



ISSN: 2278 – 0211 (Online)

Desertification: A Persistent Threat To The Sustainability Of The Nigerian Environment, Which Way Out?

Adekunbi Imosemi

School Of Law And Security Studies, Babcock University, Ilishan- Remo, Ogun State, Nigeria

Omobamidele Olufemi

School Of Law And Security Studies, Babcock University, Ilishan- Remo, Ogun State, Nigeria

Abangwu Nzeribe

School Of Law And Security Studies, Babcock University, Ilishan- Remo, Ogun State, Nigeria

Abstract:

Desertification, like climate change and loss of biodiversity is a global problem. The global community has long recognized desertification has a major environmental, social and economic problem.

This paper examines the issue of desertification in Nigeria, a developing nation with over 150 million in population. The negative impact of Desertification on the Nigerian environment, which has been linked with food security, poverty alleviation and lack of development, is also fully discussed in this paper.

Soil degradation resulting from gradual desertification of farmlands still remain a great threat particularly within the North-west state Thousands of Nomadic Nigerian who reside in those states are being forced to migrate to the southern part of the country due to hazardous effect of desertification that gradually destroy fields of grazing lands. While those left behind are often engaged in communal clashes with farmers resulting in loss of lives and properties. It is recommended that a legally binding policy framework to guide the sustainable use of soil so as to combat desertification is to be enacted by the National Assembly. Nigerians need to be enlightened on this growing menace, desertification, so as to take practical measures such as prevention of soil erosion, water resource management and sustainable pasture. Forest and livestock management should be taken to prevent desertification and restore degraded land.

Key words: *Desertification, land degradation, drought and Nigeria*

1.Introduction

Desertification has been recognized as environmental, social, economic and development problem for decades, with the issue first attracting global attention with the Sahel droughts and attendant food crises of the 1970. Initial political and institutional responses, e.g. UNEP-guided Plan to Combat Advancing Desertification (PCAD), were based on the narrow jet development.

Interventions to address the impacts of this global phenomenon are seen to have largely failed. Populations living on dry land remain among the most vulnerable in the world while global scale forces such as globalization and changing market conditions have not reduced to, increases in this vulnerability.

Desertification is not simply the advancing march of sand dunes across previously productive areas, but relates to a more general phenomenon of environmental degradation and its interaction with human populations.

It was only after the mid nineties and the dawn of the new millennium that desertification started to be increasingly seen also as a social-economic problem.

Nigeria is blessed and 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 which is sensitive to the environment and social and economic issues.

A major threat to Nigeria realizing the full potential of her kind resources is desertification. Desertification affects not only Nigeria but 70% of the world's Arable lands in more than 100 countries. Inextricably linked to poverty, it is estimated that the livelihood of 250 million people is directly affected while another billion living in rural dry lands are threatened by this phenomenon.

The former U.N Secretary- General, Kofi Annan, said that desertification undermines the fertility of the world's land, with productivity losses reaching 50 percent in some area.

Today, the world faces a situation of growing urgency, there is widespread of access to water, food security is affected by unprecedented price likes for commodities (basic food) driven by historically low food stocks which leads to a growing demand for bio-fuels.

Environmental changes such as desertification, drought and land degradation are creating growing problems. International areal prices have already led to food riots in several countries, while the most vulnerable are also seeing the food aid process being threatened by this economic context.

Thousands of people die of hunger in Africa due to the effects of desertification, land degradation and drought. In the summer of 2005, Niger, the poorest country in the world, witnessed thousands of her children die of hunger as the terrible food crises affected millions of people and led to widespread malnutrition. Presence on the availability of fertile land due to the growth of the population combined with the effects of desertification and drought, decline in soil fertility and the constraints of a rain fed agriculture, have all driven Nigeria's population to be highly vulnerable to food insecurity.

Desertification is fast stealing and threatening many a livelihood in the affected parts of Nigeria. In some, communities, it is so serious that there are poor agricultural fields, wells and other water resources are drying up and people are beginning to leave for fear of being swallowed by sand dunes.

