

## An Examination of Variable Environmental Assets for Environmental Valuation in Nigeria

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**Abstract:** In Nigeria the Estate Surveyor and Valuer has been bestowed with the responsibility of interpreting the value of Assets for various purposes. In the face of current world focus on Environmental Management and Sustainable Development, scholars have called for a systems approach where all professionals should contribute their quota towards making our environment better. This paper therefore tries to examine variable environmental assets for Environmental Valuation in the Nigeria. The paper equally discussed the importance of these variable assets and tried to suggest strategies for their conservation, management and proper valuation. The study adapted the descriptive research method and data was collected mainly from secondary sources. The paper recommended inter alia extensive environment education for stakeholders in the environment, development of skills in the field of environmental valuation on the part of Estate Surveyors and Valuers, proper planning and synergy at all levels of government and a dequate funding for development of environmental sites.

**Keywords:** Environment, Environmental Assets, Valuation, Environmental Valuation, Sustainable Development, Variable Assets.

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### I. Background of the Study

According to Aniagolu (2009) since the Stockholm Conference of 1972 the seriousness of the interplay between development and environment has been recognized world-over. Many countries of the world are now very much concerned about the devastating impact of development on the environment. Consequently, the Bruntland Report of 1987 suggested that "Our common future is sustainable Development and Environment Management". Aniagolu, Iyi and Ugwanyi (2018) quoting NEST (1991) opined that:

*"Sustainable development seeks to meet the needs and aspirations of the present generation without compromising the ability to meet those of the future generation .... It is a process in which the exploitation of resources, the direction of investment, the orientation of technological development and institutional change are all in harmony and enhance both current and future potentials to meet human needs and aspirations"*

According to Kassim (2005), Sustainable Development has an environmental dimension which requires knowledge of environmental assets (resources) that our environment holds and of what value they are to us. He emphasized that without this knowledge of the Environmental Assets, we might tend to undervalue and abuse these resources to our own detriment. Hence MDBA (2017) defines Environmental Assets (Resources) as

*"the naturally occurring living and non-living components of the Earth, together comprising the biophysical environment, that are used in production and that deliver ecosystem services to the benefit of current and future generations"*.

However, from the Environment Management point of view Acting (2014) points out that the whole essence of the concept is firstly to reduce negative environmental externalities arising from uncontrolled development, secondly, to provide environmentally related public goods, thirdly, to improve sectorial or spatial natural resource allocation between production, consumptive and non-consumptive uses to control environmental degradation and finally to reallocate natural goods and services across time for successive generations.

This paper therefore tries to examine variable environmental assets for environmental valuation in Nigeria.

## **II. The Problem**

According to LEAD (1997) proponents of the twin issues of Sustainable Development and Environmental Management have called for a Systems Approach, since no profession, no matter how well trained in techniques can claim an exclusive expertise in them. This therefore calls for a multi-disciplinary approach where all professionals should contribute their quota towards protecting our environment (Ogunba, 1999). The Estate Surveyor and Valuer is the professional saddled with the interpretation of value of assets in Nigeria (Udo and Egbenta, 2011). Hence, from their valuation standpoint they should be able to rise up to the collective task of protecting the environment. Little wonder then that in a communiqué issued by the institution after its 29<sup>th</sup> Conference at Calabar in 1999, NIESV stated *inter-alia*:

*“...that the institution should play a more prominent role as an environmental protection advocate and uphold relevant heads of claim for compensation on environmental issues”.*

When placed before the giant strides the world has made in the field of Environmental valuation, it appears that the “heads of claim” do not hold water any more when accounting for environmental assets in the present age. It becomes imperative therefore that the first port of call in environmental protection is an understanding of what constitutes environmental assets bearing in mind that various communities are endowed with different levels of assets. This paper therefore intends to identify the variable environmental assets for environmental valuation in Nigeria.

## **III. Aim and Objectives**

The aim of this study is to examine the variable environmental assets in Nigeria for Environmental valuation. The study therefore intends to pursue the following line of objectives:

- a. To identify the various environmental assets in Nigeria
- b. To discuss the importance of these environmental assets to local communities where they occur.
- c. To suggest strategies for conservation, management and proper valuation of environmental assets in Nigeria.

