on the rural people, some authors have also argued and stated that poverty leads to land degradation. According to Duraiappah (1996), the poor people have customarily taken the blame for being the cause of the society's numerous challenges which includes, most recently that of land deterioration. Among the people is a popular agreement that poverty is a leading cause of environmental degradation. For instance, one of the Bruntland Commission Report conclusions, which happens to have been agreed as the perfect layout and masterplan for environmental preservation, was that, poverty is a leading reason for environmental challenges and the improvement of the poverty situation is crucial and central to any effective program in addressing the environment problems.

Following same lines, Jalal (1993), the chief of the Department of Environment of Asian Development Bank said, "It is generally accepted that environmental degradation, rapid population growth and stagnant production are closely linked with the fast spread of acute poverty in many countries of Asia". The World Bank also showing solidarity with the popular agreement when in the World Development Report 1992, the World Bank clearly expressed that, "poor families who have to meet short term needs mine the natural capital by excessive cutting of trees for firewood and failure to replace soil nutrients "(World Bank1992). Some of the ways poverty leads to land degradation includes deforestation, felling trees for fuel and firewood, therefore, exposing the land to harsh conditions like erosion. Erosion gets worse over time, the vegetation cover been removed and so the top soil is washed away and essential nutrients leached beyond the reach of crop roots. Also the burning of wood for cooking by the poor rural people increases atmospheric pollution which falls back as acid rain on the land, makes it less productive and this reduces crop yields. Local poor farmers in preparation for the planting season burn the land cover and vegetation because of the high cost of renting machines to do the job, this practice gradually reduces the productivity of the land and ultimately degrade the land. Poor farmers engage the use or inorganic fertilizers because they want to get the most and best of the planting season, and the overuse of these inorganic fertilizers destroys the land overtime (Von *et al*, 2012).

Supporting the idea of poverty being a leading cause of land degradation, Grepperud (1996) states that poverty is a vital cause of excessive soil and fertility loss rates observed in the Third World. This is accepted to happen either due to poor families lacking enough technology and resources, or due to the fact that poverty forces them to supply immediate important short-term needs, which make them to "mine" and exploit natural resources as soils and vegetation (see World Bank, 1992; WCED, 1987; Pinstrup-Anderson et al., 1994).

Perrings (1989) and Larson and Bromley (1990), have used deterministic dynamic models to investigate poverty/land degradation relationships. Perrings (1989) created a model of the open-agrarian economy which functions at the lowest level of subsistence, where resource degradation as a result of extreme agricultural production is the best reaction to unfavorable changes. Larson and Bromley (1990) used a model where the family is presumed to cultivate under a fallow-rotation structure. Their research looked at motives for resource engagement under private and public property, and also analysed the way environmental features and qualities, a frail ecosystem and poverty may have consequences on a family's cultivation and degradation motives. Both researches revealed that poverty increased the speed at which lands are degraded.

Although Murad and Mustapha (2010) states a different view, they examined if the waste management styles of the poverty ridden families that reside in squatters and low-cost flats in Kuala Lumpur are environment friendly. The goal of this research was to empirically assess knowledge, attitude and behavior of the poor people residing in urban community regarding the management of household solid waste. With primary data sourced from the level of living state and waste management styles of the poor people in the urban area, the results of the research provide proof that poverty does not lead to land degradation as the knowledge, attitude, and behavior of the poor urban people regarding management of solid household wastes are seen to have been environment friendly.

Zaman et al (2011) studied the relationship between poverty, population growth and environment in Pakistan between the periods of 1975 to 2009. They disagree with the idea that poverty is a leading cause of land degradation and suggest that increasing population has an adverse impact on poverty.

2.3. The link between Poverty and Land Degradation

On the link between land degradation and poverty, Mainuri & Owino (2014) state that land and water are very vital resources for agricultural output. In order to grow and sustain productivity in both crops and animals, proper land management is crucial. The design and enforcement of the right land management strategies, however, presupposes the identification of the challenges linked to land and water that limit agricultural output. Agriculture plays a crucial role in economic growth and development of the country directly and through linkages with other sectors. Growth in agriculture and improved rural incomes has a significant and direct impact on the reduction of overall poverty.

The contradiction of rural poverty and the environment has been the subject of examination for some time (Leonard, 1989; World Bank, 1992). Ecological assets can be comprehensively used by rural population in various routes, for example, assembling, touching, and other overseeing planting. It would be invaluable if individuals could control the utilization of specific assets.

According to Tallis *et al* (2008), the provision of ecological services are generally thought to contribute to poverty alleviation, especially in rural regions of developing nations. Eventually the degradation of these services is also presumed to lead to adverse effects on human-well-being, or to downplay efforts to reduce poverty (Sjostedt, 2012). Indeed, a lot of the research into ecological services and well-being focuses on developing nations; perhaps stemming from observations that the downward spiral in wellbeing has been linked with growths in dependence on ecological resources (e.g. Shackleton and Shackleton, 2012), and because the livelihoods of the poor appear to depend most directly on the supply of ecological services.

According to Felman (2015), Environmental degradation and poverty are connected in regards to development, nonetheless, the form of their linkage is hard to understand. About 30% of India's total populace are surviving under the poverty mark and almost half of the populace relying solely on ecosystem capital that are highly being exploited and diminished, a huge percentage of the population are in jeopardy. It has been argued that the link between land degradation and poverty is correlated and that a poverty hold remains, in which land degradation enhances poverty, which invariably and ultimately destroys the environment; however; the linkage is quite complex and complicated (Brundtland, 1987). Even though this connection happens to a little extent as a result of the poor rural dwellers' sole reliance on ecosystem capital exploitation, poverty does not exclusively lead to environmental degradation. However, environmental degradation aggravates poverty even if the responsibility of environmental degradation falls more heavily on the wealthy and on the policies of Western countries (Kuri, 2007). Essentially, the poverty hold explanation of the linkage between land degradation and poverty is to a large range correct. However, institutional and policy issues are a huge cause of environmental degradation, which in turn worsens the living standards of those impoverished.

Aigbe & Isiorhovoja (2012) report that the limit of the farming sector to play its economic part has endured numerous setbacks. The FAO (2010) reported that 925 million individuals were undernourished with Sub-Saharan Africa taking a toll of more than 234 million individuals.

Vosti and Reardon (1997) present a model of the linkages between poverty and the environment that serves to highlight the unpredictability of the interrelationships. Poverty is seen to be the result of "resource" parts involving common assets, on-ranch assets, group possessed assets and social and political capital. These variables focus on household unit size, wages, utilization, and interest in resources, relocation and human richness.

The issue of supporting development in agricultural production in numerous developing nations exudes from impromptu land utilization and failure to give sufficient consideration regarding the physical, organic and natural ramifications of agricultural strengthening (Cleaver & Schreiber, 1993, 1994; Barbier, 2001). In this way, the yields of some tropical harvests have begun to decrease and the areas of unused land regions are diminishing, along these lines driving to consumption of the normal asset base of agricultural development and improvement.

In Nigeria, persistent stagnation in agricultural production is a matter of genuine concern. In spite of the fact that yields in a few harvests have as of late expanded, the greater part of the increases came about because of expanded in land territories developed (Oyekale, 2012). Expanding yield production is consequently putting a considerable measure of weight on the forests, and it is impossible that this will be supportable as population further increases.

The World Bank (1990) had estimated that natural misfortunes in Nigeria were in order of $5.1 billion per year as a result of disintegration, soil degradation, natural life and fisheries mismanagements, water pollution, and deforestation.

As indicated by Chokor (2004) such improvements have not just unfavorable outcomes on resource integrity and community livelihood but convey to the fore some basic questions. Are the poor aware of the natural and resource issues confronting them?

2.4. Increased Demand for Food versus Land Degradation

Scherr and Yadav (1996) stated that as populations grow, agriculturists are constrained to cultivate lesser plots, on the other hand they extend onto minimal lands, delicate slopes, semi-dry zones, and cleared forestland. Once these lands get to be harmed, most cannot be repaired.

