A STUDY OF WETLAND VALUATION PRACTICE FOR COMPENSATION IN THE NIGER DELTA, NIGERIA

By

MAYOWA OLUSOLA AJIBOLA
(Matric No. CUGP070179)

A PhD THESIS SUBMITTED TO THE DEPARTMENT OF ESTATE MANAGEMENT, SCHOOL OF ENVIRONMENTAL SCIENCES, COLLEGE OF SCIENCE AND TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY (PhD) IN ESTATE MANAGEMENT OF COVENANT UNIVERSITY, OTA, NIGERIA

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The study examined wetland valuation practice for compensation in the Niger Delta, Nigeria. The primary data used for the study were obtained from questionnaire administered on 120 respondent Estate Surveying and Valuation firms in the study area. Personal and/or telephone interviews were conducted on the Heads of Department of Estate Management of the various Universities offering Estate Management in the Southern part of Nigeria, to ascertain whether environmental valuation is being taught in the affected institutions. Equally, personal/telephone interview was conducted on the officials of Nigerian Institution of Estate Surveyors and Valuers (NIESV), to ascertain whether environmental valuation is included in the curriculum for professional examinations. The primary data collected were analysed using descriptive and inferential statistics with the aid of Statistical Package for Social Sciences (SPSS version 17). Relative importance index and principal component analysis were applied in testing for the most important factors influencing the choice of wetland valuation methods in the study area. Major findings of the study were that Estate Surveyors and Valuers in the Niger Delta adopted open market (56.4%) and cost (27.3%) bases for wetland valuation as against total economic value basis (16.3%) which takes cognisance of non-use value aspects of wetland ecosystems, traditional methods cannot be wholly applied to the valuation of wetland ecosystems because they cannot capture the value of attributes, functions and services which are not traded in the open market, respondents in the study area adopted methods that rely more on market evidence, except contingent valuation, which considers evidences both within and outside of open market, only four factors have major influences on the choice of wetland valuation method adopted in the study area. These are availability of data (RII; 4.16), availability of substitute sites (RII; 3.49), limitations of valuation methods (RII; 3.47) and people's perception (RII; 3.00). The study also revealed that valuing wetland resources in the study area is fraught with various challenges including lack of data (87.3%, RII; 3.84), complex wetland ecosystems (80.0%, RII; 3.75), inadequate government policy (69.1%, RII; 3.29) and sophisticated survey design (63.6%, RII; 2.35). The study further revealed that only 5.5% of the respondents took any course in environmental valuation during their undergraduate school days. Also environmental valuation has not been included in NIESV Professional valuation curriculum. The study equally revealed that there was no government policy on wetland ecosystems. The study recommends that Estate Surveyors and Valuers should adopt total economic value basis for wetland valuation instead open market value and cost bases and also contemporary methods so as to capture both use and non-use values of wetland resources. NIESV should include environmental valuation in the curriculum for professional examinations and organise mandatory training/workshop/seminar on wetland valuation from time to time to keep members up-to-date with the appropriate techniques available. Also, Estate Surveyors and Valuers Registration Board of Nigeria (ESVARBON) should mandate Institutions offering Estate Management programmes to include environmental valuation as a Course, rather than treating it as a topic, as is currently done in most universities.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Economic theory states that goods and factors of production have values due to their utility, scarcity and possibility of exchange in relation to the uses to which individuals and/or group of people put them. However, not all goods possess these characteristics as there are some, though of great benefits, that do not meet these criteria. They include air, water, aesthetics and cultural heritage among others. The economic mindset, on utility and satisfaction derivable from goods, has led to excessive usage and degradation of the natural environment such as wetland. Many natural resources are consumed collectively hence the true values are not accounted for because there is no mechanism to enforce the property rights as they are perceived as public goods and services. To avert further degradation of the environment, resulting from lack of appreciation of the value of wetland, there must be explicit assessment of the value of environmental resources, in general, and wetland ecosystems in particular.

Wetland ecosystems, which are an important environmental/natural resource, form part of the total wealth of a nation. However, because many of its services are not traded in the open market and their values are not captured using the conventional approaches to valuation, they are usually ignored in the systems of national accounts. As a result, conventional measures of wealth give incorrect indications of the state of its well-being, leading to misinformed policy actions, poorly informed decision-making, or ill-advised strategic social choices, especially for compensation purposes.

A STUDY OF WETLAND VALUATION PRACTICE FOR COMPENSATION IN THE NIGER DELTA, NIGERIA

By

MAYOWA OLUSOLA AJIBOLA
(Matric No. CUGP070179)

A PhD THESIS SUBMITTED TO THE DEPARTMENT OF ESTATE MANAGEMENT, SCHOOL OF ENVIRONMENTAL SCIENCES, COLLEGE OF SCIENCE AND TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY (PhD) IN ESTATE MANAGEMENT OF COVENANT UNIVERSITY, OTA, NIGERIA

AUGUST, 2012

DEDICATION

This work is dedicated

to

My Mother – Jaiyeola Rachael

For her unrelenting efforts in ensuring that, in spite of all attempts to dissuade her, she ensured that I achieved my desired academic goal in life.

CERTIFICATION

This is to certify that AJIBOLA Mayowa Olusola (Matric No. CUGP070179) carried out this research work titled A STUDY OF WETLAND VALUATION PRACTICE FOR COMPENSATION IN THE NIGER DELTA, NIGERIA under my supervision and that this has not been submitted for the award of any degree in this or any other institution.

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Dr. Samuel Adesiyan Oloyede Date

Supervisor

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Dr. Abel Olaleye Date

Co-Supervisor

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Dr. Samuel Adesiyan Oloyede Date

Ag. HOD, Estate Management

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Prof. A. S. Asaju Date

External Examiner

DECLARATION

I, AJIBOLA Mayowa Olusola, declare that this research was entirely carried out by me under the supervision of Dr. S. A. Oloyede **(**Supervisor**)** of the Department of Estate Management, Covenant University, Ota, Ogun State, Nigeria and Dr. A. Olaleye (Co-Supervisor) of the Department of Estate Management, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria

The thesis has not been presented, either wholly or in parts, for any degree elsewhere. All sources of scholarly information used were duly acknowledged.

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M. O. AJIBOLA DATE

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To God be the glory for the great thing He has done in seeing me to the successful completion of this programme. Achieving this feat is not by my power or might but by the Spirit of God. Thanks be unto God who has not abandoned me to the expectations of man.

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Also, my appreciation goes to the past and the present Registrars of Covenant University, Pastor Yemi Nathaniel, Dr. Daniel Rotimi and Mr. J. N. Taiwo respectively for the various roles God has used them to play in the accomplishment of a task that looked, initially, impossible to accomplish. Pastor Yemi Nathaniel's posture of frankness, boldness and eloquence, while Dr. Daniel Rotimi and Mr. J. N. Taiwo's humble ways of encouraging Faculty to fully lend themselves to raising of a new generation of leaders captured my admiration. My prayer for the trio is that the foundation that has been laid,

upon which they are building, God will continue to give them the building blocks with which they will accomplish their parts in the vision they have keyed into. Amen.

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Assessing compensation for oil spill/pollution, which is a common occurrence in the Niger Delta, is founded on the provisions of the laws, especially the Nigeria Constitution (Sec. 44) 1999 and other relevant laws such as Oil Pipelines Act Cap 338 of 1990; Petroleum Act 1969; Mining Act No. 24 of 1999 and the Land Use Act Cap 202 of 1990. Specifically Sec. 44 (2m) of the Constitution provides, "subject to prompt payment of compensation for damage to buildings, economic trees or crops, providing for any authority or person to enter, survey or dig any land, or to lay, install or erect poles, cables, wires, pipes, or other conductors or structures on any land, in order to provide or maintain the supply or distribution of energy, fuel, water, sewage, telecommunication services or other public facilities or public utilities". On the other hand, Oil Pipelines Act provides for compensation in Sec 6(3), 11(5) and 20(1, 2). Though these laws prescribed the process for assessing damage from oil pollution, they do not make comprehensive provision for compensation in respect of oil pollution in the petroleum industry in Nigeria. For example, Section 29 of the Land Use Act provides compensation for only land; buildings, installations and improvement thereon; and crops while Oil Pipelines Act in Section 11 (5a) considers compensation for buildings, crops and profitable trees. The aftermath of this is dissatisfaction among victims of oil pollution and conflicts within the oil producing communities (Egbenta, 2010).

Oil production activities in the Niger Delta affect not just the use goods but to a larger extent the non-use goods such as wetland, clean air, water, wildlife, natural heritage sites, recreation sites, natural scenic views and a host of other goods that have direct positive impact on the life of the people. According to Obot, Antonio, Braide, Dore, Wicks, and Steiner (2006) oil spills/pollution has been a major source of damage to wetlands in the Niger Delta region over the years. In their study, a total of 220 hectares were damaged by oil pollution in Bayelsa State, 105 hectares in Delta State and 202 hectares in Rivers State (See Appendix IV).

According to Kakulu (2007) the bone of contention among oil companies and the claimants, from inception till now, is the adequacy of compensation paid or payable for oil spills/pollution, in particular, and general damages to people's interest in land and other ecosystems. Compensation principle is to ensure equity, i.e. the affected persons are neither worse off nor better off than before the occurrence of the damage. The author is of the view that there is the general feeling and expression that compensation paid in respect of land acquired compulsorily and compensation paid for damage caused by oil spillage are inadequate. She opines further that the issue of inadequate compensation is one of the reasons for the current socio-political situation in the Niger Delta region. In a paper titled "Compulsory Acquisition of Land and Compensation", Food and Agricultural Organization (FAO) (2008), state that "compensation is to repay the claimants for their losses, and should be based on principles of equity and equivalence".

The principle of equivalence is crucial to determining compensation: affected owners and occupants should neither be enriched nor impoverished as a result of the compulsory acquisition, in the case of Niger Delta, oil pollution. Also, Olusegun (2009) states that the basic principle of compensation for acquisition is that it should be fair and adequate. It should restore the individual to a state where he is neither better nor worse off at the end of the revocation exercise. The author states further that compensation is a recompense for loss and must be approximate, as far as possible, to the money value unto which the owner might have converted his property, had the law not deprived him of it. Commenting on the method of assessing compensation, Olusegun (2009) opines that any method of assessment used by the acquiring authority to determine compensation must sustain the principle of equity under which the property owner is to be left whole in terms of naira and that the requirements for the payment of compensation on acquired lands include the right to compensation and social equity. Nuhu (2006) also argues that when land is compulsorily acquired for a just purpose, there should be prompt payment of/and adequate compensation. FAO (2008) adds that financial compensation on the basis of equivalence of only the loss of land rarely achieves the aim of putting those affected in the same position as they were before the acquisition since in most cases, the money paid may not fully replace what is lost. Commenting on adequacy of compensation in Malaysia, Alias and Daud (2006) state that there is nothing in any compulsory acquisition laws that prescribes the measure or yardstick to apply in assessing the adequacy of compensation. In the same vein, Ambaye (2009) states that despite the fact that the Ethiopian Constitution, under Article 40(8), provides that just and adequate compensation should be paid to the expropriated; the compensation paid is found to be inadequate. This suggests that compensation should not just be for use goods it should take account of non-use goods. It is against this background that this study seeks to examine wetland valuation practice in the Niger Delta with a view to determining whether or not the problem of the quantum of compensation lies with the approach(es) adopted in its assessment.

1.2 Statement of Research Problem

An environmental resource/service is not limited to the usual tangible items of real estate such as land, buildings, plant and machinery. It includes goods that are traded in the market and those that are not traded in the market. In addition to goods traded in the market, environmental resource also includes intangible items such as human health and safety, the existence and preservation of flora, fauna, ecosystem and biological diversity; soil, water, air, climate and landscape; use of land, natural resources and raw materials. Others are protected areas and designated sites of scientific, historical and cultural significance; heritage (including the architectural and archaeological heritage), recreation and amenity assets; and livelihood, lifestyle and well-being of those affected by a proposal (Dixon, 2008). Seabrook, Goodman and Jaffry (1997) assert that environmental resources denote more than utility used in defining a resource but include the nonuse aspects of the environment. The authors opine that a wrong perception of the environment results in the overuse and degradation of its resources, while the wrong perception of the environment by policy/decision makers results in the under-valuation of environmental resources. Dixon (2008) observes that while real property is adequately priced in the open market, majority of environmental resources are not priced. The author state that this does not mean that such resources are completely valueless. He states further that the focus of environmental valuation is to put monetary values on environmental goods and services, many of which have no easily observed market prices. By training, Estate Surveyors and Valuers in Nigeria should be able to apply the various approaches adopted in the valuation of real property. However, these approaches only take into consideration the market determined (use) values at the expense of nonuse values which constitute a greater component of wetland (environmental) resources. There is therefore the need to ascertain if Estate Surveyors and Valuers apply the methods that capture the nonuse values of environmental resources. This is due to the fact that while property value is usually estimated for goods priced in the conventional market place, the value of environmental resources is estimated for goods priced both inside and outside of the market valuation system.

Various authors had looked at issues pertaining to wetland valuation practice from different perspectives. Ramachandra and Rajinikanth (2000) consider the processes involved in wetland valuation and conclude that these should include the choice of appropriate assessment approach, definition of wetland area, identifying and prioritising wetland resources, relating wetland resources to use value, gathering information required for assessment, quantifying economic values and implementing appropriate appraisal method. However, their study did not consider a situation where individual's right is subject to the provision of such a law as the Land Use Act in Nigeria. On the methods for valuing wetland resources, Barbier, Acreman and Knowler (1997) identify four methods, namely market prices, indirect opportunity cost, travel cost and contingent valuation. Their study did not consider the basis of valuation and heads of claim. Without establishing the basis of valuation, it may be difficult to determine the appropriate method to adopt for a particular valuation. The choice of method(s) adopted in the valuation of wetland is predicated on some factors. They include complexity and limitation of the method(s) (the Canadian Wildlife Service, 2005) statistical complexity, information required, availability and accessibility to data required, and people's perception (King and Mazzota, 2000). These studies were conducted in environments different from the study area, which may have other factors peculiar to the study environment. Wetland valuation is fraught with diverse challenges; amongst these are public good qualities of wetland resources, externalities, perverse incentives, lack of clear property rights and lack of information (Turpie et al. 2010). Cultural challenges and biases were not considered in their study and these pose great threats to wetland valuation.

The concern for wetland valuation is the determination of appropriate compensation payable to the affected claimants. Adopting the technique that gives the figure of adequate compensation requires serious focus for the Estate Surveyors and Valuers. There are various approaches used in wetland valuation. For example, Breunig (2003) apply benefits transfer approach in valuing ecosystem services from Massachusetts freshwater wetlands by applying the results of studies conducted on 16 different wetlands. The study did not consider that there is no uniformity across study sites, each wetland site is unique. Earnhart (2001) adopts hedonic pricing in assessing the effects of neighborhood features on houses. The study basically focused on the effects of environmental amenities on housing prices contrary to wetland valuation practice.

With this background, the following questions come to mind as to why attention is not being paid to the importance of wetlands in Nigeria. Amongst these questions are:

i. What are the legal provisions on valuation of wetland for compensation in Nigeria?
ii. What are the processes involved in wetland valuation?

iii. What are the basis and methods used for wetland valuation for compensation in the study area?

iv. What are the factors responsible for the choice of wetland valuation method in the study area?

v. What are the challenges facing wetland valuation?

This study is therefore set to find answers to the questions raised above.

1.3 Aim and Objectives of the Study

The aim of this research work is to investigate wetland valuation practice for compensation in the Niger Delta with a view to providing a framework for better valuation practice.