## **IV. Methodology**

The study adopted the descriptive research method. Osuala (2007) opined that descriptive research is that research which specifies the nature of a given phenomenon. It gives a picture of a situation at hand and it begins with an understanding (description) of the problem at hand. Also Odoziobodo and Amam (2007) stated that descriptive research is interested in finding the meaning and getting an understanding of the present conditions, beliefs, attitudes, uses, etc about a particular phenomenon or its attributes.

## **V. Natural Resources, Environmental Assets and Biodiversity:**

In order to understand and identify environmental assets, this study, first of all tried to discuss the difference and similarities of natural resources, environmental (resources) assets and biodiversity since many texts use them interchangeably.

According to Asthana and Asthana (2012) a natural resource is anything that can.

- a. Be useful to man
- b. Be transformed into a useful product or
- c. Be used to produce a useful thing.

This immediately shows that natural resources are those resources that can be obtained from nature and forms the basis of existence in the entire planet earth (Ajayi, 2003). Mburu, *et al* (2007) classified natural resources using two criteria namely biology and renewability. Using the first criterion of biology, the two types of natural resources are

- a. Biotic Natural Resources and
- b. Abiotic Natural Resource

Biotic natural resources arise from biological activities of animals and green plants eg. food, fruits, wood, fibre, milk, milk products including fish, meat, leather, etc. It is equally pertinent to understand that coal, oil, natural gas, etc are also biotic since they occur from photosynthetic activities of plants which occurred millions of years ago. Again, abiotic natural resources are those that are not formed through the biological activities of plants and animals. These include minerals, rocks, salts, metals and other chemical. These are formed through chemical or physical processes. Based on the second criterion, Mburu, *et al* (2007) classified natural resources into Renewable and Non-renewable resources.

Kapur (2016) explained that renewable natural resources are those resources which can be regenerated after use eg. fruits, vegetables, grains, vegetation, meat, milk, etc while non-renewable resources are those which cannot be re-generated once they are exhausted. It must be noted that if the consumption of these non-renewable resources exceed their generation, these resources begin to disappear or go extinct. Very good examples are coal, oil, natural gas, precious metals, etc.

Similarly, Polyakov, *et al* (2013) pointed out that Environmental Assets (resources) are those natural resources that are beneficial to mankind but are difficult, if not impossible to own. This is what economists call “public goods”. Very good examples are clear air, flowing rivers, existence of particular plant and animal species and scenic beauty of the environment. MDBA (2017), reports that Environmental assets support complex physical, chemical and biological functions and processes, at a variety of geographic scales. They also support the existence of many communities.

Finally, Brooks (2017), opined that Biodiversity is an umbrella term for the various degree and extent of nature’s variety including the number and frequency of ecosystems species and genes in a given assemblage. USEPA (2009), however defined Biodiversity as the variability among living organisms from all sources including *inter-alia* terrestrial marine, and other aquatic ecosystems and the ecological complexities of which they are a part. Biodiversity therefore is used to describe the number, variety and variability of living organisms within a specified location. EFTEC (2005), pointed out that biodiversity has three very important levels viz:

- a. Genetic Diversities
- b. Specie Diversities
- c. Ecosystem Diversities

Mburu, *et al* (2007), described these as diversities within species, between species and of ecosystem.

**Genetic Diversity** represents variability within species as measured by the various genes (chemical units of hereditary information that are passed from generation to generation) within a specie, variety, subspecies or breed.

**Species Diversity** represents various population size of different species. Increase in population of one specie may lead to the loss in size of others. Some species even go extinct if not controlled and monitored.

**Ecosystem Diversity** is the diversity and health of ecological complexes within which species occur. Ecosystems provide natural cycles of nutrients eg. water, oxygen, carbon dioxide, etc. Ecosystem should also be preserved.

