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Our Forests, Our Environment, Our Sustainable Livelihoods

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Abstract: Forests are the nature's most bountiful and versatile renewable resource which is capable of providing simultaneously, a variety of benefits including environmental, economic, social, and cultural benefits and services. Among these benefits include building and protection of soil, filtering of water and securing the maximum absorption of rainfall, preserving watershed and regulating stream flow thus helping to prevent flooding and siltation of rivers and streams as well as carry out photosynthesis, the basis of all food chains and the main source of life-giving oxygen. Wood, one of the major products from the forest plays a part in more activities of the modern economy than does any other commodity. It is virtually the only renewable resource that is economically suitable for structural and architectural purposes. Wood in form of fuel forms the major source of energy in the developing countries. Forests also make diversified and valuable contributions to food security that ranges from the direct production of food items to the provision of jobs, income generation, and support to the sustainability of farming systems. Their role in human health is also very significant with plant-based medicines providing primary health care to some 75% of the world's population. Unfortunately, because we are surrounded by the synthetic materials of the modern age, we tend to forget easily our dependence on forests. This is the reason why this crucial life-support system is today under serious threat occasioned by human-induced factors and this is threatening the basis of our existence. Its conservation should therefore be a matter of priority for all.

Keywords: Forests, Fuelwood, Environment, Carbon sequestration, Greenhouse effect, Evapotranspiration

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1. Introduction

The forest conjures different meanings to different people. Whereas to some people, the forest is seen as an impediment to development that must be mowed down, to some others, it is the abode of the dead, evil spirits. Others see its presence as indicative of underdevelopment and backwardness. Yet to some, the sight of a forest invokes fear, awe and mystery. With

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the advent of "Boko Haram insurgency", using Sambisa Forest Reserve in Borno State as their operational base and kidnappers that often hide their victims in the forests, some have of late come to view the forest as a refuge for insurgents and criminal elements. Even many Agricultural experts, the closest allies of Foresters know next to nothing about the positive relationship that exists between forestry and agriculture particularly its indispensable role in ensuring sustainable agricultural production. To such people, a forest land is an area that must give way for agricultural expansion.

This lack of awareness and proper understanding of the benefits derived from the forest and of its' relevance to everyday concern is the main reason why forest remains the most neglected, the most undervalued, the most underrated and one of the most overexploited natural resource. It is also the major reason why policy makers, development practitioners and the general public do not see the urgent need for its sustainable management and conservation. Ultimately, forests are being destroyed because people do not know that it is in their own interest not to destroy them. If the current trend of forest destruction with its negative environmental and socio-economic consequences is to be reversed, then the public need to understand and appreciate the role and place of forests and trees in environmental sustainability and human wellbeing. This forms the main focus of this paper.

2. The Environmental and Socio-Economic Roles of Forest

Forest or a community of green plants is the nature's most bountiful, ubiquitous and versatile renewable resource which is capable of providing simultaneously, a variety of benefits including environmental, economic, social, and cultural benefits, as well as services. Not only is the forest one of the principal components of the earth's environment, but also one of our basic life-support systems (or ecosystems) along with mountains, lakes, rivers and soils. These terrestrial ecosystems are not only vital to all life on earth, but are closely interwoven with one another [1]. More importantly, the survival of forests is crucial for the sustainability of these other key resources of the planet Earth.

This natural resource by creation exists to serve man. History reveals a consistent relationship between people and forests. The history of humans is a story of forests and their use [2]. They and their products play critical roles in human environment, situation, needs and even lifeline. In a treeless area, food is not only unavailable, its' consumption may not be feasible on the unlikely occasion of its availability because of lack of domestic energy. It is equally evident that throughout ages, the presence or absence of forests is an indicator of civilization; where there are no trees, such as the polar region, deserts and high mountain tops, human endurance and permanent habitation are virtually non-existent. By the same token, dense tropical forests exert profound debilitating effects on human development and growth. Thus, too much forests or none are deterrent to modernity [3].