The objectives for achieving the aim of the study are to:

i. Examine wetland valuation processes for compensation in the Niger Delta.

ii. Identify the basis and methods used for wetland valuation for compensation in the study area

iii. Examine the factors influencing the choice of wetland valuation method in the study area.

iv. Examine the challenges involved in wetland valuation in the study area.

1.4 Significance of the Study

The research will educate policy/decision makers and encourage them to give this natural resource its appropriate position in the national economy. The inclusion of environmental (green asset) value in the national asset of the country will also help in balancing the System of National Accounting (SNA). The asset accounts measure the value of opening and closing stocks of economic and environmental assets, and their changes during an accounting period. Changes in assets are brought about by the formation and consumption of produced and natural capital (assets) and other non-economic influences such as discoveries, natural disasters or natural regeneration.

Lambert (2003) posits that natural resources have values that call for serious consideration by both the individual and the government. Such values include; improvement of water quality, storing floodwaters, habitat for wildlife, wetlands contributes to the health of the planet and human wellbeing by ensuring food supply, regulating the atmosphere and providing raw materials for industry and medicine. Many natural products found in the economy come from wetlands, including shellfish, cranberries and timber. Wetlands provide valuable open space and create wonderful recreational opportunities. They provide tremendous economic benefits such as water supply, fisheries, agriculture, etc. through the maintenance of water tables and nutrient retention in floodplains; timber production; energy resources such as peat and plant matter; wildlife resources; transport; and recreation and tourism opportunities. Translating these many values into economic terms is of primary importance to convince the policy makers of the importance of these ecosystems as life-supporting systems. Achieving this can only result with good valuation practice.

In the same vein, Barbier, Acreman and Knowler (1997) note that wetland resources are particularly susceptible to misallocation decisions because of the nature of the values associated with them. Wetlands perform an unusually large number of ecological functions and services which support economic activities. Many of these services are not marketed. In the case of tropical wetlands, many of the subsistence uses of wetland resources are also not marketed and are thus often ignored in development decisions. To capture the value for these functions and services require that the Estate Surveyor and Valuer adopts the techniques that take into consideration both the use and nonuse values of wetland ecosystems.

Environmental (natural resource) valuation seems not yet properly taught in Nigerian institutions of higher learning because it is usually included as a topic in a valuation course. Most teachings have always focused on the valuation of land and buildings; plant, machinery and equipment; furniture, fixtures and fittings, etc and for the purposes that are market determined. In response to increasing paradigm shift in favour of the environment, this study provides a basis for teachings on environmental valuation. Professionally, the Nigerian Institution of Estate Surveyors and Valuers would also be encouraged to include environmental valuation in the scheme for professional examinations. In addition, the Institution has a role to play in influencing policy makers in favour of environmental valuation for decision-making purposes. This study will encourage the Institution in carrying out this job.

Valuing the economic benefits of wetlands can help set priorities and allocate spending on conservation initiatives. Valuation can also be used to consider the values attached to wetland ecosystems by the public and thereby encourage their participation in certain initiatives. More specifically, valuation could assist Environmental Assessment (EA) decision-making by providing a reference value against which other economic factors could be compared in order to determine the significance of environmental effects – the bottom-line in most EAs. Many people seem not to be aware of the values of wetlands. Many think that they are no more than mosquito breeding areas. Most people only seem to care about what they love or what brings economic benefit to them. Wetland valuation is a way to estimate ecosystem benefits and it allows financial experts to carry out a Cost-Benefit analysis. It is therefore an important tool for environmental managers and decision makers to justify public spending on conservation activities and wetland management. By giving objective evidence of the monetary and non-monetary benefits of wetlands to managers and the public, environmentalists will gain additional support. This study would help provide an enabling environment to policy/decision makers in taking appropriate decisions about wetlands, in particular and the environment in general.

This study seems to be a pioneering effort in Nigeria on the need to establish an enduring practice for the valuation of wetland benefits and project the status of wetlands in Nigeria to international recognition since not much on this topic is available in Nigerian books or from Nigerian authors on the internet.

1.5 Scope of the Study

Nigeria is a nation blessed with wetland resources. Ramsar (2008) identifies eleven (11) wetland locations in Nigeria designated as wetlands of international importance, Table 1.1. Two of these locations fall within the study area – Apoi Creek Forest in Bayelsa and Upper Orashi Forests in Rivers State.

Table 1.1: Ramsar's List of Wetlands of International Importance in Nigeria as at 2008

Location	**State**	**Date of Recognition by Ramsar**	**Size (ha)**
Apoi Creek Forest	Bayelsa	30/04/08	29,213
Baturiya Wetland	Kano	30/04/08	101,095
Dagona Sanctuary Lake	Yobe	30/04/08	344
Foge Islands	Kebbbi	30/04/08	4,229
Lake Wetlands in Nigeria	Bornu	30/04/08	607,354
Lower Kaduna/Middle Niger Flood Plain	Kwara/Niger State	30/04/08	229,054
Maladunmba Lake	Bauchi	30/04/08	1,860
Nguru Lake (Marma Channel Complex)	Jigawa, Yobe	02/10/00	58,100
Oguta Lake	Imo	30/04/08	572
Pandam and Wasse Lakes	Nassarwa	30/04/08	19,742
Upper Orashi	River State	30/04/08	25,165

Source: Ramsar (2008)

The delta is an oil-rich region, and has been the centre of international controversy over devastating pollution (Wikipedia 2009). Within Nigeria it is the richest area in terms of natural resources endowment with large oil gas deposit, extensive forests, good agriculture and abundant fish resources. It is one of the world's largest coastland and the largest in Africa (United Nations, 2002). Although, the Niger Delta region is the richest source of natural resource in Nigeria, the region's potentials for sustainable development is increasingly threatened by environmental devastation and worsening economic conditions. The Niger Delta region of Nigeria is the world's third largest wetland coming after Holland and Mississippi (Omene, 2003).

Historically and cartographically, Niger-Delta area of Nigeria consists of present day Bayelsa, Delta and Rivers States (Fig 1.1). The region is one of the most blessed deltas in the world, in both human and material resources but the unfavorable manner in which these resources are harnessed overtime, is the bane of the region's predicament. The Niger Delta covers 20,000 km^2 within wetlands of 70,000 km^2 formed primarily by sediment deposition. It is one of the world's ten (10) most important wetland and coastal marine ecosystems and is home to some thirty-one (31) million people. This floodplain makes up 7.5% of Nigeria's total land mass. It is the largest wetland and maintains the third-largest drainage basin in Africa. To enable the researcher carry out concise job one location was chosen from each of the affected states; Nembe (Bayelsa State), Forcados (Delta State) and Orashi (Rivers State).

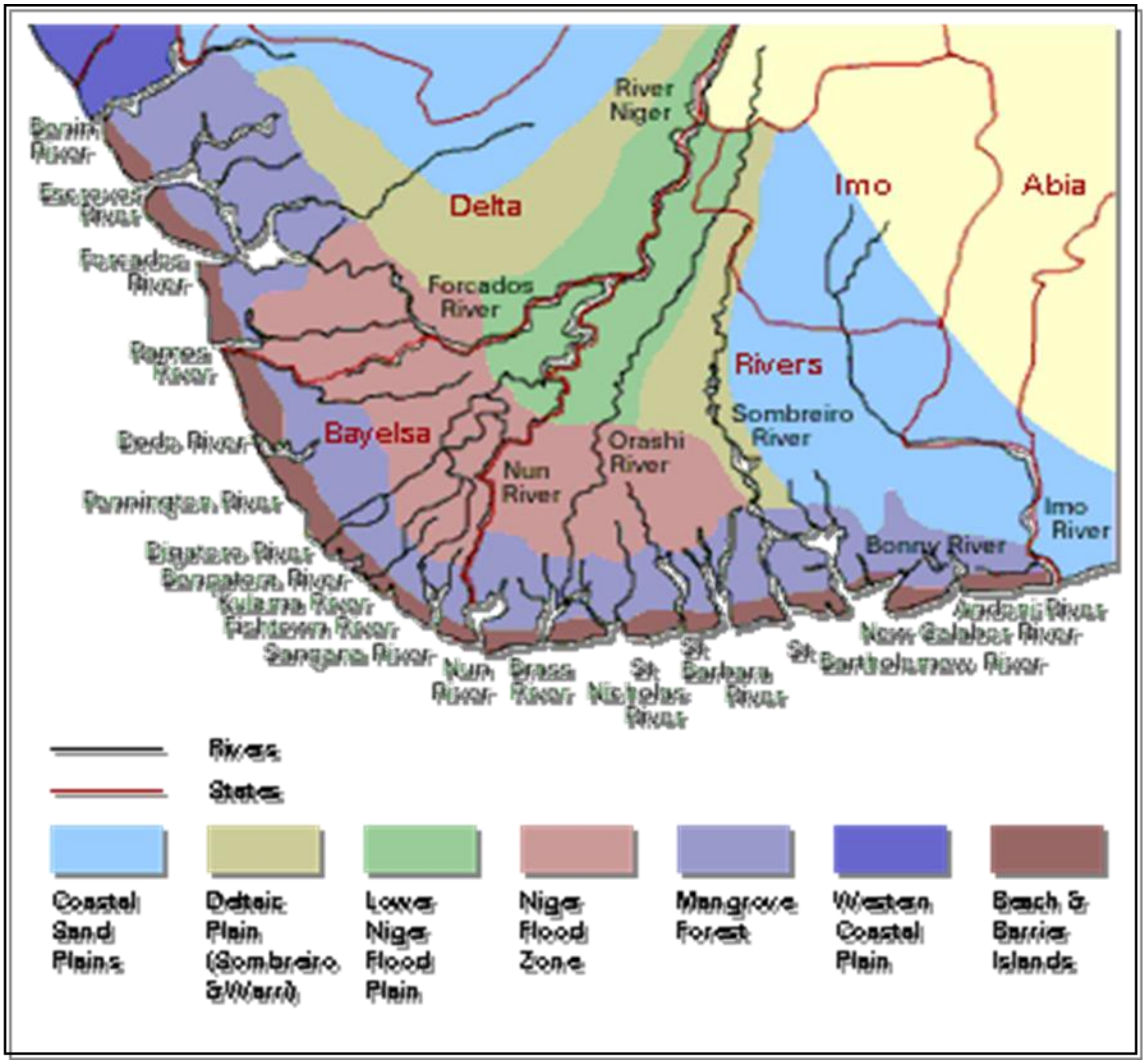

Fig. 1.1: Map of Niger Delta, Nigeria

Source: http://www.waado.org/nigerdelta/Maps/NigerDelta_Rivers.html

The Niger Delta environment can be grouped into four ecological zones: costal barrier islands, mangrove swamp forests, freshwater swamps, and lowland rainforests. This well-endowed ecosystem contains one of the highest concentrations of biodiversity on the planet, in addition to supporting abundant flora and fauna, arable terrain that can sustain a wide variety of crops, lumber or agricultural trees, and more species of fresh fish than any ecosystem in West Africa (Omofonmwa and Odia 2009 and Wikipedia 2009).

There are various purposes for which wetland valuation can be undertaken. These include; conservation, compensation, loan facilities, development activities and management. However the focus of this study is on wetland valuation practice for compensation purposes in the Niger Delta. The major activity in the region is oil prospecting and exploration which results in environmental degradation. The spate of pollutions and environmental damage in the Niger Delta, (oil spills, disposal of waste, gas flaring, seismic surveys and the construction of roads and pipelines, dredging, inadequate clean up prolongs, and cumulative impact) demands that the affected persons or communities be compensated for the losses suffered. To determine the compensation to be paid depends on strong wetland valuation practice that accords all the components of wetland resources their appropriate pricing.

There are different individuals or group of individuals as well as corporate organisations that are usually interested in the outcome of wetland valuation. These include the entire population, fishermen, farmers, oil companies, government agencies, Estate Surveyors and Valuers and Institutions offering Estate Management. For the purpose of this research, the focus is on the Estate Surveyors and Valuers practicing in the study area. The choice is made based on the fact that the Estate Surveyors and Valuers are the ones empowered by law to assess the worth of an interest in a property and wetland being an aspect of environmental assets can be valued by the Estate Surveyors and Valuers.

The study of wetland valuation practice encompasses an understanding of the processes involved, the basis and methods of valuation, the purpose of valuation, element (duty) of care, market survey and analysis. Since the practice is made up of different components, the study examined how the process of valuation, the basis and methods of valuation, challenges encountered and factors considered in the choice of valuation methods – all impact on the practice of wetland valuation for compensation in the Niger Delta.

1.6 Definition of Terms

1.6.1 Ecosystem Functions

Wetlands are composed of a number of physical and chemical components such as soils, water, plant and animal nutrients. The interaction among and within these components allow the wetland to perform certain functions. Wetland functions are the capacity of ecosystem process and components to provide goods and services that satisfy human needs, directly or indirectly (Millennium Ecosystem Assessment, 2003). The capacity of an ecosystem to provide services in a sustainable manner depends on the biotic and abiotic characteristics which should be quantified with ecological, biophysical or other indicators. The level of wetland function depends on site and landscape characteristics and can be assessed independently of any human context.

On the other hand, ecosystem services are the benefits people obtain from ecosystem processes and non-material uses (Millennium Ecosystem Assessment, 2003). These beneficial outcomes result from wetland functions (e.g., better fishing and hunting, cleaner water, better views, and reduced human health risks and ecological risks). These require some interaction with, or at least some appreciation by humans. However, they can be measured in physical terms (e.g., increased catch rates, greater carrying capacity, more user days, reduced risk, and property damage avoided). The types of potential services depend to some degree on the level of functions but predominantly on other factors (e.g., access, proximity to people). In achieving the objectives of this study, ecosystem functions are defined as the collective intraspecific and interspecific interactions of the biota, such as primary and secondary production and mutualistic relationships. They result from the interactions between organisms and the physical environment, such as nutrient cycling, soil development, water budgeting, and flammability.

1.6.2 **Process**

According to Wikipedia (2011) process or processing typically describes the action of taking something through an established and usually routine set of procedures or steps to convert it from one form to another. A process usually involves steps and decisions in the way work is accomplished, and may involve a sequence of events. The process that one follows is as important as the results that are produced by the process. Without understanding the underlying process, it is difficult to know how a certain set of results were achieved, or why they were good or bad. So, if results are viewed as the "destination", then process can be viewed as the "vehicle" that gets one there (and ideally, one should be able to use the same "vehicle" for many trips, with a few modifications based on the desired destination). In this study, wetland valuation process is a series of steps taken to produce the figure of value for wetland resources.

1.6.3 **Stakeholders**

A stakeholder is a person, an organisation or a group of people with interest(s) in an issue or particular resource. Stakeholders are both the people with power to control the use of resources and those whose livelihoods are affected by a change in the use of resources. Brown, Tompkins and Adger, (2001) were of the opinion that stakeholder involvement is essential in determining the main policy and management objectives, to identify the main relevant services and assess their value and to discuss trade-offs involved in wetland use. Stakeholders identified for one valuation project may not necessarily be relevant to another project.

Stakeholder analysis is a system for collecting information about groups or individuals who are affected by decisions and explaining the possible conflicts that may exist between important groups and areas where trade-offs may be possible. The stakeholders in the study area include: the entire population of the study area, fishermen, farmers, Estate Surveyors and Valuers, the Nigerian Institution of Estate Surveyors and Valuers and Institutions offering Estate Management.

1.6.4 **Wetlands**

According to Kusler (2004), a widely agreed upon or precise definition of what constitutes a wetland is not available. He noted that Scientists have documented wetlands as transition areas between aquatic ecosystems and upland areas. Wetlands are characterised not only by inundation or saturation but by plants able to grow under saturated conditions, and soils reflecting periodic inundation. However, in 1971, the RAMSAR convention on wetlands defines wetlands very broadly (in Article 1.1) as:

> "areas of marsh, fen, peatland 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",

In addition, the Ramsar Convention (in Article 2.1) provides that wetlands

> "may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands."