Some perceive that land degradation poses a potential risk to worldwide sustenance supplies over the long term (Pimentel et al. 1995; and, Kane 1994), while others contend that land degradation is overestimated in its effects, and, moderately irrelevant to worldwide sustenance supplies (Crosson 1994). Numerous others stress about the impacts of land degradation on the occupations of rural dwellers, especially in the more negligible agricultural territories (lFAD 1992). Further extension also, intensification of nourishment production could too have a potentially debasing impact on the environment (Pinstrup- Andersen and, Pandya-Lorch 1994).

By 2050, global population is projected to be greater than the present state by about 50% and the demand for grain worldwide is estimated to have doubled (Cassman, 1999; Alexandratos, 1999). This doubling will result in an estimated 2.4-fold rise in per capita real income and from dietary shifts towards a greater amount of meat (much of it grain-fed) associated with higher income. Further

increases in agricultural output are essential for global political and social stability and equity. Doubling food production again, and sustaining food production at this level, are major challenges (Ruttan, 1999; Postel, 1999).

According to Tilman *et al* (2002), agricultural practices have an expected and acceptable degree/level of ecological impacts. The major effects on the environment and ecosystem by agriculture result from the changing of natural capital for agricultural uses and purposes, from wash-offs of plant nutrients that drain into water, land habitats and groundwater polluting them, also, from pesticides, particularly the stubborn agricultural natural pollutants. Agricultural nutrients move into other ecosystems through the process of leaching, volatilization and the streams of human and livestock wastes. Pesticides can also pose great risks to the human health as well as disease-causing organisms, including antibiotic-resistant pathogens related to peculiar animal production systems.

In the bid to ensure the objectives are satisfied, the literature survey has clearly showed previous studies on this subject. A link between rural poverty and land degradation has been established even though the direction of the argument varies as some believe poverty leads to land degradation and vice versa. The history of the problem and its present state in Nigeria and particularly the Northern region has been reviewed. Further into this paper will be a narrow focus on the study area, working with available secondary data and suggesting long lasting solutions and management tactics to the problem of land degradation in Northern Nigeria to help alleviate poverty in the region.

3. Study Area

3.1. Physical and Socio-economic Setting

Seventy percent of the land area in Nigeria belongs to the Northern region of the country geographically (Oladipo, 1993). The Northern region is located between latitudes 06°27N to 14°00N and between longitudes 02°44E and 14°42E. The region is majorly agrarian, with most of the dwellers engaged in cattle rearing and grain cultivation as this provides a source of income and livelihood for most of the people. However, a greater percentage of the people in the region are regarded as poorer in terms of money and education, than other regions of the country (Omonona, 2009). Guinea Savannah, Sudan Savannah and Sahel Savannah are the three major climatic belts in the region.

Northern Nigeria is occupied by more than 50 percent of the nation's 167million individuals and occupies 65 percent of the nation's 923,768sq.km landmass. It is home to more than 66% of the nation's 250 ethnic groupings. The land is used to produce a wide range of products, and so there is the potential for agricultural upset and instability. Be that as it may, most cultivating and farming practice is still subsistent. Iortim (2012) highlighted that agribusiness comprises 42 percent of Nigeria's GDP and the North records for the majority of these; yet the area is poor and backward. Nigeria is ranked 153 out of 187 countries for the Human Development Index (UNDP, 2010) which is a measure of social and economic development. There is a high occurrence of poverty, social imbalance, a high rate of maternal and baby mortality, high unemployment, lack of education, among others (Kawu, 2012; UNDP, 2010; UNDP, 2009; NACA, 2007). The 2012 Nigerian National Bureau of Statistics'(NBS) information demonstrates the North-West and North-East geo-political zones recorded poverty rates of 77.7 and 76.3 percent respectively (NBS, 2010); and a disturbing absence of education levels of 86 percent (UNESCO, 2010).The North also has the minimum yearly per capita salary, underneath the national normal of N20,000 ($127).In addition, it has a small capacity for absorbing the expanding number of unemployed adolescents. The zone in this way encounters more clashes because of poor administration of its diversities than different parts of Nigeria. The contentions show as religious, ethnic monetary, political or quality based. The outcomes are apparently wrecking to the improvement of the zone that is progressively demonized as a theater of savage conflicts and can't get by without month to month government designations. These social imbalances have prompted religious fundamentalist belief systems and uprising. There have additionally been political disturbances, hidden in ethnic and religious hues that have brought on loss of huge lives and property. Criminal have just as exploited the disorder (HRW, 2012). Ciroma (2011) concludes that unemployment and foul play turned the physically fit armed force of youths to anxiety and political thuggery. Confronting a depressing future, they loathe society and resort to wrongdoing and solitary practices. Northern Nigerian ladies are additionally the least educated. It has been reported that there are no less than two million youngsters wandering the roads as opposed to being in school. (Blueprint, Dec. 28, 2011).

Figure 1 is the map of Nigeria showing the Northern region of the country and the states.

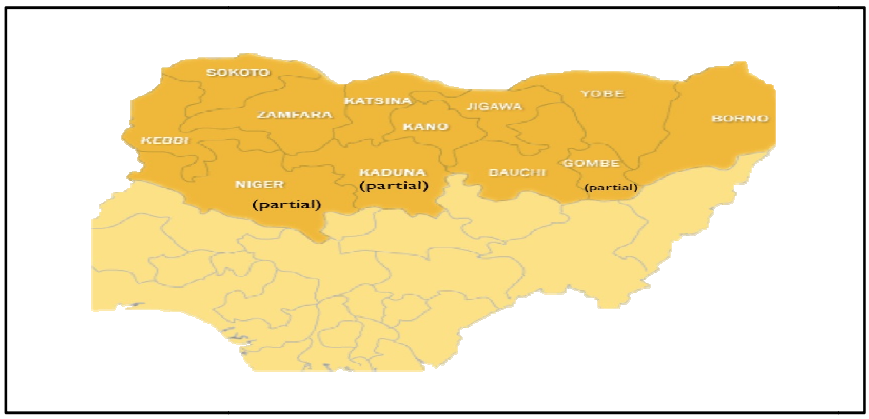

Figure 1: Map of Nigeria showing the Northern region and States

3.2. Data Collection

The study was done by analysing secondary source data. Research on the northern region of Nigeria with regards to this topic is comparatively new, so, little related research has been carried out so far; hence, the limitation in the amount of literature to work with. The implication of this is that a lot of the analysis was solely based on the published report of the United Nations Convention to Combat Desertification (UNCCD). Efforts were made to incorporate other sources such as peer-reviewed papers found in books and journals. These materials were gathered through a wide literature survey with the use of academic databases including Science Direct, Wiley Online Library and JSTOR sources. Google scholar an internet search engine was also engaged to find related literature. Sources were scrutinized and information gathered, with specific reference to the land degradation.

4. Results and Discussion

The tables below were sourced from the United Nations Convention to Combat Desertification (UNCCD) reports for Nigeria.

LAND DEGRADATION			
S/NO	**INDICATORS**	**AREAS AFFECTED**	
		1990 – 1999	2000- 2003
1	EROSION - Wind - Water	 6,500,000ha 86,500,000ha	 9,000,000ha 92,000,000ha
2	DEFORESTATION	350,000ha/annum	400,000ha/annum
3	FOREST FIRE - Forest Lands - Savannah Lands	 260,000ha/annum 100,000ha/annum	 310,000ha/annum 120,000ha/annum
4	OTHERS Total areas degraded lands (mine wasteland, salinised lands etc.)	93,000,000ha	95,000,000ha

Table 1: Land degradation in the Northern region of Nigeria and how much damage has been done by various causes between the years 1990 – 1999 and the years 2000 – 2003. Source: The Study on National Water Resources Master plan. Draft Final Report (Federal Ministry of Water Resources - Japanese International Development Agency, 1994).

Table 1 reveals the amount of damage done by deforestation in the northern region. The rate of deforestation that obtained in the region moved from 350,000ha/annum in ten years (1990 – 1999) to 400,000ha/annum in four years (2000 -2003) at a geometric progression. The extra 50,000ha/annum increase in deforestation means less land available and useful for farming and this puts the farmers out of work further impoverishing them.