It is estimated that more than 30 million people in Nigeria live under the hardship of desertification. There are 19 states in the Northern Nigeria and the Federal Capital Territory (FCT), Of this number, 10 states already affected by desertification.

The affected states include Bauchi, Gombe, Borno, Yobe, Jigawa, Kano, Katsina, Zamfara and Kebbi. Although, the magnitude of this environmental hazard is not equal, as one move further north, it becomes more severe. The boundary states of Northern Nigeria which are Sokoto, Kebbi, Zamfara, Jigawa, Borno and Katsina experience severe desertification, while Bauchi, Gombe and Kano experience moderate desertification. Meanwhile, Adamawa, Taraba, Kaduna and Niger state are already witnessing the signs of desertification, while the ecological density of the Guinea Savannah in general is on the decline.

Today, a third of the earth's surface is threatened by desertification, which adds up to an area of over 4,000 million hectares (ha) of the planet. It not only contributes to food insecurity, famine and poverty, but may also fuel social, economic and political tensions that can cause migration conflicts, further poverty and land degradation.

2.Statement Of Problem

The environmental damage as a direct result of desertification in Nigeria needs urgent attention from Government at all levels (Federal, State and local). Desertification poses as a threat to man and his environment. The adverse effect of desertification is felt on the Nigerian economy since it leads to environmental issues like overpopulation in some parts of the country. People from the northern part of the country are forced to migrate to the southern part, once the desert spreads.

Since drought causes desertification, it violates the citizens' right to food and good water supply; this leads to hunger and poverty which could cause death if not properly and adequately addressed by the government. Furthermore, desertification affects Nigeria's economy negatively by shooting up unemployment.

3.Objective Of Paper

This paper seeks to examine the negative and adverse effects of desertification on the Nigerian populace and most importantly, on her economy.

The objective of this paper is also to create awareness of the consequences of desertification among Nigerians for some people even believe that desertification is a "myth" or a "Scientific jargon".

Furthermore, this paper explores the legal, administrative and policy framework on desertification in Nigeria.

Some environmental issues that are of concern to people and how they lead to desertification are also discussed.

4.Methodology

We base our analyses on the new concept of desertification and drought. This paper is comprehensively descriptive in nature and relies on secondary data that are retired from textbooks, periodical magazine, journals, news items, articles and internet material.

Most of the materials sourced from journal articles, magazines, news items and periodical are also online.

5.Literature Review

5.1.What Causes Desertification?

Desertification is a world renowned problem and it occurs on all continents except Antarctica. It can be identified by some indicators which include reduction in the amount and diversity of plant and animal species, loss of water retention capacity, loosened soil capacity increasing wind and water erosion.

Desertification is caused by majority of reasons some of which could be classified as economic, social, political and natural factors but these factors vary from region to region. The following are the major causes of desertification in Nigeria;

5.2. Poverty

Desertification is both a cause and a consequence of poverty in Nigeria and everywhere else. At least 90 percent of the habitants of dry lands lives in developing countries where they suffer from poor economic and social conditions. It often causes rural lands to become unable to support the same sized populations that previously lived there.

This results in mass migrations out of rural areas and into urban areas most especially among on inhabitants on the desert fringes in Africa. As a result of these mass migrations into the cities, they are often numerous numbers of employed people who end up living in the slums. Desertification is contributing greatly to the tremendous poverty globally.

Desertification can reduce productivity in some regions by as much as half or more. It contributes to food insecurity, famine and poverty and can give rise to social, economic and political tension that can cause conflicts, further poverty and land degradation. Poverty forces the people who depend on land for their livelihoods to overexploit the land for food, energy, housing, earnings.

As the human population increases, the poor may find it compulsory to overuse their land for a short time, not planning for the long term effects. Food and water scarcity can also cause the already struggling masses to become poorer because desertification is gradually reducing the level of the lakes and rivers and farms are becoming deserted, bare and less productive.