The world's forests provide an array of goods and services that sustain millions of plant and animal species as well as provide energy, industrial wood products and other non-wood products. Their products are essential to housing, to the education of children, and even to the flow of information in today's electronic age, which shows no signs of producing a paperless society [4]. Forests are also a priceless ecological resource that regulates climate, protects land and water resources, controls floods, wards off wind and water erosion, stores and cycle nutrients, and provides habitats for wildlife. They also carry out photosynthesis, the basis of all food chains and the main source of life-giving oxygen. Finally, they constitute a rich stock of valuable genetic resources, a common heritage of mankind.

These roles shall be further elaborated upon beginning with its environmental functions.

3. Environmental Functions of Forests

Carbon sequestration and climatic amelioration functions of forests:

Forests play important role in climatic amelioration. Forests absorb heat and help cool the earth. They encourage local rainfall, releasing moisture into the atmosphere and forcing water-saturated air currents to rise and produce rain. Forests help to stabilize climate at both regional and global levels. The tropical rain forest, in particular has such a high evapotranspiration that about 75% of the rain that falls on it is recycled through the atmosphere within a few days [5; 6]. Forests affect climate globally by reflecting less heat back into the atmosphere than other types of land use that have more bare soil and less green cover. They also make an enormous contribution to the earth's atmosphere and climate by absorbing carbon dioxide ($CO_{2)}$ and helping regulate temperature. Heat from the earth is trapped in the atmosphere due to high levels of CO_2 and other heat-trapping gases known as greenhouse gases (GHGs) that prevent it from releasing the heat into space. This creates a phenomenon known as the ***"greenhouse effect."*** Carbon dioxide remains the most important GHG, contributing more than 50% of the greenhouse effect.

Forest has close relation with the GHG emissions. Among the CO_2 exchange between the air and land plants, 90% are achieved by the forest vegetation. On the one hand, forests absorb CO_2 from the air during photosynthesis and carbon is fixed permanently. On the other hand, damage to forest will result in releasing of the sequestered carbon into the atmosphere and increasing the GHG emission. Thus, forests play very important role in the global carbon cycle because they store large quantities of carbon in vegetation and soil, exchange carbon with the atmosphere through photosynthesis and respiration, are sources of atmospheric carbon when they are disturbed by human or natural causes (e.g. wildfires, logging with poor harvesting procedures, clearing and burning for conversion to non-forest uses) and become atmospheric carbon sinks (i.e. with a net absorption of CO_2 from the atmosphere) during regrowth after disturbance [7]. Therefore, trees act as carbon sinks, alleviating the greenhouse effect and hence climate change.

Approximately 830 billion metric tonnes of carbon is stored in the world's forests, about the same amount of carbon as the atmosphere holds in the form of carbon dioxide. Roughly 40 percent of this carbon—330 billion tonnes—is contained in trees, plants and other forest vegetation, with the remainder contained in forest soils and roots [8]. A 1996 report commissioned by the UN Intergovernmental Panel on Climate Change concluded that the world's forests could store up to 87 billion tons of carbon between 1995 and 2050, an amount representing more than 12 percent of cumulative fossil fuel emissions over the same period. This additional carbon storage would however need to come from a reversal of tropical deforestation.

Erosion control

Human survival is dependent on less than a meter depth of mixed organic and inorganic debris which we call the soil. As the primary source of fiber and a major interface with the environment, soil is the reservoir on which most life on earth depends. Soil occupies a unique position in the ecosystem being at the interface or zone of interaction between the major spheres that constitute the foundation of the universe, that is, the atmosphere, the lithosphere and the hydrosphere. It is the medium for plant growth and for many of the processes that constitute man's life support system: including energy flows and cycling of matter. The physical, chemical and biological characteristics of the soil determine such essential qualities of land as for example, its ability to supply water and nourishment to plants and animals, and to provide mechanical support and construction materials for all living things including man. The soil also is the repository of much of our waste products both from the home and the work place. Its ability to break down or purify these waste products and to re-synthesize new products from them is one of the most important life-sustaining functions of the soil in the earth's environment system [9]. As the bulk of all food production depends on it, the soil is therefore a crucial life-support system. Even under natural condition of vegetation cover, nature takes from 100 to 400 years or more to generate 10 millimeters of top soil; 3,000 and 12,000 years to build up enough soil to form productive land. So, once the soil has gone, for all practical purposes it has gone for good [10]-[11]. And this