AFFECTED AREA				
YEAR	**Number of people**	**Percentage of population %**	**Method of Poverty Assessment**	**Approximate proportion of the human population living in affected areas surveyed during the poverty assessment**
2000	23782875	63	Stratified random survey	70%
2001	23291332	60	Stratified random survey	70%
2002	---	---		
2003	---	---		
2004	29212682	69	Stratified random survey	70%
2005	---	---		
2006	---	---		
2007	30640732	64	Stratified random survey	70%
2008	---	---		
2009	---	---		
2010	33729997	64	Stratified random survey	70%
2011	---	---		

Table 2: The number of people and the percentage of the population living below the national poverty line in affected areas. Source: Fourth UNCCD reporting cycle, 2010–2011 leg. Report for Nigeria

COUNTRY				
YEAR	**NUMBER OF PEOPLE**	**PERCENTAGE OF POPULATION**	**METHOD OF POVERTY ASSESSMENT**	**APPROXIMATE PROPORTION OF THE NATIONAL HUMAN POPULATION SURVEYED DURING THE POVERTY ASSESSMENT**
2000	**70583250**	**60**	**--**	**--**
2001	**70583250**	**60**	**--**	**--**
2002	**--**	**--**	**--**	**--**
2003	**--**	**--**	**--**	**--**
2004	**69585907**	**54**	**--**	**--**
2005	**--**	**--**	**--**	**--**
2006	**--**	**--**	**--**	**--**
2007	**101138559**	**70**	**--**	**--**
2008	**--**	**--**	**--**	**--**
2009	**--**	**--**	**--**	**--**
2010	**109573846**	**69**	**--**	**--**
2011	**--**	**--**	**--**	**--**

Table 3: The number of people and the percentage of the population living below the national poverty line in the country (Nigeria).
Source: Fourth UNCCD reporting cycle, 2010–2011 leg. Report for Nigeria

Table 2 and Table 3 show that the rate of poverty in Nigeria has generally skyrocketed since 2000 (with an average 60% of the total population). The tables show that the amount of people living underneath the country's poverty line of $1 per day is greater in the areas affected by land degradation. The percentage of people living below the poverty line was greater between the years 2004 and 2006 because that was the period the effects of the drought was experienced.

Human Population Estimates			
Year	**Number of People living in the National area**	**Number of people living in rural areas**	**Number of people living in affected area**
2000	114401196	72896442	37750545
2001	117638750	74959412	38818886
2002	120967927	77080763	39917460
2003	124391319	79262149	41047125
2004	127911593	81505267	42208758
2005	131531491	83811866	43403266
2006	140003547	89210257	46391611
2007	144483655	92064985	47876143
2008	149107132	95011065	49408182
2009	153878561	98051419	50989242
2010	158802675	101189065	52620897
2011	163884360	104427114	54304765

Table 4: Table showing Proportion of population living below the poverty line
Source: Fourth UNCCD reporting cycle, 2010–2011 leg. Report for Nigeria

From the table above, a rapid increased was noticed between the year 2005 and 2006 in the number of people living in the affected areas and rural areas. The implication of this is that more than ever, the dwellers have to compete for space and food on a degrading land. With the rapid increase, less land is available for farming and it will be overused in the bid to produce more for the growing population, hence, further impoverishing the people. There has been an increase over the years in the number of poor people over the years which implies the situation is getting worse.

The causes of land degradation identified in the study area include the following:

4.1. Forest and Vegetation Destruction

One of the leading causes of land degradation in the northern region is the destruction of forest and vegetation. Wood is used as fuel for household purposes and other times for non-household purposes. Major non-household uses of fuel wood in cities are probably in food processing for human consumption: by roadside food vendors, schools, hotels, bakeries and so on. Some other non-households uses of fuelwood are likely brickmaking, pottery and tobacco-curing. Fuelwood consumption by non-urban household is mostly less than fuelwood consumption by urban households. (Cline-Cole et al., 1987; Davidson, 1985)

Schemes and strategies to manage public and private trees have overtime proved to be ineffective and inadequate, contributing very little to the mean yearly incremental growth. Sustainable woody vegetation resources management has yielded no useful result. In regions with high population density, the forestry plantation and local wood supply are not sufficient to make up for fuelwood decline resulting from increased consumption by rising human population. These have made sure the issue of deforestation and felling of trees very recognisable to the public and everyone who cares.

The northern region of Nigeria has low amount of rainfall which is short in duration and has high temporal and areal variations (Thambyahpillay, 1984; Mortimore, 1989; Kolawole, 1993; Olofin, 1992; Odihi, 1996; Maryah, Gadzama, & Audu, 1997), also the region has vegetation that is seasonal and sparse. The restoration of the vegetative land cover (Afforestation) tops the priority of this region as they strive to preserve resources and slow down land degradation. The clamor for resource conservation in the northern region of Nigeria appears to be popular as all the three levels of government (i.e. federal, state and local) and various international and local organisations are participating in afforestation and other activities, which are targeted at bringing to an end the growing problem of land degradation with respect to desertification. Afforestation schemes such as tree planting campaigns and establishments of shelter belts are undertaken on yearly basis at the local, and state government levels in all states within the region after the programme for afforestation kicked off in the 1980s (Odihi, 2003). Laws must be passed to stop the indiscriminate felling of trees and these laws must be enforced by making defaulters pay some fine or other related measures.

4.2. Erosion

Research has revealed that the activities of humans in the study area such as intensive farming, overgrazing and deforestation have had an adverse effect on the environment. These human activities have set off wind erosion, water erosion and also flooding in the northern region of the country. Urbanization and the establishment of new settlements have led to deforestation through the removal of surrounding woody biomass. These have led to the permanent degradation of land in the region. Soil erosion in the various forms of shallow gullying, rill erosion, sheet erosion and river bank erosion is prevalent in the semi-arid northern region of the country. The use of temporary cover crops as a palliative solution to the problem of land degradation in the region has not be holistic enough to deal with the root causes. Valentin *et al*, (2005) stated a similar finding in a study of gully erosion where he discovered that in most cases, the emergence of gullying are a result of urbanization, road construction and overgrazing, log haulage, inappropriate irrigation and farming practices. By implication, these have a severe consequence on the development of the land in the areas of agriculture and water supply. Daba *et al*, (2003) pointed out that these gullies are increasing rapidly into lands meant for cultivation at a very scary speed. Wang *et al*, (2014) noted that soil erosion is presently a very crucial environmental challenge the entire world has to deal with. Loss of soil and water have become one of the major causes limiting economic growth and development of rural areas. Due to its speed, gully erosion tends to reduce the gradient into an area, reducing the farmland area causing very serious harm to agricultural production.

Solving the problem erosion will be a major breakthrough in the race to stop land degradation. The planting of trees, intercropping, crop rotation and cover cropping should all be encouraged in the northern region of the country. Overgrazing exposes the land to harsh weather conditions and with no vegetation cover the land stands no chances of surviving. All hands must be on deck to combat erosion before it destroys the land completely leaving the rural people with no means and chance of survival. The importance of the soil cannot be overemphasized, humanity depends on it for life, therefore, we have to adequately care and protect the soil so it can continue to sustain human life and existence (Greenland & Szabolcs, 1994; Pierce & Lal, 1994; Syers, 1997; Brunner et al, 2008). Erosion over the years has become one of the worst facilitator of land degradation throughout the world.