5.3. Globalization

The idea of globalization is to bring people and countries together for the purpose of sharing ideas, knowledge, culture and traditions, goods and services, trades and discoveries in all aspects of human existence.

Globalization has caused both harm and good to the environment as it gives room for both changes and challenges. Globalization creates links between local, national, regional, and global factors related to desertification. While it improves the prospects for economic growth worldwide and increases overall global output, globalization has conceivably reduced economic prospects in Nigeria.

Some studies have shown that trade liberalization, economic reforms and export oriented production in dry lands which could include focusing on agricultural and livestock production and promote desertification. The technological advancement introduced by globalization makes it possible for humans to cause desertification more than it can be anticipated.

5.4. Poor Irrigation Practices

In the northern part of Nigeria, farmers engage in poor irrigation practices. Improper irrigation practices result in salinated soils which can prevent plants from growing. Irrigation can cause environmental problems such as water logging, salinization; which is the buildup of salts in the soil, water pollution, and excessive groundwater use.

Generally, irrigation has had a strong impact on inland waters, causing a decline in biodiversity and further desertification. Ironically, the availability of water for irrigation can cause desertification because almost all irrigation water contains some salt and if an irrigation system lacks a good drainage system, the salt builds up in the soil. Eventually, the salt reaches a toxic level and starts affecting the plants and this problem has jeopardized one-third of the world's irrigated land, Nigeria inclusive.

5.5. Drought

The occurrence of drought in Nigeria is not a new phenomenon Sub-Saharan part of Nigeria because the Sahelian part has quite a number of issues concerning the climate. Drought is an extended and continuous duration of very dry weather. Insufficient rainfall and unfavourable weather conditions are natural causes of drought. When farmland is overused and when forests are reduced as a result of felling of trees, drought can occur.

Whenever there is drought, several plant species are lost, some of which could go into extinction and others are weakened. Drought occurs in dry and semi-dry climates where periods of rainfall failure are interrupted with years of abundant rainfall. When the rain is sparse, plants and trees don't grow as everywhere is dry and the desert comes in and from the sand of the desert is not fertile, nothing grows.

During drought, the food security becomes an issue because famine is very rampant, the severity of drought is forcing most of the inhabitants of dry lands usually the poor farmers seek in other places to live until the drought ends. It has also contributed to the poor standard of living and has rendered the agricultural sector of most countries partly paralysed.

5.6. Grazing By Livestock

One of the primary causes of desertification is Overgrazing of dry lands by livestock. Livestock depend on the growth of plants that also depends on the availability of water. When livestock forage for food, it tends to have an aftereffect on the environment, in turn leading to desertification because as they feed on these plants, the land gradually diminishes in value and becomes barren when these livestock are not controlled by their owners.

In Nigeria, the nomadic farmers take their livestock into the available land to forage for food for survival. The further the farmers take their livestock grazing to in hopes of finding better grazing areas, the more the land destroys. The pastoralists are now forced to move through cultivated land with their livestock.

Moreover, the loss of Arab land and pastures threatens the economy of the predominantly rural region and the national food supply. The Nigerian State's Ministry of Environment estimates that more than 5 billion livestock are threatened by desertification.

Excessive grazing can lead to the killing of individual grass plants leaving only patches of bare soil. Overgrazing damages or kills repeatedly grazed plants while ungrazed declining grasses are weakened, and it removes the vegetation causing erosion and loss of top

soil. Overgrazing can also add to soil erosion. It has also contributed to the poor standard of living and has rendered the agricultural sector of most countries partly paralysed.

5.7. Deforestation

Forests are large areas of land with trees and are noticeable in area with subequatorial and monsoon types of climates. The importance of the forest to man cannot be overemphasized. They act as a sanctuary for rare and endangered animals. Forests act as storm breaks, hereby protecting the towns and villages from destruction.

Deforestation is the cutting of trees for household and other uses and this leaves soil uncovered leading to an increased in the temperature of the soil. Forests and woodlands are essential to human life.

