PRELIMINARY RESEARCH ON THE EXTERNALITIES OF FOREST LANDS IN SOUTHERN NIGERIA

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Abstract

The externalities of forest lands in Southern Nigeria are discussed, relating it to forests around the world. Highlights are made of the different benefits obtained from forests. Included in the discussion are the effects of forests on carbon sequestration, stabilization of weather and climate, noise abatement, benefit to hydrology, wildlife habitation, and oxygen production, socio-economic and psychological benefits amongst others.

KEY WORDS: Externalities, Carbon sequestration, noise abatements, wildlife, oxygen production

Introduction

Forest is defined as a plant community, predominantly of trees or other woody vegetation, occupying an extensive area of land. In its natural state, a forest remains in a relatively fixed, self-regulated condition over a long period of time (Adams, 2008). The forest sustainability and productivity is affected by some factor which include climate, soil type or composition, plant and animal interactions which help or harm each other, topography and lay out of the slope of forest land as well as other external disturbances as a result of man actions. These externalities exist and affect the performance and even threaten the survival of some forest species. The basic knowledge of these external factors will result in effective forest management practices through the understanding of the needs of species, the regeneration of forests after flood, tornadoes, fire, disease outbreak or timber harvesting

The Study Area

Vegetation in southern Nigeria varies with climate, soil, elevation, and human activities on the environment. It starts from the mangrove swamps from the Niger-Delta region to the rain forests, then to the guinea savanna. The mangrove swamps exist along salty waters and creeks while swamp forests are present where the water is fresh. It is characterized by high humidity and rainfall. The rain forest is present farther inland, consisting of many species of tropical hardwoods which includes Mahogany, Iroko, Obeche, etc. Immediately north of the forest is the first wave of savanna: the Guinea savanna, a region of tall grasses and trees. The southern margins of the Guinea savanna which has been so altered by humans that it is also called the derived savanna. This was created by repeated burning of

forest until only open forest and grassland were left. The burnings destroyed important fire-sensitive plant species and contributed to erosion by removing ground cover. Tropical forest is giving way to the Guinea savanna at such a rate that the only forests expected to survive the next generation are in reserves. Beyond the Guinea savanna lies the drier Sudan savanna, a region of shorter grasses and more scattered, drought-resistant trees such as the baobab, tamarind, and acacia. In Nigeria's very dry northeastern corner, the semi-desert Sahel savanna persists. Throughout these drier savannas, drought and overgrazing have led to desertification—the degradation of vegetation and soil resources. In the forest regions, only about 12 percent of the country's total land area (Robert Stock, 2005).

Forest management practices in Southern Nigeria.

There is an organized system of management in Nigeria's forest practices. These include the nature preserves, game reserves and national parks most of which are carried out at the state level. Although the country participates in the African Convention on the Conservation of Nature and Natural Resources, law enforcement and protected system infrastructure are lacking and there is a constant abuse of these reserves. Desertification is a major problem in Nigeria, made worse by massive water impoundment and irrigation schemes. Uncontrolled grazing and livestock migration put tremendous pressure on the environment in some areas. Other environmental threats include poaching and settlement within protected areas, bushfires, increasing demand for fuel wood and timber, road expansion, and oil extraction activities.

Externalities of Forestlands

Carbon sequestration

One of the most important functions of the forests is carbon sequestration, which is a strategy of reducing the emission of green house gases that are responsible for global warming by storing the gas or its carbon component somewhere else. It is a way of keeping carbon dioxide emissions from reaching the atmosphere by preserving and planting more trees. Trees, especially young and fast-growing ones, soak up a great deal of carbon dioxide from the atmosphere and store carbon atoms in new wood. However, when these trees are felled, carbon atoms are sent back to the atmosphere in form of carbon dioxide. Human activities in which primarily includes the extraction and combustion of fossil fuels contributes a major part in the release of carbon to the atmosphere. It has been found that fossil fuel consumption and land use changes contribute about 6.6 billion metric tons of carbon per year with the ecosystem as well as the ocean absorbing only 3.2 billion metric tons and leaving about 3.4 billion metric tons to be absorbed into the atmosphere. It is also predicted that at the rate human activities release carbon to the atmosphere, there is bound to be a net gain of about 25% increase in the earth's carbon content (Starvins and Richards, 2005). The fact that the rates at which human activities contribute to the atmospheric carbon content is on the increase also makes the forests

more relevant for sequestration. Therefore, slowing the rate of deforestation and planting new trees will help counteract the buildup of greenhouse gases.

Stabilization of Weather and Climate

The effect of the emission of green house gases and aerosols (microscopic airborne particles) due to human activities has a far more reaching impact than just global warming as they alter the atmosphere in ways that are expected to affect the climate. For example, the severe drought experienced from the late 1960s to the early 1980s between the Sahara and the wetter tropical areas towards the south was interpreted as a phenomenon in which reduced rainfall and inappropriate human use of the delicate environment caused the desert to expand relentlessly (Newman, 2008). The effects of the forest in stabilizing weather and climate can be explained by its efforts at capturing and reducing the carbon content of the atmosphere explained earlier.