4.3. Intensified Cultivation and Shorter Fallow Period

The semi-arid northern region of Nigeria is vastly known around the world as one of the most sensitive, fragile and stable ecosystems on the planet. The region has come under serious threat of degradation as it is has gradually become almost impossible to maintain the development of the tender land. This is as a result of population explosion, desertification, compounded by an elongated drought period of about 20 years (1970-1990) and unexamined human activities. (Gadzama, 1991). A couple of researchers have established that the northern region of Nigeria is generally sandy with really poor vegetation. They state that the soil has low water and nutrient retaining capacities which make nutrient depletion easy as soon as cultivation of the land is done unless necessary measures are taken to arrest the situation (Harpstead, 1973; Jones and Wild, 1975; Lombin and Chude, 1988). Abubakar (1995) in recent studies also affirmed that in the Kabomo savanna region, parts of the soil has had their nutrients depleted between 30 and 70 percent as a result of varying land use for almost 20 years. The usual practice in the region is for the land to be cleared, cultivation done and afterwards the land is left to rest (i.e.: fallow), with the goal of allowing the land to regenerate naturally. (Jones and Wild, 1975). However, with a rapidly increasing population and the growth of markets, fallow periods have been lessened and cultivation cycles longer. The fertility of the soil has drastically reduced overtime because crops are harvested from the lands successively and nothing is returned. Thousands of hectares of degraded lands have emerged as a result of this downward trend of degradation in the past few decades (CTA, 1993). Splash and sheet erosion contribute to the overall loss of nutrients from the soil as they remove the top layer of the soil which is the richest part of the soil, and there are proofs in the areas affected by this degradation that crop yields are declining. Resuscitation of these degraded lands is a vital step towards achieving sustainable development and poverty alleviation in the affected region (Abubakar, 1996). Fallowing for a long time is known to be one of the most scientifically best method for the maintenance of soil fertility, even though, some still hold that the system is crude (Greenland, 1975). Research into fallowing in the semi-arid northern region of Nigeria is lacking, and this limits the amount of information available regarding the extent to which fallowing can help

revive degraded lands. Periods of fallow were discovered to have only lasted between 1 and 2 years which is a lot shorter than the usual 5 to 7 years a land should be allowed to fallow to regain its fertility (Lal and Okigbo, 1990).

4.4. Land Use Act

The Nigerian land use act of 1978 which summarily holds that all land belongs to the government (Mabogunje, 2007) has been a major setback in land matters in the country. It has affected the way the people treat the land. The people view the land as not the government's property, so they treat it bad doing with it as they wish and like with the aim of maximising the gains from it because the government can take it back at any point in time.

In the bid to make sure that the Land use Act is not easily abolished or amended by future governments, the Decree was made a fundamental component of the Nigerian Constitutions of 1979 and 1999 (Fenske, 2011). Even though this Decree has made it very easy for the government to procure land for public purposes, immensely reduced the responsibility of land compensation and to a large extent minimized court cases over land disputes, it has, since its enactment over twenty years back, brought into existence a new category of severe problems for land management in Nigeria (Uchendo, 1979; Mabogunje, 2002).

To solve the issue of bad orientation of the people towards the land, a review of the land tenure system has to be done. There are many benefits in allowing the people have rights to the land. One of the gains of people having rights to land will be the increased access to capital by holders. Most of these rural farmers require capital to engage the land properly but these funds are inaccessible to them because they lack the collateral to obtain loans. Secured rights to land can make funds available to farmers for investment (Deininger and Castagnini, 2006). Also, having to always be present in person to defend claims of ownership of land can be discouraging to creditors and workers off the farm, hence, reducing the flow of capital available to the farmer. (Zerfu, 2007; Field, 2007).

Better rights to land also allows for gains from trade. Deninger and Jin (2006) argue that, alternatively, better rights to land makes it easier to sell off investment in the event of unfavorable business downturn. Also, the opportunity to sell off the land and the enhancements on it makes it possible for the farmer to get over the problem of waiting for the long fallow period before investing in the land in order to make gains from it. The freedom to sell land makes it possible for the natural resource to get within reach of the people who would make most and judicious use of investing in it.

Total land rights minimises the risk that the investment would be taken over in the future and all the gains of the land would go to another. A farmer who is a sharecropper or comes from a clan with reciprocal duties may have no absolute rights over the yield from a plot of land; regardless of the fact that he faces no uncertainty, he is still convinced to under-invest. This situation does not exclusively apply to the poor, it happens sometimes that landowners may seek title to their lands in order to avoid seizure of their plots by the tenants (Jacoby and Minten, 2007)

Even though there are numerous theoretical reasons why better land rights would promote better agricultural practices, Brasselle *et al*, (2002) noted that "no clear-cut conclusion emerges" from empirical studies using rural data that have endeavored to authenticate this relationship, "whether their authors deal with areas dominated by systematic titling procedures, optional titling, or informal enforcement of land rights." There are a various reasons for this, which relies on both the African background where the investigations have been carried out and empirical matters involved in actualizing them. Noticeably, local tenure systems may serve as security to encourage investment. Land tenure has lost its empirical focus, it is a laborious task to measure land rights and investment, and it is challenging executing econometric tests.

4.5. Lack of Conservation Knowledge

The role of information in the adoption process of new conservation practices is very vital. Policy has its role to play but more importantly is that of social capital. Adoption of new conservation practices would be impossible without the knowledge of them been communicated through specific information channels. Research on the adoption of information and its diffusion have long recognized information as a key variable, and the availability of information has been found to be directly proportional to its adoption (e.g. Traore, et al., 1998; de Harrera and Sain, 1999). As the extent of complexity of the conservation technique increases, information becomes very important (Nowak, 1987). Sources pf information that induce adoption quickly can include fellow farmers, meetings, extension agents and the mass media (e.g. Rahm and Huffman, 1984; Westra and Olson, 1997). But when it comes to extension agents, contact alone will not enhance adoption of the conservation practices especially when information dissemination is inaccurate and ineffective (Agbamu, 1995).

More than the extension practice, government policies play a very big role in influencing the decision of farmers. Nevertheless, a lot of critics point accusing fingers at the state government's intervention in agriculture as a major cause of negative trends. Some of these trends include the rising use of agrochemicals, regional and enterprise specialization, soil tillage and concentration of farms (OECD, 1989; Robinson, 1989; Gardner, 1990; Ilbery and Bowler, 1998). 7 In response to the accusations against the government, a lot of governments have introduced a range of programs to foster the adoption of conservation practices, and most importantly conservation tillage, and investigations reveal some crucial outcomes.

As highlighted earlier, government subsidies targeted at fostering the adoption of conservation practices among farmers can be validated by the often alteration between the attenuated interests of profit-oriented people and the bigger interests of society (Pierce, 1996). Nevertheless, that line of thought may be such thinking may be ludicrously conceived. For instance, Lynne (1995) argues that farmer decision-making reveals ordinarily a concession between the collective and private utilities. Crop growers frequently recognize the collective interest as 'the right thing to do', to a certain extent in those places where management is a crucial part of the cultural standard. The dispute holds that for a lot of growers the pride associated with management supplies for the restraints in financial compensations. (Campbell et al., 1999). With much being said, empirical proofs do not totally support this thought line.

In a broader view, it is identified increasingly that individual doings connected to the environment may reflect, or at least portray the social capital of the society (Pretty and Ward, 2001). In the broadest view, social capital indicates the interdependence and connectedness among dwellers in a society and these relationships are viewed as a type a kind of asset. Many studies have investigated the impact of technology and social capital on adoption of conservation practices. For instance, kinship and 'connectedness to others' have been revealed to positively induce the adoption of conservation practices and technology (Warriner and Moul, 1992), even though not all studies have agreed that this relationship is significantly so (Carlson et al., 1994). Furthermore, analyses have revealed membership in grower associations has a positive impact on adoption of conservation technology and practices (Smit and Smithers, 1992; Swinton, 2000), even though this discovery has not been revealed in every analyses (Traore et al., 1998). Studies on the role of social capital in the adoption of conservative technology and practices in general are not many, but initial findings encourage further studies.