Depending on interpretation, this very inclusive definition encompasses a large number of ecosystem types. As of 2002, the 'RAMSAR Convention' includes 1,230 wetland sites, located in 135 countries throughout the world. The RAMSAR-sites cover over 80 million hectares of wetland. In the light of the high inclusiveness of Ramsar's wetland definition, this study adopts and defines wetlands as areas such as swamps and marshes where water either covers the soil or is present at or near the surface, particularly in the root zone, for at least a good portion of the year, including the growing season. In other words, for this study, wetlands are lands on which water covers the soil or is present either at or near the surface of the soil or within the root zone, all year or for varying periods of time during the year, including the growing season.

1.6.5 **Willingness-To-Pay (WTP)**

In principle, a product or service does not need to be traded in markets to have a measurable monetary value. Non-market valuation methods exist that can be used to estimate the monetary value that people would be willing to pay for such non-marketed products and services if they were bought and sold. However, economists have been attempting to use these methods to estimate the monetary value of non-marketed wetland services. Gunatilake, Yang, Pattanayak and van der Berg (2006) were of the opinion that this approach measures the willingness of the people to pay for such goods and services based on their financial capability. These attempts fall into three categories:

1.6.5.1. **Revealed Willingness-To-Pay** (e.g., market prices). When people purchase a home near a wetland, or spend time and money to get to a fishing spot or a bird-watching site that is dependent on a nearby wetland, they are usually willing to pay, at least, what they actually spend for those services; and in some instances may be willing to pay more. In other words, Revealed Willingness-To-Pay is an approach used in valuing wetland goods and services that have market prices, or are used in the production of other goods and services that are traded in the market. Emanating from this approach are other methods such as Market Price (used in estimating the economic value of ecosystem products or services that are bought and sold in the markets), Productivity (used to estimate the economic value of wetland products or services that contribute to the production of commercially marketed goods), Hedonic Pricing (an approach whereby the value of properties, especially residential houses and lands are estimated by determining what people actually pay for the environmental services and/or utilities from the local environment), and Travel Cost methods (derives the value of an environmental resource like tourist centre by determining what people are willing to pay, in terms of money and time, to visit the environmental benefits).

1.6.5.2. **Expressed Willingness-To-Pay** (e.g., survey results). Many wetland goods and services are not traded in the market; hence, people may never "reveal" what they are willing to pay for such wetland services as a scenic view or a day of bird watching. In this case, simply asking them what they would be willing to pay can sometimes yield useful results. Expressed Willingness-To-Pay is a survey approach whereby respondents, through the use of a hypothetical scenario, are asked what they would be willing to pay to avoid losing a particular wetland goods and services. However, surveys of willingness to pay are expensive, controversial, and usually yield results that are reliable when questions are asked about specific wetland services provided in specific contexts. The methods commonly used to measure respondents' willingness to pay include Contingent Valuation Method and Contingent Choice Method (Choice Modeling).

1.6.5.3. **Derived Willingness-To-Pay** (e.g., circumstantial evidence). This method is known as imputed willingness to pay and it involves tracing and measuring the functions provided by a wetland (e.g., retaining floodwater, reducing wave energy, and maintaining water quality) and estimating what people would be willing to pay to avoid the adverse effects of losing such functions. It measures the cost of action the people are willing to take in order to avoid the adverse effects that would occur if these services were discontinued, or to replace the lost services or revive the services. Three closely related methods are usually adopted for this approach. They are; Damage Cost Avoided Method, Replacement Cost Method and Substitute Cost Method.

1.7. Limitations of the Study

In the course of carrying out this study, a number of challenges were encountered. These include:

i. Dearth of local literature on the subject matter of the study;
ii. Limited time as a result of serving as full-time lecturer thereby limiting the time of visits to holiday periods;

The constraints notwithstanding, necessary precautions were taken to ensure that the study aim and objectives were achieved. The results of the study were not significantly affected by the constraints. To overcome the identified limitations on local literature, the researcher resorted to using materials on wetland valuation from other countries, and in-depth discussion with practicing Estate Surveyors and Valuers in the study area. Also, personal and/or telephone interviews were conducted with the Heads of Department of Estate Management in the Universities offering Estate Management in the Southern part of the country. To overcome limitations posed by limited time, the researcher spent most of his annual leave and public holidays visiting the study area. The researcher equally applied for casual leaves, from work, to spend time meeting the respondents both for personal interview and to retrieve the questionnaires administered.

1.8. **Layout of the Study**

The thesis consists of seven Chapters, organised in a logical manner in order to enable the readers appreciate the thoughts of the researcher in achieving the objectives of the study.
Chapter One is the introductory chapter and it is inclusive of the background of the study, statement of research problem, aim and objectives, significance of the study, scope of the study, definition of key terms, limitations of the research and the layout of the study. Relevant literature in the area of study was reviewed in Chapter Two. These include a discussion on wetlands and their classifications, the need for valuation, regulations governing compensation in Nigeria, wetland valuation processes for compensation, basis and methods used for wetland valuation for compensation, challenges of wetland valuation, factors responsible for the choice of wetland valuation method, effects of economic activities on wetlands and effects of location on wetland values. Consideration was also given to importance, functions and services of wetlands. The study equally

examined the various techniques available for wetland valuation. It also looked at wetland valuation in Nigeria and ended with observed gaps/limitations in previous wetland valuation studies.

The conceptual framework for the study is contained in Chapter Three. Discussion in the chapter was weaved round the objectives of the study, by looking at the wetland valuation processes for compensation purposes, basis and methods used for wetland valuation for compensation, challenges of wetland valuation, factors responsible for the choice of wetland valuation method. The study area for the research was examined in Chapter Four. This was done by focusing on the geography, climate, demography and economy of the constituent states. The research methods adopted for the study is explained in Chapter Five. It comprises the study population, sample frame, sample size, sampling method, sources and instrument for data collection, data analysis and presentation and pilot study. Chapter Six is the presentation and interpretation of data while Chapter Seven deals with distillation of findings, recommendations and concluding remarks.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

This review synthesizes the current literature that are germane to wetland valuation practice. The purpose is to highlight the issues useful to the successful completion of this study. However, it must be stated that this review is eclectic due to the fact that there are limited works in this area. Thus, the review is grouped into fourteen major subheadings to wit: significance and importance of wetland, wetlands and their classifications, the need for valuation, regulations governing compensation in Nigeria, wetland valuation process for compensation, basis and methods used for wetland valuation for compensation, factors responsible for the choice of wetland valuation methods, challenges of wetland valuation, effects of economic activities on wetlands, effects of location on wetland values, wetland functions, wetland services, determinants of property values and identified gaps/limitations in literature reviewed. The review is aimed at identifying gaps in earlier works which this study attempts to fill.

2.2 Significance and Importance of Wetland

For millions of people "swamps" long suited only for draining have become "wetlands" worth conserving. (McNeill 2000)

Wetlands, historically considered as worthless wasteland, are now considered among the most important natural resources throughout the world (Xu, 2007). As the society have begun to appreciate the importance of wetlands, increased emphasis has been placed on maintaining existing wetlands and, where possible, restoring those wetlands that have been lost or seriously degraded. The task of maintaining and restoring wetlands is not only a technological challenge but will also be costly to society in terms of scarce resources that will need to be employed. In the same vein, McCartney, Masiyandima, and Houghton-Carr (2004), in a research, on Africa, conducted for International Water Management Institute (IMWI) stated that throughout history, wetlands have played an important role in human development. They have brought benefits, but also caused difficulties, for people. Their perceived value, which has always been largely dependent on social perceptions of the use and benefits to be gained from them, has varied from place to place and, as the quote above illustrates, has changed over time. Wetland values arise through the interaction of the ecological functions they perform with human society. They stated further that until recently, in many parts of the world, wetlands were considered, with few exceptions, as unproductive wastelands associated with disease, difficulty of access and danger. This is because some wetland functions do not benefit people, but are harmful. Honingsbaum (2001) identifies the provision of habitat for mosquitoes that transmit illnesses as a function of many wetlands that has a huge negative impact on human wellbeing and, historically, was one reason for draining many of them.

McCartney, et al. (2004) opines that in recent years, greater insight into the ecological processes that occur in wetlands has brought about a radical change in perception. Wetlands are now widely viewed as valuable ecosystems that play an important role in maintaining environmental quality, sustaining livelihoods and supporting biodiversity. For example, many seasonally saturated wetlands make a vital contribution to the livelihoods of millions of people living in the arid and semi-arid areas of Africa (Scoones 1991). Schuyt and Brander (2004) estimate the global economic value of wetlands (i.e., the value attributed to direct physical benefits, but neglecting wetland-related costs) to be

US$70 billion a year. People also gain *nonphysical* benefits from wetland functions. These are associated with spiritual enrichment, cognitive development and aesthetic experience. Hence, wetlands bring a wide variety of tangible and intangible benefits to large numbers of people. The way in which they do so is complex and multifunctional and is directly related to the ecological functions and, hence, the condition of the wetland. However, wetlands are also associated with many costs. In the past, it has often been the cases that while the costs were recognized the less quantifiable benefits to human welfare have tended to accrue without communities and decision-makers fully appreciating them. As a result, the benefits have often gone unrecognized in development and resource planning, and management.

de Groot (2007) opine that wetlands - including (inter alia) rivers, lakes, marshes, estuaries, lagoons, mangroves, seagrass beds, and peatlands – are among the most precious natural resources on earth. These highly varied ecosystems are natural areas where water accumulates for at least part of the year. Driven by the hydrological cycle, water is continuously being recycled through the land, sea and atmosphere in a process that ensures the maintenance of ecological functions. Wetlands support high levels of biological diversity: they are, after tropical rainforests, amongst the richest ecosystems on this planet, providing essential life support for much of humanity, as well as for other species. Coastal wetlands, which may include estuaries, seagrass beds and mangroves, are among the most productive, while coral reefs contain some of the highest known levels of biodiversity (nearly one-third of all known fish species live on coral reefs). Other wetlands also offer sanctuary to a wide variety of plants, invertebrates, fishes, amphibians, reptiles and mammals, as well as to millions of both migratory and sedentary waterbirds. He noted also that wetlands are not only sites of exceptional biodiversity; they are also of enormous social and economic value, in both traditional and contemporary societies. Since ancient times, people have lived along watercourses, benefiting from the wide range of goods and services available from wetlands. The development of many of the great civilizations was largely based on their access to, and management of, wetland resources. Wetlands are an integral part of the hydrological cycle, playing a key role in the provision and maintenance of water quality and quantity as the basis of all life on earth. They are often interconnected with other wetlands, and they frequently constitute rich and diverse transition zones between aquatic ecosystems and terrestrial ecosystems such as forests and grasslands.

Naturally, it is the public, rather than the private landowners, who receive most of the benefits accruing from "healthy" wetlands. This market failure suggests that private investment by landowners (for maintenance and restoration activities) is likely to be less than that amount which is socially optimal. Hence, there may be a role for government in stimulating investment. However, there are numerous means by which the government can potentially stimulate investment (e.g. tax credits, subsidies) and the efficacy of the different methods are likely dependent on how the private market demand changes in response to investment (Stone 1996).

Reed, (2005) conducted a study on the Significance of Wetlands in Urbanized Locations in South Alabama using two creeks – Milkhouse Creek had approximately 136.3 acres of wetland and Second Creek had approximately 77.3 acres. The purpose of the study was to determine the differences between urban stream water quality when wetlands are present or when they have been modified or destroyed. The researcher took samples of water from each creek and analysed them for turbidity (sediments, or foreign particles suspended in the water), dissolved oxygen, and temperature. The samples were collected five times on a once-a-week basis around 2 to 4 pm each time, using sampling kits available from the Alabama Water Watch organization. The result shows that the watersheds' acreage was found to be 6,033 acres for Milkhouse Creek, and 5,113 acres for Second Creek, approximately and that the turbidity levels with Milkhouse Creek were consistently lower than those of Second Creek, with the exception of the first sample results, which were not recorded as accurately as the other four. The study concluded that with respect to the amount of wetland acreage available to each creek, it is understandable that Milkhouse Creek would have slightly better values across the board, since it had slightly more wetland acreage available for the improvement of the urban runoff. Although Second Creek did not necessarily have “poor” water quality, the results from it demonstrate the effect a difference of (at least) 58 acres of wetlands can have on water quality results within urban locations. The Reed (2005) study was not basically on the determination of wetland values hence the approaches contained therein cannot and was not adopted in the present study.

The valuation of wetlands requires that consideration be given to the various importance attached to them. These are: ecological, socio-cultural and economic (Majule and Mwalyosi, 2003). Each type of importance has its own set of criteria and value-units, which are briefly described, in the following sections.

2.2.1 **Ecological Importance of Wetland Services**

The ecological importance of wetland ecosystems has been articulated by natural scientists in reference to causal relationships between parts of a system, for example, the importance of a particular tree species to control erosion or the value of one species to the survival of another species or of an entire ecosystem (Farber, Constanza and Wilson, 2002)

On a global scale, different ecosystems and their species play different roles in the maintenance of essential life support processes such as energy conversion, biogeochemical cycling, and evolution (Millennium Ecosystem Assessment, 2003). The magnitude of this ecological value is expressed through indicators such as species diversity, rarity, ecosystem integrity (health), and resilience, which mainly relate to the Supporting and Regulating Services.

2.2.2 **Socio-Cultural Importance of Wetland Services**

For many people, natural systems, including wetlands, are a crucial source of non-material wellbeing through their influence on physical and mental health, historical, national, ethical, religious, and spiritual values. A particular mountain, forest, or watershed may, for example, have been the site of an important event in the past such as the home or shrine of a deity, the place of a moment of moral transformation, or the embodiment of national ideals. These are some of the values that the Millennium Assessment recognises as the cultural services of ecosystems (Millennium Ecosystem Assessment, 2003). The main types of socio-cultural values described in literature are therapeutic value, amenity value, heritage value, spiritual value and existence value.

To some extent, these values can be captured by economic valuation methods but to the extent that some ecosystem services are essential to peoples' very identity and existence, they are not fully captured by such techniques. To obtain a certain measure of importance, this may be approximated by using participatory assessment techniques (Campbell and Luckert, 2002) or group valuation (Jacobs 1997; Wilson and Howarth 2002).

2.2.3 **Economic Importance of Wetland Services**

Some authors (Turner, et al. 2003, Seidl, and Moraes, 2000 and Straton, 2006) consider cultural values and their social welfare indicators as a subset of economic values, others state that in practice economic valuation is limited to efficiency and costs-effectiveness analysis, usually measured in monetary units, disregarding the importance of, for example, spiritual values and cultural identity which are in many cases closely related to ecosystem services. In this study, economic and monetary valuation are therefore treated separately from socio-cultural valuation, whereby it is emphasised that ecological, socio-cultural, and economic values all have their separate role in decision making and should therefore, be seen as essentially complementary pieces of information in the decision-making process.

However, de Groot (2007) put the components of total value/importance of wetlands together as indicated in Fig. 2.1.