work can be destroyed by wind and water erosion in a matter of hours. Soil erosion is however a natural and a slow process; problems arise because it can be greatly accelerated with disastrous consequences on agricultural lands due to poorly managed human activities. Erosion whether by wind or water leads to the loss of top soil where soil nutrients are concentrated thus leading to the disruption of agricultural production and degradation of the soil. The loss of top soil is accompanied by increased troublesome sedimentation in rivers and reservoirs. This contributes to flooding and damage to irrigation systems and hydroelectric stations. Water erosion in particular causes landslides and by silting up rivers, increases flooding and degrades drinking water. Typical of flooding events caused by water erosion was the 2012 flood witnessed in Nigeria. The flooding incidence which affected over seven million Nigerians resulted to the loss of over 363 lives, displacement of over 2.3 million persons and the destruction of well over 600,000 houses while millions of naira worth of property including agricultural crops were destroyed [12].

Wind and water erosion has a major impact when the soil is left exposed: when the protective cover of vegetation is lost. Hence, this situation can be halted by the provision of trees and other vegetation cover. Trees conserve the soil by protecting it from rain and wind, reducing soil erosion to a minimum. Trees reduce topsoil erosion by catching precipitation with their leaf canopies. This lessens the force of storms and slows down water runoff which in turn ensures that our groundwater supplies are continually being replenished. This underground water is slowly released through soil kept porous through the trees' roots action, to feed streams, at a steady rate over a long period, with pure silt-free rain-water. By contrast, storms striking bare slopes results in rapid runoff, causing soil erosion and carrying off silt in sudden flows, leading to choked riverbeds and silted up reservoirs downstream [13].

As well, high winds are slowed down by the dense foliage of many trees, creating sheltered conditions. As the speed of dust-laden winds drops, the dust is deposited on the leaves or falls to the ground, it is thus prevented from being blown any further [1]. Planting trees as windbreaks and shelterbelts can reduce the velocity of the wind to a speed that is insufficient to move soil particles. The reduction in wind speed leads to lower evaporation from both open water and soil surfaces, making more water available for plant growth. Research in China for instance has confirmed that shelterbelt eight to nine years old can reduce wind velocity and evaporation by about 30 and 18%, respectively, and increase soil moisture and atmospheric humidity by around 20 and 9%, respectively [14]. Besides the prime objective of stabilizing the soil, shelterbelts have resulted in increases in grain production ranging from 30 to 200% in Argentina, China, India, the Niger, Papua New Guinea and Tunisia [15].

Forests and Water Quality and Quantity:

Forests are the best cover for safeguarding water quality from sedimentations and chemicals. Forests protect water bodies by reducing surface erosion and sedimentation, filtering water pollutants, regulating water yield and flow, moderating flood, enhancing precipitation and mitigating salinity. Forest vegetation strongly influences the flows of stream on watershed by intercepting rainfall so that it reaches the forest floor more gently and does not cause compaction. The presence of litter and humus further enhances the infiltration into the soil, which is a key hydrological property affecting surface run-off. Deep and large root nets both living and decaying act as underground storages which maintain the yield and quality of water. In dry periods, rainfall that soaked into the soil and entered the groundwater table is released to streams to maintain a steady flow. The reduction of surface water run-off also means fewer and less violent floods. Research has indicated that 100 mature trees intercept approximately 100,000 gallons of rainfall per year and for every 5 percent of tree cover added to a community, storm water runoff is reduced by approximately 2 percent. Along with breaking the fall of rainwater, tree roots remove nutrients that are harmful to water ecology and quality. Forests also play a significant role in *evapotranspiration*. Between 75 and 95 percent of rainfall in the Congo River basin is from local evapotranspiration within the forest itself. When the trees disappear, so does much of this rainfall, putting at high risk

plant and animal species that evolved in a rainforest climate. [16]

Within the farming communities and municipal areas, rainfall usually picks up sediments, pesticides and fertilizers from lawns and farms. It collects metals, oils, and gasoline from roadways and pollutants from the air. Precipitation can then quickly transport these pollutants directly into streams. Riparian forests (that is, strips of trees bordering streams, rivers and lakes in agricultural areas) protect water quality by removing such pollutants from agricultural runoff. Hence, riparian forests can help filter out pollutants before they enter waterways. Research studies have shown that riparian forest buffers can actually reduce fertilizer, pesticide, and sediment runoff into our streams by as much as 90% [17].

