CONSERVING BIOLOGICAL DIVERSITY FOR SUSTAINABLE USES IN TROPICAL RAINFOREST OF NIGERIA

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ABSTRACT

The most serious loss of biological diversity occur in the tropics due to explosive growth of human populations, widespread poverty, growing demand for fuel wood and failure to use sustainable methods in agriculture and forestry. A considerable part of tropical rainforests of Nigeria are also being destroyed through indiscriminate and reckless logging of timber, extraction of non-timber forest products and exploitation and exploration of crude oil in the region. This study was primarily designed to assess the conserving biological diversity for sustainable uses in tropical rainforest of Nigeria. It carefully reviewed the contributions of other related works. It was revealed that the weakness of conservation and sustainable management effort is due to poor governance and lack of knowledge and scarcity of research programs on species conservation. Hence, the Earth's basic life-support systems, including climate, the water cycle, and soils, must be conserved intact if life is to continue and the genetic diversity, a major key to the future, must be maintained.

Keywords: *Biological Diversity, Causes of Extinction, Sustainable Uses*

INTRODUCTION

The preservation of biological diversity is an issue of unprecedented urgency. Science is discovering that the genetic variety contained in wild species can relieve human suffering and improve the quality of life, yet, the activities of exploding human populations are degrading the environment at alarming rate, and diversity is being irreversibly diminished through extinction as natural habitats are destroyed. Conservation of biological diversity is vital to human survival and well- being, in part because wild species of plants, animals, and other organisms provide people with important products, including food, medicine, and industrial raw materials. The invaluable services they provide include pest control, flood control and the natural recycling of waste. Yet hundreds of thousands of the Earth's species have become extinct in the last 50 years because of destroying their natural habitats and excessively depleting their populations. Tropical forests and coastal regions which contain the greatest variety of known and undiscovered species are the most affected. Tropical

regions contain more than two-thirds of the world's species. Live in the forested areas, are facing a serious threat due to human activities in the area. The activities in the tropical regions pose a major threat to all forms of life, including plants, insects, fish, birds, reptiles, amphibians, and mammals. Once species become extinct, they are not renewable. The loss of large numbers of plant and animal species could greatly limit the options of future generations (Edward, 1998). In addition, many species will be reduced to populations teetering on the edge of extinction. When a species become rare, it losses genetic diversity and becomes vulnerable to environmental hazards.

Table 1: Known and Estimated Diversity of life on Earth in Coastal Regions

Form of life	Known species	Estimated total species
Insects and other arthropods	874,161	30 million insect species, extrapolated from surveys in forest canopy in rainforest region of Nigeria.
Higher Plants	248,400	Estimates of total plant species range from 10-15 percent of all plants are believed undiscovered.
Invertebrates	116,873	True invertebrate species may number in millions, nematodes, eelworms, and roundworms each may comprise more than 1 million species.
Lower plants	73,900	Not available
microorganisms	36,600	Not available
Fish	19,056	Estimates that 10 percent of fish remain undiscovered
Birds	9.040	Known species probably account for 98 percent of all birds.
Reptiles and Amphibians	8,962	Known species of reptiles, amphibian and mammals probably comprise over 95 percent of total diversity.
Mammals	4,000	

Source: Edward (1998)

Extinction: In 1984, based on then-current estimates of 5 million to 10 million species overall, Norman Myers estimated that the world might be losing one species a day, or about 400 plants and animals each year, and that the annual rate of species loss might reach some 10,000 species by 1990 and approach 50,000 by the year 2000. Based on recent estimates some scientists forecast that the losses could reach one million by the year 2010 (Simberloff 1995). Peter (1995) estimates 10 percent loss of the world's species by the end of the ninth century, and more than 25 percent within the next couple of decades. Sampson (2000) recent projection of plant extinction in the tropic forests, based on current rates of population growth and forest clearing, indicates that as these forests shrink to half their original size by the year 2000, 15 percent of the forest plant species, or about 13,600 kinds of plants could be lost from it original total population of over 92,000 species.

Causes of Species loss: The most serious loss of biological diversity is occurring in the tropics, due to explosive growth of human populations, widespread poverty, growing demand for fuelwood, and failure to use sustainable methods in agriculture and forestry. Historically, competition between species, overexploitation of species , and habitat destruction have all been important causes of species loss, but habitat destruction is now the primary direct cause of extinction (Raven, 2001). Human population is expected to increase by 40 percent in the next 20 years, primarily in the

tropics, as the number of people increases, more areas of forest, savanna, and desert will be converted to cropland. The need for the fuelwood will cause additional forest to be cleared. At least 40 percent of the earth's tropical forests have already been destroyed, and growing demand for fuelwoods, beef, lumber, paper pulp and even human shelter will put additional pressures on the tropical forests. Wetlands are among the Earth's most important and biological diverse ecosystems. Between 25 and 50 percent of the world's swamps and marshes have been lost (Campbell, 1988). The habitats within shallow coastal areas and coral reefs are also threatened. These estuaries and marine areas, which serve as nurseries for commercially important fin and shellfish, are being damaged by siltation, dredging and pollution by chemicals.

