

## Impact of Human Activities on the Forest and Their Effects on Climate Change

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**Abstract:** Developing countries including Nigeria as saddled with problems emanating from Environmental deterioration which has great impact on climate change. These problems are glaring and threaten the existence of mankind. A wide range of human activities on forestland contribute to climatic change, prominent among these are, deforestation, desertification, industrialization, urbanization and other socio-economic activities. In this paper, attempts have been made to trace the causes and consequences of these human activities especially as they relate to climate change, while suggestions on possible solutions are proffered with a view to mitigating the effects of climate change on our environment and existence.

**Key words:** Human activities, Forest, Climate change, Semi arid and Sub- humid.

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### INTRODUCTION

The issue of climate change is receiving so much global attention because of the projected impacts on the environment and socio-economic system which now contribute to environmental problems mankind faces as we enter the 21<sup>st</sup> century. Climate change cannot be aptly described until we have a good understanding of what I meant by the very dynamic phenomenon called climate. Climate can be defined as the synthesis of weather at a given location or area over a period of at least thirty (30) years. Ayoade, (2003) described it as representing a generalization of weather condition over an area. The term climate change can therefore be regarded as a shift in the average weather that a given area experiences (Anon, 2007). This is measured by changes in all the features associated with weather, such as wind pattern, rainfall, temperature and storms, more aptly, global climate change means change in the climate of the earth as a whole (Anon, 2007). Climate change therefore has to do with long term significant change in the average weather conditions which includes average temperature, precipitation, wind pattern etc. These changes according to Anon, (2006) can be caused by a dynamic process on earth, external forces including variation in sunlight intensity and more recently human activities. All countries feel the effects of climate change, however, people who are poor are least able to adapt to climate change. They are the most vulnerable as they lose their sources of food, fuel, shelter and income hence their poverty deepens.

#### *Status Of Forests In Nigeria:*

As at 1897, Nigeria had sixty (60) million hectares of forest as woodland (Oguntala, 1995). There was an array of plant species which according to NEST, (1991) were above 4,614 out of which 255 were endemic. Threatened species of Nigerian flora due to deforestation are about 480 which represent about 10% of the total plant species put the number of gazetted forest in Nigeria at about 1,160 covering an estimated area of (10) million hectares. The conservation areas have spread over 366 local government's areas in thirty (30) states of Nigeria and the Federal Capital Territory. They include twelve (12) Strict Nature Reserves (SNR), 1 biosphere reserve, thirty-two (32) game reserves and eight (8) National parks. Table 1 shows the area of forest reserve in Nigeria by vegetation types between 1976 and 1995

Forest area declined during the 1990s at an estimated annual rate of 2.6+% (or 398,000 hectares per year) (FAO, 2005). Caused by agricultural expansion, encroachment, over-harvesting, bush burning, illegal harvesting and dereservations. The Federal Department of Forestry (FDF,2001) suggested that the annual depletion rate could be as high as 3.5%. The FDF also noted that the forest estate of Nigeria is highly depleted and that the Sahara Desert is encroaching southward at a rate of about one kilometer per year.

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**Table 1:** National Land Use and Vegetation Changes between 1976 and 1995.

	1976/78 % of Country	Change Km <sup>2</sup>	Km <sup>2</sup>	1993/95 % of Country	Km <sup>2</sup>	
Undistributed forest	2.9		25,951	1.3	12,114	-13,851
Distributed forest	1.6		14,573	2.1	18,990	4,417
Riparian forest	0.8		7402	0.5	5,254	-2,148
Montane forest	0.7		6,762	0.7	6,759	-3
Freshwater swamp	2		18,316	1.8	16,499	-1,817
Mangrove swamp	1.1		9,994	1.1	9,977	-17
Salt water swamp	0		4	0.1	545	541
Forest plantation	0.1		997	0.2	1,573	575
Tree crop plantation	0.1		830	0.2	1,641	811
Teak plantation	0.1		628	0.1	1,156	525

Source: Ayoade, (2003).

It was estimated that 975,000 hectares of forest reserves are productive while another 2.34 million hectares of free (non-reserve) areas are only partially productive.

