RIVERS STATE UNIVERSITY
PORT HARCOURT

BLACK SWAN EVENTS IN WETLANDS ECOSYSTEMS: THE INADEQUACY OF MONETARY COMPENSATIONS

AN INAUGURAL LECTURE

BY

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DEDICATION

This Lecture is dedicated with utmost affection to:
My beloved wife Ijeoma and my children namely Victor, Ibalaunwo, Chiasaleme, and Chichenimeuma and My late parents Catechist Alfred Ezekwesiri Akujuru and Mrs. Salome Nwanda Akujuruwho gave me the foundation to thirst for excellence in education and my late sister Mrs. Zilpah Abidi who ensured I continued schooling after the death of our father. May their gentle souls rest in perfect peace until the Parousia. Amen!

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The Vice Chancellor and Chairman of this occasion
Chairman and Members of the University Governing Council
The Deputy Vice Chancellor (Academics)
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The University Librarian
The University Bursar
Former Vice Chancellors and Emeriti Professors
Former Deputy Vice Chancellors
Former Registrars
Provost of the College of Medicine
Dean of the Postgraduate School
Deans of Faculties and Directors of Institutes, Centres and Units
Heads of Departments
Distinguished Professors and Members of Senate
Academic, Administrative and Technical Staff
Undergraduate and Graduate Students
My Lord Bishops and other Ministers of God
Your Royal Majesties and Highnesses
Members of the Fourth Estate of the Realm
All Invited Dignitaries
Distinguished Ladies and Gentlemen

1.0 PREAMBLE:

I thank the Almighty God for this opportunity to stand before this audience today, to present the 92nd Inaugural Lecture of this University. Let me join the award-winning Chairman of this occasion and Vice Chancellor, my Boss Professor Nlerum Sunday Okogbule FCIAbr, DSSRS, to welcome you all to this inaugural lecture. I am very excited to make this presentation today following the openings in the lecture schedule broadcast by the Lectures' Committee.

Vice Chancellor Sir, I present this inaugural lecture as the 1stProfessor of Environmental Valuation and Land Administration in Nigeria, the 2nd inaugural lecturer in the Department of Estate Management, and the 4th in the Faculty of Environmental Sciences of the Rivers State University. I chose to focus on environmental valuation instead of general Estate Management, because Estate Surveyors and Valuers have feared venturing into this specialization. The purpose of environmental valuation is to ascribe an economic value in monetary terms to natural resources and the environment to lay the rules for their optimal use. Valuation helps to correct the balance between quantifiable and non-quantifiable effects in cost–benefit analysis. It gives a more accurate gauge of economic performance and is essential for settling disputes regarding environmental use and awarding compensation for environmental damages.

Vice Chancellor Sir, my educational journey started in 1969 when I enrolled into the Western Ahoada County High School, Ahoada, after my primary school years in several primary

schools at Akinima, Omoku, Banigo-Ishile-Ogonor and Boyle Memorial Schools in Bonny and St John's State School, Ihuowo in 1968. By November 13,1969, my hope of being educated was dashed with the murder of Catechist Alfred Ezekwesiri Akujuru, my late father, in the Church he was pastoring. Having been destined by God to reap the rewards of my father's sacrifice in God's vineyard, I secured a scholarship from the Rivers State Government, to complete my secondary education in March 1970. In 1974, I applied for a Post-secondary Scholarship to read Estate Management and secured a scholarship to study Estate Management in the United Kingdom. I chose to read Estate Management without knowing what the course was about. When I graduated from Bristol Polytechnic (now University of the West of England) in 1979 with a BSc in Valuation and Estate Management, it became obvious that I have chosen to specialize in the Valuation of Land and Buildings. I served my NYSC period in the Oyo State Housing Corporation, Ibadan where I worked only on Land Administration, preparing myself for a career in the Ministry of Lands and Survey, Port Harcourt, at the end of the Service year.While in the Ministry, I secured a British Council Scholarship in 1985 to study Urban Land Appraisal at the University of Reading, in the United Kingdom. The appraisal of land and buildings programme helped focus my attention on Valuation issues and being destined to be a Valuer, I graduated with a Distinction in 1986. From 1987 to 1988, I became a Part-time lecturer in the then Department of Land Surveying and Estate Management. When the Rivers State Government needed

to strengthen the Department following the exit of Ghananians from Nigeria, I was seconded to the University in 1988. Vice Chancellor Sir, I became convinced that my future was in academics with this secondment and by 1995, I accepted a full-time appointment as a Lecturer in the then Rivers State University of Science and Technology. The burden of departmental administration delayed my further studies until 2012 when I secured another scholarship to pursue a PhD program at the University of Salford, in the United Kingdom where I chose to research into the Valuation of Contaminated Wetlands Ecosystem.

My choice of focus was influenced by my exposure earlier in my professional career to the sufferings of rural community dwellers whose real estate were crisscrossed by oil and gas pipelines/installations. These pipelines and the connected oil installations regularly suffered breakages, spilling crude oil on their land, and contaminating such lands. In assessing the damage suffered by these rural estate owners over the years, I realized that the monetary compensations paid were mostly inadequate. This inadequacy necessitated my inquiry into the valuation methods used by Valuers, with the aim of discovering their inadequacy or otherwise. My Vice Chancellor, we can see that I was destined to benefit from my late father's reward as a labourer in God's vineyard by the number of scholarships with which I studied all my life. Today I stand before this gathering to profess my appointment as a Professor of Environmental Valuation and Land Administration, to the Glory of God and in the fulfillment of God's promise in Colossians 3: 23-24.

2.0 INTRODUCTION:

Wetland ecosystems are a type of real estate that requires to be valued when contaminated by oil spills, to determine the monetary compensations that should be paid for any damages resulting from the oil spill. Valuations or Appraisals are undertaken by Estate Surveyors and Valuers in Nigeria and Appraisers in other climes.

2.1 REAL ESTATE:

Real Estate is the physical land and objects that are permanently attached to the land, like Land (of whatever definition), Buildings, Structures, Piers, Dams and all types of developments on Land. It is therefore a fixed asset, usually financed by the liquid capital of investors.Real Property is all the rights, title, and interests associated with the ownership of real estate (these are generally referred to as Personal Property). Real property is generally referred to as the bundle of rights attached to real estate and includes the rights to sell, enjoy, rent or lease, etc. wetlands are real estate providing the society with ecosystem services like fishery habitat, timber, wildlife, water filtration, erosion control etc.Most wetland ecosystem goods and services do not have market prices as they are never traded in the market. Despite not being traded in the market, they need to be valued, especially when they are contaminated by oil spills.

2.2 THE REAL ESTATE PROFESSION:

The global real estate profession developed first in the Garden of

Eden, after God Almighty created man from the dust of the earth. In the Holy Bible book of Genesis Chapters 1 and 2, "the Lord God took man and put him in the Garden of Eden to work it and take care of it". Several centuries ago in Great Britain, the Kings and Nobles became very interested in the ownership of land and having amassed so much land, needed to organise the management of their land for their benefit. Originally, the profession was the exclusive preserve of Kings, Princes, Rich Barons, Land Holding Lords, and Powerful Knights. Modern civilization and the increased pressure on land and development has thrown the profession open to whoever is privileged to belong to it.Here in Nigeria, the real professional body known as the Nigerian Institution of Estate Surveyors and Valuers was established in 1970 and became legalized by the Federal Government vide Decree No. 24 of 1975 (now CAP 111, Laws of the Federation of Nigeria), with the creation of the Estate Surveyors and Valuers Registration Board of Nigeria (ESVARBON). Members of the profession currently practice in the areas of Valuation and Estate Agency, Urban Estate Management, and Finance Appraisals.

2.3 VALUATION:

Property valuation may be considered the heart of all real estate activity. Valuation is neither the science that some of its proponents make it out to be nor the objective search for true value that idealists would like it to become. Property valuation is the process in which the economic value of a real estate is determined, which often seeks to determine the fair market value of a real estate property at a given date and for a given

purpose. Where oil spills contaminate the real estate, valuation seeks to determine the value of damages caused by the contamination to determine the monetary compensation payable by the polluter, to the real estate owner. When the real estate is privately owned and its title can be exactly defined, market values can be defined with precision. Where the real estate is publicly owned like the wetland ecosystems, the real estate does not possess any definite title and are classified as public goods and the services they offer, as public services. Public goods and services are not traded in the market and thus require special valuation methods to determine their value. The purposes for which valuations of wasting assets are required can vary widely. They may include: financial reporting sales and acquisitions company mergers public and/or private funding lending rent or royalty review taxation and litigation insurance.

2.4 ESTATE SURVEYORS AND VALUERS:

An Estate Surveyor and Valuer is a professional who has undergone relevant academic training and acquired the needed practical experience and have been registered by the Estate Surveyors and Valuers Registration Board of Nigeria (ESVARBON) to carry out valuations to determine the value of all descriptions of property and all subsisting interests, among other functions as prescribed by the ESVARBON Act of 1975, under CAP 111, Laws of the Federation of Nigeria. As stated above, the practicing Estate Surveyor and Valuer is more than an Estate Agent and can specialize in any aspect of the whole gamut of studies making up Valuation and Estate Management. Even

within the Valuation specialization, the Valuer can either major in Urban Real Estate or Rural Real Estate, where wetland ecosystems dominate the terrain. Vice Chancellor, it is in the Rural Real Estate sector that I decided to specialize and chose the topic of this inaugural lecture, more so when the incidents of oil spills are prevalent.

2.5 COMPENSATION:

The Cambridge Dictionary defines compensation as money that is paid to someone in exchange for something that has been lost or damaged or for some problem. When oil spills occur, the real estate on which it is located, gets contaminated, some properties like fishponds, crops economic trees and the environment generally, get damaged either temporarily or permanently. The Valuer is regularly consulted to determine the value of the properties damaged by the oil spill, either by the real estate owner/holder or the operator of the oil installation that caused the spill. The Valuer's report will normally determine the quantum of damage suffered, in monetary sums. The operator of the oil installation being required to compensate the real estate owners resorts to paying monetary compensation. It is the adequacy or otherwise of the monetary compensation that is the subject of this inaugural lecture.

2.6 BLACK SWAN EVENTS:

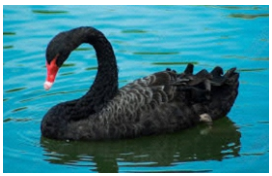

Plate 1: Black Swan
Source: Taleb (2007)

A black swan event is a rare and unexpected event that has a significant impact, often with far reaching consequences. The term was popularized by Nassim Nicholas Taleb in 2007 in his book “The Black Swan: The Impact of the Highly Improbable.” The term "black swan" comes from the ancient belief that all swans were white, and black swans were believed to be non-existent “Plate 1 shows a black swan”. However, when black swans (Plate1) were discovered in Australia, it shattered the long-held belief and became a metaphor for unexpected events that have significant consequences.

