

Review

Understanding and appreciating the need for biodiversity conservation in Nigeria

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Biodiversity is becoming one of the major environmental issues of our times. The basic problem is the increased rate of extinction as a result of expanding human population, resource exploitation, land clearing and land use development. Biodiversity by definition refers to the life forms on earth and include the millions of plants, animals and micro-organisms, the genes they contain and the intricate ecosystems they help built into the living environment. Some 1.4 million species have been described but biologists now believe the total number is between 10 and 80 million. The question that may readily come to mind is why the interest in biodiversity and its conservation? Of course, biodiversity conservation is important because it forms the major part of our life-support systems. For instance biodiversity constitute the source of all our food, much of our raw materials, a wide range of goods and services and genetic materials for agriculture, medicine, industry and commerce worth millions of dollars per year. For Nigeria and other African countries, biodiversity is of critical importance to our survival as our livelihood is dependent on having free and open access to a great variety of biological resources for food, fuel, medicine, housing materials, farm implement and economic security. Unfortunately, these biological wealth are today seriously threatened. The greatest threat is habitat destruction and one of such habitats is the tropical rainforest. Estimated to contain between 50 and 90% of the earths species, tropical forest is the major storehouse of biodiversity. This review paper therefore tried to bring to the front the issue of biodiversity, its importance and how it is threatened as a way of creating the necessary awareness needed for its conservation.

Key words: Understanding, biodiversity, conservation, appreciation, Nigeria.

INTRODUCTION

Biological diversity (often shortened to biodiversity) refers to the life forms on earth and include the millions of plants, animals and micro-organisms, the genes, they contain as well as the intricate ecosystem they help built into the living environments. We as yet do not know the exact number of this wealth of life on earth. Though some 1.4 million species have been described, but biologists now believe the total number could be between 10 to 80

million. The question that may readily come to mind is "why should disappearing insects, plants or birds be of concern to us. Of course, so many reasons can be adduced for the interest in biodiversity and their conservation. In the first place, biodiversity should be conserved as a matter of principle because all species deserve respect regardless of their use to humanity and because they are all components of our life support systems. Plants and animals that have evolved over hundreds of millions of years have made the planet fit for the form of life known to us today. They are responsible for the maintenance of the chemical balance of the earth as well

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as climate stabilization. They renew soils and protect watersheds. More importantly, all societies both rural and urban, industrial and non-industrial draw on a wide range of ecosystems, species and genes to meet their ever-changing needs. We are reliant on biodiversity for our sustenance, health, well being and enjoyment of life. This is because, it is the supplier of all our food, much of our raw materials, a wide range of goods and services and genetic materials for agriculture, medicine, industry and commerce worth many dollars per year. This paper explains why and how this biological wealth can be conserved.

THE ROLES OF BIODIVERSITY

Agricultural importance

Biodiversity is important to agriculture. All modern crop varieties were originally produced using land races developed by farmers around the world from wild plants over hundred and thousands of years. Wild relatives of these crops still represent important reservoirs of genes that are essential for improving the crops or developing new strains to keep them from being overwhelmed by stresses such as changing climate or the evolution of new pests, parasites and diseases. Primitive populations of crops and their wild relatives are an important source and often the only source of pest and disease resistance worth many millions of dollars of adaptations to difficult environments and of other agronomically valuable characteristics such as the dwarf habit in rice and wheat, which has revolutionized their cultivation and led to increased yields in many parts of the world.

According to OTA (1987) and Day (1977), the abundant harvests provided by modern agriculture are largely the result of careful breeding of different varieties of a crop. Though, irrigation, fertilizers and pesticides are also important but in general, 40 - 60% of improved yields is attributable to breeding. Genetic diversity has always been a key raw material in agricultural research accounting for roughly one half of the gains in US agricultural yields from 1930 to 1980 (OTA, 1987). A single sample of uncultivated rice (*Oryza nivara*) from Central India is the only known source of resistance to grassy stunt virus and has been used in the breeding of "IR36" which is now the world's most widely grown rice variety (WWF and IUCN, undated). Four crops wheat, rice, maize and barley together make up almost 90% (1,575 million tons per year) of the world's annual production of grains and all have been improved with wild genetic resources (Prescott-Allen and Prescott-Allen, 1988).