Human activities are the major factors contributing to climate change through deforestation. Desertification due to urbanization, logging, farming activities and population explosion to mention a few.

This paper therefore intends to examine deforestation and desertification - at the major destructive activities of man solely responsible for climate change - a major threat to human continued existence and suggest ways by which the phenomena could be managed with a view to arresting the negative climatic trend they have brought to bear on our environment and by extension on our economy.

**Effects Of Deforestation On Climate Change:**

Deforestation has been variously defined as any act that leads to removal or destruction of forest vegetation unaccompanied by deliberate effort at its replacement (Oguntala, 1995). The United Nations Conference on Environment and Development (UNCED) in 1992 defined deforestation as land degradation in arid, semi-arid and sub-humid areas resulting from various factors including, climatic variation and human activities. According to Kio, (2000) the term “deforestation” denotes the complete clearing of natural tree formation (high forest and savanna) for agriculture particularly shifting cultivation and other uses. In the past few decades, tropical deforestation rates have increased dramatically. The world’s forest and woodlands declined from an estimated 6.2 million hectares to approximately 4.3 million hectares (Lanly, 1982; Adedire, 2002). In Africa 5.1 million hectares were deforested annually between 1981 and 1990, and according to Oguntala, (1995) Ethiopian forest which covered 40% of the country in 1900 managed to extend across by only 3%. In Nigeria about 300,000 hectares of forest is destroyed annually (WRI, 1987) The major causes of deforestation are population growth and expansion of economic activities such as logging, timber extraction, farming, urbanization, bush burning, firewood collection, grazing and infrastructural development (Oguntala, 1995, Papka, 1997, Adedire, 2002).

However, Oguntala, (1995) submitted that deforestation must be seen as a means of providing for man’s legitimate needs for wood products and expanding agriculture.

**Table 2:** Some Causes Of Deforestation In Various States Of Nigeria

	TIMBER EXTRACTION		LARGE SCALE AGRIC		SHIFTING CULTIVATION		FUEL WOOD EXTRACTION		ANNUAL FIRE	
	NO. OF STATES	%	NO. OF STATES	%	NO. OF STATES	%	NO. OF STATES	%	NO. OF STATES	%
Major Cause	6	27.3	19	84.4	13	59.0	12	54.6	9	40.9
Minor Cause	10	45.5	3	13.6	7	31.9	6	27.3	10	45.5
Non- Cause	3	13.6	0	0	2	9.1	3	13.6	3	13.6
Non-Response	3	13.6	0	0	0	0	1	4.5	0	0
TOTAL	22	100	22	100	22	100	22	100	22	100

Source. Kio, 2000.

Agricultural practices was considered as a major cause of deforestation in Nigeria with the country’s present population of over 140 million and an annual growth rate of 3% (NPC, 2006) more pressure on land will be expected especially within the next two to three decades (Kio, 2002), Meanwhile, Oguntala (1995) opined that shifting cultivation and large scale agriculture, exploitation of fuelwood and general improper land use would continue to result in deforestation (Table 2).

Adedire (2002) reported that local and regional deforestation is associated with decline in rainfall, increased surface temperatures and the alteration of local hydrology. Table 3 below shows that deforestation has also

been implicated in the increasing atmospheric concentration of carbon-dioxide (CO<sub>2</sub>) since trees required for sequestration have been drastically reduced or completely lost. Increase in CO<sub>2</sub> content of the atmosphere modifies the climate and causes general warming of the earth (Sorensen, 1994; Okojie, 1991). The consequence of global warming brought about through the green house effects are massive flooding of coastal regions of the world, changes in food chains and general disruption in agricultural production.