According to Taleb, a black swan event is characterized by three attributes: it is unexpected, it has a major impact, and after it occurs, people try to rationalize why it happened and why it was predictable, even though it was not.

2.6.1 Attributes of Black Swan Events

The attributes of black swan events are:

i. Extreme rarity: Black swan events are rare and unpredictable, and they occur much less frequently than other events. They are often seen as outliers or exceptions to the norm.

ii. Severe impact: When a black swan event occurs, it has a significant impact on the world, causing widespread disruption and often leading to major changes in society or the economy.

iii. After-the-fact predictability: Although black swan events are impossible to predict or forecast, people often try to explain them after they have occurred and come up with reasons why they should have been expected or could have been prevented.

In the context of wetland ecosystems, black swan events refer to

the unpredictable events that occur during usage of the wetlands for business and other developments. Such developments will include development of oil locations, laying of oil/gas transmission pipelines, and lately, puncturing of oil pipelines "to per-take in the national cake" and illegal conversion of crude oil to refined petroleum products.

3.0 VALUATION OF ECOSYSTEMS AND WETLANDS:

3.1 An Ecosystem

An ecosystem is a community of plants and animals interacting with each other in each area, and also with their non-living environments. The non-living environments include weather, earth, sun, soil, climate and atmosphere. The ecosystem relates to the way that all these different organisms live near each other and how they interact with each other.

An ecosystem is defined as a complex set of relationships among the living resources, habitats and residents of an area. It includes plants, trees, animals, fish, birds, micro-organisms, water, soil and people. It is a term derived in 1935 from ecology and system. Ecology is defined by the English Dictionary as a system involving the interactions between a community of living organisms in a particular area and its non-living environment.

3.2 Wetlands:

A wetland is an area of land that is either covered by water or saturated with water. The water is often groundwater, seeping up

from an aquifer or spring. A wetland's water can also come from a nearby river or lake. Seawater can also create wetlands, especially in coastal areas that experience strong tides. Itis an ecosystem that bridges the gap between terrestrial and aquatic ecosystems. It is an area of land that is wet for all or part of the year like swamps and marshes. It usually contains some level of water and it is fed by creeks, streams, or even underground springs. It is a natural and important habitat for frogs, birds, turtles, molluscs, periwinkles, oysters and serves as a fish nursery. The Ramsar Convention defines it as "……areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt including areas of marine water, the depth of which at low tide does not exceed six metres. "They are generally lands where saturation with water is the dominant feature determining the nature of soil development and the type of plant and animal communities living in the soil and on its surface and generally occupy about 6% of the world's land surface.

The Niger Delta physical features appropriately fit this description hence it is classified as the World's third largest wetland "Figure 1 shows the Niger Delta Wetlands" . The depth and duration of this seasonal flooding varies. Wetlands are transition zones, and they are neither totally dry land nor totally underwater; but they have characteristics of both. The saturation of wetland soil determines the vegetation that surrounds it. Plants that live in wetlands are uniquely adapted to their watery (hydric) soil. Wetland plants are called hydrophytes. Seasonally

dry wetlands or wetlands with slow-moving water can often support trees and other sturdy vegetation. More frequently flooded wetlands have mosses or grasses as their dominant hydrophytes.

Wetlands exist in many kinds of climates, on every continent except Antarctica. They vary in size from isolated prairie potholes to huge salt marshes. They are found along coasts and inland. Some wetlands are flooded woodlands, full of trees. Others are more like flat, watery grasslands. Still others are choked by thick, spongy mosses.

Wetlands go by many names, such as swamps, peatlands, sloughs, marshes, muskegs, bogs, fens, potholes, and mires. Most scientists consider swamps, marshes, and bogs to be the

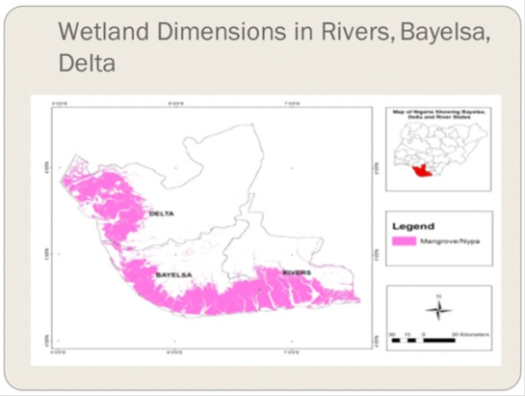

Figure 1: Wetland Dimensions in Rivers, Bayelsa, Delta

Since wetlands are part of the ecosystem, the valuation techniques used for ecosystem valuation, naturally applies to wetlands, in view of our focus on the Niger Delta wetlands, our subsequent discussions will focus on the valuation of wetlands

ecosystems, drawing from the composition of such ecosystems. Wetlands ecosystems are generally divided into three categories thus:

I. Marine/ coastal wetlands,
II. Inland wetlands, and
III. Manmade wetlands.

3.3 Importance of Wetland Ecosystems

Wetlands are some of the most valuable ecosystems on Earth. They act like giant sponges or reservoirs. During heavy rains, wetlands absorb excess water, limiting the effects of flooding. Wetlands also protect coastal areas from storm surges that can wash away fragile beaches and coastal communities. Saltwater swamps and tidal salt marshes help secure coastal soil and sand. Wetland ecosystems also act as water-treatment facilities. The plants, fungi, and algae of a wetland filter wastes and purify water. Nitrates and other runoff chemicals often wash into wetlands from urban areas and farms. Organisms there absorb the harmful chemicals. Pollutants not absorbed by plants slowly sink to the bottom, where they are buried in sand and other sediments.

Wetlands, especially marshes and swamps, are home to a wide variety of plant and animal life. Some animals, such as shrimp, live in tidal marshes. Many marine fishes, such as striped bass, enter coastal wetlands to spawn. Bass swim from the ocean and into salt marshes to lay their eggs. When the eggs hatch, the young bass find plenty of food and some protection in the grasses or tree roots. Oysters live in huge reefs in salt marshes. All these wetlands are home to economically valuable fisheries.

3.4 Functions of Wetland Ecosystems:

These can diagrammatically illustrated as in Figure 2, below.

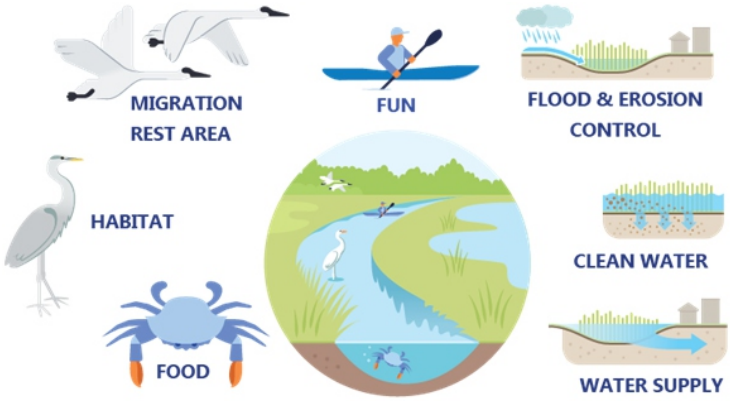

Figure 2: Functions of Wetland Ecosystems.

3.5 Wetland Degradation

Wetland degradation is the impairment of wetland functions because of human activity. Wetland degradation frequently occurs without the loss of wetland area, through upstream impacts on hydrology and water quality, etc. In valuing wetland ecosystems, valuers need to understand some terms like environmental degradation, and land degradation.

3.6 Environmental Degradation

The terms degradation, damage, destruction and transformation all represent deviations from the normal or desired state of an intact ecosystem. The meanings of these terms overlap, and their application is not always clear. Degradation pertains to subtle or gradual changes that reduce ecological integrity and health.

Damage refers to acute and obvious changes in an ecosystem. An ecosystem is destroyed when degradation or damage removes all macroscopic life, and commonly ruins the physical environment as well. Transformation is the conversion of an ecosystem to a different kind of ecosystem or land use type (Clewell *et al.* 2004). When applying the above definitions, the Aichi Target No. 15 deals with both degraded and damaged ecosystems.

Different ecosystems, as well as different values placed on environmental resources by different societies make the definition of environmental degradation difficult and complex. Choudhury & Jansen (1999), define environmental degradation as the deterioration of the environment through depletion of resources such as air, water and soil, the destruction of ecosystems and the extinction of wildlife. It is any change or disturbance to the environment perceived to be deleterious or undesirable.

Environmental degradation is both a driver and consequence of disasters, reducing the capacity of the environment to meet social and ecological needs.

Over consumption of natural resources also results in environmental degradation, reducing the effectiveness of essential ecosystem services, such as the mitigation of floods and landslides. This leads to increased risk from disasters, and in turn, natural hazards can further degrade the environment.

The reduction of the capacity of the environment to meet social and ecological objectives and needs is also described as environmental degradation. This degradation and the associated decline of ecosystems and their invaluable services (the benefits

we obtain) are driving disaster risk. Changes to the environment can influence the frequency and intensity of hazards, as well as our exposure and vulnerability to these hazards. For instance, deforestation of slopes often leads to an increase in landslide hazard and removal of mangroves can increase the damage caused by storm surges.

Environmental degradation is also the deterioration of the environment through depletion of natural resources such as air, water and soil, the destruction of ecosystems and the extinction of wildlife. It may be defined as any change or disturbance to the environment perceived to be deleterious or undesirable. It is one of the Ten Threats officially cautioned by the High-Level Threat Panel of the United Nations. The United Nations International Strategy for Disaster Reductiondefines environmental degradation as "The reduction of the capacity of the environment to meet social and ecological objectives and needs".

3.7 Land Degradation:

A degraded land according to Choudhury & Jansen, (1999) is a land which due to natural processes or human activity is no longer able to sustain properly an economic function and/or the original natural ecological function. The United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa (UNCCD) defines Land degradation as reduction or loss of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a

process or combination of processes, including processes arising from human activities and habitation patterns, such as:

I. Soil erosion caused by wind and/or water;
II. Deterioration of the physical, chemical and biological or economic properties of soil;
III. Long-term loss of natural vegetation (United Nations 1994).

3.8 The Need to Value the Environment:

Generally, economic valuation is an attempt to assign quantitative values to the goods and services provided by environmental resources and we can summarize the need for environmental valuation to include:

· Environmental Litigation.
· Formulation/Changes in environmental policy. Environmental Dispute Resolution e.g. logging, new mines, power station location and leisure resort development etc.
· Guiding Environmental Regulations.
· Evaluating Proposed Environmental Programmes.

3.9 Why we Value Wetlands Ecosystems:

Economic valuation is concerned with the allocation of wetland ecosystem resources to improve human welfare (Figure 1). A major reason for the excessive depletion and conversion of wetland resources is the failure to adequately account for their non-market environmental values in development decisions. This is because most wetland goods and services are often public goods that may be enjoyed by any number of people without affecting other people's enjoyment. This means that they are not traded in the market and have no market values

"Table 1 below shows composition of Total Economic Value".