According to FAO, 9.5 million Km² of land around the world is too saline for normal agriculture. Fortunately, several of our existing crops such as millet, rice, wheat

etc have wild relatives which can grow well in salty conditions. These can be bred with domestic strains to provide new crops for currently unproductive lands (Mudie, 1974). Specially developed salt tolerant varieties of wheat, rice and alfalfa are already producing yields of similar nutritional values to those of traditional varieties (WWF and IUCN, undated). It is obvious from the foregoing analysis that the vision of agriculture can be fulfilled by biodiversity but this can only occur however, if the disastrous reduction of the habitats containing the reservoirs of diversity is checked in time.

The contributions of biodiversity to health

From time immemorial, people have made use of extracts from plants and animals in the wild. In Southeast Asia, approximately 6500 and in India, 2500 plant species are used by traditional healers (Myers, 1984). In China, over 5000 medicinal plants have been catalogued; of which some 1700 are in common use (Thorhang, 1970). Here in Nigeria, thousands of plant species are in common use by different ethnic groups in the country as herbal remedies for various ailments. Indeed, according to the Food and Agricultural Organization (FAO) of the United Nations, plant based medicine is said to provide primary health care to some 75 - 90% of the world population, mostly in developing countries where world commercial alternatives are unaffordable or unavailable (FAO, 1991). More importantly, research into traditional medicine has led to the development of many modern medicines. Antibiotics aspirin, atropine, quinine, digitoxins, and other heart drugs, hormones, morphine, quinine, tranquilizers and ulcer treatments for example are among the drugs that are plant or animal derived (Litvinoff, 1990). In all, over 74% of plant drugs are used for the same or similar treatment in both traditional and modern medicine (FAO, 1991). In the US alone, more than 40% of the prescriptions each year are said to contain a drug of natural origin either from higher plants (25%) or microbes (13%) or from animals (3%) as sole active ingredients or as one of the main ones (IUCN, 1980). In spite of these enormous contributions of biodiversity to medicine, only a minute proportion of the world's plants and animals have been investigated for their value as medicines. In fact, only about 5000 species of higher plants worldwide have been thoroughly studied for their potential as sources of new drugs and the majority of them are found in the temperate zone while the much larger plant reserves of tropical forest is left untouched (WWF, undated). Thus the biochemistry of the vast majority of other plants represents a reservoir of new and potentially more effective substances. Unfortunately however, these reservoir are being decimated at an alarming rate with their forest habitats. Their conservation is therefore very essential.

The contributions of biodiversity to commerce and industry

The contributions of biodiversity to commerce and modern industrial processes are immense. Timber has remained the biggest wild contributor to industry with a world trade of US \$ 40 billion per year, well ahead of second ranked fishery products worth US \$ 12 billion per year (WWF undated). The rattan industry in Southeast Asia contributed to a world trade worth US\$2000 million. The gum timber trade earned the developing countries US\$134000 million in foreign exchange. More importantly, timber and non-wood products from the forest supports hundreds of thousands of large and small scale industries throughout the world and give employment to millions of people (FAO, 1991b).

Conserving wild plants for their medicinal value not only saves lives. It makes good economic sense. More than 40 species of lower plants have in addition to providing man with important medicines have also generated income for local villages and world commercial sales of around \$40 billion a year. Also, asles of Leukemia treating vincristine and vinblastine originally formulated from the wild rosy periwinkle of Madagascar (*Catharanthus roseus*) are worth around \$100 million a year (WWF and IUCN, undated). As cellulose and lignin wood is now being converted into sugars, pentosans, alcohols, fodder, yeasts, various biochemical substitutes and other industrial chemicals (Nwoboshi, 2000). And generally modified organisms are proving valuable in such applications as mining, waste treatment, carbon dioxide scrubbing, chemical detoxification and bio-remediation (Reid et al., 1993). Thus the current contribution of biodiversity to modern industrial processes is immense. Other properties in nature waiting to be discovered may be even greater. However, the full potentials of biodiversity can only be realized if the raw materials are protected.