This positive relationship between forests and water quality is already being exploited to help supply clean drinking-water to millions of people around the world [18]. Surveys of the world's 105 largest cities, carried out for the World Wide Fund for Nature (WWF) and the World Bank in 2003, found that one-third draw a substantial amount of their drinking-water from protected forest catchments [19]. Among these cities include New York, Jarkata, Tokyo, Mumbai, Rio de Janeiro, Los Angeles, Barcelona, Nairobi and Melborne.

Forests and air-quality improvement in the urban areas

One of the major problems in cities and urban areas is poor air quality. Air quality in urban areas is often degraded due to emission from various sources (e.g., factories, cars, incineration of urban wastes) associated with urban development and high concentration of people. Carbon dioxide emissions, a major contributor to global climate change are also considerably higher in urban areas. Trees in urban areas however have the ability to improve air quality. They do this by presenting a large surface area on which particulate pollutants can be trapped, gaseous pollutants may be bound or dissolved particularly when wet and gaseous pollutant may be taken up during gas exchange by leaf stomata [20]-[21]. Trees also remove large amounts of one of the major greenhouse gases by using carbon dioxide in the photosynthetic process and by storing carbon in its leaves and woody matter. The leaves of trees reflect and absorb sunlight and radiation from the sun. They prevent the area underneath them from becoming hot. Trees thus create cool, shady and comfortable conditions under their canopy, especially in the hot summer season. Trees can also be used to shade walls of buildings exposed to the sun. Water is continuously supplied to the leaves of the tree by its root system and is constantly being released to the air by evaporation. This loss of water from the tree is known as transpiration. When wind blows through the foliage of a tree it carries with it this moisture and this becomes a pleasant breeze [22]. Ongoing studies indicate that trees planted in strategic locations can be an effective tool in managing industrial and livestock odours and can reduce vehicle road noise by as much *as* half [17].

A number of researches have already been conducted to show the extent of air quality improvement by urban trees. One of such researches conducted in the United States indicated that trees in New York City, removed an estimated 1,821 metric tons of air pollution in 1994 at an estimated value to society of $9.5million [23]. The U.S Forest Service also estimated that all the forests in the United States, combined, sequestered approximately 309 million tons of carbon each year from 1952 - 1992, offsetting approximately 25 percent of human-caused emissions of carbon during that period. Over a 50-year lifespan, a tree generates almost $32,000 worth of oxygen, providing $62,000 worth of air pollution control. This tree would also be responsible for recycling $37,500 worth of water and contr olling $31,000 worth of soil erosion. Trees also remove other gaseous pollutants through the stomata in the leaf surface by absorbing them with normal air components.

Forests and aesthetic value

There are many ways trees enhance their surroundings. Planting trees along and around buildings provide a distraction for the eye, softening the background and screening unsightly views. Trees also contribute eye-catching colors to their surroundings, from the different shades of green found in the

leaves, the colours found in flowering trees and sometimes even the bark of the tree. For the urban dwellers, it is the aesthetic and recreational values of tree, forests and parks that are directly and easily visible to them. Visiting green areas in cities can counteract the stress of city life, renew vital energy and restore attention and improve medical outcomes [24]. Vegetation reduces sun glare and reflection, complements architectural features and tones down the harshness of large expanses of concrete. Trees have also proven to contribute to a community's economy and way of life. The beautification of Singapore and Kuala Lumpur, Malaysia, was one of the factors that attracted significant foreign investment that assisted those cities rapid economic growth [20]. Another advantage of aesthetically pleasing green areas is their positive effect on property values. Depending on species, maturity, quantity and location, increased property values of 5 – 15% have been attributed to trees on residential properties [25].