Table 1: Classification of total economic value for wetlands

USE VALUES			NON-USE VALUES
Direct Use Value	Indirect Use Value	Option and Quasi-Option Value	Existence Value
• fish • agriculture • fuelwood • transport • peat/energy • wildlife harvesting	• nutrient retention • flood control • storm protection •groundwater recharge •external ecosystem support •micro-climatic stabilisation •shoreline stabilisation, etc	• potential future uses (as per direct and indirect uses) • future value of information	• biodiversity • culture, heritage • bequest values

Source: Adapted from Barbier (1989b, 1993, 1994) and Scodari (1990)

3.10 The Lure of Black Swans:

The Vice Chancellor Sir, the inhabitants of the Niger Delta especially the youths realize that their terrain is crisscrossed by a network of oil and gas pipelines and with the prevailing level of youth unemployment, have resorted to creating black swan events in most communities. Initially, their actions were aimed at attracting compensation for their contaminated wetlands but now includes bunkering to "steal" oil from pipelines. The

process of tapping oil from the pipelines, spills crude oil into the environment, and contaminate it. Persons whose land is contaminated will normally demand for compensation, which calls to question, how we can value such contaminated wetland ecosystems. Ordinarily, black swan events are not contemplated but the youth activities now question the unforeseen nature of oil pipeline ruptures and arms the oil and gas operators with the defense of sabotage.

3.11 Consequences of Black Swan Events:

Whether the oil pipeline ruptures accidentally or is humanly induced, the land and environment will usually get contaminated (Table 2, 3 and 4). While compensation may not be paid when sabotage can be proven, it is still necessary for the value of damages suffered because of land contamination to be assessed add "Table 2 shows the major oil spills in the Niger Delta.".

Year	No of Spills	Major Spills	Spills with no Estimate	Spills with no JIV*
2011	1059	2	359	218
2012	1135	4	391	179
2013	1666	1	762	450
2014	1521	8	540	284
2015	920	4	268	158
2016	684	5	173	129
2017	599	6	178	73
2018	699	0	154	104
2019	723	5	192	70
2020	440	0	90	35
2021	382	2	122	33

Source: NOSDRA Oil Spill Monitor.ng (2023)

Some contaminated sites at Edeoha Plate 2 in Ahoada East Local Government Area of Rivers State indicate typical contaminated wetlands thus "Also Plate 3 shows oil spill at Bodo in Gokana LGA; and Plate 4 shows oil spill at Odau in Abua/Odual LGA of Rivers State":

Plate 2: Oil Spill at Edeoha, AELGA

Oil Spill at Odau in Abua/Odual LGA, Rivers State

Source: BBC Oil Spill in Rivers State
Plate 3: Oil Spill at Bodo, Gokana LGA

Source:BBC Oil Spill in Rivers State
Plate 4: Oil Spill at Odau in Abua/Odual LGA, Rivers State

3.12 Valuation of Wetland Ecosystem Goods and Services:

Heal (2000) cited in Berkes and Folke (1998) , states that valuation is a way of organizing information to help guide decisions but is not a solution or end in itself. It is one tool in the much larger politics of decision making and wielded together with financial instruments and institutional arrangements, allow individuals to capture the value of ecosystem assets. The Millennium Ecosystem Assessment (2005), defines "Valuation" as the process of expressing a value for a particular good or service in terms of something that can be counted, often money, but also through methods and measures from other disciplines (sociology, ecology and so on) According to the Oxford English Dictionary (2023) the term value is used in either of three ways:

I. Exchange value, which refers to the price of a good or service in the market.

II. Utility which refers to the use value of a good or service; and

III. Importance, referring to the appreciation or emotional value attached to a given good or service (e.g. the emotional or spiritual experience some people have when viewing wildlife or natural scenery.

While valuation has been mostly used in real estate investments as a branch of economics, Winkler (2006) opines that the literature on environmental valuation is based on two distinct foundations of ecology and economics. He states that while ecological valuation methods derive values by a cost of production approach, the economic valuation methods focus on the exchange value of ecosystem services. Ecological valuation methods are either based on an energy theory of value or on an economic-ecological analogy. In the first case, they are based on the principle that the solar energy is the primary input to the ecosystem and that one can derive the exchange values of goods and services in the ecosystem in terms of the numeraire solar energy. These methods explicitly consider the internal structure of ecosystems and emphasize the connectedness of different ecosystem entities. Their main weakness is that the derived values do not indicate how the ecosystem products contribute to human well-being and it is difficult to justify theoretically. The economic valuation methods emphasise the importance of consumer preferences and focus on the exchange value of ecosystem services, which is the trading ratio of these goods and services. Where they are traded in the market, the exchange value would be their market price. Since most of the ecosystem

services have public good properties, there is no simple way to introduce markets for these services. While economic valuation methods incorporate the relationship between humans and the wetland ecosystem products, they do not reflect the internal structure of ecosystems or the interdependencies of different ecosystem entities. They also do not capture the ethical aspects of ecosystem valuation. Despite the attraction of these views of value, Winkler (2006), defines value as the contribution of an action or object to user-specific goals, objectives or conditions and opines that the valuation of ecosystem goods and services has no virtue in itself but is merely a tool to guide human actions towards an efficient and sustainable use of natural resources.

Economic valuation is often undertaken to influence a decision. It is important to consider carefully, the decision the valuation advocacy intends to influence. Being based on the view of the ecosystem as a source of goods and services for consumption and other inputs for production, economic valuation is influenced by human use or enjoyment of the environment. Though it has been argued that it is either impossible or unnecessary to value ecosystems as we cannot place value on such 'intangibles' as human life, environmental quality or long-term ecological benefits, valuation is done unintentionally every day. When construction standards are set for highways, bridges, and the like, we are in fact valuing human life as spending money on construction would save lives. Since ecosystem goods and services provide outputs and outcomes that directly and indirectly affect human wellbeing, valuation is necessary as it will contribute to better decision making by ensuring that policy

appraisals consider, the costs and benefits to the natural environment and the implications of new developments on human wellbeing. To highlight the place of value in ecosystem management, De Groot et al presents the figure 3 below as a frame work for an integrated valuation.

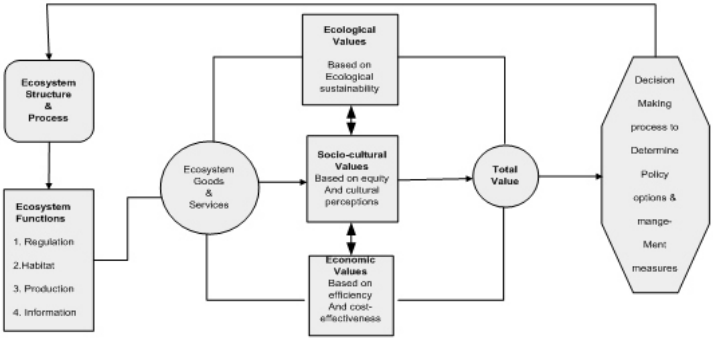

Figure 3: Framework for an Integrated Valuation
Source: De Groot, Wilson et al. (2002)

3.13 The Importance of Wetland Valuation:

Like other wetlands, the Niger Delta is subject to intense and growing pressures for development of residential, commercial and industrial development of oil and gas. Wetland species are harvested at very high rates and the scourge of pollution has pervaded the region and given it an identity. Heavy loads of industrial and domestic wastes are discharged untreated into the marsh. The combination of all these has led to serious degradation over time and these pressures Continue to intensify. Land use decisions have been based on a development imperative that favours constant modification of the wetland for economic advancement of the nation. The attendant pollution

that follows the production and evacuation of oil and gas has been allowed to continue without the economic value of the goods and services being considered, not being factored into the development decisions. The region's biodiversity and natural ecosystems continue to be reclaimed, degraded, and lost because they are seen as being "value-less" especially when compared to the gains from oil and gas production, whose revenue sustains the national economy.

Generally, the Ramsar Convention in de Groot, Syuip et al. (2006)states other reasons why wetlands need to be valued to include:

I. Market failure to capture the value of public goods because of their peculiar characteristics of being like water purification or flood prevention.
II. Market failure to reflect the full social costs or benefits of a change in the availability of a good or service like the price of sea foods do not fully reflect the impact of pollution which destroys the natural habitat and make such foods scarce;
III. Policies that stimulate over use of the wetland like the creation of a subsidy for the production of shrimps, inadvertently leads to the destruction of the mangrove vegetation and further diminishes the protection services offered by the wetland;
IV. The multiplicity of stakeholders leads to a multiplicity of values and unequal distribution

of costs and benefits, as some stakeholders may indulge in over-use not minding the costs and some may impose costs on others unintentionally. For example, when a wetland is affected by pollution upstream no matter how the pollution is caused, those living downstream will suffer losses that may not be compensated for;

V. Lack of clear ownership boundaries. Most wetland ecosystems do not have a natural boundary and may straddle between different administrative boundaries like between local government areas. In such situations, it becomes difficult for one administrative unit to manage such wetland use like controlling the harvesting of mangrove forests.

VI. The neglect of user- stakeholders in decision making and policy formulation about the use and management of wetlands leads to non-implementation of policies no matter the benefits. In some cases, it leads to non-appreciation of the importance of a particular wetland by policy makers.

Howarth and Farber (2002) opine that valuation is particularly useful in settings where institutional arrangements like markets are not functioning well to reflect the social costs of environmental degradation and that decision about conservation or restoration can lead to misuse of resources when not guided by some concept of value. Daly and Cobb (1989) state that at the

macro level, ecosystem valuation can contribute to the construction of indicators of human welfare and sustainability. Emerton and Kekulanda (2003) argue that while economics is very important, it is often a neglected component of wetland assessment. That whereas biological, ecological and hydrological methods are relatively well established, little work has been carried out on developing and applying economic assessment techniques to wetlands. This is particularly true of the Niger Delta which has a very high economic value and occupies a significant position in the national classification of regions because of the preponderance high quality hydrocarbon deposits. Since economic forces account for the degradation and loss of the region's ecosystem, and where conservation is contemplated, it requires a range of economic management policies, it is critical to determine the economic value of the ecosystem of the Niger delta wetland. The aim here is to determine value of the wetland with a view to highlighting the policy implications of its use, degradation, or loss.

3.14 The Composition of Wetland Values:

The RAMSAR Convention in de Groot, Syuip et al. (2006), decomposes wetland values into three main types of ecological, socio-cultural, and economic values. The sum total of these three types make up the total economic value (TEV) of a wetland ecosystem, though each has its own set of criteria and value units (indicators). TEV as a concept first appeared in an essay by Peterson and Sorg (1987) titled: “Towards the measurement of total economic value”. It was thereafter used by other environmental economists like Turner and Pearce (1996).

