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# MANGROVE DEGRADATION IN THE COASTAL SOUTHEAST OF NIGERIA: CAUSES, EFFECTS AND REMEDIES FOR THE FUTURE

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## Abstract

The Nigeria Delta area of Nigeria was one of the richest regions of the country in terms of forest resources of diverse types. It is particularly endowed with the mature mangrove forests. The vegetation contained many species of unique socio-economic and ecological importance. Until very recently, the mangrove community had remained fairly secured because of the difficult terrain on which they existed. However, population pressure coupled with the aggressive drive for socio-economic development from early 1970s to date have taken very serious toll on the forest resources. This has left many forest areas badly degraded or completely dereserved in some cases to the extent that the continued existence of mangrove communities in the region is under threat. This paper takes a look at the various factors responsible for mangrove forest degradation in the area and the effects of this on the environment. Suggestions are offered on way(s) to address the problem.

**Key Words:** Forest Degradation; Niger Delta; Remedies and Rehabilitation

## Introduction

The tropical rainforest is unique in many ways. Apart from being a reservoir of genetic resources, its biological diversity is a major support to the maintenance of ecological and climatic balance. According to FAO (1986) the tropical forest shelter between 40 and 50% of the species that exist on planet earth. Man has exploited the complexity and diversity of this unique ecosystem to his own advantage. Apart from timber, which is used in construction works, buildings, furniture and tools, wood has been put into several other uses by man. Furthermore, dietary and medicinal benefits are being derived from the forest. Unfortunately, man has developed advanced technology for the extraction of goods and services from the forest without corresponding advancement in the management technology that will ensure its sustainability. The consequence of that is severe degradation, deforestation and desertification in extreme cases. According to Areola (1991), Nigeria's natural forest and savanna are among the most complex and delicately balanced of natural ecosystems. Any form of human interference usually leaves an indelible mark on the structure of the forest. A large percentage of this natural forest ecosystem has been

The various activities are highlighted as follows:

(i) *Shifting Cultivation*

This is a cropping system in which the land is cleared of vegetation, cropped for a few years and then abandoned when soil fertility and crop yields decline. The soil is expected to regain its fertility through natural regeneration if the land is rested for sufficiently long time. This system of farming which involves the clearing of forest and felling of trees was initially productive and sustainable because the man: land ratio was quite low. However, with a soaring population growing at a rate of between 2.5 and 3.5% per annum (NEST 1992), the fallow period became progressively shorter and the soil is not allowed to fully regain its fertility before farmer returned to it. In addition, more areas of virgin forest were cleared and converted to food crop farms in order to feed the teeming population, occasioned by the influx of immigrant oil workers into the area. Apart from the traditional shifting cultivation, modern plantation agriculture has also taken its toll on the forest. For instance, a large chunk of the Okomu Forest Reserve, Edo State has been lost to dereservation for the establishment of the Federal Oil Palm Project; rubber plantation and taungya farming, the latter not being properly managed to achieve its objectives.

(ii) *Timber Exploitation*

In terms of plant biodiversity, the mangrove swamps of Nigeria are rich in tree species many of which are commercially important (Olatunji, 1992). The area of Forest Reserves in Edo and Delta States alone was 6,360Km<sup>2</sup> (NEST., 1991). A lot of these have been lost to heavy logging and other land use forms. Exploitation of the Nigerian natural forests started in the early 1930s (Enabor, 1981). The economic benefits derived from timber sales to both local and international markets contributed immensely to the degradation of the forests.

Furthermore, the demand for wood rose sharply after the Nigerian civil war, which coincided with the period of oil-boom. There was need for national reconstruction on one hand and the oil economy raised the standard of living of the average Nigerian which led to the increase in demand for all grades of wood for uses ranging from building construction; roofing; furniture to paper-making and lorry building (Ajayi, 1996). Numerous wood based industries were established in the region because of the general drive towards socio-economic development which led to further exploitation of the forest with little or no effort at reforestation. Thousands of logs of valuable species like Mahogany, Ironwood and Iroko were exported to Europe via Sapele and Lagos between 1960 and 1975. From 1980 to date a lot of exploitation of the natural forests has been carried out for general economic benefit on one hand and the selfish objectives of those in the position of authority on the

other hand. Government officials who were supposed to advise the policy makers failed to do so appropriately for their personal economic gains.