The forests in Northern Nigeria have almost vanished. Deforestation is a serious problem in Nigeria which currently has one of the highest rates of forest loss (3.3 percent) in the world. Since 1990, the country has lost some 6.1 million hectares or 35.7 percent of her forests cover. Between 1990 and 2005, the country lost a staggering 79 percent of these forests and since 2000, Nigeria has lost an average of 11 percent of its primary forests, double the rate of the 1990's. These figures give Nigeria the dubious distinction of having the highest deforestation rate of natural forest on the planet.

Nigeria's government is concerned with the rising deforestation and the problem of environmental degradation which costs the country over \$6 billion a year. Nevertheless, it has failed to curtail illegal logging and other forms of degradation. Previous Nigerian governments have had to control forest loss by placing a ban on forest exports, promoting agro forestry and community based conservation schemes, increasing energy and fuel efficiency and encouraging plantations and reforestation programs achieve a target of 25 percent forest cover but the impact is limited considering Nigerian's astonishing deforestation.

5.8. The Nigerian Experience

Nigeria is endowed with natural resources including forestry and other biodiversity, solid minerals, oil and gas to mention a few. Environmental problems however vary from region to region in the country and include solid wastes, flood and erosion, drought and desertification.

In the northern part of the country, the nomadic groups live in the desert. They are the Tuaregs, Bedouins, Fulanis and Nubians. They move from place to place in search of food and water for their livestock. Periodically, the Nigerian governments and several organizations have veered into different directions searching for solutions to the threat posed by desertification but they always manage to find temporary solutions.

The entire semi-arid zone of Nigeria lies approximately between latitude 11^oN and 14^oN and is affected by desertification.

Desertification is fast becoming a very popular environmental problem in Nigeria. According to National Assessment report (2000), the most pressing environmental problems facing the northern parts of Nigeria is desertification. No fewer than 35 million people located in 19 states in northern Nigeria are facing threats of hunger and extreme weather conditions due to desert encroachment on available lands and grazing fields.

Desertification has been recorded as a recurrent phenomenon in Nigeria in general and more specifically in the Sudano-Sahelain regions, which are the areas of West Africa characterized by droughts and desertification. The northern part of Nigeria especially the frontline states comprising of Bauchi, Gombe, Bornu, Jigawa, Yobe, Kano, Kastina, Sokoto, Zamfara, Adamawa and Kebbi which lie roughly north of latitude 12^oN face serious threats of desertification where the Saharan desert has eaten deep into the once fertile land. The Lake Chad basin, the largest body of inland fresh water, which is situated in the area is not left out of desertification and it has brought about economic losses and negative impact on the people within the environs.

One of the lead causes of desertification in Nigeria is overgrazing especially in the north of the country as the most prominent occupation is cattle rearing. The little grass that grows from the little rain that falls is what they feed their cattle with, so there is nothing green to fight the desert.

The rush for the black gold which is crude oil has made everyone forget the importance of agriculture to the economy, coupled with illiteracy as people have no idea out the importance of preventing desertification by planting trees to replace the fallen ones.

The northern part of Nigeria is endowed with a large expanse of arable land that has provided a vital resource for agriculture and other fiscal activities over the years, but as it is no longer that the Sahara desert is advancing southwards at the rate of 6.0 percent yearly, the farmer in the north are the ones suffering from the problems caused by desertification.

Nigeria loses about 350,000 hectares of land yearly to desert encroachment; this has led to demographic displacements of many people across 19 states in the north. No fewer than 42 million people are believed to have been affected by this development.

To the north, in about 19 states of the country, each year the desert advances another 600 meters further south. Tens thousands of farmers and their families have already been forced to move off land that has become barren. These people head south in search of jobs and land that does not exist. All these movements have put a major strain on the fertile land of central Nigeria, which are more prized and less available. There have always been tensions and conflicts between cultural and pastoral practices, but desertification has heightened them.