Initially the definition concentrated on use value until Kurtillla (1995) identified its double feature to include non-use values. Scholars after Kurtilla have since concentrated on an empirical analysis which allows them to identify the main features especially of non-use value and the different methods useable for their measurement. Today, environmental economists have settled on an agreed typology for the different components of total economic value to consist of use value and non-use value. These various value types can be illustrated thus in Figure 4:

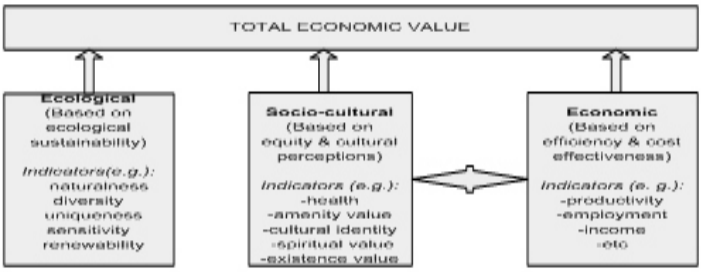

Figure 4: Composition of Total Economic Value
Source: De Groot, Wilson et al (2002)

It is contended that ecological, socio-cultural, and economic values have their separate roles in decision making and while they should be seen as being complementary, our emphasis in this study will be on the economic value of a wetland ecosystem. The economic value of a resource- environment system as an asset is the sum of the discounted present values of the flows of all the services. This value may be different from its market value since many service flows are not traded in markets and therefore have no market prices (Freeman, 2003). The economic

value of resource- environment systems, reside in the contributions that ecosystem functions and services make to human well-being. This thinking originates from the economic assumption that people have well defined preferences among several alternative goods whether marketable or non-marketable, and that people know that their preferences are substitutable. Value from the economic point of view, is usually measured in monetary terms which is indicative of the utility people derive from using a wetland ecosystem.

The use value describes the benefits derived from using an ecosystem good or service directly or indirectly. Direct use values also known as consumptive or structural use value refers to those goods or service that can be used directly (Dixon & Pagiola, 1998), while indirect use which is also known as extractive or functional use, derives its value from the services the environment provides. Option value is another type of use value which describes the value attached to maintaining the option to take advantage of something's use in the future.

Non-use values refers to the benefits derived from goods and services without using the environment in any way whether directly or indirectly. The most important variant is the existence value which is the value derived from the knowledge that something exists. Another type is the Bequest value which is the desire to pass on an environmental service to future generations.

The various types of value referred to above, fall broadly into two categories known as revealed preference methods and hypothetical methods referred to as Stated preference methods. The principal difference between them is that the later draws

data from people's responses to hypothetical questions while the former draws from observations of real-world choices. The Group of methods can be measured monetarily. Monetary valuation methods may be by means of direct market valuation, indirect market valuation, or by survey- based valuation. Table 3 summarises the methods and their applicable constraints.

Table 3: Wetlands Valuation Methods and Constraints

DIRECT /INDIRECT	METHOD	DESCRIPTION	CONSTRAINTS
Direct	Marketprice	Theexchangevalueofgoodsorservices(canalsobe extended to other nonmarket ecosystem service benefitsbyobservinghowchangesinprovisionaffecttheprice sorquantities of other marketed goods).	Market imperfections and policy failuresdistortmarketprices.
Direct	Factorincomeorproducti on factor method (also known as*dose-response*technique	Measurestheeffectofecosystemservicesonloss(orgains)ine arnings and/orproductivity	Care needstobetakennotdoublecountvalues.C annot estimate nonusevalues
Direct	Publicpricing	Publicinvestments, e.g.landpurchaseormonetaryincentives(taxes/subsidies)for ecosystemserviceuseorconservation.	Propertyrightssometimesdifficulttoestab lish; care must be taken to avoidperverseincentives.
Indirect	Avoided(damage) cost or defensiveexpen dituremethod	Considerscostsandexpendituresincurredinavoidingdamag esof reducedenvironmental functionality.	It is assumed that the costs of avoideddamage or substitutes match the originalbenefit. However, thismatch may notbeaccurate,whichcanleadtounderesti matesaswell as overestimates.
MarketV aluation	Replacement cost andsubsti tutecost	Estimates the value of a change in nonmarket ecosystemservice by calculating the cost of replacing the lost orreducedservicewithamanmadesubstituteorwithrestoratio noftheecosystem	Tends to overestimate and cannotestimatenon-usevalues.
MarketV aluation	Mitigation or restorationcost	Costofmoderatingeffectsoflostfunctions(oroftheirrestorati on)	Tendstooverestimate
MarketV aluation	Travelcostmethod	Useoftravelandtimeexpendituresasanindicationoftheimpli ed value oftheecosystem service	Techniqueisdataintensiveandgetscomple xwhentripsaremultipurpose.Caneasilyov erestimatevalue
MarketV aluation	Hedonicpricingmethod	Uses prices paid for associated marketed goods (in mostcasesthiswillbeinthepropertymarket),asareflectionoft he demand for an ecosystemservice	Themethodonlycapturespeople'swilling nesstopayforperceivedbenefits.Verydata intensiveandsensitiveto specification.
MarketV aluation	Contingent valuation methods	The method asks people how much they would be willingto pay (or accept as compensation) for specific servicesthroughquestionnaires orinterviews	There are various sources of bias in theinterviewtechniques.Alsothereiscontr oversy over whether people wouldactually pay the amounts they state intheinterviews.
MarketV aluation	Benefittransfer	Usesresultsfromother,similarareatoestimatethevalueofagi ven servicein thestudyarea.	Values are site and context dependentandthereforeinprinciplenottra nsferable.

Source: de Groot et al(2002)

3.15 Land Valuation

This is a tool used in Disaster Risk Management(DRM) as a management approach that combines prevention, mitigation and preparedness with emergency response and recovery. The Hyogo Framework for Action 2005–2015 (UNISDR, 2005) aims at substantial reduction in loss of life and economic losses through the implementation of Disaster Risk Reduction (DRR) strategies in DRM. The DRM process includes the incorporation of pre-disaster and post-disaster activities into its approach. DRM is defined by UNISDR (2009) as "the systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters". The valuation of contaminated land properly falls within this definition.

Land valuation can support post-disaster emergency response, recovery, and reconstruction activities. The disaster response functions that benefit from valuation expertise include insurance, compensation, property tax, compulsory purchase, and strategic advice to governments. The difficulties of effectively valuing land include the preponderance of informal tenures in the wetlands such as customary land, or informal settlements and the impact on disaster management. Improved tenure security, and therefore access to land, provides an incentive for landholders to invest in measures to improve their land, such as soil protection, tree planting, pasture improvement, irrigation, or sustainable cropping (FAO, 2011).

After a disaster, wherever there are involuntary changes to

where a person lives, or the quality of their housing, or their access to livelihoods, land valuation can help estimate those changes for the purposes of compensation (Mitchell, 2010). Rapid assessments are made in relation to damage and loss, needs, and gender during the recovery phase and property valuation information (if available) can be very important in estimating the economic losses. These assessments are undertaken to determine the scope, scale and distribution of the impact of the natural disaster and identify issues that may affect the response. They provide information on the needs, possible intervention types and the resource requirements. They can include damage and loss, shelter, livelihoods, agriculture, infrastructure, and vulnerability assessments.

3.16 Estimating Damage and loss

In completing the damage, loss and needs assessment phases of disaster recovery, valuations are essential to estimate the economic losses. To calculate losses, valuers need to estimate the economic value prior to the disaster (retrospective value) and post-disaster. These valuations can be used for insurance or compensation purposes for damages and for land taken, for mortgage lending (homeowners need to refinance/borrow to rebuild), rental assessment, and as cost–benefit analysis on where to allocate limited resources in the disaster recovery.

Where cultural goods and landmarks are involved, traditional valuation approaches are not appropriate, and thus non-economic valuation methods will be applied such as derived benefits methods, cost-based methods, revealed preference methods, and stated preference methods. Valuation of public

assets, such as government buildings, schools, and public infrastructures such as roads and utilities can aid recovery decision-making.

3.17 DAMAGE ASSESSMENT:

The damage assessment process generally requires the coordinated efforts of scientific, legal, economic and policy~ specialists, hence it is said to be a BASTARD SCIENCE. Natural resource damages reflect injuries and lost services from the time of the release through completion of remedial activities or spill response actions, as well as any injuries or lost services remaining after these activities are completed.For example, a remedy selected for a site might address the human health risks posed by a site, but not more wide-scale ecological effects. Similarly, oil spill response activities are generally limited to removal of gross oil contamination, while effects such as reductions in fish populations or loss of wetland are not generally addressed. Thus, the purpose of a natural resource damage assessment is to identify activities that will fully restore injured resources to baseline (i.e., pre-release) conditions, and to compensate the public for services lost or diminished from the time of the release through full restoration of the resource.

4.0 COMPONENTS OF A NATURAL RESOURCE DAMAGE CLAIM:

A black swan event which causes a natural resource damage, requires the preparation of a claim. Such “damage claim” is made up of three components (Figure 5, 6a, 6b and Table):

Restoration Costs + Compensable Value + Cost of the Assessment

Environmental Restoration Costs is defined by Law insider (2023) as the total cost of all measures necessary to restore the environment to its condition prior to an incident which caused damage to it and in the event of this not being possible, the value of the cost benefit that has been lost through the damage to or destruction of the environment; while Damage Assessment Costs is defined as all costs associated with the planning, design, implementation and oversight of the Plaintiff's damage assessment process, which addresses the extent and quantification of the injury to, destruction of, or loss of Natural Resources and the services provided by those resources resulting from the release of hazardous substances, and the planning of restoration or replacement of such Natural Resources and the services provided by those resources, or the planning of the acquisition of equivalent resources or services…….

"Compensabie value" is the amount of money required to compensate the public for the reduction in natural resource services from the time of the release until the injured resources and the services those resources provide are returned to their baseline conditions (also referred to as "interim losses"). Compensable values represent the value of lost public use of the services provided by the injured resources plus passive use values.

Generally, Value can be defined in terms of the economic value provided by natural resources services for example, Clean Water -- Fish Populations - Recreation, subsistence, passive use

Clean Sediments -- Benthic Organisms - Commercial shell fishing, marine transportation, archaeological preservation Healthy Ecosystems -- Diverse Wildlife Populations - Passive use, cultural spiritual services provided by natural resources.

A relationship often exist between compensable values and selected restoration activities, While all damage claims involve an assessment cost component, not all cases will involve recovery of both restoration costs and compensable losses. For example, an oil spill may result in interim lost use (e.g., a fishing closure), but the owners may choose a no-action alternative for restoration to allow natural recovery. In such cases, the owner may act to recover compensable values, which will then be used for restoration projects at other sites.