4. The Productive Role of Forests

Wood production:

Wood, that hard fibrous material that forms the main substance of the trunk or branches of a tree or shrub remains not only the most prominent among the products from forest but also the most versatile product in human use. Wood and its allied products are found in every sphere of modern existence from the timber used in construction, walls, doors, shutters and furniture and myriad of industrial and domestic uses to fibre board, plywood, pulpwood, cardboards, carton, and rayon, poles, posts, mining timber and railway track sleepers etc. Wood plays a part in more activities of the modern economy than does any other commodity. Hardly is there any industry that does not use wood or wood products somewhere in its manufacturing and marketing processes. Thousands of consumer products are directly made from wood. It is one of the most available of all construction materials and virtually the only renewable resource that is economically suitable for structural and architectural purposes. The alternatives to wood in those uses - steel, aluminum and other metals, concrete and plastics are - non-renewable (although they are recyclable at varying costs). But, they use considerably more energy per unit of production than those of wood [26]. Steel stud may require about nine times more energy to produce and transport to the site than wood stud. These materials also incur serious environmental cost [27]. Lumber is the least energy intensive construction material and its production releases significantly less carbon dioxide and toxic products than substitutes. Some types of wood, such as oak, are twice as strong as an equal mass of soft steel and aluminum. This explains why wood was widely utilized in aviation in the past. Timber, plywood, veneer, particle board, and chipboard made from industrial timber and round wood together, account for about one-half of worldwide wood consumption. This exceeds the use of steel and plastics combined [26]-[27].

Solid wood forms the basis of numerous labour intensive industries like sawmills, ply mills, industrial and residential construction and furniture manufacture, all of which create employment, earn foreign exchange for all nations as well as help to contain the rural urban population drift particularly in the developing countries. Transformed into paper, wood serves as an essential tool for government, commerce, education and communication [6]. Even in today's computer-driven societies, wood continues to power the global diffusion of information, and paper remains its primary currency. Even though, Satellites may connect cellular telephones and relay television signals directly into homes, but the vast majority of the world's communications — from telephone calls to World Wide Web pages and cable television programming — still travels over wires suspended on modified tree trunks called telephone poles. These same poles also convey the electricity that powers the most influential communication media of this century: radio and television. And despite the spread of digital technologies, by far the bulk of the world's reading materials — including schoolbooks — are still printed on paper made from pulp wood [28]-[4]. Wood and its products rank third in value among the world's commodities, trailing only oil and natural gas [29]. International trade in wood and wood products amounts to more than $100 billion each year [30].

Wood was so important a raw material that until the late 19th century, disputes over access to forests sparked wars. It is

important to note that the main driving force for the colonization of Africa by the European countries was for the exploitation of her natural resources mainly wood and other forest products that were in abundance in the African forests. The major trade items for the earliest multinational trading companies that operated in Nigeria were timber and other forest resources. The National African Company for instance, was empowered as far back as 1886 to acquire licenses and concessions in forests, particularly for timber exploitation. Historically also, the forestry sector is reputed as possessing the first manufacturing plant in the country. In 1907, the Nigerian Railway Department established two sawmills one at Ebute Metta, Lagos and the other at Han, near Baro in Niger State. And by 1948, the largest plywood factory in Africa, African Timber and Plywood (AT & P) factory was established at Sapele in the present day Delta State of Nigeria.

The importance of Non-timber forest products (NTFP)

Forests provide much more than just the raw material for wood products. They shelter and supply an enormous variety of plant and animal resources. Referred to collectively as *non-timber forest products* **(NTFPs)**, these include fuelwood, medicines derived from forest plants and animals; nuts, seeds, fruits vegetables and other foods; as well as food flavorings and additives such as herbs, spices, resins and gums. The various ways these products contribute to the people's livelihood strategies are further highlighted in the following sub-sections.

NTFPs and domestic energy supply

Fuelwood forms the major source of energy in the developing countries and in fact form the heaviest demand on forests and woodlands. More than two billion people in developing countries depend on wood for cooking and keeping warm. Their annual consumption of wood is estimated to be more than 1,000 million m^3, well over 80% of developing countries total wood use (excluding exports). Fuelwood provides 93% of all energy in Burundi, 84% in Haiti, and 97% in Bhutan [11]. Estimated annual fuel wood consumption in Nigeria stands at 70 million m^3 accounting for about 90% of the total annual wood production in the country [31]-[32]. The projected 2010 fuel wood demand for Nigeria was 93.12 million m^3 out of a total wood requirement of 102.197 million m^3.