**Table 3:** Agrometeorological Weather Data At The Forestry Research Institute Of Nigeria Headquarters, Jericho, Ibadan (1970-2007)

YEAR	RAINFALL (MN)	NO. OF RAINING DAYS	MAXIMUM TEMPERATURE	MINIMUM TEMPERATURE
1970-79	1444.0	92	26.9	21.6
1980-89	1408.0	86	31.6	23.4
1990-99	1373.0	100	32.2	23.6
2000	1178.4	72	32.7	23.7
2001	1133.6	54	32.9	23.3
2002	1196.4	73	32.8	23.9
2003	1304.0	79	32.5	23.3
2004	1006.6	62	32.4	24.2
2005	1314.0	62	30.5	25.5
2006-2007	1198.5	56	32.5	23.7

Source: Odofin, (2007)

Table 3 shows that while the quantum of rainfall as well as number of rainy days decreased steadily in the first 30yrs, the two weather elements became irregular in the following seven years. Similarly, the maximum Temperature of the area was also on the increase while the minimum temperature decreased over the same period. This trend was associated with the removal of the forest vegetation surrounding FRIN between the early and late 1980s as a result of urbanization.

***Effects Of Desertification On Climate Change:***

Desertification is a process by which changed bio-geophysical conditions emerge owing to human actions that cannot be supported by the resource base (mainly rainfall) and which will not quickly return to their former non-desertified condition. (Prince, 2002, Otegbeye, 2000, and Nelson, 1990). From the above definition, desertification is brought about by two main factors, namely climate change as expressed by reduce rainfall and secondly human activities which if continued unchecked the location may increasingly become incapable of supporting plant growth. The primary reasons for desertification are overgrazing, overcultivation, water impoundment, deforestation, overdrafting of groundwater, increased soil salinity and global climate change. The effects of desertification include climatic variation resulting in low agricultural productivity, loss of livestock population, drift, wind erosion, drying up of dams, rivers and other waters and sparse vegetation with attendant scarcity of forest produce including timber and fuelwood. Igboegwu and Ekwebelam, (1989) estimated that the annual fuel wood deficit in the arid regions of Nigeria is about 10 million Cubic meter frequent bush burning which has become the traditional feature of the farming practices of the people is enhanced by the dry vegetation. The low rainfall and low humidity of the environment limits the extent and productivity of rainfed farming and more land is cultivated to increase farm yield. All these result in more land area being cleared, burnt and more trees cut.

***Mitigation And Roles Of Forestry In Combating Climate Change:***

Deforestation and desertification can be controlled using the following methods, traditional methods, in-situ and ex-situ conservation methods.

***Traditional Conservation Methods:***

Research findings suggest that the maintenance of biodiversity is related to people’s cultural identities and is usually a response to environmental, ecological and economic uncertainty and fragility. Some of the traditional methods of conserving our genetic resources include scattered trees in farms, home gardens\compound farms, taboo and superstition-some trees are left on farmlands for providing shade or for economic value, fetish grooves where natural forests are dedicated to deities and forbidden to people for their uses or entry into them. Thus with the use of such grooves, plants and wildlife species that constitute the grooves are protected.

***Establishment of National parks, Biosphere Reserves and Botanical gardens:***

These conservation units forms natural reservoirs of genetic resources.

***Ex-situ Conservation:***

It involves the maintenance of organism outside their original habitat. This could be found in seed gene banks, in-vitro gene banks, forest plantations etc. This method becomes necessary when the safety of any particular endangered species is not guaranteed. Control of desertification is complex and difficult usually impossible without alteration of land management practices that led to the desertification. Several measures aimed at controlling desertification include the following:

***Afforestation Programmes:***

In the past afforestation programmes was practiced solely by government. The approach now should be that federal, state and local government as well as individuals should embark on massive planting of trees in marginal lands. Plant species that have morphological and physiological features to adapt to the environmental conditions in the savanna and Sudan zones of the country should be adopted.

***Shelterbelts:***

These are strips of woody perennials established by government owned forestry agencies primarily for environmental protection. The tree species mainly used for this purpose in the region are *Azadirachta indica* and *Eucalyptus camaldulensis* either as mixed species or as monoculture belts.

***Social Forestry:***

Efforts should start now to encourage social forestry in the country, with the attractive objective of providing benefits to rural people in terms of fuelwood, fodder, sawn timber and raw materials for cottage industries as well as contributing to environmental stability and providing income and employment to the community. The social forestry programme takes forms such as farm forestry, strip plantation, community self help and village woodlots. The programme will greatly increase the land under forest reservation.