Not all services provided by natural resources accrue directly to humans, and not all involve consumptive activities. The services provided by a natural resource may accrue to other resources (e.g., clean surface water can support fish populations), or to humans (healthy fish populations can support a sport fishery).

1.3.5 THE RELATIONSHIP BETWEEN RESTORATION COSTS AND COMPENSABLE VALUES

Compensable values are often a function of the restoration option chosen for a site. For example, consider the graphic presented in Exhibit 1-3. In this case some event has occurred at time T_1 which reduces services from the baseline (i.e., pre-spill) level to a lower level. This example assumes that, if no restoration activity is undertaken, the resource will recover to the baseline level by time T_4. In this case economic damages would be represented by the area A+B. Now assume that some restoration activity begins at time T_2, which allows the resource to recover more quickly (by time T_3). In this case damages would be represented by area A. In other words, the benefits of the restoration action (in the form of avoided losses) are represented by area B.

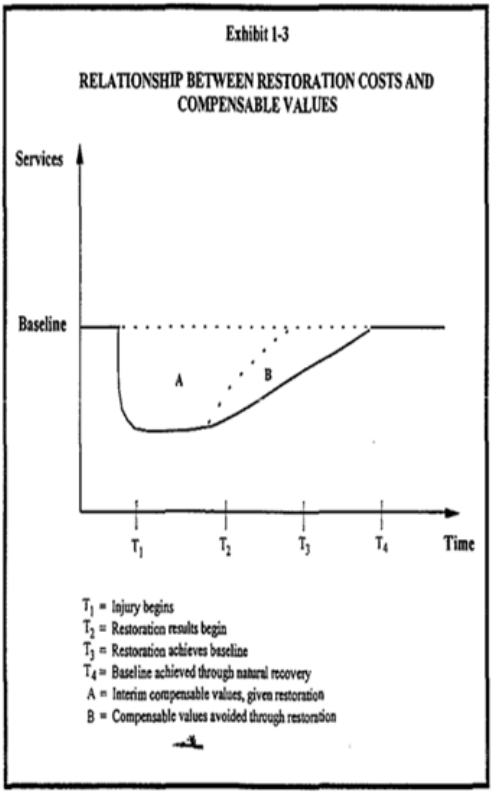

Figure 5
The Relationship Between Restoration Costs and Compensable

This relationship is also considered in Exhibit 1-4. In this case three alternative restoration options are available, which vary in terms of the number of years to full recovery of the injured resource. For these options, as restoration effort increases, compensable values decrease. For example, releases from an uncontrolled hazardous waste site may have resulted in contamination of a riverine environment. A less intensive restoration action (e.g., source control

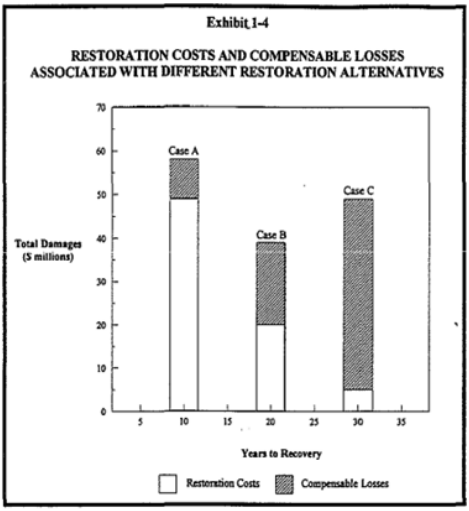

Figure 6a
Restoration Costs and Compensable Losses Associated with Different Restoration Alternatives

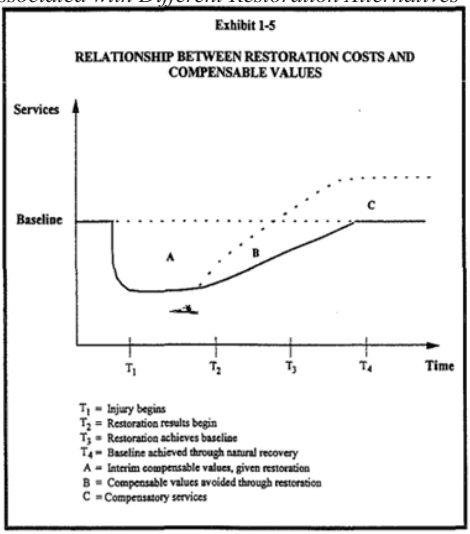

Figure 6b: Relationship Between Restoration Costs and Compensable Values

with no treatment of contaminated sediments) might cost relatively little, but leave significant compensable value losses (as illustrated in Exhibit 1-4 as Case C). Alternatively, a more intensive restoration program (e.g., treatment of contaminated sediment combined with restoration of injured biota) might be relatively expensive, but allow for a large reduction in compensable losses (Case A). In the single example shown in Exhibit 1-4, the economically optimal restoration action would be Case B, which represents the option with the lowest total restoration cost plus compensable losses (i.e., the minimum of total damages). Of course, in many cases it will not be feasible to monetize all compensable losses, or to generate such a complete set of restoration options. The general concept that restoration costs and compensable losses should be balanced, however, should be considered in all cases.

Recall that all funds recovered as part of a damage claim must be used only to compensate the trustees for assessment costs and to restore the resource. Thus, in some cases the pattern of services at the site of a release will look more like the graphic presented in Exhibit 1-5. That is, activities will be undertaken to restore services at time T_2, which will continue past time T_3. These additional services, which are sometimes referred to as compensatory services, are represented by area C.

Table 4: CATEGORIES OF INJURED RESOURCES AND LOST SERVICES

Example Categories of Injured Resources*	Example Lost Services **
Habitat (e.g., wetland, forested upland, grassland, riverine systems, coastal systems, sediments, coral reef)	Services provided to other resources, such as: clean water, sediments, soils, and food. Passive use
Fish and Wildlife	Recreation Education Cultural Commercial Passive use
National Parks, National Wildlife Refuges, National Monuments, other public lands	Habitat Recreation Education Preservation Cultural Passive use
Beaches, Rivers, Surface Water Bodies, Marine Corridors, Wetlands	Water quality Commercial use (e.g., municipal/ industrial/agricultural water supply; marine transport; economic development) Recreational use (e.g., swimming, fishing, hunting, wildlife viewing) Subsistence use Flood control/erosion prevention Education Research Passive use
Groundwater	Municipal/commercial/industrial/ agricultural use Discharge of clean groundwater to surface water Passive use

Archaeological and Cultural	Historical Cultural Education Research Passive use

* The categories listed in this exhibit are not mutually exclusive (i.e., a release may result in injury to multiple resource categories, as well as a range of lost services).

** The services provided by a natural resource can accrue to humans and to other natural resources, and need not be consumptive.

The damage assessment procedure will depend on the characteristics of the case at hand, the level of funding and time available for the assessment, and the purpose of the assessment (e.g., to establish a preliminary estimate of damages as part of the decision to proceed with a full assessment, or for use in settlement negotiations with the responsible party).

The questions to consider include, but are not limited to:

Are simplified methods or models available to address the damage category of concern?

Is there a case-specific or site-specific factors that preclude the use of a simplified approach, or an approach based on benefits transfer (e.g., the discharge resulted in substantial injury to a unique or highly valued resource)?

Is there the availability of more detailed methods available for damage estimation, and are these methods likely to be applicable to the case at hand?

-Will a more detailed or case-specific analysis provide a significantly more accurate or defensible damage estimate?

-Is the expected improvement in accuracy or

defensibility resulting from the application of a more detailed approach justified considering the added cost?

Is there the availability of sufficient funding to cover the cost of the assessment?

Is sufficient time available to undertake -more detailed or case-specific analysis?

Is recovery of damages from the responsible party likely, including the cost of the assessment (i.e., does the responsible party have sufficient financial services)?

What is the status of the relationship and communications between the responsible party and the trustees (i.e., is the responsible party likely to litigate or is a negotiated settlement likely)? and

Do the advantages of increased accuracy and completeness in the damage estimate outweigh the potential disadvantages of delays in resource restoration?

The cost of conducting a damage assessment normally varies depending on several factors, like the types of natural resource services affected, the amount and quality of available data, and the nature of the natural resource injury. For example, detailed data on recreational behavior (e.g., number of recreational anglers who traditionally visit a site) are often collected by resource management agencies. While the quality of these data varies, in some cases these estimates may be sufficient to meet the needs of the damage assessment (e.g., a case in which a negotiated settlement is likely). Normally, the cost of restoration is a source of disagreement, but existing estimates of the cost of restoring injured wetland ecosystem may be available for use in establishing a restoration cost estimate. In other cases, existing data may not be available, necessitating the need for primary

data gathering or analysis.

4.1 Conceptual Framework

Black swan events in the wetland ecosystems result in two main types of disaster effects on a society and economy. These are usually considered for valuation: destruction (total or partial) of physical assets, and subsequent changes or modifications to economic flows in the affected area.

The following definitions of disaster effects have been adopted after careful consideration of the experience over the past four decades:

> Damage: total or partial destruction of physical assets existing in the affected area. Damage occurs during and immediately after the disaster and is measured in physical units (i.e., square meters of housing, kilometers of roads, etcetera). Its monetary value is expressed in terms of replacement costs according to prices prevailing just before the event.
>
> Losses: changes in economic flows arising from the disaster.4 They occur until full economic recovery and reconstruction is achieved, in some cases lasting for several years. Typical losses include the decline in output in productive sectors (agriculture, livestock, fisheries, industry and commerce) and the lower revenues and higher operational costs in the provision of services (education, health, water and sanitation, electricity, transport and communications). Also considered losses are the unexpected expenditures to meet humanitarian needs during the post-disaster emergency phase. Losses are expressed in current

values.

The value of damage is used as the basis for estimating reconstruction needs, while the value and type of losses provide the means for estimating the overall socio-economic impact of the disaster and the needs for economic recovery. It is this value that is usually sought in determining the compensation payable, when black swan events occur.

Determining the compensation payable when black swan events occur, has become very contentious in view of the absence of any properly defined framework for conducting a post impact study, and the absence of an integrated valuation approach, suitable for use in valuing wetland ecosystems. While Valuers have resorted to adopting Pre-determined Compensation Rates, Akujuru and Ruddock (2014), showed that this approach resulted in under-valuation of the degraded resources when black swan events occur. Extending the study into the inclusion of totems, shrines, and sacred places, Akujuru and Ruddock (2014a), concluded that there exists a socio-cultural interest on contaminated lands which professional Valuers do not reflect in damage assessment claims. They recommended that any comprehensive damage assessment, requires the incorporation of socio-cultural values in the Valuations.