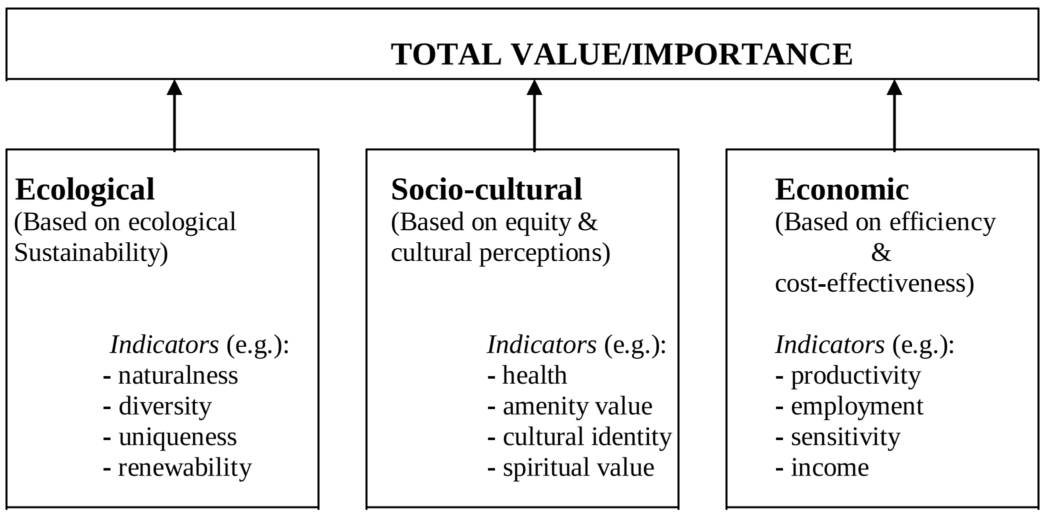

Fig. 2.1 Components of Total Value of a Wetland
Source: de Groot (2007).

2.3 Wetlands and their Classifications

Mitsch and Gosselink (1993) observed that there is no consistent method developed to classify wetlands. They are of the opinion that the easiest way to differentiate wetlands is to divide wetlands into natural (wetlands that originate in geological settings due to water movement and accumulation) and constructed types (man-made systems designed to imitate the functions of natural wetland systems). In another classification of wetland, Gren and Soderqvist (1994) base their approach on the total production output of a wetland and this is divided into three different uses: (i) for its own development and maintenance; (ii) for export to other ecosystems; and/or (iii) for export to human society. The confusion in terminology seems to have stemmed from the vast diversity of wetland types that exist throughout the world and the lack of direct equivalent translations between various languages. The first type of output refers to the build-up and organising capacity of a wetland ecosystem, and is called the primary value; the second and third types of output refer to the exported life-support values, and are called the secondary value. Since the secondary value is dependent on the well-functioning of the wetland ecosystem, the primary value is a prerequisite for the existence of secondary values; therefore the current study will not differentiate between primary and secondary values in the classification of wetland ecosystems.

The U.S. Fish and Wildlife Service (Shaw and Fredine, 1956) develop the first classification scheme in 1956. In this classification, twenty types of wetlands were described under four categories;

i. inland fresh areas (Seasonally flooded basins or flats, Inland fresh meadows, Inland shallow fresh marshes, Inland deep fresh marshes, Inland open fresh water, Shrub and swamps, Wooded swamps, Bogs),
ii. inland saline areas (Inland Saline flats, Inland saline marshes, Inland open saline water),
iii. coastal freshwater areas (Coastal shallow fresh marshes, Coastal deep fresh marshes, Coastal open fresh water) and
iv. coastal saline areas (Coastal salt flats, Coastal salt meadows, Irregular flooded salt marshes, Regularly flooded salt marshes, Sounds and bays, Mangrove swamps).

The classification scheme used in the United States, as part of the National Wetlands Inventory (Cowardin, Carter, Golet, and LaRoe, 1979), is formal and all encompassing. The classification system is based on a taxonomic separation scheme, in which all wetland and deep-water habitats are divided into five systems (marine, estuarine, riverine, lacustrine, and palustrine), and further subdivided into various subsystems and classes. Mitsch and Gosselink (1993) group wetland types into two systems (coastal and inland).

Other studies such as Mitsch and Gosselink (1986), U.S. EPA, (1993), Novotny and Olem (1994) and Widener (1995) grouped wetlands on the basis of their origin, as natural or constructed wetlands.

In the study conducted in Nigeria, Agbi, Abang and Animashaun (1995) identify two major types of wetlands in Nigeria; they are freshwater wetlands and coastal wetlands. Freshwater wetlands include swamps, marshes, bogs and similar areas that are inundated or saturated by surface or groundwater at a frequency and for duration sufficient to support the ecosystem. Coastal wetlands means all tidal and sub-tidal lands, including all areas below any identifiable debris line left by tidal action; all areas with vegetation present that is tolerant of salt water and occurs primarily in a salt water or estuarine habitat; and any swamp, marsh, bog, beach, flat or other contiguous lowland which is subject to tidal action during the maximum spring tide level as identified in tide tables published by the National Ocean Service. Coastal wetlands may include portions of coastal sand dunes.

Nigeria's wetlands fall into two major categories to wit; the Coastal Wetlands (Mangrove Swamps), and the Freshwater Wetlands (Floodplains). Eregha and Irughe (2009), note that the mangrove swamps covers an area of 9,000km^2 in the coastal States of Akwa Ibom, Cross River, Delta, Edo, Lagos, Ondo and Rivers while floodplains covers an area of 2,585 km^2 mostly along Niger/Benue River system (Table 2.1 and Fig 1.1).

Table 2.1: **Distribution and Extent of Nigeria Wetlands**

Coastal Wetlands (Mangrove Swamps)		**Freshwater Wetlands (Floodplains)**	
Name	**Extent (Ha)**	**Name**	**Extent (Ha)**
Niger Delta	617,000	Niger Delta	
		Niger River	1,177,000
Cross River Estuary		Benue River	242,000
Imo River	95,000		
Qua Iboe River	36,000	Cross River	250,000
Other Estuaries	110,000	Imo River	36,000
		Lake Chad	25,000
		Ogun/Osun Rivers	380,000
Total	**858,000**		**2,110,000**

Source: Agbi, *et al.* (1995)

The foregoing suggests that there is no consistent method for classifying wetland resources. However, for the purpose of this study, the classification developed by Agbi et al. (1995) is adopted. This approach is easy to understand and also avoids the confusion arising from the complex nature of wetland ecosystems.

2.4 The Need for Valuation

Wetlands are recognised as being valuable ecosystems which provide water, food and raw materials, services such as flood attenuation and water purification, and intangible values such as cultural and religious value. In some areas, they can be particularly important for peoples' livelihoods. Despite these benefits, and various legislations to protect them, they are increasingly threatened, with more than half of the world's wetlands being lost already. Wetlands are degraded beyond the socially tolerable extent due to market failure since markets do not reflect true values or costs and government

failure (perverse incentives, lack of well-defined property rights) leading to open access and ignorance of decision makers as to the value of wetlands.
Given the complex structure and functioning of aquatic and related terrestrial ecosystems, these systems often yield a vast array of continually changing goods and services. The quality and quantity of these services are in turn affected by changes to ecosystem structure and functioning. Thus, alternative policy and management options can have major implications on the supply of aquatic ecosystem services, and it is the task of economic valuation to provide estimates to decision-makers of the aggregate value of gains or losses arising from each policy alternative.

Barbier, Acreman and Knowler (1997) were of the view that a major reason for excessive depletion and conversion of wetland resources is often the failure to account adequately for their non-market environmental values in development decisions. They posit that by providing a means for measuring and comparing the various benefits of wetlands, economic valuation can be a powerful tool to aid and improve wise use and management of global wetland resources. They stated further that valuation attempts to assign quantitative values to the goods and services provided by environmental (wetland) resources, whether or not market prices are available to assist in the assessment of the value.

Valuation is important because services provided by aquatic ecosystems have attributes of public goods. Public goods are non-rival and non-excludable in consumption, thus preventing markets from efficiently operating to allocate the services e.g. wetland filtration of groundwater. As long as the quantity of groundwater is not limited, everyone who has a well in the area can enjoy the benefits of unlimited potable groundwater. However, in the absence of any market for the provision of water through wetland filtration, then there would be no observed price to reveal how much each household or individual may be willing to pay for the benefits of such a service. Although everyone is free to use the aquifer, yet no one is responsible for protecting it from contamination. This is not an action that could be undertaken by a company and provided for a fee (price) because no individual has ownership of the wetland filtration process or the aquifer. However, non-market values can be estimated to assess whether the benefits of collective action—perhaps through a state environmental agency or the Federal Environmental Protection Agency (FEPA), exceed the cost of the proposed actions to protect the wetland, and consequently the wetland filtration process and the quality of the water in the aquifer for drinking purposes.

Some aquatic ecosystem services indirectly contribute to other services that are provided through a market but the value of this ecological service itself is not traded or exchanged in a market. For example, an estuarine marshland may provide an important "input" into a commercial coastal fishery by serving as the breeding ground and nursery habitat for fry (juvenile fish). Although disruption or conversion of marshland may affect the biological productivity of the marsh and thus, its commercial fishery, a market does not exist for the commercial fishery to pay to maintain the habitat service of the marshland. The problem is also one of transaction costs, for example (i) it is costly for participants in the commercial fishery to come together and negotiate with marshland owners (ii) there may be many owners from whom protection agreements must be sought. Estimation of the implicit (non-market) value of the fishery of marsh habitat can be used to understand whether there are laws and rules that protect the breeding and nursery functions of the marsh.

Aquatic ecosystem services that do not have market prices are excluded from explicit consideration in cost-benefit analyses and other economic assessments, and are therefore likely not to get full consideration in policy decisions. Valuation helps to compare the real costs and benefits of ecosystem use and degradation, and allows more balanced decision-making regarding the protection and restoration versus degradation of wetlands.

This facilitates optimal decision-making which maximises societal well-being. If monetary values of ecosystem services are not estimated, many of the major benefits of aquatic ecosystems will be excluded in benefit-cost computations. The likely outcome of such an omission would be too little protection for aquatic ecosystems and as a consequence, the services that people directly and indirectly enjoy would be undersupplied. Valuation, therefore, can help to ensure that ecosystem services that are not traded in markets and do not have market prices receive explicit treatment in economic assessments. The goal is not to create values for aquatic ecosystems; rather, the purpose of valuation is to formally estimate the “non-market” values that people already hold with respect to aquatic ecosystems. Such information on non-market values will in turn assist in assessing whether or not to protect certain types of aquatic ecosystems enhance the provision of selected ecosystem services and/or restore damaged ecosystems. Finally, economic values are often used in litigation involving damage to aquatic ecosystems from pollution or other human actions. According to Barbier, Acreman and Knowler, (1997) wetland valuation is used to build local and political support for its conservation and sustainable use, help diagnose the causes of environmental degradation and biodiversity loss, allow more balanced planning and decision-making, and/or develop incentive and financing mechanisms for achieving conservation goals.

2.5 **Regulations Governing Compensation in Nigeria**

The concept of compensation simply means recompense for loss (Babatunde, 2003). It is to place in the hands of the owner expropriated, the full money equivalent of the thing of which he has been deprived. Compensation valuation has only been treated as one of the statutory valuations with basis and valuation techniques stipulated by law. The principle of compensation rests upon justice and equity, and this cannot be achieved without legal backing. Under Article 42(1), the 1989 Constitution of the Federal Republic of Nigeria has it that a right to compensation in the instance of compulsory acquisition is a fundamental human right hence claimants must be put in positions which are not different from their states before the occurrence of the a possible disaster. Emphasis is placed more on prompt payment of compensation rather than on fair and adequate compensation. Other legal bases for assessing compensation in Nigeria, among others, include: State Lands Act No. 38 of 1968; Public Lands Acquisition (Miscellaneous Provision) Act 33 of 1976; Oil Pipelines Act (Cap. 338 LFN 1990); the Land Use Act, 1978 (Cap 202 of 1990), Petroleum Act, 1969 (Cap 350 of 1990), and the Mineral Act (Cap 226 of 1990).

A cursory look at the compensation provisions of the above laws show that compensation is basically for the use goods. For example, Sec. 44 (2m) of the 1999 Constitution provides

> *"subject to prompt payment of compensation for damage to buildings, economic trees or crops, providing for any authority or person to enter, survey or dig any land, or to lay, install or erect poles, cables, wires, pipes, or other conductors or structures on any land, in order to provide or maintain the supply or distribution of energy, fuel, water, sewage, telecommunication services or other public facilities or public utilities".*

On the other hand, Oil Pipelines Act provides for compensation in Sec 6(3), 11(5a) and 20(1, 2).

> *"The holder of a permit to survey acting under the authority of section 5 of this Act shall take all reasonable steps to avoid unnecessary damage to any land entered upon and any buildings, crops or profitable trees thereon, shall make compensation to the owners or occupiers for any damage done under such authority and not made good. Sec 6(3)"*

> *"The holder of a licence shall pay compensation – "to any person whose land or interest in land (whether or not it is land respect of which the licence has been*

granted) is injuriously affected by the exercise of the rights conferred by the licence, for any such injurious affection not otherwise made good Sec 11 (5a)"
"If a claim is made under subsection (3) of section 6 of this Act, the court shall award such compensation as it considers just in respect of any damage done to any buildings, lion crops or profitable trees by the holder of the permit in the exercise of his rights thereunder and in addition may award such sum in respect of disturbance (if any) as it may consider Just Sec 20 (1)"

If a claim is made under subsection (5) of section 11 the court shall award such compensation as it considers just having regard to – "any damage done to any buildings, crops or profitable trees by the holder of the licence in the exercise of the rights conferred by the licence Sec 20 (2a)"

The current legislation on compensation in Nigeria is the Land Use Act of 1978. Provisions for compensation under the Act are contained in Sec 29. The Act provides that the holder/occupier of the right of occupancy revoked for overriding public interest shall be entitled to compensation under the following heads of claims;

i. **Land**: for an amount equal to the rent, if any, paid by the occupier during the year in which the right of occupancy was revoked Sec 29 (4a);
ii. **Buildings, Installations, and Improvements thereon**: the amount of the replacement cost of the building, installation or improvement, that is to say, such cost as may be assessed on the basis of the prescribed method of assessment as determined by the appropriate officer less any depreciation, together with interest at the bank rate for delayed payment of compensation and in respect of any improvement in the nature of reclamation works, being such cost thereof as may be substantiated by documentary evidence and proof to the satisfaction of the appropriate officer Sec 29 (4b);

iii. **Crop**: crops on land apart from any building, installation or improvement thereon, for an amount equal to the value as prescribed and determined by the appropriate officer Sec 29 (4c).

Compensation for oil spills goes a little beyond the general term of compensation due as a result of compulsory acquisition due to socio – economic components of the effects of such an environmental pollution. The natural environment of wetland ecosystems includes both use and non-use goods. Therefore, any compensation paid/payable to the expropriated person should include the assessment of values for both groups. Otegbulu (2005) argues that the provision of these laws does not capture the full value of these natural resources as they do not place accurate value on them. Also, Otegbulu (2009) argues that there is an absence of a policy and legal framework for assessing full economic value to individual species based on economic functions and for assessing the value of damage to natural resources. In the same vein, Onugu, Iwu, Schopp, Czebiniak and Otegbulu (2003), opine that imbalances in the law and practice of environmental valuation are central to the problem faced by communities and ecosystem in the Niger Delta. The researchers are of the opinion that an effective valuation practice could minimize conflict and civil strife arising from inadequate compensation for damage wrought to the sources of food, water and livelihoods of communities throughout the Niger Delta, as well as elsewhere in Nigeria.

According to Egbenta (2010) compensation due as a result of oil spills has therefore evoked so much problems and controversy in Nigeria in the past to an extent that Valuers have continued to question the relevance and ability of regulatory laws and methods hitherto adopted for its determination. The aim of any compensation is to place the property owner in a position that will make him not to be worse off than before the damage.