According to NEST (1991), larger concessions of forest were given out to a multitude of persons who were neither professionally engaged in wood processing nor capable of financing and operating wood-based industries. Furthermore, Odimgwu (1997) observed that management of the forest for the future was not given much consideration by advisers to government. The forest laws are obsolete and so encouraged wasteful and selective exploitation. This is because farmers and timber contractors are encouraged to violate the laws since the fines for such violations are meagre and are a far cry from the financial benefits they derive from violating the laws and regulations. The selective method of wood extraction without serious attempt at replenishment has resulted in creaming-off the forest, destruction of wildlife habitats and initiations of the process of desertification.

### (iii) *Oil Exploration and Exploitation*

Oil Exploration started in Nigeria by Shell D. Acry at Iho near Owerri, Imo State. According to NEST (1992), the first commercial quantity of crude oil was discovered at Oloibiri near PortHarcourt, Rivers State at about 1956. Oil prospecting activities have now spread to areas such as Rivers, Akwa Ibom, Cross River, Imo, Ekiti, Bauchi, Borno, Benue, Taraba, Edo, Delta and recently Lagos State. The activities involve several multinational and a few Nigerian companies. Right from 1960s to date, the petroleum industry has remained the foremost sector in the Nigerian economy. According to Areola (1991) oil prospecting takes place in one of the most difficult and fragile ecosystems in Nigeria. The Niger Delta is an extensive mudflat; covered by swamps and mangroves, the ecosystem is so delicately balanced that it is highly susceptible to sheet wash erosion once cleared of the protective vegetation cover. Oil exploitation in the Delta region has greatly impacted on the vegetation of the area. The prospecting involves a lot of road construction and vegetation clearing.

The major damage to the natural forest of the Niger Delta is caused by the real exploitation of oil and gas. The causes of forest degradation come in two forms:

- (a) Modification of physical landscape as a result of road construction; transportation of heavy drilling equipment from one location to another, the laying of pipe lines across the forests; erection of drilling platforms, storage depots and construction of buildings for official and residential accommodations. All these activities contribute significantly to forest destruction in the region.....
- (b) Pollution as a result of oil spillage and gas flaring is another cause of forest degradation in the Niger Delta Area resulting from oil exploitation activities. Accidents by ultra large crude oil vessels have potentials to cause significant

damage to the structure and function of mangrove ecosystems. Such accidents include: (i) Collision of oil tankers near the coast (ii) Flushing of oil vessels at seas (iii) explosion of oil wells as it happened with Funima oil in 1983 which according to Hoi-Chaw and Mcow-Chan (1984) resulted in the spillage of 37 million litres of crude oil into the Coastal Forests. Apart from the direct impacts of oil contamination, exploitation of offshore oil and gas fields also cause severe damage to vegetation. Gas flaring to allow access to the underlying crude oil reserves produces such gases as Nitrogen dioxide ( $\text{NO}_2$ ) and Sulphur dioxide ( $\text{SO}_2$ ) which when released to the air are very toxic and inhibit regeneration and growth of mangrove seedlings, because of the hot soot emitted. Between 1970 and 1982 alone, 1,581 cases of oil spillage incidents were reported, involving almost 2 million barrels of oil (NEST 1991). (iv) Several cases of pipeline explosion have occurred in the area since the commencement of oil production activities. The Jesse infeno of 1999 is still very fresh in the mind. Many lives and properties were destroyed. Many cases of such explosion have been reported in the country which have far-reaching effects on human lives and the larger environment.