4.6. Urbanization

Another major challenge facing the Northern region, enhancing land degradation is that of urbanization. In the bid to keep up with the modern world the Northern region of Nigeria just like every other developing country has been keen on modernizing. The establishment of social infrastructures and amenities require land. These lands have to be cleared, thereby exposing the land, reducing the available land for agriculture and encouraging population explosion through massive influx. Accelerated urbanization goes hand in hand with third world countries in recent times (Brockerhoff, 2000; Fox, 2012). The rate of urbanization has rapidly increased from 18% to 40% between 1950 and 2000, with the rise projected to go beyond 50% by 2020 and by 2050 beyond 64% (UNDESA/PD, 2012). Some previous studies have shown that some developed countries have witnessed greater levels of urbanization than third world countries. Nevertheless, recent investigations note that accelerated urbanization in terms of population size has become a challenge to sustainable development in third world countries (Brockerhoff, 2000; UNDESA/PD, 2012). For instance, developing and developed countries had urbanization rates of about 46% and 78% respectively in the year 2010, and corresponding population urban sizes of 2.6 billion and 96 million (UNDESA/PD, 2012), showing accelerated growth of the urban population in third world countries. This accelerated level of increase will go on, with a projected 90% global population growth expected to take place in urban regions of third world countries over the next forty years.

The threat of accelerated urbanization to the sustainable growth of urban regions is agreeably sure and evident in Africa, a region where urbanization is all over the place (Brockerhoff, 2000; Fox, 2012; UNEP, 2007). Presently, Africa is the fastest urbanizing zone, but formally was majorly rural with an average 3.3% rate of urbanization (UNDESA/PD, 2012). According to the UN official statistics, Africa's urban populace rose from 33 million to 288 million between 1950 and 2000, having an urbanization rate than that of places like North America (UNDESA/PD, 2012).

4.7. Climate

Beyond the human induced and caused degradation, land degradation could sometimes not be a direct effect of human activities. Climate plays a very significant role in land degradation and if in a bad state can totally destroy and change the land. No one is in charge of the climate, therefore when there harsh natural conditions, we only hope it does not last long. According to Ojo (1987), the drought of 1971-80 in the northern region had very severe and grave consequences on the land, causing great harm to the land and the people's livelihood in that region of the country. The cattle grazers and herdsmen in the northern region had to move down south (ecological migration) in order to fend and find pasture for their cattle. The consequence of this ecological migration to the southern region of the country is increased pressure on land and its resources in the south which is due to overgrazing, this further exposes the land in the southern region to harsh weather and climatic conditions. After this long drought period came a period of long constant rainfall for a decade in the Northern region. This period was the 1990s and it has been described as the warmest period since 1400A.D, but still, this long period of rainfall has not been able to undo the effects of the elongated drought period of 1971-80. The problem of land degradation persists.

The geomorphological characteristics of the Northern region go a long way to affect its climate and ecology. The mean annual rainfall in the Northern (Sahel) region of Nigeria is between 380mm and 700mm (Fasona and Omojola, 2005), which is low compared to those of the other regions of the country. For this reason, elongated drought periods often damage the land.

Climate change is a global issue and measures are being put in face to deal with the challenges it poses to earth. Climate change will affect crop production and livestock farming and every sector of agricultural systems. Nevertheless, the extent of the influence of climate change (biophysical processes) and the reciprocal reaction of the people to it are very complex and unpredictable. It has been proved that climate change will have severe effects on Nigeria, especially the Northern region of the country in the aspects of energy, water, land use, water and biodiversity. The Northern region and every other region of Nigeria is very susceptible to the effects of Climate Change (IPCC 2007; NEST 2004). The Northern region particularly has a vegetative / land cover is susceptible to drought, degradation and desertification, the effects of climate change would be sorely felt in the region if quick necessary measures to manage the effects are not put in place. It was also pointed out that Nigeria has to be seriously bothered about the issue of climate change because of the country's long coastline (800km), this puts the country at the risk of dangerous storms and sea-level rising. Rain-fed agriculture is the mainstay of 2/3 of the Nigerian populace, a threat to the agricultural system would be a threat to the livelihood of about 140 million people leaving them with nothing. Not only will climate change affect agriculture, it would adversely affect power and energy sources (e.g.: kanji dam and Shiroro dam), crippling irrigation system alongside (IPCC 2007; NEST 2004).

4.8. Population Explosion

Land is finite but the population keeps growing. As the population increases, the demand for food and other land resources increases and hence supply and production skyrocket in same manner. The Northern region of Nigeria is majorly an Islamic zone and the religion allows a man to have more than one wife, this has led to a very high birth rate among the rural dwellers. Supply has not been able to meet demand in the Northern region because food production is increasing at an arithmetic rate while population growth is at a geographic. The over-exploitation of the land by farmers and grazers just to meet the needs of the rapidly growing population invariably, on the long run strips the land of its nutrients and renders its useless and unfit for further cropping.

In the bid to meet with the demands of the growing population, land productivity has considerably been limited through various forms like erosion, water logging, salinization, overgrazing of range/pasture lands and desertification. The provision of biodiversity and ecosystem services and resources has been seriously cut short by these (Von *et al*, 2013).

Population growth in the Northern region leads to an increase in the demand for more animal based foods with preferences for greater energy consumption, this drives up the prices of the prices of ecosystem services such as food, energy, water, fuel and fiber. The rapid growth of the population in Northern region could result in land degradation (Grepperud, 1996) and intensification (Boserup 1965, Tiffen et al. 1994) depending on other determining factors. According to the Nigerian census of 2006, the total population of the Northern region of Nigeria is 73,599,965, occupying 52.57% of the total population of country (Nigeria master web, 2015). This is a way bigger population density than in any other region of the country and this population would not stop growing while the land remains limited. The rising population would require land for residence, land resources for fuel and also need land for growing crops for food. The question is how much land would be enough to sustain this rapidly growing population? And for how long can these lands sustain the needs of this skyrocketing population, ten years? Fifty years? Something has to be done urgently and the issue carefully investigated to create a long lasting system to manage the available finite land. As the people and the farmers strive to meet the needs of the growing population, vegetation gets destroyed, forests cleared exposing the soil to harsh conditions, mono-cropping declines the soil fertility and the land gets degraded gradually. The issue of population control is a very sensitive one in this region of the country because of the religious factor, very likely to engender serious arguments if raised as a possible solution.

Table 4 shows that the population in the areas affected by land degradation increased by over sixteen million in a decade without the condition of the land improving. Notably, there was a major explosion in the population size between the years 2005 and 2006. The usual yearly increase was between a million and two million people but between these years (2005 and 2006), the population increased by over three million people. This increase will definitely increase the pressure on the land in the region. With the rapid increase, less land is available for farming and it will be overused in the bid to produce more for the growing population, hence, further impoverishing the people. There has been an increase over the years in the number of poor people over the years which implies the situation is getting worse.

5. Recommendations and Conclusion

In conclusion, there is the likelihood to generally assume across all resource sectors and this will compound the complexity of the matter. A detailed microeconomic-ecology review should be done in the following three aspects. Firstly, an investigation of the consumers of the natural resource should be done, this should contain the behavioral attitude of each consumer group and also their relationship with one another and the natural resource. Secondly, a study of the consequences of land degradation across the consumer groups and how they react to the changes. Thirdly, a study of the workings of the natural resource itself should be done. Incidentally, most economic studies disregard this aspect. The above described method is a difficult one to be executed; it would require purposefulness, diligence and commitment on the part of the various research teams and also the policy makers. However, because of the asperity of the challenge at hand, and also the absence of previous researches into the three aspects, particularly in a quantitative and integrated way, the only option is to start the study agenda as quickly as possible.

Deep tilling of the soils and other usual practices in agriculture have overtime been viewed as problematic by the people bothered about the state of agro-ecosystems and most importantly global food security. In the bid to deal with this challenge, the concept of conservative farming has been created to add to a number of already existing land conservation and management techniques for research and analysis. Even though the concept may be rare, many of the related practices have been studied into detail by researchers. It has been the purpose of this paper to gather the various researches geared towards this discuss to find out if there has been progress by social scientists in figuring the level of adoption of land conservation practices by farmers, with the major goal of providing better policies for solving the problem of land degradation.

The government should ensure that laws are passed to protect the land and the vegetative cover and penalties put in place for offenders. Policies that favor and protect the land must be made, and in the bid to urbanize the region, proper regional and urban planning should be done. Extension agents should get across to the farming community and groups and not just individuals to enhance quicker and better adoption of conservation technology and practices. The government should pass and make policies targeted at enhancing farm-level adaptation via emphasis on the quick alerting systems and disaster danger management and even efficient involvement of cultivators in adopting new and improved agricultural and land use technology and practices.