## **5.2 Economic Concerns of Natural Resources and Environmental Assets**

The economic concerns in management of natural resources differ between resource types. For instance the primary question in managing non-renewable resources is “at what rate should a resource of fixed supply be depleted?” taking into consideration the fact that they cannot be regenerated easily. Besides, once they are depleted they cannot be regained. Similarly, renewable resources can be regenerated but the management question remains “what balance should be struck between the rate of use and the rate of resource regeneration. This concern is important because if the rate of use supercedes the rate of regeneration the resource would likely go out of stock. However in managing Environmental Asset the major economic concern remains “what are the cost to the society of diminished or diminishing ecosystem function as a result of renewable and/or non-renewable resources depletion”. Put in another way, “what are the benefits to the society of enhanced ecosystem function resulting from renewable and/or non-renewable resource increase or enrichment.

This brings us to the issue of ecosystem goods and services which economists refer to as public goods and services. EFTEC (2005), opined that ecosystem goods are the natural products of the environment which are harvested and/or used by human beings for their livelihood (eg. wild fruits and nuts, forage, timber, game, natural fibre, medicinal herbs etc.

However, ecological services support life by regulating essential natural processes such as purification of air and water, pollination of crops and flowers, nutrient recycling, decomposition of wastes and generation & renewal of soils. MDBA (2017), summarise these into the following services:

- i. plant production through photosynthesis
- ii. plant and animal reproduction through pollination, cross fertilization and cross breeding.
- iii. watershed protection, recharging of ground water through natural cycles and buffering extreme situations.
- iv. production of soil and protection of soil from degradation through erosion and other causes
- v. supply of essential nutrients to the soil
- vi. absorption and breakdown of pollutants and organic matter.

Ecological services also moderate environmental condition by stabilizing climate, reducing the risk of extreme weather events, mitigating drought & floods and protecting the soil from erosion. EFTEC (2005), categorized them into six, based on their economic and ecological functions as follows:

### **a. Purification and Detoxication**

This involves filtration, purification and detoxication of air water and soil. For instance, woodlands and forests purify the air through photosynthesis and respiration. Also, the soil purifies our water bodies through extensive filtration. Again, wetlands are known to remove toxins from the environment.

**b. Cycling Processes:**

These are natural processes and cycles that stabilize the ecosystem. Very good examples are Nitrogen Fixation, Carbon Sequestration and soil formation (breakdown of rocks) and release of minerals and nutrients.

**c. Regulation and Stabilization**

The ecosystem provides numerous processes and organisms that interact in very complex ways thus ensuring that pest and diseases are natural controlled, climate is regulated, extreme flooding and storm are mitigated, erosion is controlled and rainfall & water supply are regulated.

**d. Habitat Provision:**

Ecosystems naturally provide habitat for plant and animal species. These habitats are available to plant and animal both as a residence or temporal hiding or breeding places during migration or reproduction. These habitats equally serve as store houses for genetic materials.

**e. Regeneration and Production:**

These are ecological processes that ensure regeneration of plant species through pollination and dispersal of seeds. They also include biotic processes that ensure productivity of plant and animal species. These include conversion of light into energy and energy into biomass. A large number of bees, butterflies, beesflies, moth, birds, bats and other animals / insects/fish are agents to pollination.

**f. Information and Life Fulfilling Services:**

These involve natural landscapes that provide humans with aesthetic, recreational, cultural and spiritual values. These enhance human wellbeing and economic revenue through tourism and sports.

### 5.3 Total Economic Value (TEV)

Esara (2016), quoting Kasuma (2005), stated that for some public goods and services markets are readily available to reflect the values which people or the society place in them. However, for other public goods and services the markets do not exist in some circumstances and in some other circumstances they partially capture these values. Hence, Egberta and Udo (2013), opined that the most appropriate basis for valuing ecosystem goods and services is Total Economic Value (TEV).

Otegbulu (2011), stated that TEV incorporates actual use values and non-use values. World Bank (1998), pointed to the fact that use value involves some interactions with the resources either directly or indirectly. Hence, use value includes the following:

a. **Direct Use Value (Extractive Value)** which involves the direct use of ecological resources for either production or consumption (hence it can be consumptive use or extractive use). It equally involves human interaction with the ecosystem itself rather than via the services it provides eg. direct use of fuel wood, timber, fish, ivory, medicinal plants, construction materials etc.

b. **Indirect Use Value (Non-Extractive Value)** which entails the use of ecological resources without extracting the resource either for production or consumption. It is derived from the services provided by the ecosystem. Very good examples are recreation and tourism, education and research, employment and other ecosystem services.