#### (iv) *Urban and Industrial Development*

The population of Nigeria has been growing very rapidly at a rate regarded to be among the highest in the world. This rapid rate of growth has placed great pressure on the land both for food production and for the urban and industrial developments. As stated earlier, the oil economy has increased the wood demanded for residential and official buildings, furniture making, bridge construction and fabrication of tools and other utilities, thus placing further pressure on the forest. In addition to this direct cause of forest degradation, forest clearing and dereservation have been effected to give way to infrastructural developments in several places. For instance, 410,000 ha of the Ogba Forest Reserve in Edo State were dereserved for the various government projects and for the expansion of the airport, while another 14,650ha in Orle, Ohosu, Emuoloholo, Ehor and Urhonigbe Forest Reserves were lost for agricultural development.

The installations of N. E. P. A., NITEL and Water Corporations' equipment also involve the destruction of the native forests, many of such installations have been carried out within the Niger Delta Area particularly since the commencement of oil exploration and exploitation activities. Millions of people migrated to the area between the 1970s and now and all these people have to be provided with accommodation. Hence there was need to build more houses and this has further contributed to forest degradation and deforestation within the area. Furthermore, several roads, bridges and tarmacs were constructed through the forest which involved the

clearing and destruction of large areas of forests. Also many higher institutions of learning were established within this period which consumed large areas of forest land for buildings and installations.

The forest degradation currently being witnessed in the Niger Delta Area is thus a product of the general drive for the socio-economic development of the country. However, the economic benefits being derived from the area may not be commensurate with the deleterious effects of these activities on the environment which are already staring us in the face. Some of these destructive effects include: loss of valuable and irreplaceable genetic resources, progressive deterioration in the quantity and yield of forest resources and many others as highlighted below:

### **Effects of Shifting Cultivation**

The practice of shifting cultivation has had significant effects on the vegetation of the Niger Delta Area. These effects include the reduction in the areas of forest reserves as a result of conversion to food farms as earlier identified. Reduction in quality and yield of the various resources obtained from the forests such as timber, fuelwood, fruits, vegetables, rattan canes, bush-meat etc. Also, loss of valuable and irreplaceable genetic resources resulting from the repeated clearing of the forest without allowing enough resting period for regeneration. Savannalization has developed in a number of places. Gully erosion is another serious effect of forest degradation resulting from shifting agriculture. This problem is currently a cause for concern in places like Cross River, Bayelsa and Rivers States within the Niger Delta region.

### **Effects of Timber Exploitation**

According to Areola (1991), the maintenance of the quality and productive capacity of the environment depends on keeping a balance between natural resources, human population density and the system's means of production. Once the equilibrium is offset a series of adverse reactions are triggered off which is difficult if not impossible to reverse. The maintenance of this balance in a forest ecosystem calls for a careful balancing of exploitation of the forest with the yield (productive) capacity of the ecosystem. In Nigeria in general and the Niger Delta area in particular, the selective logging of the forest and uncontrolled exploitation of the resources of the forest has resulted in serious ecological and social problems. Some of the problems include: flooding, erosion, siltation of rivers and streams, shortage of wood for building, furniture making and domestic cooking. Destruction of habitats of some rare wildlife species has led to their migration and threat to their continued existence in extreme cases. There has been rapid loss of biodiversity and gene resources of valuable timber, food and medicinal plants species. Furthermore, mechanical logging involving the use of heavy equipment and construction of forest

roads have caused serious damages to seedlings and saplings of valuable species. Felling damages on surrounding trees not targeted or not mature enough for felling are also tremendous, a lot of trees are killed through careless felling habits, where the log falls on several other trees, some of which are not able to recover from the injury.

Also because most forest management plans are obsolete and not usually adhered to on the field, the exploitation of the forests is arbitrary without care for sustainability, both for the timber and other resources of the forest ecosystem. The common timber species of great economic value have almost completely disappeared from the forests.