The steady declining incomes for most of the people dwelling in the Northern region of the country means that the demand for alternative energy would be limited. It is predictable that the problem of land degradation would aggravate rather than lessen in the foreseeable future. The damage resulting from this aggravating problem of land degradation will be inestimable. The rapidly increasing population of the poor is not the only problem of land degradation. The renowned historian, David Hackett Fischer was correct in his right in his remark that change is likely to happen in the rates of change, with prices, for instance, which is as a result of expanding markets. Urban Nigeria has largely grown to be more politically inconsistent, with several forms of turbulence and anarchy

on the rise and this also impoverishes the people. The need for reviewing energy policies in the country is crucial to ensure sustainability of the land and the people that depend on it for their livelihood and income. It is exigent that government should pay due attention to the consequences of such policies for the poor in the mechanism of making macro-economic policies. The candor of the natural resource can only be guaranteed through a process that makes sure the society is adequately provided for. Otherwise, mankind will economize living from an indisposed and frail land even though it recognises that such reliance on the natural resource is precarious for both mankind and the natural resource.

6. References

i. Abubakar, S.M. (1995). Assessment of land degradation under different agricultural land-use types in a part of Katsina State, Nigeria. Paper presented at the 3rd National Workshop on Land Administration and Development in Northern Nigeria, Bayero University, Kano, 12-16 March 1995
ii. Abubakar, S. M. (1996). Rehabilitation of degraded lands by means of fallowing in a semi-arid area of northern Nigeria. Land Degradation & Development, 7(2), 133-144.
iii. Agbamu, J.U., (1995). Analysis of farmers' characteristics in relation to adoption of soil management practices in the Ikorodu area of Nigeria. Japanese Journal of Tropical Agriculture 39 (4), 213–222
iv. Aigbe, F. O., & Isiorhovoja, R. A. (2013). Crop Productivity, Land Degradation and Poverty Nexus in Delta North Agricultural Zone of Delta State, Nigeria. Journal of Agricultural Science, 5(4), p85.
v. Alexandratos, N. (1999). World food and agriculture: outlook for the medium and longer term. Proc. Natl Acad. Sci. USA 96, 5908–5914.
vi. Barbier, E.B., 1998. The economics of land degradation and rural poverty linkages in Africa, United Nations University (UNU)/institute for natural resources in Africa (INRA) annual lectures, public affairs section. The United Nations University, Shibuya-Ku, Japan.
vii. Bennett, H.H., 1930. The problem of soil erosion in the United States. Ann. Assoc. Am. George., 21: 147-170.
viii. Blaikie, P. and H. Bookfield, 1987. Defining and Debating the Problem. In: Land Degradation and Society, Blaikie, P. and H. Brookfield (Eds.). Methuen, London.
ix. Blueprint Newspaper, December 28, 2011.
x. Brasselle, A.S., Gaspart, F., Platteau, J.P., (2002). Land tenure security and investment incentives: puzzling evidence from Burkina Faso. Journal of Development Economics 67 (2), 373–418.
xi. Boserup E., (1965). The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure. Aldine Press. New York, USA.
xii. Brockerhoff, M. P. (2000). An urbanising world. Population Bulletin, 55 (3), 3–43
xiii. Brown, L.R. and E.C. Wolf, 1984. Soil Erosion: Quiet Crisis in the World Economy. Worldwatch Institute, Washington, DC, USA, ISBN-13: 9780916468606, Pages: 49.
xiv. Brunner, C., Park, J., Ruecker, R. & Vlek, P.L.G. (2008). Erosion modelling approach to simulate the effect of land management options on soil loss by considering catenary soil development and farmers perception. Land Degradation & Development, 19, 623.
xv. Campbell, B., Byron, N., Hobane, P., Madzudzo, E., Matose, F., Wily, L., 1999. Moving to local control of woodland resources: can CAMPFIRE go beyond the mega-fauna? Society and Natural Resources 12, 501–509.
xvi. Carlson, J.E., Schnabel, B., Beus, C.E., Dilman, D.E., (1994). Changes in soil conservation attitudes and behaviors of farmers in the Palouse and Camas prairies: 1976–1990. Journal of Soil and Water Conservation 49 (5), 493
xvii. Cassman, K. (1999). Ecological intensification of cereal production systems: yield potential, soil quality, and precision agriculture. Proc. Natl Acad. Sci. USA 96, 5952–5959.
xviii. Chisholm, A. and R. Dumsday, 1987. Land Degradation-Problems and Policies. Cambridge University Press, Cambridge.
xix. Chokor, B. A. (2004). Perception and response to the challenge of poverty and environmental resource degradation in rural Nigeria: Case study from the Niger Delta. Journal of Environmental Psychology, 24(3), 305-318.
xx. Ciroma, Usman (17 June 2011). "Shettima: battle against poverty ahead"; Retrieved fromhttp://www.leadership.ng/nga/columns/833/2011/06/17/shettimabattle_against_poverty_ahead.html. Accessed January 12, 2013
xxi. Cleaver, K.M. and G.A. Schreiber, (1994). Reversing the Spiral. The Population, Agriculture and Environment.
xxii. Cleaver, K. M., & Schreiber, G. A. (1994). The Population Agriculture and Environment Nexus in sub-Saharan Africa. Washington D.C.: The World Bank
xxiii. Cline-Cole, R. A., Main, H. A. C., & Nichol, J. E. (1990). On fuelwood consumption, population dynamics and deforestation in Africa. World Development, 18(4), 513-527.
xxiv. Cline-Cole, R. A., J. A. Falola, H. A. C. Main, M. J. Mortimore, J. E. Nichol and F. D. O'Reilly, (1987). Wood fuel in Kano: Production, and Trade in a West African Savanna Environment, Final Report to the United Nations University.
xxv. CTA 1993. Restoring the fertility of Africa's degraded lands: Process approach, pp. 1-6 in: Spore, A Publication of the Centre for Technical Cooperation and Assistance. The Netherlands. November
xxvi. Crosson, P. (1994). Degradation of resources as a threat to sustainable agriculture. Paper presented at the First World Congress of Professionals in Agronomy, Santiago, Chile, September 5-8
xxvii. Daba, S. Rieger, W. & Strauss, P. (2003) Assessment of gully erosion in eastern Ethiopia using photogrammetric techniques. Journal of Gully Erosion and Global Change 50(2-4), 273-291
xxviii. Davidson, O. R., (1985). Energy Use Patterns, Sierra Leone, IDRC Manuscript Report 103e (Ottawa: IDRC).
xxix. De Harrera, A.P., Sain, G., (1999). Adoption of maize conservation tillage in Azuero, Panama. Economics.
xxx. Working Paper 99-01. CIMMYT.

xxxi. Deininger, K., Jin, S., (2006). Tenure security and land-related investment: evidence from Ethiopia. European Economic Review 50 (5), 1245–1277

xxxii. Duraiappah, A. K. (1998). Poverty and environmental degradation: a literature review and analysis. CREED Working Paper Series No 8. International Institute for Environment and Development, London Institute for Environmental Studies, Amsterdam.

xxxiii. Eckholm, E., (1976). Losing Ground. W.W. Norton, New York.

xxxiv. Facts on Desertification (2006). Is finder. http://www.greenfacts.org .

xxxv. FAO. 2011. The State of the World's Land and Water Resources for Food and Agriculture, Managing systems at risk. Food and Agriculture Organization of the United Nations, Rome.

xxxvi. Fasona, M. J., & Omojola, A. S. (2005, June). Climate change, human security and communal clashes in Nigeria. In Human Security and Climate Change Conference.

xxxvii. Felman, S. (2015). Environmental Degradation and Poverty in India. International Review Spring 2015, 45.

xxxviii. Fenske, J. (2011). Land tenure and investment incentives: Evidence from West Africa. Journal of Development Economics, 95(2), 137-156.

xxxix. Field, E., (2007). Entitled to work: urban property rights and labor supply in Peru. Quarterly Journal of Economics 122 (4), 1561–1602

xl. Fischer, D. H. (1996). The Great Wave: Price Revolutions and the Rhythm of History. New York: Oxford University Press.