5.0 DEVELOPMENT OF A FRAMEWORK:

The Vice Chancellor Sir, the main reason for the present quagmire is the absence of any valuation framework that will regulate the procedure and method valuers may adopt in valuing contaminated wetlands ecosystems, and the various professionals that will be required to conduct a comprehensive

study of the contamination impact, which will be known to both land owners and the polluters alike, in order to produce an unbiased value and minimise disputations between them. Such a framework will guide valuers in undertaking the valuation of contaminated wetlands ecosystems and also inform the polluters of the necessary protocols to follow in the event of any occurrence of a black swan event (contaminating event).

A framework, by definition, is a logically structured representation of the concepts, variables and relationships involved in a study, with the purpose of clearly identifying what actions need to be taken and what should be explored, examined, or measured in the process of solving a real world problem to present a detailed protocol that will improve the accuracy and precision of valuation practice (Kummerow, 2006). The proposed framework consists of three broad phases ranging from the occurrence of the contaminating incident through the investigative phase, remediation phase, to the valuation phase. The existence of a wetland ecosystem is taken for granted in the Niger Delta. Thus, the first phase includes the reporting/occurrence of a contamination incident, the initial observation stage, the preliminary survey stage, and possibly provision of relief materials to affected persons. The second stage involves a topographical survey to determine the extent and boundary of the site, detailed site investigations of the contaminated site to detect the extent and impact of the incident through a Scientific Study or Environmental Impact Analysis, the design of a remediation plan and the actual remediation of the site. The third stage entails the appraisal/valuation process which spans from the definition of the valuation problem, data collection, data analysis, selection of valuation methods and development of a composite valuation method suitable to the

case to the determination of the value of the wetland ecosystem in its non-contaminated and subsequently its contaminated state. Akujuru and Ruddock (2013) proposed a multidisciplinary framework that will meet the objectives of the various stakeholders of a contaminated wetland ecosystem in the Niger Delta. The proposed framework highlights the total stages involved in managing a contaminated wetland ecosystem commencing from the occurrence of the black swan event (contamination), through the investigative stages, the definition of the contamination problem and its remediation, and culminating in the determination of the value of damages due to the contamination (Figure 7).

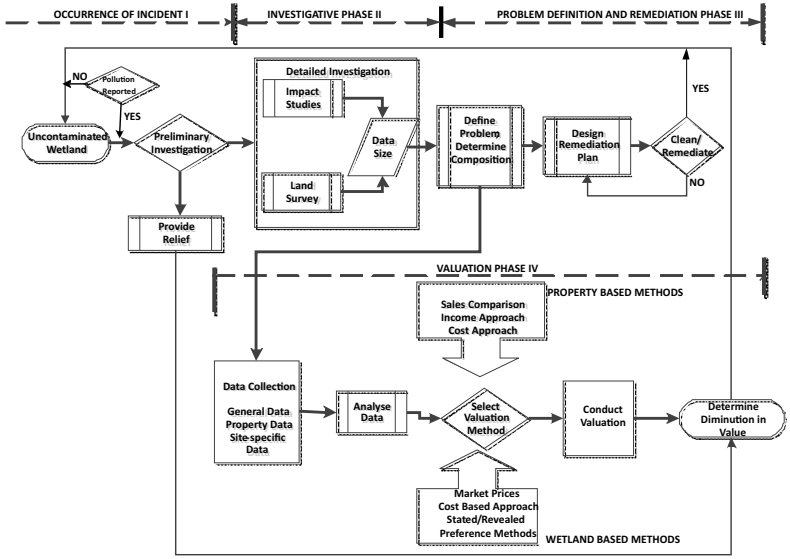

Figure 7:Proposed Contaminated Wetland Valuation Framework

Source: Akujuru and Ruddock, (2013)

5.1 Phase 1: Occurrence of a Black Swan Event

This framework that is being proposed is to be used in assessing a contaminated wetland and the process commences with the occurrence and notification of a contamination incident to the party responsible for the facility causing the contamination. (The focus of the framework is, of course, only wetlands affected by contamination caused by oil spillages which occur from the oil prospecting and development activities of the IOCs). Land contamination is defined by the UK Environment Agency (2004) in its broadest sense as a general spectrum of site and soil conditions which can include areas with elevated levels of naturally occurring substances, as well as specific sites that have been occupied by former industrial uses, which may have left a legacy of contamination from operational activities or from waste disposal, and also include areas of land in which substances are present as a result of direct or indirect events, such as accidents, spillages, aerial deposition or migration. Thus defined, contamination involves three basic components of contaminant, a receptor, and a pathway. A contaminant describes any substance in, on, or under the land with the potential to cause harm or to cause pollution of adjoining waters and may include crude petroleum and crude petroleum pipelines; a receptor which is something that could be adversely affected by a contaminant like people, an ecological system, real property, or a water body; a pathway which is the route or means through which a receptor can be exposed or affected by a contaminant. Contamination usually impacts the surrounding environment.

5.2 Phase II: Detailed Investigation

Upon the confirmation of the veracity of the contamination report, the IOC will initiate a detailed investigation of the

incident in compliance with the applicable laws. The first action here will be the identification of the Stakeholders of the incident, which will include the operators of the oil/gas field, the landowners/users, and the parties responsible for the incident.
The oil industry operations in the Niger Delta as in other parts of Nigeria is subject to certain laws such as the Oil Pipelines Act (Cap. 07, LFN, 2004), the Petroleum Act (Cap. P10, LFN, 2004), and the NOSDRA (Establishment) Act (No. 72, Vol. 93, 2006). There are other regulations like the Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) of NNPC (2002), issued by the Department of Petroleum Resources (DPR). The DPR supervises all petroleum industry operations and enforces the other laws, while NOSDRA is a government agency responsible for compliance with the environmental laws affecting the petroleum sector.

5.3 Phase III: Remediation:

The actual remediation of the site commences when the results of the detailed investigation stage indicate the presence of concentrations of hazardous materials over the regulatory thresholds and thus define the nature and extent of the contamination and its remediation; it will continue until the concentrations of hazardous substances are reduced to their regulatory standards; and may continue until after the clean-up of the receptors. The results of this stage will inform the actual valuation process, as this stage provides the required input data that is necessary for determining the damages suffered due to the contamination.

5.4 Phase IV: The Appraisal Stage:

Whipple (1993) opined that fields of study like Valuation which are fundamentally healthy exhibit a process of intellectual

growth and development. This growth involves rethinking the process followed by professional valuers in executing valuation assignments to meet the needs of their clients, avoid malfeasance and enrich their practice, and this is what the proposed framework is designed to achieve. This is necessitated by the cry of inadequacy of the compensation paid as damages due to oil pollution contamination and a general feeling that traditional valuation methods were not serving clients' needs and the need to provide a protocol for defining and solving valuation problems within a logically coherent frame of reference. To do this, the valuer is required to follow a protocol diligently as detailed below.

5.5 Definition of Problem:

A valuer retained to advise on the value of a contaminated wetland or any property, needs to first ascertain what the client's problem is and in the case of a contaminated wetland, this might be to enable the client know the damages suffered due to the contamination. Graaskamp (1992), stated that the definition of the valuation problem leads in turn to the definition of the most appropriate value sought by the client whileColeman (2006)indicated the elements necessary for problem identification to include (1) client; (2) the intended use of the valuation report; (3) the intended use of the valuation opinion and conclusions; (4) the type and definition of value; (5) effective date of the valuer's opinion and valuation; (6) the subject of the assignment and its relevant characteristics; (7) assignment conditions like any assumptions made about the title and rights that are the subject of the valuation which may be intrinsic to the definition of the problem or externally imposed like a restrictive covenant.

5.6 Determine Land Composition and Use:

This is an extension of the task of defining the subject of the valuation assignment captured under problem definition above. A wetland by nature consists of both an upland portion and a wetland portion that may be put to different uses. This will entail stating the overall size of the contaminated wetland and the size of each component and the current uses and a confirmation of the legality of such uses. To be able to source for comparable data, the valuer will need to determine the alternative uses of the site and the possibility of securing legal permits to use the site for such alternative uses and the financial feasibility of doing so. The valuer needs to confirm that the property is physically suited to the use or the practicability of being adapted to the use. The Niger Delta Wetlands being of two types namely coastal and freshwater wetlands provide numerous goods and services that have an economic value, not only to the local population living in its periphery but also to communities living outside the wetland area. They are important sources for food, fresh water and building materials and provide valuable services such as water treatment and erosion control. Salau (1993) posited that there are 46, 000 plant species, 205 of which are endemic and approximately 484 plants in 112 families in the region, while Kadafa (2012) stated that a large population of the Niger Delta survive on services provided by the Niger Delta wetland like crabs, fish, shrimps, periwinkles, cockles, molluscs, and animals and birds.

5.7 Data Collection and Verification:

The data that will be required will cover both general data and site or property specific data, some of which may already exist in the valuer's records and some may be collected afresh. A valuer practising in the Niger Delta, will maintain files containing

regional, city and neighbourhood data for the area in which they customarily practice, local construction costs, and potential comparable properties may also be available. Where this is not, the valuer needs to collect general economic data at the national, regional, city, and neighbourhood levels. In some cases, international data may also be collected. The data that will be relevant will relate to social, economic, governmental, and environmental factors affecting the subject wetland. Specific data on accessibility of the site to surrounding transportation routes and distance to transport termini will be considered, so also any potential conflict in the means of accessibility will be mentioned. The locational characteristics will be considered to understand the nature of the linkages of uses to the site.

Site/Property-specific data or data more directly relevant to the contaminated wetland being valued and to comparable properties will also be collected. For the land itself, it will include the dimensions, slope, exposure, soil conditions, drainage and the like. Improvement data starting at the boundaries and working inwards will be recorded including a full description of any buildings or structures like fishponds etc. effort must be made to ascertain the age of any structure to be able to determine approximate cost of construction and depreciation and income and expense data; utilisation histories and every other information that ordinary buyers might likely require to make a decision should be collected.

5.8 Analysis of Data:

The analysis will involve separating the data into those applicable to the upland component and those applicable to the wetland ecosystem part, and thorough interpretation of all the strengths and weaknesses, the environmental conditions of the site, and interpreting the significance of the data to lay a

foundation for selecting the best alternative use. For the upland part, the various data collected on the developed structures on the land encompassing its structure, measurements, description, depreciation, and use will be assembled with those of any comparable properties collected. As the valuer is analysing the subject property, he will also analyse suitable comparable where available, to be able to compare and extract market evidence of values. For the wetland ecosystem portion, having collected both general and specific data, the valuer will collect supply and demand data characteristic to the most probable market for the wetland ecosystem. This will be analysed to determine the value contribution of each component of the wetland ecosystem and every income generating use or potential use of the wetland ecosystem. It will be necessary to establish as much as possible the inventory of goods and services generated by the wetland ecosystem and the potential gainers or losers from the presence or absence of the wetland in its present state as well as establish the potentials in the future. The analysis of data on contaminated wetlands requires a complete knowledge of the contamination life cycle, which according to Bell (2008) and Defrancesco *et al* (2012), commences from (1) the occurrence of the contamination event; (2) the assessment of the extent and impact of the contamination on the environment, including an estimate of the cost of assessment and the apportionment of remediation responsibility; (3) the remediation or repair stage; to (4) the Post-remediation Stage.