### **Effects of oil exploration and exploitation**

The effects of oil prospecting and mining activities on the vegetation and the general environment are very drastic and far reaching. According to Areola (Op. cit.), the first and most noticeable impact of oil exploration in Niger Delta is the modification of the vegetation and physical landscape. Apart from direct clearing of vegetation for construction of buildings and roads, transporting of heavy drilling rigs; laying of pipe lines and the erection of drilling platforms and storage depots; hitherto inaccessible areas have also been opened up for other forms of human activities including farming, fishing and timber exploitation. Furthermore, pollution resulting from oil spillage and gas flaring both have serious impacts on the vegetation. Some of the more common impacts include the following:

- (i) The various islands formed by the numerous tributaries of the delta are gradually being eroded by river floods from torrential rains. The islands also suffer from creek erosion by basal sapping and lateral erosion which occur when the level of the sea water falls and the creeks erode their banks and cut back gradually.
- (ii) The continued existence of freshwater communities in the Niger Delta area is now under serious threat due to the ingress of seawater along canals constructed by the oil industries to facilitate transportation to the sea. Serious damages to vegetation have been reported in the area as a result of exposure of fresh water communities to saline seawater introduced through the canals. For instance NEST (1991) reported massive destruction of swamp vegetation in a study carried out around the Isekelewu oil field in the Niger Delta area as a result of exposure of fresh water communities to saline seawater.
- (iii) Whenever mangrove forests disappear, tidal waves hit the coast more severely, which leads to accelerated coastal erosion and subsequent development of salt flats, which leads to starvation of coastal communities.

Furthermore, Lewis (1983) reported that the Forina Oil Explosion of 1983 led to the spillage of 37 million litres of crude oil into coastal forests. Efforts to prevent mass mortality of mangrove flora and fauna were abortive as the onshore winds blew the oily carpets about 80km of the tidal zone. He added that tidal currents transported the oil far into the vast deltaic system depositing a thick sticky coat on trees and animals. The effect on the entire mangrove community included defoliation and death of both sessile and burrowing organisms. Many mangrove trees were windthrown as a result of the damage to their root systems. The resultant effect of this was an acceleration of coastal erosion by about 5m per year.

- (iv) Oil contaminated soils cannot adequately support plant growth. This is because the oil combines with certain mineral cations in the soil forming organomineral complexes known as *ligands* which cannot be utilized by plants for their growth. Hence oil pollution leads to inhibition of mangrove seedling growth. Gas flaring activities have also resulted in serious damages to the mangrove forests.

### Urban and Industrial Development

As stated earlier, thousands of hectares of forest lands have been cleared to give way to urban and industrial developments. The effects are not less drastic than the effect of other forms of forest degradation discussed above. Some of the effects include sheet and gully erosions, coastal erosion, flooding, siltation of dams and streams, shortage of merchantable timber, destruction of wildlife habitat and loss of biodiversity.

From the foregoing, it is obvious that various human activities have caused serious depletion to the forests of Niger Delta Area. In order to halt the deleterious effect of the activities and restore the forest cover in the area; the following remedial measures are suggested:

#### (1) **Agrisilvi-culture**

This system involves the incorporation of valuable tree species into the traditional farming system. Farmers should be educated and encouraged to adopt this practice. This is achievable if the system is made to stimulate the traditional bush fallow system. Seedlings of fruit species which are already known to and accepted by the local people should be mass-produced and distributed to farmers to plant on the farms at least a year or two before they vacate the land for a new area. This ensures that while the land is fallowing sufficient trees remain there to facilitate soil recuperation while at the same time the farmer is assured of reasonable income from the harvest of fruit from the fallow with which he supplements his farm income.



## (2) Review of Management Plans and Policies

Forest management plans and forest produce valuation system should be reviewed to reflect the reality of the present situation. Taxes, tariffs, stumpage prices and outturn volume prices should be made commensurate with the true value of produce removed from the forest. The management plans should be based strictly on the principle of sustained yield. On no account, should we remove the forest at a given time more than what the forest produces within such period. Forest offences such as illegal felling, encroachment and poaching should attract greater penalties than just token fines. If forest produce are valued appropriately the forest will be better placed to stand the competition from other land use demands such as agriculture and industrial development which are responsible for deforestation of large areas of forests.