Studies have shown that as habitats become smaller, the number of species they support decreases (WRI, 1986). Preliminary, from the World Wildlife Fund's Minimum Critical size of Ecosystems Project in the United States, when forest areas are isolated, the number of bird and mammal species living inside invariably declines, particularly in the smaller areas. However, other studies such as Sheldon (1998), Oyelowo (2007) show that species richness increases with the degree of habitat subdivision; these suggest that to maintain biological diversity, it is better to set aside several smaller parks than large one.

Competition from introduced species is another cause of extinction. When humans bring exotic (non native) animals or plants into an environment, the native species may not have evolved appropriate defenses, and the introduced species edge out the native ones. This is a particular problem on islands, where many native species have evolved in the complete isolation from certain predators. In the coastal areas of the Niger Delta of Nigeria, for example, 40 percent of the mangrove forest is considered extinct or endangered due to habitat loss combined with the introduction of nympa palm. Another cause of extinction is excessive harvesting; rhinos are killed for their horns, and elephants for their tusks; blue whales are sought for their oil; sea turtles are hunted for their eggs, leather, shells and meat; and cacti are collected for their decorative shapes. In some cases, one species is depleted during the harvesting of another. For instance, porpoises, sea turtles and sea birds are often snared in commercial fishing nets (Kent, 2005).

In Africa, the elephant population estimated at around 10 million in the 1930s was reduced to about 1.3 million by 1979, and is now believed to number less than 750,000, Some 80,000 elephants are killed each year. The number of African rhinos declined from 15,000 in 1980 to less than half that number in 1985; the world's population of blue whales , originally about 200,000, has depleted to about 15, 000 and the humpback whale population has dropped from 50,000 to 8,000 (George, Robinson and James, 1986).

THE IMPORTANCE OF BIOLOGICAL DIVERSITY

The diversity of biological species is the Earth's most important natural resources. Humans depend on the wide variety of species in healthy ecosystems for

air to breathe, water to drink, and productive soil for farming. Green leaves absorb carbon dioxide and release oxygen during photosynthesis. The root systems of plants - along with other species such as worms, insects, fungi, and soil bacteria- regulate stream flows and groundwater levels, cleanse pollutants from surface waters, and help recycle soil nutrients. Insects are the important pollinators; 90 percent of the crops are pollinated exclusively by insects (Norman, 1983). Bat, which represent almost a fourth of all mammal species are among the most important pollinators and seed dispersers in tropical regions, also Bats and parasitic insects prey on insect pests. Although we lack the scientific knowledge to determine which and how many species can be eliminated before a given system deteriorates significantly, we do know that if the current rate of extinction continues, we will lose these free services and our lives will be altered.

Agriculture: Although laboratory synthesis has freed us from total dependence on wild plants and animals for organic chemicals, these species still provide us with important products, including food, medicine, and industrial raw materials, as well as luxury goods. Just 29 plants species provide more than 80 percent of the world's food; four of them- corn, wheat, rice and cassava constitute 85 percent of the food supply. Plant breeders strive constantly to improve these crops genetically in order to make them resistant to a continually evolving array of pests. The most important source of such genetic material is the wild or locally cultivated relatives of these crop species, which are found where they were originally domesticated. Most of the remaining populations of wild and local varieties exist in the tropical forest (Frankel, 1970). Even with modern genetic technology, genes to improve crop plants must come from existing wild varieties. As with agricultural crops, livestock production tends to rely on only a few of the available species. By preserving the diversity of the wild species suitable for game ranching, more efficient use can be made of land, water and other resources without decreasing nutritional returns. For example, certain African wild animals require little water and are much more disease- resistant than introduced cattle (WWF, 2000).

Medicine: Today, over 40 percent of the prescription drugs sold in the world contain chemicals originally derived from wild species, about 25 percent of these drugs come from plants, 12 percent are derived from fungi and bacteria and 6 percent come from animals (Old-Adams, 1981). Among the currently used drugs derived from wild species are digitoxin and digoxin originally extracted from the foxglove or digitalis plants, used to treat heart disease, and vincristine and vinblastine from the rosy periwinkle, used to treat Hodgkin's disease, leukemia and other cancers. Penecilium from fungi produced penicillin which is used as anti bacterial treatment. Marine organisms are considered by scientists to be a still untapped source of new chemicals for the study and treatment of diseases (Godson, 1998).