Human health is highly dependent on access to fuelwood. This is because cooking releases the nutrients in some food while others can be poisonous if not properly prepared. Because of increasing fuelwood scarcity, finding fuelwood is taking up more time in rural communities. This in effect reduces the time available for other activities. And the burden of fuelwood collection weighs mostly on women and children, who may have to trek several kilometers to find wood when supplies from near-by areas are depleted. A survey carried out in Abia State, Nigeria for instance, showed that women and their children now trek on average of two kilometers and spend an average of two hours a day to obtain supplies of fuel wood [33]. People are also forced to turn to other sources of fuel when supplies of wood declines. Thus straw and cow dung are now increasingly being used for fuel instead of for feed and manure thus depriving the soil natural fertilizer with consequent decline in crop yields.

There are indications that more and more people will still continue to use wood as fuel in preference to commercial fuels like kerosene and gas as these and their appliances are costly and generally beyond the reach of the rural poor [34]. It has been noted that people's cultural habits will continue to prolong the use of fuelwood to other energy sources even among the rich and enlightened elites. This is because, some of these people enjoy roasted yams, roasted plantain and roasted African pear eaten with roasted maize. In addition, palm oil production and large scale cooking (at burials, weddings and launchings etc.) will continue to consume tonnes of fuelwood in the rural areas [35]-[36]. It is also important to note that a number of agriculture-based industries have heavy dependence on fuelwood. These industries include fish-smoking, beer-brewing, tea-and tobacco-curing as well as pottery and brick-making. Fuelwood shortages directly affect these industries and the level of employment and income generated by them. Prediction is that fuelwood is likely to remain an important

energy source in Africa in the coming decades while forecasts made in 2001 even suggested a 34% increase in wood fuel consumption from 2000 to 2020 [37]. Thus, the real energy crisis remains the acute shortage of firewood rather than the high oil prices.

Non-timber forest resources and household food security

The contribution that trees and forests make to food security is important, diversified and valuable. It ranges from the direct production of food items to the provision of jobs, income generation, and support to the sustainability of farming systems. The variety and importance of food that people obtain either directly from the flora and fauna that comprise the forest environment or produce in an environment sustained and protected by trees are enormous. Forests and trees provide food sources in most seasons and in a variety of forms which include edible nuts and seeds used as staple foods or main dishes; those used as minor food supplements, condiments, thickening agents and flavours; leafy vegetables; edible flowers, fresh fruits, fresh seeds, edible oils, spices, fruit drinks and non-alcoholic beverages; alcoholic drinks (plus flavouring barks); mushrooms; honey and bush meat game, snail, insects etc. Collectively, these forest foods provide protein, energy, vitamins and essential minerals as well as add flavour to the diet [34]. By providing many of these essential nutrients, forest products help to improve both the physical and mental well-being of rural people [15]. So far, some 190 such species with edible parts in the rain forest areas of Southeastern Nigeria have been listed [38], while the prospects of exploiting species with such potentials in the sudano-sahelian region of the country has also been highlighted [39].

These classes of food are not only used to help meet dietary shortfalls during particular seasons of the year when stored food supplies are dwindling and the next harvest is not yet available, but are also valued during the peak agricultural labour periods when less time is available for cooking and people consume more snack foods. Furthermore, these products feature prominently during emergency periods such as floods, droughts, famine, wars, economic and social disasters when nutrition, fuel for cooking and heating and timber for the reconstruction of homes and animal shelters become critical. In Southeastern Nigeria for instance, the leaves of the forest trees such as *Pterocarpus spp, Gnetum africanum* and *Vitex doniana* are highly valued as vegetables because they flush during the dry season when cultivated vegetables are scarce. As well, African pear (*Dacryodes edulis*) and African star apple (*Chrysophyllum albidum)* provide off season food because they mature during dry seasons when cultivated staples such as yam are yet to mature [34]-[40].