## (3) Creation of Conservation Areas

Unique habitats and communities of plant and animals alike should be set aside as conservation areas. The likes of Okomu Sanctuary initiated by the Nigerian Conservation Foundation (NCF) and Edo State Government in Okomu Forest Reserve; the Rainforest Elephant project at J4, Omo Forest Reserve and the Stubbs Creek Wildlife Sanctuary in Akwa Ibom State jointly initiated by Mobil and NCF should be encouraged. This ensures that the genetic resources of many valuable species are not lost completely to development drive.

## (4) Tree planting Campaign Programme

It is pertinent at this stage to intensify the annual tree-planting campaign. The programme should metamorphose from an annual political ritual to a more pragmatic one with three tiers of government being actively involved. Tree species such as *Hallia ciliata*; *Brachystegia eurycoma*; *A. indica*; *Avicinnia africana* and *Rhizophora spp* are known to survive well on coastal lands. Such species should therefore be employed in the rehabilitation of degraded areas. Both the government and individuals should be involved in the programme. Post establishment maintenance should be adequate to ensure that the trees planted survive to serve their purpose.

## (5) Economic Empowerment

Poverty is a serious constraint to conservation programmes. The rural populace depends so much on goods and services derived from the forest. They have associated culturally and economically with the forest for a very long time. It will be difficult to sever this association without providing alternative means of survival for the people. They should therefore be given incentives and encouragement to participate in income generating activities outside the forest in order to improve on their living

standard. It is hoped that if the people have alternative means of sustenance, urge to encroach on the forest will be reduced.

#### (6) Reforestation Tax

This measure involves the introduction of meaningful tax on users and destroyers of forests. Timber contractors may be required to pay certain sums of money into government coffer for the purpose of replacing whatever has been removed from the forest. Oil prospecting companies should be made to enter into contractual agreement to rehabilitate/reforest specific areas of forest before they are licensed to prospect. Those already licensed should not be allowed to renew their licenses until they have signed such agreement.

#### (7) Community Participation

In Nigeria, management of the forest has been left in the hands of government for too long and the resultant effect is massive degradation and deforestation which lead to shortage of woods for building, furniture and other uses. It is high time the local communities were involved in the production of forest goods and services to withstand the ever-increasing demand for these products. In order to induce community participation in forest management, the following steps may be taken:

- Government should encourage direct participation of individuals and non-governmental organizations by assisting them to establish private and community woodlots, farm forestry, community and school nurseries. Women and youth associations should be trained in seedling production. The species to be planted should include those that are most commonly used by the people and which are becoming scarce or threatened.
- Timber contractors should be compelled to replace any tree felled. The seedlings for this exercise should as a matter of compulsion be purchased from the community and private nurseries close to the project site.
- Community involvement should be right from the planning stage to management and utilization of the resources. They should collectively identify what the problem(s) is/are; possible solutions and the dangers inherent in failure to address the problems. Hence, location of project site, management objectives and choice of species to be planted should be decided together with the people.
- Direct benefits, in terms of output and income, from the forest should accrue to the local community e.g. a community development account may be opened into which the community's share of forest monetary benefits may be paid. The account will be managed by chosen representatives of the

community who will also liaise with the forestry department to manage the forest. Funds from such account should be used for developmental projects such as building of schools, health centres, public toilets and palaces. This measure will go a long way to secure the forest, as the communities will perceive themselves as joint stakeholders with the government. This will also reduce the cost of forest protection.

- Suitably qualified members of the community should be employed to work with the forestry department both at the management level and as technical and unskilled labour. This will further enhance the security of the resources, as most youths who are unemployed and who can be easily tempted and used to commit forest offences will be gainfully employed within the forest.

### Conclusion

The rapid socio-economic development drive and population pressures have taken very serious toll on the forest resources of the Niger Delta. This has led to problems of erosion, flooding, killing of mangrove flora and fauna species, and siltation of rivers and streams in the area. Steps must be taken to remedy the situation as quickly as possible to guard against possible ecological disaster in the nearest future.

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