5.9 Selection of Valuation Methods:

Cognisant of the composition of the wetland, the valuer selects from the array of valuation methods available for valuing both marketable and non-marketable goods/services. Two broad groups of methods consisting of the normative methods taught

to valuers and referred to as 'Property Based Methods' and the ecologists' methods referred to as 'Wetland Based Methods' are available to the valuer.

Property Based Methods like Sales comparison or Market Approach; Income Capitalisation Approach; and Cost Approach, and while Wetlands Based Methods include Market prices Approach; Cost-Based Approaches; Stated Pretences Methods; and Revealed Preferences Methods.

While the market goods/services could easily be valued with the valuers normative methods, it is not easy to value non-market goods/services. Market goods/services could easily be valued since a market exists for them and methods such as the property-based methods and the market prices and cost-based approaches from the wetland-based methods can be used. These market based methods rely mostly on historical information on market prices (Ulibarri and Wellman, 1997). For non-market goods/services, there is no market data to rely on and the valuation methods adopt indirect estimates of people's willingness to pay or accept for a good/service like the revealed or stated preferences methods of hedonic pricing or contingent valuation methods respectively. in view of this mixed grill nature of wetlands, this study proposes the selection of a valuation method that will criss-cross the property and wetland-based methods of valuation, selecting the most appropriate in each case, and combining to produce a composite method for use in determining the diminution in value of a contaminated wetland.

5.10 Valuation:

Uba (2010)stated that when contamination a black swan event has been identified, quantified, and the remediation costs have been identified by a qualified expert, the valuer may be able to

develop an opinion of market value that considers the negative impact on value, and provide a list of notes to guide valuers valuing contaminated properties. This includes:

- An estimate of value as if the contamination has been removed, i. e. as if free and clear of contamination.
- The valuer must rely on the expert advice of environmental and other qualified experts with proper disclosure of the experts' findings, opinions and conclusions on the contamination.
- Realise that the estimated diminution in property value may be more than the estimated costs to remediate the property.
- The valuer may prepare the valuation opinion subject to a hypothetical condition that the property is not impacted by contamination if requested to do so but with full disclosure of the hypothetical condition and the likely effect of the hypothetical condition on the estimate of value.

The IVSC (2007) in its guidance, advice valuers to note the 'peculiarities' of the real estate market in reporting their values, especially:

- The fact that it is the market's reaction to the contamination that the valuer must consider and measure.
- Where market value is sought, the valuer should reflect the market effect of the condition or circumstance.
- The valuer must research and reflect the effects of the contaminant on the property in its market.

The valuer must also note that there can be a difference between public perception and the actual market effects for the presence of the contamination, so he must avoid generally held public perception which are erroneous

but should conduct competent research and reflect market attitudes towards the contamination. As an expert of Value determination, it is expected that the Value Opinion derived by the Valuer will approximate the total loss suffered because of the black swan event. Unfortunately, no polluter/ business operator will like to pay the total cost of the pollution as determined. This reluctance to pay usually results in endless litigations to prove liability. The legal process being protracted, results in the Courts' intervention and with the Courts not being experts at Value determination, compensation figures are awarded which in most cases bear no resemblance to the true losses suffered and always inadequate.

5.11 Valuation of Wetland Ecosystems:

The Vice Chancellor, within the proposed framework, Akujuru and Ruddock (2014) suggested a Valuation model that will assist Valuers in capturing every aspect of a degraded wetland ecosystem. The model aimed at determining the market value of a wetland ecosystem thus:

The market value of a wetland, is indicated by

$$Vo = \left(Aw \times \frac{V}{Aw}\right) + \left(Au \times \frac{V}{Au}\right)$$

Vo = Market Value of the Whole parcel of land;

Aw = Area of Wetlands.

V/Aw = Market Value per hectare of wetlands.

Au = Area of Uplands.

V/Au = Market Value per hectare of upland.

Where the wetland is contaminated and there is a developed property standing on it, then the compensation should be:

$\sum(Vp + Vd)$

Where Vd = Diminution in Value, and Vp = Value of the Contaminated Property, and

$Vp = \sum(Rc + Ic + Lc + CUc + Yc)$

Where

Rc = Income and revenue losses from use and occupation of the wetland (compensable value),

Ic = Costs of scientific investigations to determine extent and impact of contamination,

Lc = Legal costs where agreed in advance,

CUc = Clean-up costs to prepare for subsequent use,

Yc = Any other incidental costs not captured above, and

$Vd = Vo - \sum(Ic + Ri + Mr)$

Where

Vo = Value of Property unimpaired,

Ic = as above,

Ri = Repair costs to the property,

Mr = Risk associated with market resistance to contamination

(determined by the price reduction on contaminated properties when compared to an uncontaminated comparable). The above framework assumes a static one-off determination of value. Taking cognisance of the contamination life cycle, the actual loss in value will consist of (1) loss during occurrence but before remediation; (2) loss during remediation; and (3) post-remediation loss. The compensable value can thus be determined from the following:

Rc =RI + RIn-m/n

Where Rc = Compensable Value,

RI = Net Income from all goods/service in the year of assessment,

n-m = The duration of impact less the initial year of assessment,

n = The duration of impact as revealed by the scientific studies.

To illustrate the application of the Valuation Model recommended, a wetland contaminated by oil spill in the Egita community in the Obga/Egbema/Ndoni Local Government Area of Rivers State of Nigeria is used for illustration. The oil spill impacted about 40000square metres of land consisting of approximately 5000 square metres of wetland and 35000 square metres of rich agricultural land. The land is fertile for the production of economic trees and crops of different variety and the gathering of non-timber forest products (NTFPs) like bush mango, pears, snails, hunting of game, medicinal leaves and

vegetables etc. the wetland is used for fish farming in lakes, ponds and fish channels. An enumeration of economic trees at different stages of maturity and various NTFPs, indicates a cumulative net annual income of N1888000.00, which when capitalised, indicates an annual value of N10, 516, 160.00. When an impact duration of 10 years is considered, the total value of income accruable from the land is N105, 161, 600.00. The compensation paid for the contamination of this land adopting the pre-determined compensation rate was N20, 173, 546.25.Analysis of market evidence, wetland values amount to 25% of the upland land values and 20% in terms of land area. Recent sales indicate parcels of 930square metres being sold for N1500000.00.

It is assumed as follows:
Cost of scientific investigation = N2, 500, 000.00
Legal Costs @ 10% of Value = N10, 516, 160.00
Clean up Cost (say) = N10, 000, 000.00
Other Costs e.g. Valuer's Fee = N8, 500, 000.00
Repair Costs like improved fertiliser to the land = N5, 500, 000.00
Market risk associated with sale of similar contaminated land (say) 25% discount on value.

Compensation = $\sum(Vp + Vd)$

Where Vd = Diminution in Value, and Vp = Value of the Contaminated Property, and

$Vp = \sum(Rc + Ic + Lc + CUc + Yc)$; and

$Vd = Vo - \sum(Ic + Ri + Mr)$; and $Vo = (Aw \times \frac{V}{Aw}) + (Au \times \frac{V}{Au})$

Where

Rc = Income and revenue losses from use and occupation of the wetland (compensable value),

Ic = Costs of scientific investigations to determine extent and impact of contamination,

Lc = Legal costs where agreed in advance,

CUc = Clean-up costs to prepare for subsequent use,

Yc = Any other incidental costs not captured above, and

Vo = Value of Property unimpaired,

Aw = Area of Wetland; V/Aw = Price per Hectare of Wetland; Au = Area of Upland portion; V/Au = Price per Hectare of Upland.

Ic = as above,

Ri = Repair costs to the property,

Mr = Risk associated with market resistance to contamination (determined by the price reduction on contaminated properties when compared to an uncontaminated comparable).

Vo = (0.023 × 375 000) + (0.07 × 1 500 000)
= N1 221 772 for a parcel of 930m2 or N13 134 049 per Hectare.
Vp = 136 677 760.00
Vd = N(52 536 196 – 34 290 400) = N18 245 796.00
This computation has been done for only the period from occurrence of the spill to the end of the impact of the spill,

neglecting subsequent usage of the impacted land. When compared to the total compensation paid for damage and land value of N20 173 546.25, it becomes obvious that adopting the model indicates compensation higher than the amount paid which was determined by the use of pre-determined compensation rates and represents only the loss in value (damage). This model thus determines the various components that should ordinarily serve the actual purpose of a compensation payment. The model while illustrating an improvement, suffers the deficiency of incompleteness as it ignores the contamination life circle. The calculation should be done for each stage of the contamination life cycle to determine the total diminution in value that constitutes the compensable loss. Bell (2008) opined that some detrimental conditions require an assessment like conducting a soil, environmental, or engineering study and that each detrimental condition causing contamination is usually analysed on a case-by-case basis since each condition may have a variety of impacts on value depending on the stage in the contamination life cycle which can be illustrated as shown in Figure 8 below.

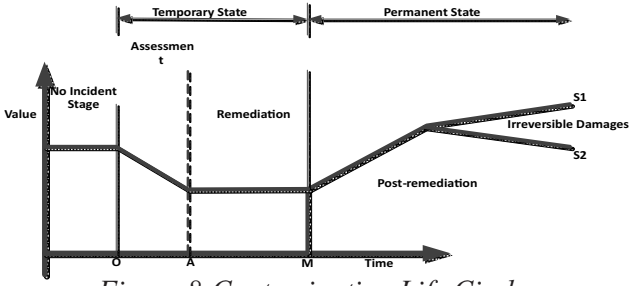

Figure 8:Contamination Life Circle
Source: Adapted from Bell (2008) and Defrancesco et al. (2012)

Vice Chancellor Sir, while our suggested model shows an improvement in Compensation determination, the controversial nature of black swan events means that compensation claims are usually litigious, and the final determination of the compensation awards lies outside the control of the professional valuer. In my practice as a Valuer, I have represented claimants in several Compensation Claims and in most cases, the Courts have awarded compensation figures far below the sum claimed. In some cases, where the Courts have upheld the assessed claims, the reluctance of the polluters to pay, have resulted in long waiting periods for the payment forcing the claimants to settle for and receive lower compensation figures than they are entitled to.

The Vice chancellor Sir, I determined the damages due to contamination of the claimants wetlands in some notable cases like:

1. SHELL PETROLEUM DEVELOPMENT COMPANY LTD V COUNCILLOR F.B. FARAH AND OTHERS, [1995] 3 N.W.L.R

   In this case, I introduced the concept of "Shock and Fear" as a Head of Claim in Contaminated Land compensation Valuation.