Apart from the floral components, the species of animals and the aquatic life given protection by these forests also constitute the forest resources available to the rural people for use and consumption. A sizeable proportion of the Nigerian population depends on these wild - life as their main source of animal protein [41]. It has also been reported that in 62 of the least developed countries, people rely on wild meat and locally captured fish for over 20% of their protein [42].

Forests and trees also contribute to the sustainability of the farming systems. A vast variety and amounts of forest and tree products are often the cheapest materials for the construction or manufacture of a very wide range of inputs to support the major productive activities of farming including livestock production, fishing and hunting. A shortage of these products constrains the efficiency of crop production. NTFPs provide materials for supporting crop (e.g. yam stakes), and materials for making farm tools e.g., hoe, axe, machete and digger handles, which are usually made from such tree species as *Pentaclethra macrophylla, and Dactyladenia guineense.* NTFPs also provide materials for making baskets used in carrying and marketing produce, racks for crop drying or crop storage (e.g. yam barns and maize cribs), and sieves for crop processing (e.g. garri making). Fencing materials are also provided by NTFPs e.g. *Spondias mombin* and *Newbuldia laevis*) while ash resulting from burning vegetal matter is used not only as fertilizer but also as pesticide to protect field crops and stored products [43]-[44]. NTFPs support fishing activities in many ways: as raw materials for boats, nets, traps, poles, poisons and fuelwood for fish preservation. Forests also supply the materials for hunting equipment: for traps, snare, arrows,

bows, and poisons. Though by modern agricultural standards, these products may be rudimentary but, they remain generally the only resources that are available to the majority of farmers in Nigeria and indeed other third world countries.

Forests also provide home for bees, butterflies, bats and other pollinators of agricultural crops. Livestock production benefits from the fodder and shade provided by forests and trees. Besides, the growing international trade for these NTFPs is also providing a steady source of foreign exchange to many developing country economies. Over 150 of these products now move through global commerce with an estimated value of between $1 billion and $10 billion annually [45].

Non-timber forest resources and human health

Forests make very important contribution to human health with plants from tropical forests increasingly being exploited for their medicinal values. Medical cares for majority of people in the tropics relies on these herbal species. Plant-based medicines is said to provide primary health care to some 75% of the world's population, mostly in developing countries where commercial alternatives are unaffordable or unavailable [46]. An estimated four out of five people in developing countries rely on plants to meet health and nutritional needs.

Tropical forests also play a very important role in modern medicine. With advances in biotechnology, pharmaceutical companies are increasingly turning to herbal plants from tropical forests as sources of raw materials for new drugs. More than 50% of modern medicine has been found to come from the natural world and a large part of these from tropical plants. The active ingredients found in 25% of all prescription drugs come from medicinal plants while over 7000 medical compounds in modern western pharmacopoeia are said to be derived from plants [11]-[47]-[6]. A study by the U.S. National Institute of Health found that nine of the ten most-prescribed pharmaceuticals in the United States were derived from compounds produced by plants and animals found in forests. Chemicals discovered in forest plants are used today in drugs that combat heart disease, leukemia, cancer and HIV/AIDS. The rosy periwinkle of Madagascar, for example produce chemicals that cure most victims of two deadly cancers, Hodgkins disease and acute Lymphatic leukemia [30] while African green monkey supplies polio vaccine.

Despite the many potential uses of tropical plants, less than one percent has been chemically screened for useful medicinal qualities. The scale of possibilities is emphasized by the fact that no fewer than 1400 tropical forest species are thought to have anti-cancer properties [48]. As has rightly been pointed out, tropical forests represent Nature's main storehouse of raw material for modern medicine [5]. This storehouse is however under serious threat with the destruction of tropical forests. The potential losses for medicines as a result of this tropical forest destruction are very great. The now famous *rosy periwinkle* which has raised the survival rate of leukemia victims from one in 5 to 4 in 5 comes from Madagascar, where 90% of the forests are already destroyed [49].