The service functions of biodiversity

Apart from these material benefits, biodiversity provide us with a wide range of essential services, which are delivered free and in most cases on so large a scale that we as humans can hardly substitute for them. Indeed, the most powerful anthropocentric argument for the preservation of earth's millions of other life-forms is their intimate involvement in the delivery of these services. These organisms help pollinate our crops, keep in check potentially harmful organisms, build and maintain soil(s) and decompose dead organic matter so that they can be used to build new life. Such natures "service providers" as the birds and bees, insects, worms and micro-organisms indicate how things that look very small and seemingly insignificant can have an unimaginable value.

For example, the value of pollinators to agriculture and the functioning of natural ecosystems are inestimable. In their absence, plants cannot produce the seeds that ensure their survival and ours. It has been estimated that more than 90% of the world's 25,000 flowering plant species are animal pollinated. Induced in this category are between 120,000 and 200,000 animal species among which are bees, beetles and butterflies, moths, ants and flies along with more than 1000 vertebrate species such as birds, bats, earthworms etc. eighty percent of the world's 1,330 cultivated crop species are said to be pollinated by wild and semi-wild pollinators (Abramavitz, 1999). Honeybee pollination services are said to be 60 - 100 times more valuable than the honey they produce. Thus, the preservation of biodiversity is necessary both to secure supplies of food and fibre, as a buffer against harmful diseases and environmental change, as the raw materials for much scientific and industrial innovations and as providers of free but very essential services to human kind.

Biodiversity and the survival of Nigerians

For Nigerians and indeed other Africans, biodiversity is of critical importance to our survival. This is because our livelihood is dependent on having free and open access to a great variety of biological resources for food, fibre, fuel, medicines, housing materials and economic security. Subsistence and commercial agriculture, livestock production, logging and fishing which accounts for the bulk of employment, economic outputs and even export earnings in many parts of the country relies on the continued productivity of the local ecosystems. What is more, majority of Nigerians particularly in rural areas depend on herbal remedies for their primary health care while wood in the form of fuel wood and charcoal represent by far the largest energy source in both rural and urban areas of the country. Housing and crafts and farming implements as well depend on local plant materials. To Nigerians therefore, biodiversity represents an indispensable resource endowment. The food we eat, the fuel with which food is cooked and the export products that generate foreign exchange, they are all dependent on the continued health and productivity of our ecological system, conservation of which is very essential.

Threats to biodiversities

Biodiversity is under serious threat today. It is being destroyed at an alarming rate. The principal cause of this threat is the degradation and destruction of habitats by human actions. One such important habitat is the tropical forests. While covering only 6% of the earth's land

surface (Wilson, 2000) tropical forests are estimated to contain between 50 and 90% of the earth's species (FAO, 1991b). Hence tropical forests are the major storehouse of biodiversity. However, with the current loss of tropical forest, estimated at the rate of about 17 million hectares annually, deforestation has been seen to constitute the single greatest cause of species extinction in the coming decade. If the present trends in the loss of tropical plant habitats continue, as many as 60,000 plants nearly 1 in 4 of the planet's total could be extinct by the middle of the century (WWF and IUCN, undated). After habitat loss, pollution is also seen as the next biggest threat to wild species, especially that which threatens the stability of our climate and biogeochemical cycles. In Nigeria threat to biodiversity can be imagined from the list of 484 plant species in 12 families, which are now threatened with extinction (Gbile et al., 1981). The implication of these losses is that many plants including many potentially valuable species may become extinct before they have even been discovered let alone analyzed for their possible benefits to man.