2.6 **Wetland Valuation Processes for Compensation**

Using various case studies that cut across many countries, Barbier, Acreman and Knowler (1997) prepared a report on economic valuation of wetlands: a guide for policy makers and planners. In the report the authors identify three (3) major steps for wetland valuation process. The stages include:

Stage 1: Defining the problem and choosing the correct economic assessment approach.
The first stage in the wetland valuation process is to determine the overall objective or problem. The first stage is necessary to determine the correct valuation approach required for the particular wetland that is to be valued. The type of economic assessment approach chosen will depend directly on the problem confronting the analyst.

Stage 2: Defining the scope and limits of the analysis and the information required for the chosen assessment approach.
The second stage involves the determination of the information needs for carrying out the selected assessment approach. The first step is to identify the wetland area under consideration, the time scale of the analysis and the geographic and analytical boundaries of the system. These will obviously differ given the type of problem to be analysed. The next step is to determine the basic characteristics of the wetland being assessed. The final step is to determine the type of value associated with each of the wetland system's structural components, functions and attributes.

Stage 3: Defining data collection methods and valuation techniques required for the economic appraisal, including any analysis of distributional impacts.
The third stage concerns choosing the appropriate economic appraisal methods and valuation techniques. This final stage involves carrying out the actual valuation itself.
In their work, Barbier, Acreman and Knowler (1997) did not consider the basis of valuation. The three stages presented above were further broken down, by the authors,

into seven practical steps which must be followed to undertake an economic valuation of a wetland. These are: choosing the appropriate assessment approach; defining the wetland area; identifying and prioritising components, functions and attributes; relating components, functions and attributes to use value; identifying and obtaining information required for assessment; quantifying economic values and implementing the appropriate appraisal method.

Also, Ramachandra and Rajinikanth (2000) examine economic valuation of wetlands. In the report submitted to Center for Ecological Sciences, Indian Institute of Science, Bangalore, the authors identify six (6) stages involved in wetland valuation process. These stages are:

Stage 1: Choosing the Appropriate Assessment Approach

The first stage in the evaluation process is to choose appropriate economic assessment approach based on the problems confronting the analyst. There are three approaches or issues most relevant to the economic analysis of wetlands. They are as follows:

Impact analysis – this would be appropriate, if the problem is a specific external impact (e.g., effluent from a textile industry polluting a wetland, oil spills on a coastal wetland, etc).

Partial valuation – conducting partial valuation would be suitable, if the problem has to do with making a choice between wetland use options (e.g., conversion of wetland to residential land or sports complex, whether to divert water from the wetlands for other uses or to convert/develop part of the wetlands at the expense of other uses).

Total valuation – this would be required if the problem is more general (e.g., developing a conservation/restoration strategy requires assessment of total net benefits of the wetland system).

Stage 2: Defining the Wetland Area

The second stage in this process is to define the wetland area and specify the system boundary between wetland area and the surrounding region based on maps of land use/land cover (e.g., agricultural use, vegetation etc.), flood extent and soils. The boundary of the wetland along with land use and land cover in the catchments/basin is to be mapped, using remote sensing data, or any other maps.

Stage 3: Identifying and Prioritizing Wetland Resources

The third step involves using various data sources, including scientific studies, consultancy reports and national resource inventories, to produce a more definitive list of components, functions and attributes present in the wetland, and then place them in their order of importance. This may be in rank order, say 1 to 10, or expressed as being high, medium or less significant based on its importance. Clearly, no single wetland will exhibit all of these, and it is important for the multidisciplinary team to work together to identify the key components, functions and attributes of the wetland being studied and to use all the available ecological, hydrological and economic information to score these various characteristics.

Stage 4: Relating Wetland Resources to Use Value and Gathering Information Required for Assessment

The fourth step is to determine whether each of the wetland resources (e.g., components, functions and attributes) is associated with direct, indirect or non-uses. Different physical, chemical and biological data will be required depending on the values that are to be assessed and the methodology for collecting and analysing the data must be specified. Interviews with local communities, census data and consultancy reports are usually good sources of information on direct use. An indirect use value requires detailed field investigations, concentrating on the physical links between wetland system functioning and the economic activities affected. Option, quasi option and existence values – may be more difficult to determine, and it will often be done with the help of the multidisciplinary team, keeping in mind the difficulties of quantifying these values.

Stage 5: Quantifying Economic Values

The fifth step involves the application of various methods to determine the value of wetland resources affected. Methods such as market prices method, travel cost approach, contingent valuation method, hedonic pricing method, etc can be adopted in valuing the particular wetland resources.

Stage 6: Implementing Appropriate Appraisal Method

In the ultimate step, the economic analysis of the wetlands should be placed in the appropriate framework as preferred during the planning for the study. For instance, cost-benefit analysis (CBA), normally involves calculating on an annual basis the benefits and costs of conserving the natural wetland functions, products and attributes over a selected time period. The three most common methods for comparing costs and benefits are net present value, internal rate of return and benefit-cost ratio. Valuation exercise is normally subjected to sensitivity analysis, which defines the variation in results arising from different assumptions or benchmark values used in the study, such as discount rates. However, Barbier, Acreman and Knowler (1997), Ramachandra and Rajinikanth (2000) did not consider the basis of valuation in their works for Ramsar.

In a report submitted to United Nations Environmental Programme/Global Environment Facility and UNEP/GEF, on Vietnam Wetland Component, Nhuan *et al.* (2003) suggest that the following steps be taken when approaching wetland valuation:

1. Appropriate valuation methods need to be decided upon, which are suitable for the particular research objectives being proposed. For developing national conservation strategies a total economic evaluation is advocated.

2. Delineate the boundaries of the wetland area as accurately as possible. This may require the consultation of maps which give the required information on soil types, vegetation zones, flood lines and agricultural practices.
3. Find out what the key resources and assets offered by the wetland are and make a list, ranking them in terms of their priority. This information may be obtained from previous literature written in the form of scientific papers, consultancy reports and national resource inventories.
4. Investigate whether each of the different functions and services offered by the wetland has a direct, indirect or non- use benefit associated with it.
5. Identify the types of information required to value each category of use value being investigated and plan how to source this data.
6. Estimate the wetland's economic value.
7. Implement an appropriate appraisal method, such as cost-benefit analysis (CBA) or multi-criteria decision-making. This choice will affect all of the seven steps in the approach to evaluating the wetland (Nhuan *et al., 2*003).

In Switzerland, de Goot, Stuip, Finlayson and Davidson (2006) examine appropriate guidelines for valuing wetland ecosystem as technical report for Ramsar Convention secretariat. They identify five (5) steps in the valuation process for wetland valuation. These steps are: Analysis of Policy Processes and Management Objectives; Stakeholder Analysis and Involvement; Function Analysis (Identification and Quantification of Services); Valuation of Wetland Services and Communicating Wetland Values. These steps are further explained below.

Step 1: Analysis of Policy Processes and Management Objectives

This step focuses on answering the question of why undertaking the valuation. Analysis of policy processes and management objectives is essential to set the stage for a discussion of why the valuation is necessary and what kind of valuation is needed [e.g., to assess the impact of past or ongoing interventions, to analyse trade-offs of planned wetland uses (partial valuation), or to determine the Total Value of the intact wetland]. During this stage of the valuation process, it should also be determined how values that are relevant to policy and management decisions can be generated. The aim of policy analysis is to:

i) identify the types of information (and kinds of values) required and by whom;

ii) understand the policy process and stakeholder interests, both in current practice and the desirable state, and how they influence the kind of information that is required;

iii) enable key stakeholders to assign their own values and incorporate them into decision-making, and be able to compare different kinds of values;

iv) describe the objective of the valuation within the policy and stakeholder context;

v) identify the main valuation questions in relation to the current and ‘desired’ policies; and

vi) ensure that valuation reflects policy goals and aspirations for wetlands and those who use them.

Step 2: Stakeholder Analysis and Involvement

In step two the issue of who should do the valuation and for whom is settled. Early in the process, the main stakeholders should be identified. The involvement of stakeholders is particularly important, because in almost all steps of the valuation procedure, stakeholder involvement is essential in order to determine the main policy and management objectives, to identify the main relevant services and assess their value, and to discuss trade-offs involved in wetland use. Methods which can and should be used, as appropriate, in stakeholder analyses of wetland valuation are: data review, observation, interviews, questionnaires, resource tenure and ownership maps, diagrams/maps, ranking, stories/portraits and workshop (de Goot, Stuip, Finlayson and Davidson 2006). However the most commonly used tool is the administration of questionnaires which must be carried out with strict adherence to the principles for drafting questionnaires. In identifying the stakeholders, Brown, Tompkins and Adger (2001) posit that it must be done from a macro- to a micro- level (e.g., global and international wider society, national, regional, local off-site and local on-site).

Step 3: Function Analysis (Identification and Quantification of Services)

It is also important at the onset to determine what should be valued; this is done in step three of the framework. In this step, through inventory methods wetland characteristics (ecological processes and components) are translated into functions which provide specific ecosystem services. These services should be quantified in appropriate units (biophysical or otherwise), based on actual or potential sustainable use levels. Wetlands are composed of a number of physical, biological and chemical components such as soils, water, plant and animal species, and nutrients. The interactions among and within these components allow the wetland to perform certain functions (i.e. the capacity of ecosystem process and components to provide goods and services that satisfy human needs, directly or indirectly) and the services (i.e. the benefits people obtain from ecosystems).

Step 4: Valuation of Wetland Services

In step four, the approach for undertaking the valuation is given appropriate consideration. In this step, the benefits of wetland services identified in Step 3 are analysed. These benefits should be quantified in both the appropriate value units (eco-logical, socio-cultural and economic indicators) as well as monetary values. The three main types of values that are defined, which together determine the Total Value (or importance) of wetlands are: ecological, socio-cultural, and economic values. Each type of value has its own set of criteria and value units.

Step 5: Communicating Wetland Values

The result of wetland valuation has to be communicated to the appropriate individual or groups. To make the results of the valuation fully accessible to all stakeholders and relevant decision-makers, communication and dissemination activities are essential.

From the above analysis, it is evident that the authors (de Groot, et.al., 2006) did not inquire into the basis and methods of wetland valuation. Also, no consideration was given to the challenges posed by wetland valuation and the factors considered in choosing valuation methods to be adopted in valuing wetland resources.

2.7 Basis and Methods Used for Wetland Valuation for Compensation

Arguing in favour of valuation generally, Blight (2003) describes valuation as a vital element in the efficient functioning of modern economies and of modern society. He further asserts that without accurate valuations, scarce resources may be allocated incorrectly. For an economy and therefore the society to function properly, market participants need to correctly identify the marginal utility of a product such that the correct market price may be established.

The above statement is also true of wetland valuation, because without proper determination of the value, both the individual and decision/policy makers will continue to underestimate the importance of this God given resource that makes life worth living for man. Estimating the value of wetlands, in monetary terms, dates back to 1926 when Percy Viosca, Jr. estimated the value of fishing, trapping and collecting activities from wetlands in Louisiana was worth $20 million annually (Vileisis, 1997). A landmark early valuation study by economists was by Hammack and Brown (1974), who focused on wetlands as waterfowl habitat and estimated the value that wetlands provided in terms of hunting with a contingent valuation method (C.V.M). However, there may be other methods that can be used in estimating wetland values and these would be identified by the current study.

Basis of valuation talks about the pillars, the resting platforms upon which a method rests. It constitutes the bedrock for the choice of method to be adopted in carrying out any valuation. According to the Royal Institution of Chartered Surveyors (RICS, 2008) a basis of value typically describes the nature of the assumed transaction, the relationship and motivation of the parties and the extent to which the asset is exposed to the market. It describes the fundamental measurement principles of a valuation. In other words, before a method is adjudged to be appropriate for use in a particular situation, there must be reasons to prefer the method over another with a purpose to achieve certain ultimate goal. In Nigeria, the Nigerian Institution of Estate Surveyors and Valuers (NIESV, 2006) Valuation Standards and Guidance Notes on Property Valuation in section 4.1, recognises only two bases of valuation (open market value and depreciated replacement cost). However, the valuation standards and guidance notes did not make mention of wetland or any environmental resources. In the work of Barbier, Acreman and Knowler (1997), the authors identify four methods that can be employed in valuing wetland ecosystems. These are market prices, indirect opportunity cost approach, travel cost method, contingent valuation. However, they did not consider the basis of valuation and heads of claim. In the same vein, Ramachandra and Rajinikanth (2000) identify seven methods that can be used for valuing wetland resources. The methods include: market prices method; efficiency prices method; travel cost approach; contingent valuation method; hedonic pricing method; production function approach and related goods method. The authors did not examine the basis of valuation, heads of claim and the challenges encountered in wetland valuation.

The appropriate basis for valuing wetland (environmental) resources is total economic value (TEV) of wetlands which according to Barbier (1993) and Arin and Siry (2000) is the total amount of resources that individuals would be willing to forgo for increased amount of wetland services. Fig. 2.2 shows the various groupings of TEV of wetlands. The TEV is divided into different components:

A. **Use Values**

1. **Direct Use Values** are the benefits derived from fish, agriculture, fuel wood, recreation, transport, wildlife harvesting, peat/energy, vegetable oils, dyes, fruits,

2. **Indirect Use Value** are the indirect benefits derived from wetlands functions such as nutrient retention, flood control, storm protection, groundwater recharge, external ecosystem support, micro-climatic stabilization, shoreline stabilization, etc.

3. **Option Value** is the additional value that comes from the option not to exercise if that is a more profitable course.

B. **Non-Use Values**

The non-use value is derived from the knowledge that a resource (biodiversity, cultural heritage, religious site, and bequest) is maintained. This value is strongly considered by environmentalists through the concept of the pure intrinsic value of nature.

For the purpose of this study, Total Economic Value (TEV) is defined as an aggregation of the main function based values provided by a given ecosystem. It includes both use and non-use values as depicted in Fig. 2.2.

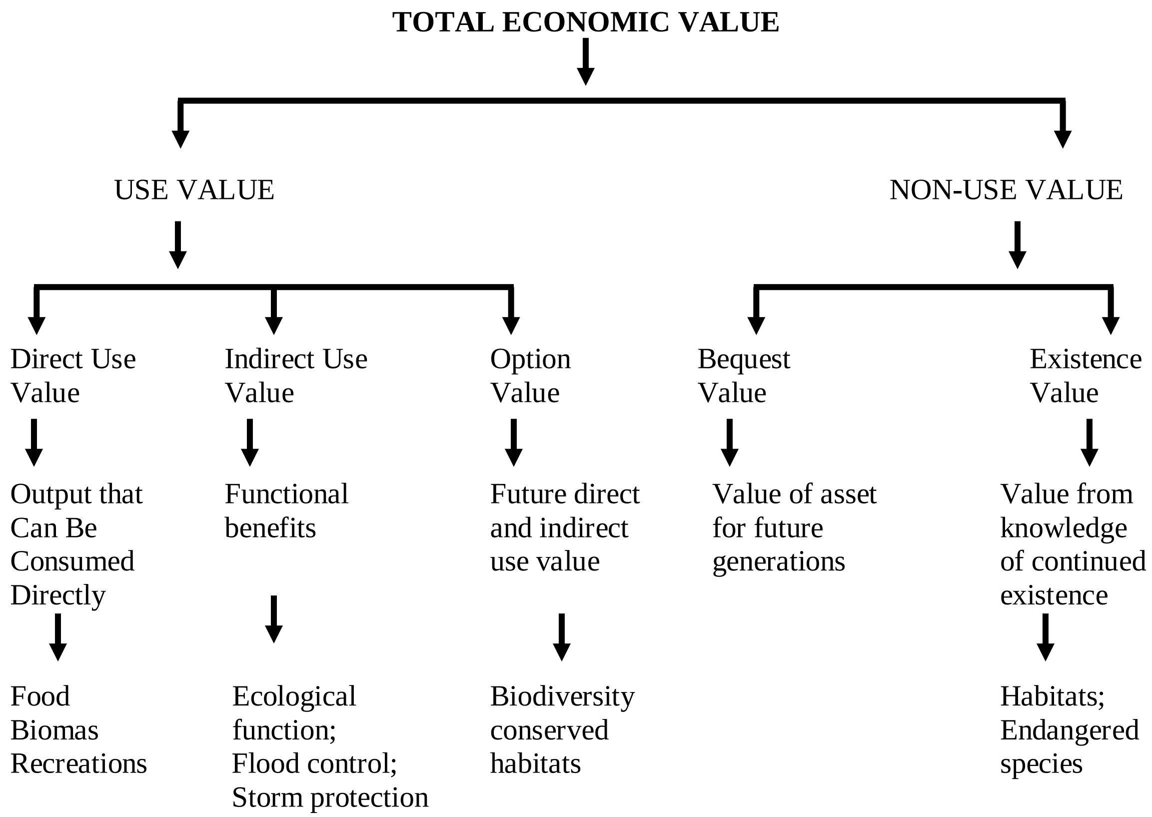

Fig. 2.2: Total Economic Value
Source: Adapted from Barbier (1993), Arin and Siry (2000)

Wattage (2002) submitted a report to the Centre for the Economics and Management of Aquatic Resources (CEMARE) University of Portsmouth, UK, the Department of Town and Country Planning, University of Moratuwa, Sri Lanka and the Department of Forestry and Environmental Sciences, University of Sri Jayewardenapura, Sri Lanka. The report which was on guidelines on economic valuation of wetland resources using other available non-market valuation methods in Sri Lanka focused on preference elicitation methods (valuation methods) of wetland conservation. The author identifies the following methods for wetland valuation; contingent valuation method, conjoint analysis, travel cost method, hedonic pricing method, production function based techniques and cost-benefit analysis (CBA). The report did not examine the valuation process, basis of valuation and factors responsible for choice of wetland valuation methods.