***Conclusion:***

The time has come for decisive action to be taken to tackle climate change head on. Mitigation strategies need to be taken to deal with the man-made causes of climate change by controlling deforestation and encouraging afforestation of deforested areas thereby protecting the CO<sub>2</sub> sink. Improved forest management and where possible, expansion of forest areas will help to reduce the concentration of CO<sub>2</sub> in the atmosphere since forest make use of CO<sub>2</sub> for photosynthesis and act as reservoirs of carbon. To combat the adverse effects of climate change, Nigerian need to be educated and informed about the consequences of over-exploitation on our forest resources.

**REFERENCES**

- Adedire, M.O., 2002. Environmental Implications of Tropical Deforestation. The International Journal of Sustainable Development and World Ecology. John Deffers (Ed.) pp: 268-272.
- Anon, 2007. Mitigating the Challenges of Climate Change in Nigeria through forestry techniques.
- Anon, 2006. Report of Inter-governmental panel on climate change summit.
- Ayoade, J.O., 2003. Climate change: A synopsis of its nature, causes, effects and management. Vantage Publishers Ltd, Ibadan, pp: 128.
- Ekwebelam, S.A., 1989. Arid Zone Research Guidelines APCU, Kano, Nigeria.
- FAO, 2005. State of the Worlds Forests 2005, FAO, Rome, Italy.
- FDF, 2001. Forestry Outlook Study for Africa Country Report Nigeria Prepared by Aruofor, R. Federal Department of Forestry.
- Igboegwu, V.C., 1981. Tree Planting Methods. An Extension Pamphlet produced by Afforestation Programme Co-ordinating Unit APCU, Kano pp: 17.
- Kio, P.R.O., 2000. Forestry and Sustainable agricultural Development. In J. J. Owonubi, A. B. Oguntala, and M. O. Soladoye (E4) National Workshop on Agriculture and Rural Development in Nigeria, pp: 34-48.
- Lanly, J.P., 1982. Tropical Forest Resources: Forestry papers 30. Food and Agricultural Organization of the United Nations, Rome.
- Nelson, R., 1990. Dryland Management, the desertification problem. World Bank Environment Department Working paper 116. World Bank, Washington D.C. pp: 78.
- NEST, 1991. The Challenge of Sustainable Development in Nigeria, Publication of Nigeria Environmental Study/Action Team: Edd. T. A. Awe and A. T. Salau, paged 102.

- Odofin, T., 2007. Forestry Research Institute of Nigeria Annual Report.
- Oguntala, A.B., 1995. Effect of Fuelwood Collection and Logging on Environment by 268 UNESCO MAB Regional Training Workshop, Akure, Nigeria 23-26 July, 1995. A. A. Afolayan (Ed) pp: 268-272.
- Okojie, J.A., 1991. Misuse of Renewable Natural Resources paper presented at the Symposium to mark the African Year of the Environment in Ogun State, Nigeria, June, 25th.
- Otegbeye, G.O., 2000. Agroforestry and Desertification Control. Invited paper at the Workshop on Soil Erosion and Desertification problems and Control Techniques.
- Papka, P.M., 1997. Strategies for Sustained Environmental Conservation through resources development: Forestry Association of Nigeria, 2001 Annual Conference Proceedings A. B. Oguntala, E. A. Oduwaiye, P. C. Obiaga and J. E. Abu (Ed.) pp: 271-286.
- Prince, S.D., 2002. Spatial and temporal scales for detection of desertification In. Global Desertification: Do Human Cause Deserts? (Ed. Reynolds, 3. F. and Slarford Smith, D. M.) Dahiem Workshop Report 88 Berlin, Dahlem University Press, pp: 23-40.
- Sorensen, K.W., 1994. Climatic Change and Biodiversity Tropical Forest Update, Newsletter, International Tropical Timber Organization, 4(1)4.
- Websites: <http://www.UNICED cc/public info/ifsl1-html>
- WRI, 1987. An Assessment of the Resource Base that support the Global Economy, with Data and Tables for 16 Countries, Washington, D.C. International Institute For Environment and Development, World Resources Institute, pp: 39.