Forests and biodiversity conservation

The term biodiversity is taken to mean the variety of life forms of both plants and animals, the ecological roles they perform and the genetic resources they contain. The intricate and interdependent relationships that often occur among these life forms are essential for maintaining the ecological processes that support life on the planet earth. For instance, animals need plants to trap the sun's energy so that they in turn can consume it; micro-organisms are required to decompose dead bodies of plants and animals and release their nutrients into the system; plants need animals to pollinate their flowers or disperse their seeds. They both need other plants to provide the right conditions of light or shade, protection or exposure, comprising the niches in which species live [50]. Thus, biodiversity makes the earth livable.

The major store house of this genetic diversity is the forest. The forest ecosystems of the world – particularly tropical forests - house a great portion of the planets plant and animal species [41]. Tropical forests are thought to be the richest ecosystem on earth. Though covering only about six percent of the world's land, tropical rainforests are said to contain between 50 to 90 percent of all species many of which are endemic [51]. With such a wealth of life, forest therefore

represents a laboratory of critical biological resources. The life-sustaining services and commodity-producing functions of forests depend on this biodiversity. Natural forests provide habitat for the wild relatives of many important tree crops, a source of genetic diversity that will become increasingly important for these species to adapt as climate change advances, and for humans to adapt to climate change as well.

The State of our Forests

From the foregoing exposition, it is obvious that the forest provides invaluable environmental, social and economic benefits to humanity the world over. Its existence affects every sphere of our lives from the cradle to the grave. It is a priceless ecological resource, a common heritage of humankind. *The forest is indeed the lung of the earth.* Without it, life on the planet earth becomes impossible. But alias, this crucial organ of planetary health is today under serious threat. It is being decimated at an alarming rate. Forests of the tropics are today disappearing at the rate of 17 million hectares a year. This is equivalent to losing an area the size of 65 football fields per minute. Nigeria presents a more dangerous trend. The country's forest area has been on a continuous decline. In 1970, the area under forest was 93,420km^2 or 10% of the Nigeria's land mass. This has now dropped to 46,542.14km^2, a mere 5.04%. Compare this to the Indonesia's 73% and the United States 32%. Available statistical record indicates that Nigeria loses her forests at the rate of 400,000 hectares annually. Whereas the world lost 3.3 percent of its forest between 1990 and 2005 alone, Nigeria within the same period lost 21 percent [52]. Deforestation has also led to the near extinction of 484 plant and 20 animal species found in Nigeria. This has taken place through massive deforestation resulting from clearing land for agriculture, fuelwood collection and rapid urbanization.

This forest destruction has left on its wake negative and disastrous consequences including erosion, flooding, landslide, windstorms, river siltation, air and water pollution, desertification, climate change etc., very common occurrences in Nigeria today. Can anyone explain why the taps in Owerri urban - the capital city of Imo State are no longer flowing? The siltation of the major portions of Otamiri head stream as a result of the destruction of the forests surrounding the Otamiri river (i.e., the Otamiri watershed forests) is to be held responsible for the inability of the gigantic multi-million naira Owerri water project to supply water to the inhabitants of the municipality. You will also recall that the immediate past administration in Imo State headed by Chief Ikedi Ohakim earmarked a whooping sum of $9 billion just for the dredging of Nworie river in Owerri municipality. Dredging is simply the removal of silts from the river bed. The fact remains that the silt came about also, due to the destruction of Nworie river streamside or watershed forests. Such a whooping sum earmarked for dredging alone gives us an idea of the value of the watershed forest to the Nworie river and by extension to the Owerri municipality

5. Conclusion

It is important to understand that when we take away the forest, it is not just the trees that go; the entire ecosystem begins to fall apart with disastrous consequences for the entire human race. Ecologists have warned that should the clearing and destruction of tropical rain forests continue as it is at the recent rate, thousands and possibly hundreds of thousands of plant and animal species many of them not yet named will become extinct. The implication is that numerous sources of beneficial drugs, foods and industrial products will be unknowingly wiped out. Also, as a vast amount of carbon is stored in the extensive forests of the tropics, the release of that carbon through deforestation and burning could add significantly to the build-up of carbon dioxide in the atmosphere and by so doing complicating the climate change issue.

This is therefore a clarion call to all of us to be alive to our environmental responsibilities. All hands must be on deck to ensure conservation and sustainable management of this important resource. Join in protecting and conserving our environment. Join in the tree planting campaign. Plant a tree today. This is my message.

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