Lambert (2003) identifies nine different methods for valuing wetland resources. The methods include market price method, damage cost avoided, replacement cost or substitute cost method, travel cost method, hedonic pricing method, contingent valuation method, contingent choice method, benefits transfer method and productivity method. The author also identifies the bases of wetland valuation as direct use values, indirect use values. However, did not examine heads of claim and the process of wetland valuation. In Canada, the Canadian Wildlife Service (2005) examines bases, heads of claim and valuation methods for Great Lake wetlands in Canada's Ontario region. By means of a non-empirical methodology, they drew attention to the failure of the market to reflect the full or true cost of wetland goods and services. They argue that the true bases of valuation for wetland resources should include not just market value but also direct use benefits, indirect use benefits, option benefits and existence benefits. They listed eighteen heads of claim (e.g. commercial harvest, flood control, potential future uses, culture, heritage etc.) under these bases of valuation. They suggested contingent valuation and benefits transfer as the appropriate methods for wetland valuation. However, they did not investigate factors responsible for the choice of wetland valuation methods.

In a report submitted to the Water Research Commission, on South Africa Wetlands, Turpie, Lannas, Scovronick and Louw (2010) identify three main groups of methods for wetland valuation. Each of the main groups was further broken down into their various components as follows:

a. **Market Value Approaches:** market valuation, production function approach, restoration cost or replacement cost methods, damage costs avoided and defensive expenditure method.

b. **Surrogate Market/Revealed Preference Approaches:** travel cost method (TCM) and hedonic pricing method.

c. **Simulated Market/Stated Preference Approaches:** contingent valuation methods (CVM), conjoint valuation methods (choice modelling; contingent ranking) and benefits transfer

The report did not make mention of the valuation process, basis of valuation and factors considered in the selection of wetland valuation methods.

Seven methods of wetland valuation have been identified in literature. They are benefits transfer, hedonic pricing, contingent valuation, participatory approach, cost-benefit analysis, travel cost method and production functions. The methods are examined and discussed as follows:

2.7.1 Benefits Transfer Method

Costanza et al. (1997) provides a well known example of benefits transfer in which wetland values play a key role. Benefits transfer approach infers the value of wetland benefits by transferring the value derived elsewhere for another wetland benefits, which may not necessarily be from the same neighbourhood/region. In their work they used the results from a study of the blue crab productivity of western Florida salt marshes by Lynne, Conroy and Prochaska (1981) for estimating the marginal product of Louisiana wetlands for blue crab. Several other studies including Batie and Wilson (1978) were used to estimate the marginal product of wetlands for oysters, in Virginia wetlands. In using benefits transfer method, Woodward and Wui (2001) apply meta-analysis technique to value wetland services provided by Lake Ontario in Northern US region. Meta-analysis is an approach that uses statistical figures from numerous valuation studies to determine the value of the wetland under study. The purpose of their study was to assess whether any systematic trends can be distilled from the breadth of wetland valuation studies already conducted and to shed light on the factors determining a wetland’s value. They reviewed 46 studies, after which data from 39 wetland valuation studies were identified as having sufficient commonalties to allow inter-study comparisons. They used two techniques to learn about the valuation function, both of which can be broadly described as meta-analysis since many studies are used to identify general relationships. The first method they employed uses bivariate graphical and standard techniques, which gives an indication of the extent to which particular characteristics influence wetland values and at the same time portraying the full distribution of the data. The second technique employed used a multivariate regression of wetland values on the characteristics of both the wetlands and the studies. The study revealed that there is some evidence that the method employed affects the value obtained. The study further shows that there are variations in the values arrived at using different methods. Also, Breunig (2003) apply benefits transfer approach in valuing ecosystem services from Massachusetts freshwater wetlands by applying the results of studies conducted on 16 different wetlands.

Using the results of de Zoysa (1995), Hushak (2001) conducts a benefits transfer study on wetlands in Saginaw Bay, Michigan. The main finding of the study is that benefits transfer results vary tremendously depending on the assumptions made about the relevant population of people willing to pay for wetland services and the method used to translate per acre values to the programme being valued. Making generalisations about wetland values is difficult because wetlands are not a homogeneous commodity, different types of wetland provides very different services. Also, location (distance) plays important role in the value placed on wetland, where a wetland is located close to people, they tend to attach much importance to it and this will eventually affect its value. Demographic characteristics and tastes of the people whose values are being measured will affect wetland values. High variability limits the confidence that can be placed in any attempt to transfer values from one study context to another area. Smith (1992) criticises this approach on the ground that it is not possible to observe all the factors that influence people’s preference, applying models that use empirical information to predict people’s preference are inherently wrong therefore the result from Benefits Transfer can only be regarded as an approximation. McConnell (1992) puts forward two observations that he believes characterise the decision on environment and which he argues impact on benefits transfer estimates. The first observation is that natural resource services are not provided in market clearing setting. This means that similar resources in different regions will provide different total and marginal values, suggesting that benefits transfer across regions is not likely to be reliable. The second observation is that non-market valuation seeks to estimate values that are rarely observed. According to McConnell (1992), this places considerable emphasis on the demand model and requires judgments to be made about the behaviour of the model for other sites, for which there is little basis other than introspection. Both of these observations lead to the conclusion that benefits transfer cannot be mechanical, that transferred estimates will require informed judgments.

For Benefits Transfer to be reliable, Brouwer (2000) identifies the fundamental essential conditions to include:

i. The environmental good (or service) in both sites, including any proposed change in provision levels should have approximately the same characteristics;
ii. The population in both areas should have similar characteristics, including income, education level and culture;
iii. The values estimated for the study site should not be dated as preferences could change over time;
iv. The availability and price of substitutes should be the same;
v. The relative prices of other goods and services should be the same;
vi. The technical quality of the study site, including adequate data, sound economic methods and appropriate analytical techniques needs to be determined. Studies being considered for Benefits Transfer to a policy site should provide regression results;

vii. The constructed or hypothetical markets for estimating the value of environmental resources, including the distribution of property rights, should be the same at both the study site and policy site.

Despite the simplicity of this approach, in practice the assumption of identical unit values across study and policy sites may well not hold. Reasons for such differences may be numerous and include the following:

Differences in the socio-economic characteristics of the relevant populations;

i. differences in the physical characteristics of the study and policy site;
ii. differences in the proposed change in provision between the sites;
iii. differences in the market conditions applying to the sites (for example variation in the availability of substitutes).

The use of benefits transfer to estimate wetland values faces substantial challenges. The prediction of a wetland's value based on previous studies is, at best, an imprecise science. The need for site-specific studies remains. Part of the problem lies in the lack of uniformity across studies. Benefits transfer method did not consider the fact that each wetland site is unique, it assumes that wetlands are homogeneous commodities that are provided in market clearing setting, however forgetting that non-market valuation seeks to estimate values that are rarely observed. The result from benefits transfer method can only be as accurate as the initial study. Making generalisations about wetland values is difficult because wetlands are not a homogeneous commodity, different types of wetland provides different services. There seems to be no current wetland valuation studies in the study area and Nigeria from which values could be inferred and this would make the application of benefits transfer inappropriate.

2.7.2 **Hedonic Pricing Method**

Graves, Murdoch, Thayer and Waldman (1988) used the hedonic analysis of housing markets to measure the benefits of various environmental amenities and other studies had been conducted on the use of hedonic approach to determine the value of environmental amenities (including wetlands). Such studies include Brown and Pollakowski (1977), Lansford and Jones (1995). Hedonic models value environmental attributes associated with housing locations by estimating consumer preferences for these attributes, that is, linking tradeoffs between environmental attributes and housing prices. It assumes a continuous functional relationship between the price of a house and its attributes; it models the price that people pay for a house by equating the marginal utility of each house attribute to its marginal price.

Earnhart (2001) in conducting a valuation of the Pine Creek Marsh, Fairfield, Connecticut, applied the hedonic analysis using mailed survey approach whereby 464 homeowners (respondents) were used. While controlling the effects of factors such as structural, neighborhood, and environmental, it isolate the effects of environmental amenities. The analysis includes the following structural features: (1) style; (2) number of bedrooms; (3) number of bathrooms; (4) interior space; (5) lot size; and (6) age of structure. It includes two neighbourhood features: (1) indicator variables for prominent neighborhoods designated by census tract boundaries; and (2) flooding frequency (much of Fairfield is built on former coastal wetland). This analysis ignores most neighborhood features because the study site involves only a single small town (population approximately 40,000) that is relatively homogenous in terms of the neighbourhood features employed in previous research: percent professional, median income of census tract, percent of houses owner-occupied, percent white and median age of census tract. The study used on actual housing choices, their associated attributes, and characteristics of buyers taken from several sources. It mailed 464 mail surveys (evenly distributed across the nine survey versions) to Fairfield homeowners in late 1996 and out of the 464 people contacted 105 returned completed surveys, or a response rate of 22.6%. The study concluded that the inclusion of stated data improves estimation of household utility (including environmentally-related utility) associated with housing locations, while inclusion of revealed data improves estimation of the marginal utility of income, as captured by the co-efficient on housing price. The study was basically focused on the effects of environmental amenities on housing prices which is contrary to the focus of the present study – wetland valuation practice. Also the adoption of homeownership respondents is not in line with the focused respondents for the present study and finally, rather than using mailed survey, this study used hand-delivered survey (questionnaire), administered on the firms of Estate Surveyors and Valuers in the study area.

Various studies had used hedonic technique to examine how the sale price of a property is related to air quality (Anderson and Crocker 1971, Beron, Murdock and Thayer, 2001; Chattopadhyay 1999) and water quality (Leggett and Bockstael 2000). Other studies include the effects of amenities such as proximity to a golf course (Do and Grudnitski 1995) and views of oceans, lakes, and mountains (Benson, Hansen, Schwatz and Smersh 1998) as well as disamenities such as proximity to a smelter (Dale, Murdoch, Thayer and Waddell, 1999), an airport (Espey and Kaufman 2000) and to highways that are used to transport nuclear waste (Gawande and Jenkins-Smith 2001). Assuming that housing choices are the result of utility-maximizing decisions, and that prices clear the market, the price of the i^{th} property location (P_{hi}) is represented by equation 1.

$$P_{hi} = P_h\,(S_i, N_i, E_i, R_i) \text{ - } (1)$$

It is generally agreed that the relationship between the price and attributes of a house is nonlinear since many housing attributes cannot be repackaged, for example, two living rooms with six-foot ceilings are not the same as one living room with a twelve-foot ceiling (Freeman, 1993b).

In a study conducted in the district of Salo in Finland, to value implicitly non-priced urban forest amenities by comparing dwelling prices and specific amounts of amenities associated with dwelling units, Tyrvainen and Miettinen (2000) used the hedonic price method. The purpose of the study is (1) to search for variables suitable for describing close home forest benefits, and (2) to estimate the monetary value of urban forest benefits reflected in dwelling prices. In conducting the study, the authors collected data on terraced houses alone. Thus, the data consists of all apartment sales in terraced housing over 3 years in the mid-1980s. The number of housing share transactions in the final sample was 590. Also information on the status of housing areas was obtained by telephone inquiry from local real estate agents. Two variables were adopted in measuring urban forest amenities on property values. The first one is distance to a forest park and according to the estimation results, an increase of one kilometer in the distance to the nearest forested area leads to an average decrease of 5.9 percent in the market price of the dwelling. The second variable is view onto forest and this revealed that dwellings with a view onto forest are on average 4.9 percent more expensive than dwellings with otherwise similar characteristics. According to the estimation results 95% confidence interval for the variable measuring distance to the nearest forested area is (0.091 – 0.024) and for the variable view onto forest (0.020 – 0.076). A study conducted by Anderson and Cordell (1988) in Athens, Georgia found a 3 to 5% increase in the sale price of properties with trees in their front yard. The present study will not consider the effect of location on wetland values.

Doss and Taff (1996) and Mahan, Polasky and Adams (2000) provide detailed estimates on the relationship between property values and wetland proximity and type. The study (Mahan, Polasky and Adams 2000), conducted in Portland, Oregon, provides coefficient estimates for six wetland types. Proximity to three wetland types was found to have a negative and statistically significant relationship to a property's sale price while proximity to one wetland type was found to be statistically significant and positive. The authors also include distance variables for streams, rivers, lakes, and parks. Proximity to streams and lakes is found to have a positive statistically significant effect, that is, living closer to these areas increases a property's sale price. The coefficients on distance to the nearest park and river were not statistically significant. The influence of riparian buffers on a property's sale price is investigated in a study conducted in the Mohawk watershed in Western Oregon by Mooney and Eisgruber (2001). The authors estimate that a 50-foot treed riparian buffer will decrease the value of the mean property in their data set by approximately 3%. This result is attributed to a diminished river view. The authors estimate that stream frontage increases property values by 7%.

The advantages of hedonic modeling have been widely acknowledged in the valuation of real estate. Hedonic modeling is able to accurately predict the value of a property using a regression analysis based on the particular characteristics of the asset. For example, in regards to real estate this approach has successfully determined the value contributions of factors such as building size and materials, availability of public transport, access to schools and parks, views and the quality of a neighbourhood (Harrison, Mandeville and Stillman, 2000). They (Harrison, Mandeville and Stillman, 2000) conclude that in this respect, the method has the potential to estimate the value of visual amenity (not the hidden) and other qualities of natural landscape that might be present in wetland ecosystem.

The theory of hedonic pricing method looks very simple, but in practice, the model requires more data about the environmental resource and these are not usually available. Also the application of hedonic pricing to environmental functions of wetlands requires that the values are reflected in surrogate markets. The model assumes that all characteristics can be measured objectively, however, different consumers may see the same product or brand as representing the same characteristics but in different proportions.