2. CHIEF ISAAC OSARO AGBARA & ORS V THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED & ORS Suit No.FHC/ASB/CS/231/2001, judgement was delivered on 14/06/2010 but payment was only made in 2021.

This case lasted for 32 years before compensation was paid.

3. The Bodo Community and Others v The Shell Petroleum Development Company of Nigeria Ltd [2014] EWHC 1973 (TCC) Judgement given in London in 2015 for $83.4m which was only 82% of the original claim of $454.9m.

4. Egita Community in Ogba/Ndoni/Egbema Local Government of Rivers State Oil well blow-out.

5. Obong Effiong Archianga and nine others, representing Ibeno Clan in Akwa Ibom State against the Nigerian National Petroleum Corporation, Mobil Production Nigeria Unlimited, and Exxon Mobil Corporation. The Federal High Court awarded a compensation of N82.0 billion for damages to the environment.

In almost all these cases, the Compensation eventually awarded after a protracted litigation, was less than the compensation claimed. With no environmental remediation, the eventual compensation is invariably inadequate and fell short of the claimants'expectations. Vice Chancellor Sir, Nigerian compensation practice rarely incorporates remediation, and its

magnitude is always determined as at the date of assessment and never considers the contamination life cycle as dictated by international practices. This results in inadequacy of the monetary compensation usually paid.

As a Valuer, I was involved in the assessment of compensation for the right of way acquisition of the Obite-Ubeta-Rumuji gas Pipeline acquired by Total E & P Limited.

6.0 Other Contributions to Wetland Valuations:

1. **Akujuru, V. A. (2001).** Evaluation of the Polluted Environment Due to Oil Exploration and Exploitation in the Niger Delta, *African Journal of Environmental Studies 2* (2): 180-187.

2. **Akujuru, V.A.** and Ruddock L. **(2013).** Compulsory Acquisition Practices and The Determination Of Compensation Payable In The Niger Delta; *Journal Of Land Administration In Eastern Africa, Ardhi University, Tanzania, 1* (1): 74-84. (Tanzania)

3. **Akujuru, V.A.** and Ruddock, L. **(2014).** The Determination of Compensation Payable in the Niger Delta for Compulsory Acquisition and the Need for a

Sustainable Practice, *Journal of Sustainable Development in Africa, 16* (2):102-114. (USA)

4. **Akujuru, V. A**. and Ruddock, L. **(2014).** Incorporation of socio-Cultural Values in Damage Assessment Valuations of Contaminated Lands in the Niger Delta, *Land Journal, 3*(3): 675-692. (Switzerland)

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6. **Akujuru, V. A.** and Ruddock, L. **(2015).** Contaminated Wetlands Valuation in the Niger Delta by Valuers: The Need for a Paradigm Shift, *Journal of African Real Estate Research (AJRER*), 1: 5- 21. (South Africa)

7. **Akujuru, V. A.** and Ogbonda, U. J. **(2016).** Rationalising the Contemporary Issues in the Valuation of Land for Infrastructural Development in Nigeria. *Donnish Journal of Research in Environmental Studies, 3* (1): 001-007.

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8. **Victor A. Akujuru** and Les Ruddock (2016), Economic value determination as a strategy for building resilient communities in the Niger Delta region, International Journal of Strategic Property Management, 20 (3): 239-251, DOI:10.3846/1648715X.2016.1191558

9. Deeyah Christopher L**,** and **Akujuru Victor A. (2016)** Assessing the Effectiveness of the Nigerian Compulsory Acquisition Practice in Road Infrastructural Provision in Rivers State. Asian Journal of Social Sciences and Humanities 5(4): 77-88.

10. Onyije, I.R.and **Akujuru, V.A. (2016),** Appraising the Equity of Nigerian Compensation Practice. International Journal of Development Research 6 (11): 10408-10412.

11. Josiah Woga and **Victor Akujuru (2016),** The Place of Environmental Valuation in the Training of Estate Surveyors and Valuers, International Journal of Sciences: Basic and Applied Research (IJSBAR), 30(3): 58-73. India.

12. Walters, D. N. **and Akujuru, V. A. (2016)**, Reflecting Stakeholders' Perspective in Compensation

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13. Deeyah Christopher L**,** and **Akujuru Victor A. (2017),** Investigating the Sufficiency of Paid Compensation for Compulsory Acquisition in Road Infrastructural Provision in Rivers State, Research on Humanities and Social Sciences7(2): 20-27. USA.

14. Ubani. S. O. J. W, **Akujuru. V. A.** and Ekeke B. **(2018)** The Value of Mangrove Forest Resources in Cookey's Creek, Opobo Town, International Journal of Humanities and Social Sciences, 7 (6):9-22.

15. Research Monograph

    1. Land Acquisition and Environmental Damages Valuation Approach Published in Niger Delta Environment Survey (NDES), Volume 5 of Socio-Economics Sector Report, 2001.
    2. Environmental Assessment of Ogoni Land by United Nations Environment Programme (UNEP), ISBN 978-92-807-3130-9, 2011 (pp. 457-471)

7.0 CONCLUSION :

Mr Vice Chancellor Sir, while black Swan events are usually unexpected, they have become deliberately created by dwellers in the wetland ecosystem environment. People now puncture oil bearing pipelines frequently to syphone crude oil for illegal refining, ignoring the damage they cause to the land. Where there is equipment failure resulting inoil spills, natives have assumed that any monetary compensation paid will be enough to cover all their losses. I have shown here that the valuation techniques being used by Valuers, hardly determines an adequate compensation. Even our proposed Valuation Model, does not still yield an adequate compensation. This confirms that monetary compensation can hardly be sufficient as most damages suffered are never traded in the market and thus have no market prices. Woga and Akujuru (2016) have shown that most Nigerian Valuers are not very conversant with methods of environmental valuations and therefore adopt Valuation methods more suitable for other purposes. The inadequacy is compounded by the absence of a workable Framework for responding to the occurrence of oil spills when they occur and being used by the statutory authority charged with the responsibility of suprintending the environment. There is also the absence of any effective environmental management policy that will ensure quick response to the occurrence of black swan events.

I. The policy implications for developing economies like that of Nigeria is that where the Government compromises its regulatory role and becomes dependent on only one sector of

the economy for its revenues, the citizens will suffer as they are unable to insist on the application of free market international best practices in the operations of the dominant industry.

ii. The framework proposed, will enable the operators of the oil industry follow a laid down protocol in responding to oil spill contamination as they will be able to visualise the various processes involved. It will also result in the adoption of market determined valuation methods that will yield better values to the landowners. Finally, it will add to the tools available for valuing wetland ecosystems for decision making.

iii. Practically, the proposed framework affords the operators of the oil industry a transparent procedure that enables each party to know what the responsibility of the other parties are. Professional valuers who adopt the framework will be able to methodically solve a valuation problem with clarity and certainty and avoid the accusation of compromising with the polluters, when consulted for their opinions. There will be uniformity among valuers handling such

valuation assignments as they will all follow a common procedure, and the aggrieved landowners will be able to understand the various processes involved in the determination of compensable value of damages due to contamination of wetlands ecosystems. The regulatory body of Valuers will also have a standard with which to assess the compliance of valuers to stated procedures of practice and thus improve the regulation of practice.

iv. The research implications of the study are that valuers will need to update their knowledge of wetland economics to be able to adopt the framework. Training institutions will need to update their valuation curricular to include ecological economics if future valuers are to be adequately equipped to value wetlands ecosystems. This also implies that academics in these institutions will need to develop their professional capacity to train future valuers.

Mr Vice Chancellor Sir, no matter the quantum of compensation paid, the damage to the land and other environnemental ressources can hardly be accurately quantified. It is therefore a misconception that monetary compensation will ever be

adequate. Occupants of the wetland ecosystem should therefore avoid forcing the occurrence of land contamination as the land and environnement will hardly return to normal.

8.0 RECOMMENDATIONS :

The state of Professional knowledge and competence of the Valuer, being inadequate to engage in environmental valuations, requires a rethinking of the training and policy formulation that will aid the management of contaminated environments. Some recommendations will include :

8.1 IMPROVED KNOWLEDGE AND SKILLS :

Professional valuers need to include in their curriculum, the training and mastery of the methods of valuing non-market goods. While our training menu concentrates on market value estimation, environmental goods are mostly valued using indirect market estimates of value. This estimate requires a good knowledge of statistical analysis which most practicing valuers are hardly disposed to learning/acquiring.Valuation is an opinion the valuer gives to convince users that all the damaged resources have been captured in the process of value formulation. Such process, will require data that Isexplanatory, reliable and incontrovertible. The process of data analysis, Is required in the estimation of the sorogate prices that form the bedrock of indirect market values.The critical role of valuers in value determination requires the training curricular of future valuers to be expanded to include aspects of ecological

economics to address the peculiarities of the Niger Delta environment and both the Nigerian Institution of Estate Surveyors (NIESV) and the Estate Surveyors and Valuers Registration Board of Nigeria (ESVARBON) should produce a Practice Standard for the Valuation of Contaminated Properties, incorporating international best practice standards.

8.2 POLICY CHANGE:

The Government has the responsibility to formulate policies that will ensure good environmental management practice. Where the Government compromises its regulatory role and becomes dependent on only one sector of the economy for its revenues, the citizens suffer and are unable to insist on the application of free market international best practices in the operations of the dominant industry. For instance, while the oil spillage in the Gulf of Mexico was quickly cleaned and the polluter made to pay adequate market determined compensation for damages caused, oil spills in the Niger Delta are hardly paid for and where they are paid, the compensation is determined with prescribed Valuation methods. Government should restrict its role to being the regulator of the oil industry and review the compensation provisions of all enabling laws dictating methods of valuation to be adopted in compulsory acquisition valuations. Government departments should allow access to their data about various aspects of the economy, and valuation firms should create a Property Data Bank that will freely share market data on property transactions to aid comparability.

8.3 OPERATION WISE:

The IOCs should allow Valuers in the Niger Delta exercise their professional skills as they do in the developed economies, rather than prescribing guidelines to be followed in the determination of compensable value of damages due to contamination. The National Oil Spill Detection and Response Agency (NOSDRA) needs to be empowered to be independent and funded to fulfill its mandate and consider the proposed framework as an aid in monitoring and regulating oil spills. A situation where NOSDRA as a regulator depends on the Oil Companies to respond to oil spill reports, compromises their objectivity in assigning blames and thus produces biased reports.

8.4 FURTHER RESEARCH:

Environmental Valuation is an emerging area of specialization for Estate Surveyors and Valuers in Nigeria. Being an option in Valuation which is dreaded by many graduates, requires further research by Institutions of higher learning, training potential professionals in the estate surveying and valuation profession. Further research will engender specialization and expertise among Estate Surveyors and Valuers and make them comparable to their international counterparts.

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