Non-use Values according to Wetland Research Commission Report (2012) are concerned with benefits derived from the knowledge that the ecosystem is maintained. They are derived values and not direct values. They include:

a. **Existence Value:** Value derived from the knowledge that a habitat, specie or landscape exist even though an individual may have no intention of visiting the area.

b. **Bequest Value:** Values derived from the knowledge that certain landscapes, services or species exist for the benefit of future generations. Hence, they will be passed on to descendants for future enjoyment.

c. **Altruistic Value:** This is derived from the knowledge that contemporaries can enjoy the goods and services that the ecosystem can provide.

d. **Spiritual, Historical or Cultural Value:** This is the wellbeing derived from the fact that certain public goods and services provide a sense of belonging.

e. **Option Value:** This is the value attached to retaining the option, or possibility of having future access to a given landscape, habitat or specie. It comes from ensuring that certain public goods and services will be available for one's own use in the future. It may be regarded as *insurance* to provide possible future use. It reflects the individual or societies perception of uncertainty both in terms of future needs or desire and future threats to the resource(s) in question.

OECD (1989), therefore summarised as follows:

$$TEV = DUV + IUV + NUV$$

Where:

$$TEV = \text{Total Economic Value}$$

$$DUV = \text{Direct Use Value}$$

IUV	=	Indirect Use Value
NUV	=	Non Use Value

## VI. Environmental Assets (Resources) and Their Importance to Man

Discussions in section 5.0 immediately brings out to limelight the fact that a valuer confronted with valuing environmental assets must first develop an in-depth knowledge of what constitutes environmental resources. Any attempt to venture into environmental valuation without this knowledge tantamount to an exercise in futility.

Power (2013), came up with the following classification of Environmental resources for environmental valuation and /or accounting. They include:

### 1. Mineral Resources:

These are natural resources endowed by nature. They can be classified into the following categories:

- a. **Energy and Fuel wood resources:** eg. crude oil, coal, natural gases, lignite, uranium, etc
- b. **Metals:** eg. Tin, Columbite, Copper, Bronze, Bauxite Iron ore, etc
- c. **Precious Metals:** Silver, gold, diamond, gems, emerald, bronze, etc
- d. **Construction Materials:** stone, gravel, granite, sharp sand, limestone, etc
- e. **Fertilizer material:** Nitrogen, Phosphorous and Potassium

Mineral Resources are very important to mankind in the following ways:

- i. They serve as raw materials in many industrial processes
- ii. They are good sources of energy
- iii. Construction industry cannot function without them
- iv. Foreign exchange can be earned from their sales
- v. They provide a very good source of employment
- vi. They can be used in road construction and maintenance eg. bitumen.
- vii. They are equally used in production of ornaments
- viii. They are very important for infrastructural development and development of human settlements.
- ix. They have also become an area of study and research.

### 2. Energy Resources:

Energy Resources are rich sources of energy to mankind. They include

- a. Solar Energy
- b. Atmospheric Resources
- c. Petroleum Resources
  - Oil Resources
  - Natural Gas Resources
- d. Wind Energy
- e. Coal and Peat resources

These sources of energy are beneficial to man as follows:

#### i. Wind:

- it helps in the formation of clouds which in turn produce rain
- it can be harnessed for power generation in wind mills
- it modifies weather in many places
- it is good for domestic use eg. drying of clothes and agricultural products, cocoa, maize, rice, millet, etc.
- it aids the sailing of boats and ships
- it helps in the aviation industry and transportation of birds
- it helps in the pollination of crops, plants and flowers.

#### ii. Air (Atmospheric Gases)

- human beings inhale oxygen from the atmosphere during respiration
- plants make use of carbon dioxide during photosynthesis
- ozone reduces the effect of intra red/ultra violet rays and help to reduce hydrocarbons
- medical gases are tapped from the atmosphere
- industrial gases are equally tapped from the atmosphere
- plants use nitrogen to produce protein and enrich the soil.