Temperature control and energy use

Countryside and forest lands are found to be about 3^0F to 10^0F cooler than habited areas (Coder, 1996). This is due to the absence of increased high density surfaces and heat generated from associated human activities. For example, three well-placed mature trees around a house can cut air-conditioning costs by 10-50 percent. Trees reduce temperature by shading surfaces, dissipating heat through evaporation and controlling air movement responsible for adverted heat.

Oxygen production

Through the process of photosynthesis, forests produce life-giving oxygen. Over time, bacteria evolved to capture energy from the Sun's light and thereby carry out the process of photosynthesis, converting sunlight into nutrients. Next they developed the sort of photosynthesis that plants today carry out by splitting water molecules to produce oxygen. All these are activities that occur in the forests.

Pollution reduction

Trees help control pollution by acting as biological and physical nets. Community forests cleanse the air by intercepting and slowing particulate materials causing them to fallout, and by absorbing pollutant gases on surfaces and through uptake onto inner leaf surfaces. Pollutants partially controlled by trees include nitrogen oxides, sulfur dioxides, carbon monoxide, carbon dioxide (required for normal tree function), ozone, and small particulates less than 10 microns in size. The removal of particulates amounts to 9% across deciduous trees and 13% across evergreen trees. In an urban park of about 212 hectares, tree cover was found to remove daily 48 lbs particulates, 9 lbs nitrogen dioxide, 6 lbs sulfur dioxide, and 1/2 lbs carbon monoxide. It is also estimated that there is about 60% reduction in street level particulates with trees (Coder, 1996).

Benefits to hydrology

Clean water is a critical and finite resource. Forests are efficient filters cleaning sediments and other pollutants from water. Forest buffers, or strips of forests on either side of streams, rivers, ponds, lakes, and bays, are essential in maintaining clean water. Forests serve as spongy reservoirs, absorbing rain and snow melt, protecting the soil and checking erosion. By these means, forests stabilize stream flow, help lessen flooding and enable recharge of underground aquifers. Forests adjacent to reservoirs, lakes and rivers provide the best permanent protection. Community tree and forest cover intercepts, slows, evaporates, and stores water through normal tree functions, soil surface protection, and soil area of biologically active surfaces. Forests also increase water volume, velocity and pollution load of run-off, increase water quality losses, erosion, and flooding.

Noise abatement

It is estimated that about 7decibels of noise is reduced per 100 feet of forest. This is due to trees which act by reflecting and absorbing sound energy (solid walls decrease sound by 15 decibels). Trees provide “white noise," the noise of the leaves and branches in the wind and associated natural sounds that masks other man-caused sounds (Coder, 1996).

Wildlife habitation

Foresters employ a variety of management techniques to benefit wildlife, including numerous endangered species. For example, thinning and harvesting create conditions that stimulate the growth of food sources for wildlife. Openings created by harvesting provide habitat for deer and a variety of songbirds. Thinning can be used to accelerate growth and development of older trees that are favored by owls and other species. In order to enhance salmon habitat, foresters also carry out strategic tree plantings and monitor forest health along streams in order to keep the water cool and reduce sediments.

Socio-economic and psychological benefits

Recreation, tourism, education, and conservation of sites with cultural or spiritual importance are examples of some of the social functions played by forests. The area of forests that is set aside for such functions indicate to what extent this role of forests is taken into account by countries and forest managers. About a third of countries and territories reported having forest areas designated for social services, and East Asia, Europe, and South America have good availability of information, while data are largely missing from other regions. Moreover, 80%, of the 1.41 million km^2 of forests designated for social services worldwide are located in Brazil since this country reported all its ‘indigenous lands’ and ‘sustainable development reserves’ in this category. Globally, an estimated 3.7% of forest area (1.7% if Brazil is not taken into account) is primarily devoted to social functions. This percentage increases to 30.9% when considering the total area that has social services among its

functions. After South America, Europe has the highest percentage of forests designated for social services (A clearer definition of social services provided by forests is needed for future assessments to help reduce the inconsistencies between country reports. The only clear conclusion is that Europe seems to give the most attention to the social services provided by forests as evidenced by active designation of areas for this purpose.

Conclusion

The externalities of forest lands have been discussed, many of which have direct bearing on the environment. Special attention was also placed on the effect of forests in regulating weather and climate as well as in curbing global warming. Other benefits obtained from the forests highlighted also gives credence to the functions of the forest and the need to conserve and preserve the existing forests in the region. It is also important to encourage the cultivation of more forests and participation of the private sectors in afforestation.

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