2.7.3 **Contingent Valuation Method (CVM)**

Brown and Henry (1989) use contingent valuation method (CVM) to estimate the value of Kenya's elephants with a view to putting them under a protected area. In carrying out the study, a survey was administered on the visitors to major national parks and lodges asking questions on how much they will be willing to pay ($100 or more, or less) to contribute towards elephant conservation or by how much would the cost of safari be reduced if elephant populations decreased by half. The study reveal that visitors attached more importance to the existence of elephants and are willing to pay more to ensure that the elephants are well protected. Navrud and Mungatana (1994) arguing that travel cost approach underestimated the recreation value of Lake Nakuru in Kenya, adopted contingent valuation to determine the total value that tourists place on wetland and its component species. Their study demonstrate that the annual recreation value of wildlife viewing in Lake Nakuru in Kenya was between US$7.5 and 15million, a figure higher than that obtained through travel cost approach.

This method (CVM) is usually used to quantify environmental benefits that have no market and whose value simultaneously incorporates multiple components. The approach is not based on any observed market behaviour or prices; rather, it infers the value that people place on wetland goods by asking them questions directly. Such questions are meant to elicit information on what people would be willing to pay (Willingness-To-Pay) to conserve important and threatened environmental resources, or what they would be willing to accept (Willingness-To-Accept) as compensation for the loss of right to any environmental resources.

Ranjani and Ramachandra (1999) also used CVM to assess the importance of Hebbal Lake, in India, through the administration of socio-economic survey conducted on respondents within 1 kilometre radius of the lake. While the first three areas were semi-urban, U. A. S. Layout is purely urban. The study showed that respondents from Hebbal, Guddadahalli and Bhoopasandra depended more on the Lake for their domestic, agricultural and livestock needs, respondents from U. A. S. Layout did not attach much value to the Lake because of access to underground water. In assigning quantitative values to the goods and services provided by the wetlands around Rachenahalli and Amruthalli Lakes in India, Rajinikanth and Ramachandra (2000) use contingent valuation method to determine the economic dependency of the people living around the Lakes through questionnaire interviews. The study revealed a high level dependency of the people on the Lakes resulting in high willingness to pay to conserve the Lakes. Beaumis, Laroutis and Chakir (2007) in assessing the people's WTP for conserving Seine Estuary Wetlands in France, sampled 300 respondents using face-to-face interviews. They conclude that income plays prominent role in what respondents are willing to pay to visit Seine Estuary Wetlands. They further conclude that respondents who are direct beneficiary from the wetlands (fishing, hunting, and walking) give a higher value to the wetland goods. These results coincide with a regular visit to wetlands and to the fact that 95% of respondents who visited the wetlands do so with other people.

The findings from the three studies (Ranjani and Ramachandra, 1999; Rajinikanth and Ramachandra, 2000 and Beaumis, Laroutis and Chakir, 2007) examined above could be applicable to Niger Delta region because the livelihood of the people of the region depends basically on wetland resources hence making them greatly affected by whatever impairs the ecosystem in the region. However, unlike these studies that used residents as respondents, the current study used firms of Estate Surveyors and Valuers in the region as focus of examination, for the purpose of examining how this important resource is valued and it is on these set of respondents that the instrument for data collection (questionnaire) was administered. The focus on Estate Surveyors and Valuers was informed by the fact that they are the people legally and professionally qualified to assess the worth of an interest in real estate (land and landed properties). The reason for this was because Estate Surveyors and Valuers are the ones that are professionally and legally qualified to assess the worth of an interest in a property. Emerton (1998) was of the view that CVM approach is often an inappropriate method for valuing wetlands utilization in developing countries, because of its hypothetical base.

Earlier studies identified above showed the effects of income, education, age and availability of substitutes on people's Willingness-To-Pay. They however, did not consider the role that distance play on environmental (wetland) resources. People that live close to the wetland may be willing to pay more than people living far away because of the differences in the level of their perceived benefits or losses. Many criticisms such as 'embedding or scope effects', biases [question order bias, information bias, etc) had been leveled against the application of CVM even though it is the most applied method for determining individual's willingness to pay (Venkatachalam, (2004)]. Such criticisms include the assumption that every individual respondent has good information about the natural resource under consideration. Also a lot of biases had been identified against this method. These biases are starting point bias, vehicle bias, information bias, interviewer and respondent bias. There is also controversy over whether people would actually pay the amounts stated in the interviews. In spite of the various criticisms, contingent valuation method has been adjudged as the only method that captures both the use and nonuse values produced by wetland ecosystems and this approach could also be suited for the valuation of wetland resources in the study area.

2.7.4 **Participatory Valuation Approach**

In valuing wetland utilization in Sacred Lake in Kenya, Emerton (1998) adopts participatory valuation approach whereby respondents were asked to indicate the importance attached to wetland benefits in terms of other locally important products or categories of value. This approach allows the respondents to choose a numerâire, usually commonly used, marketed and valued, for valuation, to express the worth of different wetlands products by using techniques such as ranking or proportional piling. Such numerâire include cattle, radio, and sack of maize, to mention a few. The rhetorical language of participation and participatory methods obscures a great deal of ambiguity about the nature of participation and its different forms. The extent to which it is achieved in practice remains a contested issue. It can be difficult to achieve local participation from harder to reach sections of the community, and especially in genuinely involving them in analysis and use of information. Scaling up the process, especially in cases where participatory monitoring and evaluation is being introduced into programmes that themselves are not participatory, is a challenge. Experience suggests that it is best to start small and create opportunities for participatory approaches to be tested before they are introduced widely. This can be helped by having a 'high level champion' who can create the space for experimentation. Participatory evaluation and monitoring is not an easy option. Opening up assessment to a wider range of stakeholders may create or expose conflicts. It requires a lot of resources (time, human resources and finances). A participatory process requires greater coordination, administrative effort and long term commitment. Evaluators or investigators need skills of facilitation, negotiation and conflict resolution, as well as a range of personal qualities, attitudes and behaviours appropriate to evaluation as an empowering process. Since the era of trade by barter is over coupled with the attendant challenges this approach is fraught with, it is, in the opinion of the researcher, not the best approach for valuing wetland resources in the study area and would therefore not be applied in this study.

2.7.5 **Cost-Benefit Analysis (Trade-Off Analysis)**

Beaumis, Laroutis and Chakir (2007) use Cost-Benefit Analysis (Trade-Off Analysis) in assessing the people's WTP for conserving Seine Estuary Wetlands in France. In carrying out the study, they identified 576 establishments on Seine Estuary Wetlands employing about 57,000 people and providing direct jobs. They sampled 300 respondents using face-to-face interviews. Their study showed that about 9,000 hectares of wetlands were destroyed as a result of the conversion. On aggregate, each hectare is an equivalent of

£182,360 (income). The outcome of their study shows that residents around Seine Estuary Wetlands considered the wetlands as an important natural asset. Ninety-two percent (92%) of the respondents were favourably disposed to conservation programme for the wetlands, with a revealed median of between £14.50 and £43.77. This approach presumes that the respondents know much about the benefits derivable from the existence of the wetland, and this cannot be said of the present situation. Their study underscores the importance the people of Niger Delta attached to their land, in terms of provision of natural assets, cultural attachment and economic activities. Such denials had resulted into uncountable attacks on the oil companies within the region. Cost-benefit analysis tends to omit outputs whose effects cannot be quantified and this constitute a great negation of the focus of environmental valuation that considers, as very important, the value of non-marketed environmental resources.

The cost-benefit analysis method of decision-making results in projects and policies that are likely to do harm to the environment because it lays emphasis on economic returns, undervalues the benefits of the environment, and the negative consequences to the environment, and cannot take into account the risk of man's actions having unintended or irreversible results. Firstly, since the valuation of the costs and benefits are contingent upon their impact upon human welfare, it privileges human well-being over that of the environment. Secondly, the cost-benefit analysis undervalues the benefits of the environment in ecological systems. Valuing environmental services solely in terms of how they benefit humans grossly undervalues them, and the ignored values are often more important than imagined, which in turn causes bigger problems for both humans and the environment. Thirdly, the cost-benefit analysis is mediocre at taking into account the possibility of irreversible or unexpected consequences of actions taken. A more fundamental critique of cost-benefit analysis is that the belief that we can ever fully measure and predict the consequences of our interventions into the environment is misguided.

2.7.6 **Travel Cost Method (TCM)**

Travel Cost Method (TCM) is an indirect method used for estimating user benefits from visits to recreational sites such as beaches, parks and heritage site (Liston-Heyes and Heyes, 1999). In a study conducted by Farber and Costanza (1987), to determine willingness-to-pay to preserve wetlands for recreational purposes in Terrebonne Parish, Louisiana, a survey of recreational users was undertaken on various days over l-year period. The survey was designed to utilize the travel cost method of evaluating consumer surplus from use of a site, and the contingent valuation method. The sampling procedure consisted of placing self-addressed, stamped questionnaires on windshields of all vehicles parked in the morning at 27 boat launch facilities in Terrebonne Parish on various dates throughout the period July 1984 to June 1985. The sum of the average number of vehicles per day across all sites was 563.29 on weekends and 132.1 on weekdays. A total of 7,837 questionnaires were distributed, and 1,126 were returned for a response rate of 14.4%. There were 6,248 questionnaires distributed on weekends, with a 15.0% response rate; and 1,589 on weekdays with an 11.7% response rate. In order to implement the travel cost methodology, seven rings of 35mile increments in radii were constructed centered at Dulac, Louisiana. Each parish or county of Louisiana, Texas, Mississippi and Alabama was placed in one of the rings or in a rest-of-world (ROW) category. The localised use of these wetlands was apparent from the fact that 78% of the respondents came from ring 1, and 98% from rings 1 through 3. Having felt that the localised use may make the travel cost methodology inadequate for determining willingness-to-pay, they went on to estimate the value of travel time by determining the total cost of travel time to the typical user group in the sample.

Iamtrakul, Teknomo, and Hokao (2005) used travel cost method to estimate the economic value of a public park in Saga City, Japan. The study found that park users spent time to visit Shinrin Park approximately 1.7 times and 1.2 times more frequent than Saga Castle Park and Kono Park. The same trend for travel distance, visitors took longer distance to travel to Shinrin Park than others that was about 2.8 times and 1.3 times as much as Saga Castle Park and Kono Park. They concluded that this fact might influence travel cost incurred on travel to park since it could be implied that the longer distance resulted to the higher expense to park users. The cost generated from transportation to park has direct relationship with travel distance and travel time. It shows that the expense for travel to Shinrin Park was on average more than Saga Castle Park (2.9 times) and Kono Park (1.6 times). Also, Karen, Sue and Richard (2007) apply TCM in assessing the monetary value of the recreational use of Irish Forests. The study establish that the mean WTP results range between IR£1.07 and IR£1.65 per trip per adult equivalent. Thirty-five (35%) percent of responses are protest bids or zero bids and consequently the mean WTP measure is skewed. It went further to state that even when protest bids are excluded from the sample, the mean WTP remains in the region of one (or two) pounds per trip.

Most simple models of TCM assume that individuals take a trip for a single purpose – to visit a specific recreational site. However, this is not usually the case, a trip may have more than one purpose and once this happens, the value of the site may be overestimated. Also, there is the problem of defining and measuring the opportunity cost of time, or the value of time spent travelling can be problematic since such time may be used for other purposes different from the visit to the site. TCM is limited in its scope of application because it requires user participation. It cannot be used to assign values to onsite environmental features and functions that users of the site do not find valuable. Most importantly, it cannot be used to measure nonuse values. Thus, sites that have unique qualities that are valued by nonusers will be undervalued. Lastly, though there are a lot of recreation sites within the study area, but the spate of militancy in the area scares tourists/visitors from patronising the sites and this has impliedly reduced the income generating capacity of the sites, hence adopting travel cost/time may not project the right value of the sites.

2.7.7 **Production Methods**

Production methods can be used to estimate the value of increased economic productivity attributable to wetlands. There is a long history of using estimates of fish and wildlife production from wetlands going back to work of Vileisis (1997), Hammack and Brown (1974) and others. Coastal wetlands are recognized as being important nurseries for commercially harvested fish species (Boesch and Turner 1984, Beck et al. 2001). Majority of the applications of production approach to wetlands have estimated the value of coastal wetlands for increased fishery productivity. Lynne et al. (1981) estimated that a hectare of estuarine marsh in Florida's Gulf Coast would yield an additional 2.3 pounds of crab per year generating an annual value of about $0.10 to $0.12 per hectare (1971 dollars). In contrast, Batie and Wilson (1978) found that the marginal value of oyster production on the Virginia coast ranged from $0.46 per hectare to as high as $57.25 per hectare per year (1969 dollars), depending on the salinity, physical characteristics, and capital invested in oyster harvesting by site.

Barbier, Strand, and Sathirathai (2002) found that the value of remaining mangrove hectares for fisheries production in Thailand as mangroves continue to decline was quite sensitive to assumptions about the elasticity of demand for fisheries output (i.e., how responsive the quantity demanded is to changes in price). The estimated marginal value of a hectare of mangrove for fish and shellfish production was $135.44 per hectare per year, with highly inelastic demand (demand changed little with changes in price) but only $3.98 per hectare per year when demand is highly responsive (elastic) to price changes (1993 dollars). The production approach has also been used to estimate the value of wetlands in other contexts. Acharya and Barbier (2000, 2002) and Acharya (2000) used production methods to estimate the value of the hydrologic services (ground water recharge) of the Hadejia-Nguru wetlands in northern Nigeria. Acharya and Barbier (2000) estimated the loss in productive capacity with a reduction in ground water available for dry season agriculture and domestic use as a result of reduced recharge to the aquifer from wetlands. The loss of ground water affected welfare through decreased production, increased marginal cost of pumping, and increased costs of water provision for the household. The value of recharge by wetlands in agriculture was estimated to be $40.50 per hectare (1996 dollars) per season, or 6 percent of yearly income per farmer (Acharya 2000).

The production approach can be useful to estimate a partial value of wetlands when there is a clear link between wetlands and the production of an economically valuable commodity. The existence of market prices for commodities produced (e.g., commercially harvested fish) makes production-based valuation of use values for wetlands less controversial than most non-market methods.

Literature available to the researcher showed that earlier studies were on methods and other aspects of environmental valuation, not strictly on wetland valuation has been conducted in Nigeria, in general and in Niger Delta in particular. The Nigerian Institution of Estate Surveyors and Valuers annual conference in Port Harcourt in 2005 focused mainly on wetland development.

Adegoke (2005) examines wetland loss and degradation, identifies the causes of wetland loss and degradation which he grouped as direct loss and degradation that occurs to the wetland itself, and the indirect loss and degradation which occur as a result of changes outside (upstream) of wetland. He went further to identify the consequences of wetland loss and degradation which result in the deprivation of humankind of the valuable services of the natural/biological capital stored up in wetlands. It also reduces the ability of wetlands to provide goods and services to support biodiversity. All through the work, the author did not make mention of wetland valuation not to talk of the process of wetland valuation. He did not examine the basis, heads of claim and methods of wetland valuation; challenges faced in wetland valuation and the factors to be considered in choosing a wetland valuation method.

On his own part, Akujuru (2005) identifies the major categories of wetlands to include; Marine, Estuarine, Riverine, Lacustrine and Pauline Systems. He went further to identify the inadequacy of the current valuation methods in their application to wetland valuation, since they could not capture the non-use value of wetland ecosystems. In resolving the impasse, he suggests the adoption of Total Economic Value concept, where both use and non-use values of wetland ecosystems are properly captured. However, he did not mention the method(s) appropriate for doing this. Also he did not consider the process involved in wetland valuation, the challenges and factors responsible for choosing a particular method of wetland valuation. Otegbulu (2005) canvassed for the adoption of Total Economic Value concept but did not explain the approaches to determining this. It will be near impossible to determine the Total Economic Value without adopting appropriate method(s) to ascertain, in monetary terms, the loss to the owner or the cost implications of any action, in respect of wetland resources since they are mostly not traded in the open market.