xli. Fox, S. (2012). Urbanisation as a global historical process: Theory and evidence from sub-Saharan Africa. Population and Development Review, 38 (2), 285–310.

xlii. Gadzama, N.M. (1991). Sustainable development in Nigeria's dry belt: Problems and Prospects, pp. 5-18 in K.O. Ologe (ed.) Proceedings of the 2nd Annual NEST Workshop, NEST Publications. Ibadan.

xliii. Gardner, B.L., (1990). The Economics of Agricultural Policies. McGraw-Hill, Toronto, Canada

xliv. Gisladottir, G., & Stocking, M. (2005). Land degradation control and its global environmental benefits. Land Degradation & Development, 16(2), 99-112.

xlv. Greenland, D.J. (1975). 'Bringing the green revolution to the shifting cultivator', Science, 190,841-844.

xlvi. Greenland, D.J. & Szabolcs, I. (1994). Soil Resilience and Sustainable Land Use. CAB International, Wallingford. pp. 41–67.

xlvii. Gretton, P. and U. Salma, (1997). Land degradation: Links to agricultural output and profitability. Aust. J. Agric. Resource. Econ., 41: 209-225. Nexus in Sub-Saharan Africa. World Bank, Washington, DC., USA.

xlviii. Grepperud S., (1996). Poverty, land Degradation and Climatic Uncertainty. Discussion Papers No.162 • Statistics Norway.

xlix. Harpstead, M.I. (1973). 'The classification of some soils', Soil Science, 116,437-443.

l. HRW (2012).Spiraling violence: boko haram attacks and security forces abuses in Nigeria. New York: Human Rights Watch (HRW). Retrieved from http://www.hrw.org

li. IFAD (International Fund for Agricultural Development). 1992. Soil and water conservation in Sub-Saharan Africa: Towards sustainable production by the rural poor. A report prepared for IFAD by the Centre for Development Cooperation Services, Free University, Amsterdam.

lii. Ilbery, B., Bowler, I., (1998). From agricultural productivism to postproductivism. In: Ilbery, B. (Ed.), the Geography of Rural Change. Longman, London, pp. 57–84

liii. Iortim, Henry Terseer (2012). How north can surmount the poverty scourge. Retrieved from http://blueprintng.com/2012/03/how-north-can-surmountthe-poverty-scourge/. Posted, March 22, 2012, Accessed January 13, 2013

liv. Intergovernmental Panel on Climate Change (IPCC), 2007: Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)]. Cambridge University Press, Cambridge. United Kingdom. Pp 1000.

lv. Jacoby, H.G., Minten, B., (2007). Is land titling in sub-Saharan Africa cost-effective? Evidence from Madagascar. The World Bank Economic Review 21 (3), 461–485

lvi. Jalal, K., (1993). Sustainable Development, Environment and Poverty Nexus. Occasional Papers No. 7 Asian Development Bank.

lvii. Jones, M.J. and Wild, A. 1975. Soils of the West African Savanna, Technical Communication No. 55, Commonwealth Bureaux of Soils, Harpenden, UK

lviii. Kawu, IshaqModibbo. (2012). Poverty statistics and crises in northern Nigeria. Retrieved from http://blueprintng.com/2012/02/povertystatistics-and-crises-in-northern-nigeria/ Posted, February 23, 2012, Accessed January 14, 2013

lix. Lal, R., & Okigbo, B. (1990). Assessment of Soil Degradation in the Southern States of Nigeria. World Bank Sector Policy and Research Staff, Environment Department.

lx. Larson, B.A. and Bromley, D.W. (1990): Property rights, externalities, and resource degradation: Locating the tragedy, Journal of Development Economics 33, 235-262.

lxi. Leonard, H.J., M. Yadelman, J.D. Stryker, J.O. Browder and A.J. De Boer, 1989. Environment and the poor: Development strategies for a common agenda. Transaction Books, New Brunswick.

lxii. Leonard, H. J. (1989). Environment and the poor: Development strategies for a common agenda. New Brunswick, NJ: Transaction Books.

lxiii. Lombin, G. and Chude, V.O. (1988). A Review of Soil Fertility/Fertiliser Research in North-Western State of Nigeria, Department of Soil Science, IAR-ABUIFPDD-FMARD published report.

lxiv. Lynne, G., (1995). Modifying the neo-classical approach to technology adoption with behavioral science models. Journal of Agricultural and Applied Economics 27 (1), 67–80

lxv. Mabogunje, Akin L., (2002). Land Management in Nigeria: Issues, Opportunities and Threats", Paper presented at the National Conference on Land Management and Taxation, Department of Estate Management, University of Lagos, July 16, 2002