#### iii. Solar Energy

- the sun helps to keep the earth warm
- it is used to dry materials
- it's a rich source of vitamin d
- it enhances plant growth and food production

- it's a rich source of power / electricity
- it can be used to cure diseases – eg. jaundice.

### **3. Water/Aquatic Resources:**

These are primary sources of water for domestic, agricultural and industrial uses. They are sub-divided into:

- a. Surface Water :- fresh water and fish habitats eg lakes, ponds, pools, rivers, etc
- b. Salt Water – Marine plants and animals that live in oceans, sea and other salt waters
- c. Ground Water – these are water resources found in the soil eg. capillary water, moisture and deep wells water tables (aquifers).
- d. Brackish Water – water resources found at estuaries i.e points where salt waters and fresh waters meet eg. wetland, mangrove, swamp and marsh resources. Water and aquatic resources are important to mankind in the following ways:
  - it is rich source of food eg. fishes, sea food, etc.
  - it creates employment to man through fishing, sports, agriculture, etc.
  - water resources could be used for irrigation agriculture
  - water can equally serve as a source of transportation
  - water is used for hydro-electricity power generation
  - water is a rich source of minerals such as salt, crude oil, etc
  - water can be put to domestic, industrial and agricultural uses
  - it is used for nursery production for fish farms.
  - water bodies are used for recreation and tourism
  - water bodies have become very good ground for sports eg. swimming, boat races, diving, etc

### **4. Timber / Forest Resources**

These are resources that are derived from forests woodland and different forms of vegetation. These are very important for man, animals and plants. The formation of these vegetation determine the nature of the activities and resources found in them. Very good examples are game reserves, fruits, wild fruits, nuts, firewood, latex fibre, pulp, medicinal plants species. Forest / vegetations of the world can be classified into the following:

- a. tropical rain forests
- b. savanna grassland and vegetation
- c. monsoon vegetation
- d. desert vegetation
- e. Mediterranean vegetation
- f. temperate evergreen forest vegetation
- g. cool temperature deciduous forest vegetation
- h. temperate grassland vegetation
- i. coniferous forests and taiga vegetation
- j. tundra vegetation and
- k. mountain vegetation

Forests and vegetations are important to mankind in the following ways:

- i. They provide employment for lumbermen, hunters, herbalists, saw millers and researchers.
- ii. They serve as a good tourist sites and centres
- iii. They serve as game reserve by providing a conducive home for wild life.
- iv. They provide a lot of timber trees such as Iroko, Mahogany, cedar from where planks and purlins are produced.
- v. They are a good supply of food to mankind eg. seeds, fruits, wild fruits, nuts, leaves, bush meat.
- vi. They generate a lot of foreign exchange for the countries where they are located.
- vii. They produce a lot of fibre which could be used to prepare nets, twines, ropes
- viii. Different types of wood are produced from forest and vegetation covers eg. fire wood, electric poles, planks for scaffolding, etc.
- ix. Pulp for making paper can be produced by some forests
- x. They also provide plants of medicinal values

## **VII. Soil (Land) Resources:**

Soil resources constitute the topmost part of the earth's crust on which plant roots find their homes. Soil as a natural resource forms as a result of complex interaction of parent materials, climate, biological organisms and time. Soil quality depends on texture, permeability, porosity, its nutrients and time. The main forms of soils are: (a) sand, (b) silt, (c) clay (d) gravel and (e) humus materials. However, some soils are a mixture of two or more of these forms eg. loamy soil.

Soil is usually made of five components viz:

- a. **Organic Soil:** decayed plants and animal that form humus
- b. **Inorganic soil:** solid materials from parent materials which form the greatest percentage of the soil – they are also responsible for soil nutrients.
- c. **Soil Organisms:** These include earthworms, rodents bacteria, etc which are useful for plant and animal existence.
- d. **Soil water:** They form about 25% of the soil and are found between the pores of the soil as moisture and capillary water. They are very important for plant germination and growth.
- e. **Soil air:** Soil air is found between soil particles and is responsible for the respiration of soil organisms.