Nigeria loses about \$5.1 billion dollars yearly as a result of the rapid encroachment of the desert in most parts of the North and it also threatens the livelihoods of over 55 million people which is equivalent to the combined population of Mali, Burkina Faso, Senegal and Mauritania.

Over 70 million Nigerians have a direct and indirect experience of the negative pacts of desertification. The Northern region experiences low rainfall and high temperature that rises up to 45 degree Celsius.

The legal and policy framework put in place to combat desertification has not been constant, efficient and adequate. Without any gainsaying, the Nigerian governments need to urgently implement both local and international legal, administrative and policy framework on desertification.

6.Measures Taken By Nigerian Government To Mitigate Desertification

Desertification can be managed through a lot of processes that have evolved over the years but it can also be prevented and tamed when countries, institutions and organizations employ incentives and programmes to fight it.

The government of the Federal Republic of Nigeria and at some instances in collaboration with donor countries, international organizations and institutions has done a lot to combat and mitigate the effect of desertification since early 1970's.

The priority in combating desertification should be the implementation of preventive measures for lands that are not yet degraded, or which are only slightly degraded. However, the severely degraded areas should not be neglected.

In combating desertification and drought, the participation of local communities, rural organizations, national Governments, non-governmental organizations and international and regional organizations is essential.

The National Action Plan to combat desertification in Northern Nigeria was an initiative of the Government of Nigeria in conjunction with the 19 desert-prone and ravaged states in Northern Nigeria. The action plan to combat desertification in Nigeria was merged into National Policy under the supervision of National Environment and Regulations Enforcement Agency (NESREA).

It is the function of the NESREA through the NESREA Act to enforce compliance with the provisions of international agreements, protocols and conventions and treaties on the environment including climate change, biodiversity conservation, DESERTIFICATION, forestry, oil and gas, chemicals, hazardous wastes, ozone depletion, marine and wildlife, pollution, sanitation and such other environmental agreements as may from time to time come into force.

Poverty, rapid population, growth, pattern of using grazing land and trees as a common pool resources and institutional weaknesses and corruption were identified as the main factors that militate against desertification policy implementation in northern Nigeria.

There is a general feeling of the people of Northern Nigeria that the desert's advance can only be stopped if Nigeria's authorities start taking the menace more seriously. Despite treaties signed, agencies formed and policies articulated to combat desertification the northerners have not noticed any tangible improvement.

In Nigeria, several policies, plans and programmes have been initiated to address issues relating to combating drought and desertification. Some policies have been introduced by the government through the relevant ministries, some others by Non-governmental organizations.

The implementing agencies are the Federal Ministries of Environment, housing and urban development. This policy also addresses climate change as it affects drought and desertification. The National Agricultural Policy protects the agricultural lands against drought, desertification, and protection and conservation of the forests.

The National Water Resources Master Plan (1995-2020) advocates for sustainable utilization of water resources with particular emphasis on the dry lands of Nigeria and the implementing ministry of this policy is the Federal Ministry of Water Resources.

According to inter —governmental Panel on Climate Change (IPCC) projections, the savannah areas of northern Nigeria would experience less rainfall which, coupled with temperature increase would reduce soil moisture availability leading to poor yield.

In a bid to combat further desert encroachment into Nigeria, the ministry of Environment embarked on a project designed to recover the ecosystem in the affected area.

Another initiative is Nigerian Energy Policy aimed at promoting the use of alternative energy to substitute fuel wood.

But despite these entire legal and policy frameworks, the expected desirable results have not been achieved in Nigeria.

6.1.International Perspective

According to the International Convention to Combat Desertification (CCD; United Nations 1994):

'Desertification means land degradation in arid, semiarid and dry sub-humid areas resulting from various factors, including climatic variations and human activities', with the arid, semi-arid and dry sub-humid zone defined as '...areas, other than polar and sub-polar regions, in which the ratio of annual precipitation to potential evapotranspiration falls within the range from 0.05 to 0.65.'