lxvi. Mabogunje (2007). Land Reform in Nigeria: Progress, Problems & Prospects
lxvii. Mainuri, Z. G., & Owino, J. O. (2014). Linking landforms and land use to land degradation in the Middle River Njoro Watershed. International Soil and Water Conservation Research, 2(2), 1-10.
lxviii. Mansur, A. (2014). An Assessment of Gully Erosion in Dutse Sahelian Zone of Jigawa State, Nigeria, and its Adverse Consequences on the Socio-Economic Development of the State. Journal of Agriculture and Environmental Sciences, 3(3), 17-25.
lxix. Maryah U. M. Gadzama N. M. Audu I. (1997). Spatial variation of rainfall and its implications on range management in the north east arid zone of Nigeria. In M. M. Daura (Ed.), Issues in environmental monitoring in Nigeria. Maiduguri, Nigeria: Nigerian Geographical Association, pp. 143–151.
lxx. Mortimore, M. (1989). Adapting to Drought. Cambridge: Cambridge University Press.
lxxi. Murad, W and Mustapha, N (2010). Does poverty cause environmental degradation? Evidence from waste management practices of the squatter and low-cost flat households in Kuala Lumpur. World Journal of Science, Technology and Sustainable Development, Vol. 7, Issue No. 3, pp.275 –289. ISSN: 2042-5945
lxxii. Naoko I., (2015). Combating Land Degradation in Production Landscapes.
lxxiii. Nigerian Environmental Study Team (NEST), 2004; Regional Climate Modelling and Climate Scenarios Development in Support of Vulnerability and Adaptation Studies: Outcome of Regional Climate Modeling Efforts over Nigeria, NEST, Ibadan, Nigeria.
lxxiv. Nowak, P.J., (1987). The adoption of agricultural conservation technologies: economic and diffusion explanations. Rural Sociology 52 (2), 208–220.
lxxv. Odihi, J. (2003). Deforestation in afforestation priority zone in Sudano-Sahelian Nigeria. Applied Geography, 23(4), 227-259.
lxxvi. Odihi, J. O. (1996). Deforestation in the afforestation priority zone of Nigeria: causes and solutions. Paper presented at the 39th Annual Conference of the Nigerian Geographical Association, University of Maiduguri, Maiduguri. 5–8 May.
lxxvii. OECD, (1989). Agricultural and environmental policies: opportunities for integration, Paris.
lxxviii. Ojo, S.O (1987): The Climatic Drama, Inaugural lecture Series, University of Lagos Press.
lxxix. Oladipo E (1993). A comprehensive approach to drought and desertification in Northern Nigeria. Natural Hazards, 8:235-261. Available online at: http://dx.doi.org/10.1007/BF00690910. http://dx.doi.org/10.1007/BF00690910
lxxx. Olofin, E. A. (1992). The gains and pains of putting the water-look on the face of drylands of Nigeria. Inaugural Lecture, Bayero University Kano. Kano: Department of Geography, Bayero University
lxxxi. Omonona BT (2009). Quantitative Analysis of Rural Poverty in Nigeria. Nigeria Strategy Support Programme (NSSP) Background Paper 9, International Food Policy Research Institute, Washington D.C.
lxxxii. Oyekale, A. S. (2012). Dynamics of Land Use, Degradation and sustainability of the Nigerian Agricultural Systems. African Journal of Agricultural Research, 7.
lxxxiii. Pagiola S. (1999). The global environmental benefits of land degradation control on agricultural land. Global Overlays Program. World Bank Environment Paper 16. The World Bank: Washington, DC.
lxxxiv. Pierce, J., (1996). The conservation challenge in sustaining rural environments. Journal of Rural Studies 12 (3), 215–229.
lxxxv. Pierce, J. & Lal, R. (1994). Monitoring soil erosion's impact on crop productivity. In: Soil Erosion Research Methods (R. Lal & I.A. Ankeny), pp. 235–263. Soil and Water Conservation Society, Ankeny, IA
lxxxvi. Pimentel, D., C. Harvey, P. Resosudarmo, K. Sinclair, D. Kurz, M. McNair, S. Crist, L. Shpritz, L. Fitton, R. Saffouri, and R. Blair. (1995). Environmental and economic costs of soil erosion and conservation benefits. Science 26, (February):1117-1123
lxxxvii. Pinstrup-Andersen, P. and Pandya-Lorch, R. (1994): Alleviating poverty, intensifying agriculture, and effectively managing natural resources, International Food Policy Research Institute. Food, Agriculture, and the Environment Discussion Paper 1.
lxxxviii. Postel, S. (1999). Pillar of Sand: Can the Irrigation Miracle Last? (Norton, New York).
lxxxix. Pretty, J., Ward, H., (2001). Social capital and the environment. World Development 29 (2), 209–227
xc. Rahm, M.R., Huffman, W.E., (1984). The adoption of reduced tillage: the role of human capital and other variables. American Journal of Agricultural Economics 66 (4), 405–413.
xci. Ravi K., and Lyn S., (1999). The Evolution of Thinking about Poverty: Exploring the Interactions.
xcii. Reynolds J., Smith D., Lambin E., Turner B., Mortimore M., Batterbury .J., Downing T., Dowlatabadi H., Fernández J., Herrick E., Huber-Sannwald E., Jiang H., Leemans R., Lynam T., Maestre T., Ayarza M., Walker B., (2007). Global Desertification: Building a Science for Dryland Development. Science. 316, 847-851.
xciii. Robinson, K.L., (1989). Farm and Food Policies and their Consequences. Prentice Hall, Englewood Cliffs.
xciv. Ruttan, V. W. (1999). The transition to agricultural sustainability. Proc. Natl Acad. Sci. USA96, 5960–5967
xcv. Scherr, S. J., & Yadav, S. (1996). Land degradation in the developing world: implications for food, agriculture, and the environment to 2020.
xcvi. Sivakumar V., & Ndiang'Ui, N. (2007). Climate and land degradation. Springer Science & Business Media.
xcvii. Sjostedt, M., (2012). Ecosystem services and poverty reduction: how do development practitioners conceptualize the linkages? Eur. J. Dev. Res. 24, 777–787.
xcviii. Smit, B., Smithers, J., (1992). Adoption of soil conservation practices: an empirical analysis in Ontario, Canada.
xcix. Syers, J.K. (1997). Managing soils for long-term productivity. In: Land Resources: On the Edge of the Malthusian Precipice? (Eds D.J. Greenland, P.J. Gregory & P.H. Nye), pp. 151–161. CAB International, Wallingford, and the Royal Society, London.
c. Land Degradation and Rehabilitation 3 (1), 1–14.
ci. Tallis, H., Kareiva, P., Marvier, M., Chang, A., (2008). An ecosystem services framework to support both practical conservation and economic development. Proc. Natl. Acad. Sci. U.S.A. 105, 9457–9464.
cii. Thambyahpillay, G. G. R. (1984). Drought in Borno State: the meteorological perception. Environmental Focus, 2(1), 35–50.
ciii. Tiffen M, Mortimore M and Gichuki F (1994). More People, Less Erosion: Environmental Recovery in Kenya. Wiley and Sons, London, UK.

civ. Tilman, D., Cassman, K. G., Matson, P. A., Naylor, R., & Polasky, S. (2002). Agricultural sustainability and intensive production practices. Nature, 418(6898), 671-677.
cv. Traoré, N., Landry, R., Amara, N., (1998). On-farm adoption of conservation practices: the role of farm and farmer characteristics, perceptions, and health hazards. Land Economics 74 (1), 114–127
cvi. Uchendu, V.C., (1979). "State, Land and Society in Nigeria: A Critical Assessment of the Land Use Decree, 1978" Journal of African Studies, vol. 6, pp. 62 - 74.
cvii. USAID (United States Agency for International Development), (1999). Environmental and Natural Resource Management: A Report to Congress. US Government Printing Office, Washington, DC.
cviii. United Nations Environment Programme (UNEP), 1982. World Soil Policy, United Nations Environment Programme. Nairobi, Kenya.
cix. United Nations. (2015). http://www.un.org/sustainabledevelopment/poverty/
cx. UNDP (2009).Human development report Nigeria 2008–2009: achieving growth with equity. Abuja: United Nations Development Programme (UNDP).
cxi. UNDP (2010). Nigeria human development index, 2007–2009. Abuja: United Nations Development Programme (UNDP).
cxii. UNDESA/PD (2012). World urbanisation prospects: The 2011 revision. New York: United Nations.
cxiii. UNEP (2007). Global environmental outlook 4: Environment for development. Nairobi: UNEP.
cxiv. UNESCO (2010).Education for all (EFA) global monitoring report 2010: reaching the marginalised. Paris: United Nations Educational, Scientific and Cultural Organisation (UNESCO)
cxv. Valentin, C. Poesen, J. & Li, Y. (2005) Gully erosion: Impacts, Factors and Control. Journal of Global Issue 63(2-3), 132-153.
cxvi. Von Braun, J., Gerber, N., Mirzabaev, A., & Nkonya, E. (2013). The economics of land degradation.
cxvii. Von Grebmer, K., von Grebmer, K., Ringler, C., Rosegrant, M. W., Olofinbiyi, T., Wiesmann, D., & Rahall, J. (2012). 2012 Global hunger index: the challenge of hunger: Ensuring sustainable food security under land, water, and energy stresses (Vol. 70). Intl Food Policy Res Inst.
cxviii. Vosti, S. A., & Reardon, T. (1997). Sustainability, Growth, and Poverty Alleviation: A policy and Agroecological Perspective. Baltimore: The John Hopkins University Press.
cxix. Warford, J. and Partow, Z. (1991). "Natural Resource Management in the Third World: A Policy and Research Agenda" In D. Chapman (Ed). Arresting Renewable Resource Degradation in the Third World. World Bank Environment Working Paper No. 44. Washington, DC: the World Bank
cxx. Wang, T. He, F. Zhang, A. Gu, L. Wen, Y. Jiang, W. & Shao, H. (2014). A quantitative study of gully erosion based on object oriented analysis techniques: A case study in Beiyanzikou. Scientific World Journal 2014(2014), 417325.
cxxi. Warriner, G.K., Moul, T.M., (1992). Kinship and personal communication network influences on the adoption of agriculture conservation technology. Journal of Rural Studies 8 (3), 279–291.
cxxii. WCED (1987): World Commission on Environment and Development, Our common future, Oxford University Press, Oxford and New York.
cxxiii. Westra, J., Olson, K., (1997). Farmers' decision processes and adoption of conservation tillage. Staff Paper P97-9. Department of Applied Economics, University of Minnesota
cxxiv. World Bank (1990). Towards the development of an environmental action plan for Nigeria. Washington, DC: The World Bank.
cxxv. World Bank (1992): World development report 1992, Washington D.C., Oxford University Press, Oxford.
cxxvi. World Bank. (1992). World development report 1992: Development and the environment. New York: Oxford University Press
cxxvii. Zaman, K., Shah, I, A., Khan. M, M., Ahmad, M. (2011). Exploring the Link between Poverty-Pollution-Population (3Ps) in Pakistan: Time Series Evidence. Journal of Economics and Sustainable Development. Vol.2, Issue No.11&12. pp. 1-27. ISSN 2222-1700.
cxxviii. Zerfu, D. (2007). Property rights institutions and investment in Ethiopia. Working Paper: Department of Economics, Gothenburg University.