Soil resources are beneficial to man in the following ways:

- a. It is the only medium through which natural agriculture is produced. Note that synthetic foods are also in production through advanced technology.
- b. It is the source of all minerals used by man
- c. It provides the habitat for soil organisms
- d. It provides nutrients for plants existence
- e. It serves as a reservoir for water and air required by soil organism.
- f. Without soil plant, vegetation and forest resources cannot get support, nutrient and other means of survival.
- g. Most sources of construction materials come from the soil and actual construction is done on the soil
- h. Some soils have medicinal or healing powers
- i. Filters the soil water and stores water

### **VIII. Strategies for Conservation, Management and Proper Valuation of Environmental Resources.**

The following strategies are suggested for well coordinated efforts towards conservation, management and proper valuation of environmental resources.

#### **a. Environmental Education:**

One of the greatest challenge facing the management and valuation of environmental assets is illiteracy and cheer ignorance on the part of stakeholder. Environmental education is therefore very important to enlighten stakeholders on the various forms, varieties and importance of the asset to mankind. This will definitely make them appreciate these assets and work very hard to conserve them at local, state and national levels.

#### **b. Planning At All Levels Of Government:**

Proper planning should commence at community levels to identify natural endowments of environmental resources since different communities are endowed with various assets. What is discovered at the community level forms part of the local government plan and in turn regional and national plans. This at a glance gives decision makers an assessment of the variability of environmental assets from one community to another. This information could also be plotted into maps for easy understanding. Targets and projection should be set for future development of sites.

#### **c. Institutional Structures and Co-operation:**

All the institutions involved in Environmental resource conservation, management and valuation should be properly coordinated. Ministries, departments and agencies involved in Environmental Management, agriculture, land and survey, water resources, river basin management, forestry, etc should be properly coordinated to ensure co-operation, synergy and proper collating, storage and management of necessary data. This immediately provides the required information network for environmental resource conservation and management.

#### **d. Development of Skill in Environmental Valuation:**

Aina (1992) had a foresight when he stated as follows

*“... lack of proper environmental considerations has resulted in habitual over-valuation of unsound properties ..., but we can change this false valuation syndrome ..., however, Estate Surveyors and Valuers hold the ace and are in the best position to call the shots ...”.*

Ogunba (1999), buttressed Aina’s position by concluding that Estate Surveyors and Valuers should be at the forefront of Environmental valuation models development. This requires skills in model development and skills in the use of already existing models namely contingent valuation model, travel cost model, hedonic valuation model etc.

#### **e. Funding for Development of Sites:**

There are limited funds for conservation, management and development of environmental resources. It is therefore very important to deliberate on how to get the best result from limited finding. Now that there is vehement call for diversification of income sources to the government, budgetary allocations should target development of Environmental Assets for diversification of income through tourism, recreation, hospitality

services and sports. It is also important to note that the limited fund could develop some sites in the near future, but others may not receive immediate funding. Therefore, there is need to draw up a scale of preference to leverage funding opportunities in coming years.

**f. Monitoring, Reporting and Evaluation:**

Targets, objectives and goals should be set during planning. Performance should therefore be monitored to ensure that they are pursued vigorously. Derivations from the targets should be detected early and corrective measures applied immediately. Short, medium and long term monitoring and evaluation strategies should be put in place.

**IX. Conclusion**

When God created the earth, his creation was good. It was a perfect environment. With the fall of man, the soil brought up thistles and thorns. Man has to clear thistle and thorns to cultivate the soil and to build his huts. From huts man went on to build houses, mansions, roads, bridges, skyscrapers, industries, etc. With these came a new environment: manmade environment as opposed to the natural environment. The natural biological, physical and chemical processes have been distorted to the extent that man is now threatened with self extinction. We must therefore go back to nature if we must continue to live on this planet earth. All professionals should therefore work acidiously to return man to nature. Environmental valuation should therefore be used by Estate Surveyors and Valuers for proper conservation, management and valuation of Environmental assets.

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