Land degradation is described as: '...reduction or loss ... of the biological or economic productivity and complexity of rain fed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as:

- Soil erosion caused by wind and/or water;
- Deterioration of the physical, chemical and biological or economic properties of soil; and
- Long term loss of natural vegetation.'

The definition is unambiguous on the issues of what and where, but the question of why is not clearly answered. Put simply, this is because there are 2 polarized views on the causes of desertification.

At one extreme is the view that drought, which is normally a short term, natural fluctuation in climate, accelerates the long term rate of land degradation. This implies that when long term reductions in rainfall occur, such as those which have affected parts of the African Sahel over the last 30 yr or so, the resultant degradation is a largely natural phenomenon and beyond the control of the nations experiencing it.

At the other extreme is the view that traditional land use systems are often well adapted to periodic drought. Desertification therefore tends to be human induced and arises because of pressure on land resources due to rising populations, unwise development policies and misuse of the land

Both of these views are partially true but most desertification has multiple causes. The picture is further complicated by the as yet unsubstantiated view that, while the desertification process may be accelerated by the natural phenomenon of drought, some of the extreme droughts experienced recently in both the Sahel and other parts of the world may be a consequence of human-induced climatic change.

Further complexity is added by the fact that vulnerability to drought increases, as land resources become degraded. Therefore, the pressure on land often increases as the population expands.

There is little doubt that desertification is a global problem but its complex nature means that there is no general solution. The UNCCD is therefore framed around the development of a set of national action plans supported by regional cooperation networks.

It also emphasizes bottom-up rather than top-down approaches to dealing with desertification based on local community action.

On the issue of funding, it was estimated by UNEP that the amount to tackle desertification for 20 years would cost \$10-20 billion per year, since to combat desertification, a substantial amount is needed. The 1994 UNCCD concluded that it is only when the developing states accord full implementation of the convention would they be assisted by the developed countries as regards financial resources and transfer of technology.

7. Conclusion

Desertification is a looming menace on the Nigerian environment and a threat to food security. The environment of the northern region in Nigeria has been degraded by desertification. The impact has been substantial.

Presently productivity of farms in Nigeria is very low as a result of degradation of land over a long period of time. Before, agriculture used to contribute more than 49% of the gross domestic product of Nigeria, while other sectors including oil and gas, wholesale and retail trades, financial institutions and manufacturing contributed 41.33, 23.2, 14.2 and 3.93% respectively.

The level of success of legal and policy, Intervention in stopping or reversing desertification remains to be seen. More so, the pressures which produced land degradation in the past are still present.

Nigeria's experience and level of success in delaying with desertification is typical of many developing countries. Obviously, it is imperative to provide adequate legal information with respect to statutes and other relevant treaties that make pronouncements on the issue of environmental protection.

Ignorance of the ecosystem should no longer be an excuse for desertification to degrade the Nigerian environment.

8. Recommendations

In order to observe democratic accountability conditions, Nigeria should ensure, in accordance with her international rights obligations, that desertification and land degradation issues are adequately addressed by policy makers and other political actors, through the mainstreaming of the relevant policy and programme instruments.

Nigeria and other countries should report environmental issues including desertification. Reports relating to national experiences and particular means for addressing desertification will enable an increase in international, national and regional awareness on the subject.

Awareness rising programme involving NGOs, as well as federal, state and local government authorities, should encourage enhanced, Community participation in environmental management.

The federal and state government improvement in access to productive resources and public investment in rural development is essential for eradicating hunger and poverty in marginal and degraded lands, including dry lands facing desertification.

There is an urgent need for the national assembly to amend some sections of the Land Use Act (1978), to promote and protect the security of land tenure especially with respect to women, and poor and disadvantaged segments of society. This will also protect the full and equal right to own land and other property, including the right to inherit.

Mechanisms for the settlement of conflicts, especially those linked to competition for access to natural resources should be developed, at federal, state and local government levels to limit the impact of such conflicts on the environment and minimize the push factors of forced resettlement and migration.