Industry: Many essential industrial products or raw materials are derived from wild plants, and a number from wild animals. Still others come from semidomesticated

plants that are highly dependents on their wild relatives for genetic improvement to enhance their economic productivity or usefulness. Timber and other wood products, including lumber, paper and wood- based chemicals such as rayon, are the most economically important industrial products derived from living resources. Rubber, another major industrial product, is derived from rubber trees. While a synthetic substitute has been increasingly used since its invention during World War II, natural rubber constitutes about one third of current world use because of its superior qualities. Over 70 percent is used for the production of tires for airplanes, trucks, buses, and off-road farm and construction equipment, as well as radial tires for cars. The meadowfoam plant contains a unique oil that can lubricate high- speed and high-temperature machinery that generate extreme pressure , the oil can also be used for precision instruments in medicine and space technology (NRMMC, 2004).

Psychological and Philosophical Value of Biological Diversity

In addition to the many practical reasons for ensuring the survival of a diversity of species, psychological and philosophical reasons can be cited. Many people seem to have a psychological need to observe, admire, photograph, collect, or be surrounded by diverse living things. Many feel that it is morally wrong to allow or force a species to become extinct. They hold that, to do so is not only unjustly depriving future generations of their right to enjoy the possible benefits of that species' existence; it also violates that species' right to exist. The ethical and legal debates over the rights of nonhuman life are complex, but a reverence for all life if fundamental to many religions and moral systems. Even in today's predominately secular society, the uniqueness and inherent value of life are deeply felt by many people (Oyelowo, 2007).

The Need to Conserve Biological Diversity

Given the importance of the Earth's plant and animal species to human welfare and economic productivity, and the seriousness of the threat to their survival a major worldwide effort to conserve biological diversity is needed. As noted earlier, the greatest variety of species exists in tropical developing nations. Although these countries are rich in genetic resources, they have low per capita incomes and need technical and financial assistance from wealthy nations to protect and manage these biological resources. There are several approaches to conserving species and biological diversity:

i Protecting species of recognized value or those known to be in danger of extinction, through provisions such as the U.S. Endangered Species Act, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and the International Whaling Convention.

ii The so- called Noah's Ark strategy, in which part of an organism, such as its seed or semen , is stored off-site in a gene bank; or in which whole organisms are kept off-site in a zoo, aquarium, botanical garden, or plantation.

iii The establishment of biological reserves that preserve genetic diversity on-site by protecting entire ecosystems. This approach conserves not only those

species that elicit public concern, but also the less conspicuous plants, animals and microorganisms on which those popular species depend. Protected areas can provide benefits such as control of soil erosion and maintenance of air and water quality. At the same time, they serve as scientific repositories for study and as natural sources of the germ plasm that contains each species' heredity.

The Need for Scientific Research, Laws and Treaties to Conserve Biological Diversity

Tropical conservation is hampered by lack of knowledge and the scarcity of ongoing research programs. There are probably no more than 1,500 professional scientists in the world competent to classify the millions of species found in humid tropical forests, and their number may be dropping because of declining research funding and professional opportunities. The number of publications in tropical ecology dropped by over 50 percent from 1990 to 2000 (Sutherst, Whittaker and Roberts, 1998). According to Peter,(19787) the Missouri Botanic Garden , in the early 1980s fewer than 25 scientists worldwide were competent to supervise large -scale studies of tropical ecosystems.

There are several ways to create a legal basis for wildlife conservation. One is to establish laws to protect individual species and group of species. The Endangered Species Act, for example, mandates the listing of endangered species and provides their protection and revival. The second approach is to develop a regional treaty, such as the Convention on Conservation of European Wildlife and Natural Habitats. A third way is to establish a global treaty, such as the Convention on Wetlands of International Importance. Of these three, the first is the easiest to establish, while the third may have the greatest impact. International treaties and convention were first used to protect wildlife less than a century ago. The first treaties were largely concerned with economically important species. Since then, there have been a number of treaties and convention, the most important of which the Convention on International Trade in Endangered Species- now adopted by nearly 100 nations. In spite of this progress, existing treaties are quite limited, and wildlife continues to disappear faster than ever. A global treaty or species convention to protect biological diversity is needed. Under such treaty, each nation could accept responsibility for species within its borders. In return, a nation could apply for support from community of nations to assist in protecting plant and animal species.

CONCLUDING REMARK

Designating parks and reserves free from human interference has long been considered the best way to conserve plants and animals. But creating parks and reserves is no longer sufficient to prevent a global extinction crisis. A strategy of preservation accompanied by rehabilitation of degraded land and restoration of ecosystems is needed to avoid a mass extinction of plants and animals (SCBD, 2002). One promising

approach to curbing the lose of habitats and species is restoration ecology, based on the study of natural ecosystem recovery, which can promote the recovery of damaged environment and reestablish native communities of plants and animals. The restoration projects will include programs to restore degraded pastureland in the savanna region, to regenerate dry tropical forest in rain forest and to restore mangrove forest in the coastal regions.

However, to sustain biological diversity in the tropical ecosystem. The following strategy should be adopted.

a. Plant and animal populations must be helped to retain their capacity for self-renewal
b. The Earth's basic life-support systems, including climate, the water cycle, and soils, must be conserved intact if life is to continue.
c. Genetic diversity, a major key to our future, must be maintained.

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