What need be done

Having highlighted the important roles biodiversity plays in shaping the human life as well as the threats posed to this biological richness, the next question that should agitate our mind is "what need be done to stop the unraveling of the nature's diversity". Since a threat to diversity is a threat to all of us, we must all be involved in its conservation. But for us to do this, a proper understanding of the interconnected web of life to which we are part becomes necessary. Education and formation is a very important tool to achieve this. To this end, schools at both primary, secondary and tertiary level need to incorporate environmental education into their curricula. As well, more fundamental ecological research about nature's services and cycles and the true extents of our reliance on them need to be undertaken. As Noor (2000) has rightly pointed out, "Realizing the cumulative impact of our activities and learning how we can conduct the human enterprises within nature's regenerative capacity is essential". Let us bear in mind that whether it is reviewed from the economic or environmental view point, we are all dependent on biodiversity. Its survival is therefore very central to our survival.

REFERENCES

- Abramavitz JN (1997). Valuing Nature's Services. In Starke I (eds): State of the World. A world watch institute report on progress toward a sustainable society. pp. 101-102.
- BGCI (Botanical Garden Conservation International undated). Plants for the planet. Working together for the world's plants. BGCI Descanso House, 199 Kew Road, Richmond Surrey, TW 93BW U.K.
- Day PR (1977). Plant genetics, Increase in Crop Yield Science 197: 1334-1339.
- FAO (1991a). Trees for Life. FAO World Food Day Publications. FAO, Rome p. 26.
- FAO (1991b). fighting Hunger. FAO World Food Day Publications. 7: 9.
- Gbile ZO, Ola Adams BA, Soladoye MO (1981). List of rare Species of the Nigerian Flora" Research Paper (Forest Series) 47, Forestry Research Institute of Nigeria, Ibadan.
- IUCN (International Union of the Conservation of Nature) (1980). World conservation strategy. Living resources conservation for sustainable development. IUCN-UNEP-WWF, Gland p. 44.
- IUCN, UNEP, WWF (1991). Caring for the earth. A strategy for Sustainable Living. IUCN/UNEP/WWF, Gland Switzerland pp. 27-29.
- Litvinoff M (1990). The Earthscan Action handbook for People and Planet. Earthscan Publication. p. 238.
- Mudie JP (1974). The Potential Economic Uses of Halophytes. In Renold and Queen (eds). Ecology of Halophytes. Academic press, New York.
- Myers N (1984). The Primary Source. Tropical Forests and our Future. W.W. Norton and Co. New York. p. 399.
- Noor QHM (2000). The Right to Diversity. Our Planet. II, UNEP 2: 5-6.
- NPGRB (National Plant Genetic Resources Board) (1979). Plant Genetic Resources Conservation and Use. USDA
- Nwoboshi LC (2000). The Nutrient factor in Sustainable Forestry. Ibadan University Press. pp. 1-3
- OTA (United States Congress, Office of technology Assessment) (1987). Technologies to maintain Biological Diversity, US Government Printing office, Washington D.C. p.334.
- OTA (1991). Biotechnology in a Global Economy. U.S. Government Printing Office Washington D.C.
- Prescott-Allen R, Prescott-Allen C (1988). Genes from the wild. Using Wild genetic Resources for Food and Raw materials. Earthscan Publication, London. p. 11.
- Reid WV, Sittenfeld A, Haird AS, Janzen AD, Myer AC, Gollin AM, Gamez R, Juma C (1993). Biodiversity Prospecting. Using genetic Resources for Sustainable Development. A contribution to the WR1/IUCN/UNEP Global Biodiversity Strategy. pp. 12-15.
- Thorhang A (1970). Utilizing Botanical Resources in the People's Republic of China. Resources Recovery and Conservation 4: 105-110. (year does not correspond with the one cited in the work)
- Wilson EO (2000). Biodiversity, vanishing before our eyes. Times Magazine april-may. 155 (16A): 24-31.
- WWF (World Wide Fund for Nature) (Undated). The Importance of Biological diversity: Wachtel PS et al. (eds) WWF Publications p. 32.
- WWF, IUCN (undated) saving the plants that save us. WWF-IUCN Publications p. 16.