Irrigation, terrace ploughing, planting of trees and grasses are means of controlling desertification and these practices should be promoted by the government to make desertification a national goal.

There is a need for a new strategy to bind the international community and build international cooperation to combat desertification. These will prevent the growing negative impacts of desertification on the poorest countries and improve food security and access to water.

Bricking together the strengths of international human rights and environmental law will better protect people, whose lives and livelihoods are threatened by desertification, focusing attention on human suffering as well as environmental harm. Linking human right and the fight against desertification offers a framework.

One of the causes of desertification is drought which cannot be controlled because it is a climatic cause. Areas where droughts occur consistently should not serve as farms or productive land. The farmlands could be relocated or means like irrigation could be used to make these areas productive.

The government and the Nigerian people surely have a lot to do to combat and fight this environmental monster- Desertification.

9. References

1. Audu E.B, (2013). Fuel wood consumption and desertification in Nigeria. *International journal of science and technology*.
2. Bisaro .A, Kirk,. M, Zimmermam, W and Zdruli, P, (2011): Identifying and analyzing new issues in desertification research trends and research need, final report of the ideas project to the German Federal ministry of education and Reasesrch (BMBF), institute in developing countries, Marburg Germany.
3. Ellis J.E, Conghenour, M.B, swift D.M (1993). Climatic variability, ecosystem stability and the the implications for range and livestock development. In Behnke, RH, Scoones, I, Kervin C: *Range ecology at disequilibrium*. Overseas Development Institute, London, 31-41
4. Geist, H and Lambin, E.F, (2004). Dynamic Causes of desertification, *Bioscience*, Vol.54, no.9, 817-829.
5. Graetz, R.D, (1996). Empirical and practical approaches to land surface detection in Hill J, and peter D (1996). The use of remote sensing for land degradation and desertification monitoring in the European Commission Basin European Commission, Brussels, P V-VL.
6. Grainger, A, (2009). The role of Science implementing international Environmental Agreements: The case of desertification report to UNCCD secretariat.
7. Kofi Annan (2004). *Livelihoods of over one Billion people at Risk from Desertification: United Nations message on the world Day to combat desertification*.
8. Lindsay stringer (2008), can the UN convention to combat desertification guide sustainable use of worlds soil frontiers in ecology and the environment. Vol 6, 138-144.
9. Mortimore, M., Ramakrishnam, P.S., Richards, J.F., Skanes, T.I, Steffen, W., Stone, G.D., Svedin. U., Veldkamp, T.A., Vogel, C., Xu, Y. (2001). The causes of land use and land-cover change, Moving beyond the myths. *Global environmental change* 11,261-269.
10. Reynolds, J.F, Stafford Smith, D.M, and Lambin, E. (2003) Do humans cause deserts. An old problem through the lens of a new framework; the Dahlem desertification paradigm. *Proceedings of the 7th international Rangelands Congress*, Durban, South Africa.
11. Tieszen, L.L., Tappan, G.G., and Toure, A. (2004). Sequestration of carbon in soil organic matter in Senegal, *Journal of Arid Environments*. 59(3):409-25.
12. Warren A, Khogali, M, (1992) An assessment of desertification and droughts in the Sudano-Sahelian region. United Nations Sahelian office, New York, USA.
13. <http://www.ohchr. Org/Documents/Issues/Climate-22/7/2013>
14. allafrica.com/stories/201307151105html.27/7/2013
15. desertification.wordpress.com/legalframeworks-regulating-the-land--5/8/2013
16. www.int-res.com/articles/cr/11/co11051.pdf.-13/8/2013
17. <http://www.ielrc.org/content/ao201.pdf.-13/8/2013>
18. www.nema.go.ke>Home>mediacentre> latest News-13/8/2013
19. www.treehugger.com/.../38-ofworlds-landindanger-ofturning-into-de-6/9/2013
20. www.uni-marburg-de/fbo∂/forshung/projekte/final report-pdf. 6/9/2013
21. <http://www.independent-co-uk/news/world/afri-6/9/2013>.