Ijagbemi (2009) opines that the basis of wetland valuation should be total economic value and methods of wetland valuation include the market approach, the direct negotiation method, the open market method, the investment method and the replacement methods (all these are tradition approaches to valuation). He also identified contingent valuation method, which he zeroed in as the approach for assessing oil spills compensation. He however ignored the process of wetland valuation and factors responsible for the choice of wetland valuation methods. In his research on the application of contingent method to valuation of non-market goods damaged by oil pollution for compensation, Egbenta (2010), lists other environmental valuation techniques to include travel cost method and hedonic method. He however did not examine the process of wetland valuation. Also, he did not examine the basis of valuation and the factors responsible for the choice of wetland valuation.

Table 2.2 shows the summary of the various wetland valuation methods contained in the literature reviewed.

Table 2.2 **Summary of Wetland Valuation Methods**

Method	**Author(s)**	**Description and Importance**	**Application/Examples**	**Constraints and Limitations**
Contingent Valuation	Ranjani and Ramachandra (1999)., Rajinikanth and Ramachandra (2000), Beaumais, Laroutis and Chakir (2007) Loomis (2000), Emerton and Bos (2004)	This method asks people (using questionnaires), directly, how much they would be willing to pay (or accept as compensation) for specific environmental services. It constructs hypothetical market to elicit respondents' willingness to pay. It is also referred to as a "stated preference method"	1.valuation of tourism services. 2. can measure option and existence values and provide a true measure of total economic value.	There are various sources of possible bias in the interview techniques. These include starting point bias, vehicle bias, information bias, interviewer and respondent bias. There is also controversy over whether people would actually pay the amounts stated in the interviews.
Hedonic Pricing	Lansford and Jones (1995)., Earnhart (2001), Mahan, Polasky and Adams (2000), Mooney and Eisgruber (2001), Leggett and Bockstael (2000), Emerton and Bos (2004)	This is an approach whereby the value of properties, especially residential houses and lands are estimated by determining what people actually pay for the environmental services and/or utilities from the local environment. Its principle is that the price of a marketed good is related to its characteristics, or services it provides. It measures value based on actual choices. It is versatile and can be adapted to consider several possible interactions between marketed goods and environmental quality.	1. commonly applied to variations in housing prices that reflect the value of local environmental attributes such as clean air, large surface of water or aesthetic views (which increase the price of surrounding houses or land). 2. measures value based on actual choices.	Application of hedonic pricing to environmental functions of wetlands requires that these values are reflected in surrogate markets. The approach may be limited where markets are distorted, choices are constrained by income. Information about environmental conditions is not widespread. This method is data intensive and in most cases, the data may not be available.
Travel Costs	Szentesi and Cristescu (2008), Emerton and Bos (2004), Iamtrakul, Teknomo, and Hokao, (2005),	The Travel costs approach derives the value of an environmental resource like tourist centre by determining what people are willing to pay, in terms of money and time, to visit the environmental benefits. That is, it is used to estimate the economic use values	1. Widely used to estimate the value of recreation sites including public parks and wildlife reserves in	This approach can result in over estimation of the site because it usually assumes that individuals take a trip for a single purpose, which is usually not the case; the trip may be taken for various purposes, at the same time. It

	Karen, Sue and Richard. (2007)	associated with ecosystems or sites that are used for recreation. It works on the premise that the time and cost expenses that people incur to visit a site represent the "price" of access to the site. This approach is not hypothetical; it is based on what people actually do. It is relatively inexpensive to apply and easy to interpret and explain.	developed countries.	does not consider the opportunity cost of the time spent in traveling to the site. The method works more accurately when travel distances are short. It also requires a lot of quantitative data.
Replacement Cost	Szentesi and Cristescu (2008), Emerton and Bos (2004)	This approach is similar to Damage Cost Avoided and Substitute Cost methods. It estimates the value of wetland services based on the cost of replacing them. The method assumes that the cost of replacing wetlands or their services provides useful estimates of the values of these wetlands and their services. The method provides approximate indicator of value. It is less data and resource intensive.	Applied to valuing water quality by measuring the cost of controlling effluent emissions or benefits derived from the nutrient removal in flood plains.	The replacement cost method and estimates of the cost of treatment are not valid approaches to determining benefits and should not be employed. In the absence of any information on benefits, and under strict guidelines, treatment costs could help determine cost-effective policy action. The method does not provide strict measures of economic values, based on people's willingness to pay for a product or service.
Market Prices	Day (2000), Smith, et. al. (2000), Barbier and Knowler (1997), Emerton and Bos (2004)	This is the approach used in estimating the economic value of ecosystem products or services that are bought and sold in the markets. It is the exchange value (based on marginal productivity cost) that ecosystem services have in the market. Market price represents the value of an additional unit of a good or service, assuming the good is sold through a perfectly competitive market (i.e. a market where there is full information, identical products and no taxes or subsidies). In using market price approach, observed data of actual consumer preferences is adopted. Also standard, accepted economic techniques are adopted. Price, quantity and cost data are relatively easy to obtain for established markets.	It is an important method used in estimating Direct Use Values, especially wetland products. It uses prevailing prices for goods and services traded in the market such as timber, fish etc sold in commercial markets. It is the best estimate of Willingness-To-Pay (WTP) and it reflects	There are usually data for limited goods and services provided by ecosystem and this may not reflect the value of all productive uses of a resource. The true economic value of goods and services may not be fully reflected in market transactions, due to market imperfections and/or policy failures. This method does not consider seasonal variation and other effects on market prices. Market Price method does not deduct the market value of other resources used to bring ecosystem products to market, and thus may overstate benefits. Many resources that contribute to the goods brought to the market go unaccounted and thus are not

			stakeholders' decision-making reality (they are the prices face when making decisions).	reflected in the prices.
Benefits Transfer	Costanza et. al. (1997)., Woodward and Wui (2001)., Breunig (2003)., de Zoysa (1995)., Hushak (2001), Boyle and Bergstrom, (1992) Brouwer (2000)	Benefits Transfer approach infers the value of wetland benefits by transferring the value derived for another wetland benefits, which may not necessarily be from the same neighbourhood/region. A benefits transfer is the process of taking an existing value estimate and transferring it to a new application that is different from the original one. In other words, it estimates economic values by transferring existing benefit estimates from studies already completed for another location or context.	This approach is applicable to the valuation of ecosystem in general and recreational uses in particular. It is applied when it is too expensive or when there is little time available to conduct original research. It is also applied when there is no available data on the case being worked on.	The result from benefits Transfer can only be as accurate as the initial study. Making generalisations about wetland values is difficult because wetlands are not a homogeneous commodity, different types of wetland provides very different services. Extrapolation can only be done for sites with the same gross characteristics. Till date, no study has been able to show under which conditions benefits transfer is entirely valid.
Productivity Method	Barbier, (1994)	This method is also known as Net Factor Income or Derived Value Method. It is used to estimate the economic value of wetland products or services that contribute to the production of commercially marketed goods. It is widely used to estimate the impact of wetlands and reef destruction, deforestation and water pollution, etc., on productive activities such as physical contribution of the resource or function to economic output. In general, the methodology is straightforward. Data requirements are limited, and the relevant data may be readily available, therefore the method can be relatively inexpensive to apply.	The application of productivity method requires the collection of data regarding effects changes in the quantity and quality of wetland resources on: (i) costs of production for the final good, (ii) demand for and supply of the final good, and (iii) demand for and	The method can only be applied to those resources that can be used as inputs in production of marketed goods, however not all wetland goods or services are related to the production of marketed goods. Care needs to be taken to avoid double counting of values. The method becomes more complicated if changes in the natural resource affect the market price of the final good, or the prices of any other production input. The application of this approach is most straightforward in the case of single use systems but becomes more complicated with multiple use systems.

			supply of other factors of production. This information is used to link the effects of changes in the quantity or quality of the resource to changes in consumer surplus and/or producer surplus, and thus to estimate the economic benefits.	
Cost-Benefit Analysis (Trade-Off Analysis)	Turpie, et al. (2000), Barbier et al., (1997). Antle et al. (2002), Beaumais, Laroutis and Chakir (2007), Emerton and Bos (2004)	Cost-Benefit Analysis is a methodology that compares the present value of all social benefits with the present value of opportunity costs in using resources. It can give valuable insights into the economic efficiency of management and regulatory actions. If the net value (benefits minus costs) of a project or action is greater than zero, then the project is considered to be economically efficient. The more the benefits exceed the costs; the better off the society in economic terms as a result of the activity.	Used in determining the implications of public scheme embarked upon by the government.	Apart from its significant data requirements, CBA does not consider the distribution of benefits and costs among stakeholders and is contingent on the existing distribution on income and wealth; besides, it tends to omit outputs whose effects cannot be quantified. (Barbier et al., 1997). Antle et al. (2002) question two basic assumptions of CBA: the discounting over time of all benefits and costs and the valuation of all effects in monetary terms. The former leads to a reduction of the weight of future outcomes relatively to present outcomes, which is often misunderstood by the general public and can be viewed as contradictory with a sustainability objective. . Moreover, stakeholders may fail at cognitively represent values in monetary terms for non-monetary aspects.

Sources: Adapted from Stuip et al. (2002), Ge and Du (2007), Day (2000), Smith, et. al. (2000)

2.8 **Factors Responsible for the Choice of Wetland Valuation Method**

Generally, the choice of method(s) adopted in the valuation of wetland resources is/are predicated on some factors that must be taken into consideration, in the process of valuation. The choice of method(s) must be decided before setting out for field work and it stems from the basis and purpose of wetland valuation. Barbier, Acreman and Knowler (1997) and Ramachandra and Rajinikanth (2000) variously identify the determination of the overall objective or problem to be solved by the valuation as the most important factor to take into consideration when choosing a particular method. The two group of authors conclude that where the damage to wetland is from a specific external environmental impact such as oil spills on a coastal wetland, the type of assessment required is *impact analysis*, but where the problem has to do with making a choice between two or more alternative wetland use options (e.g., whether to divert water from the wetlands for other uses, or to convert/develop part of the wetlands at the expense of other uses), the type of assessment required is *partial valuation*, and when the total economic contribution, or net benefits, to society, of the wetland system (e.g., for national income accounting or to determine its worth as a protected area) is concerned, then *total valuation* is required.

Also, Barbier, Acreman and Knowler (1997) were of the opinion that resource control and data collection options will influence the choice of valuation method to be adopted for any wetland valuation and importance of the wetland resources, to be valued, must equally be taken into consideration in choosing a valuation method. The Canadian Wildlife Service (2005) identifies the complexity and limitations of the method as critical in making a choice of wetland valuation method. They opine that the problem with using willingness to pay to measure the value of wetlands is that it requires a carefully designed survey, so it is not as straightforward as market price. They went further to state that not all available methods can be used in measuring values of the component parts of wetland resources.

King and Mazzotta (2000) working on ecosystem valuation, they list statistical complexity, information required, availability and accessibility to data required, people's perception, limitation of the method and availability of substitutes as factors to consider in making a choice of wetland valuation method. Explaining further, the authors state that contingent ranking requires more sophisticated statistical techniques to estimate willingness to pay. Information bias (contingent valuation) may arise whenever respondents are forced to value attributes with which they have little or no experience. In such cases, the amount and type of information presented to respondents may affect their answers. The replacement cost method requires information on the degree of substitution between the market good and the natural resource. Few environmental resources have such direct or indirect substitutes. The method is relatively complex to implement and interpret, requiring a high degree of statistical expertise. Large amounts of data must be gathered and manipulated. The time and expense to carry out an application depends on the availability and accessibility of data. Market data may only be available for a limited number of goods and services provided by an ecological resource and may not reflect the value of all productive uses of a resource. The travel cost method assumes that people perceive and respond to changes in travel costs the same way that they would respond to changes in admission price. The availability of substitute sites will affect values. The travel cost method is limited in its scope of application because it requires user participation. It cannot be used to assign values to on-site environmental features and functions that users of the site do not find valuable. The productivity method is limited to valuing those resources that can be used as inputs in production of marketed goods.

2.9 Challenges of Wetland Valuation

Wetland is a complex natural resource. Its value assessment requires a team of multidisciplinary professionals (biologists, economists, land surveyors, estate surveyors, etc). As a result of its complexity, valuing wetland resources is fraught with a lot of challenges. King (1998) using non-empirical approach identifies three challenges the wetland valuers may have to contend with. The first problem is that of political institutions, without enormous pressure to the contrary; treat no-value as zero value estimates. The second problem is that popular “scientific” literature is becoming littered with dollar estimates of wetland values that are misleading and unsound, but are being used. The third problem is that professional economists may never be willing to throw in the towel on wetland valuation. The author concluded that the results from conventional economic studies of wetland values have been so frustrating and disappointing for wetland protection. The author did not give consideration to the process of valuation, basis and methods of valuation and the factors responsible for the choice of wetland valuation methods. On their own part, the Canadian Wildlife Service (2005), in their study, identify the challenges facing wetland valuation to include among others: lack of data, sophisticated survey design, complexity of wetland ecosystem, people’s awareness and policy issues. However, they did not investigate factors responsible for the choice of wetland valuation methods.

Lambert (2003) views the challenges of wetland valuation to include; market imperfections, government policy, people’s awareness, biases, differences in wetland sites and limitation to the application of the methods. He went further to explain that market imperfections (subsidies, lack of transparency) and policy distort the market price. If people are not aware of the link between the environmental attribute and the benefits to themselves, the value will not be reflected in the price. There are various sources of possible bias in the interview techniques. Extrapolation can only be done for sites with the same gross characteristics. The methodology is straightforward and data requirements are limited but the method only works for some goods or services.

In a paper presented at the joint seminar on compulsory purchase and compensation on land acquisition and takings, Adamowicz and Boxall (2007) list six major challenges facing wetland valuation. The challenges include: capturing complex ecological –

economic relationships associated with ecosystem services; passive use values; scale of analysis; are values of wetlands (and wetland services) increasing over time?, irreversibility of wetland service provision/thresholds; primary data versus benefits transfers and targeting – do we know enough to target areas with high benefits relative to costs? Though the author examines the methods of valuation, no consideration was given to valuation process, basis of valuation and factors responsible for choice of wetland valuation methods.

In the report of Turpie, et al. (2010), the authors conclude that there are five major challenges in the valuation of wetlands in South Africa. The challenges are public good qualities of wetland resources, externalities, perverse incentives, lack of clear property rights and lack of information. First, many of the goods and services and amenity values provided by wetlands have the qualities of a public good; i.e. they are seen as “free” and are thus not accounted for in the market (e.g. water purification or flood attenuation). When services are seen as free they tend to be wasted, or not accounted for in decisions which affect wetlands. Second, markets do not reflect the full social costs or benefits of a change in the availability of a good or service. Stakeholders who benefit from degrading wetland ecosystem are not the same as the stakeholders who bear the cost hence, they do not provide a strong enough incentive to maintain wetlands rather than develop the land for other uses. Third, many policies and government decisions provide incentives (e.g. in the form of taxes or subsidies) for economic activity that often unintentionally work against the wise use of wetlands, leading to resource degradation and destruction rather than sustainable management. Fourth, one of the major problems in trying to conserve and protect wetlands is the fact that they are often open-access resources with limited control over how they are used and what is harvested from them. Wetland ecosystems often do not have clear natural boundaries and, even when natural boundaries can be defined, they may not correspond with an administrative boundary. Finally, many sectors of society view wetlands as being of little or even of negative value. Incomplete knowledge of the economic and ecological importance of wetlands leads to unsustainable land practices or development taking place. The economic benefits and services provided by wetland ecosystems are frequently overlooked by governments, developers, private industry and other land users. Lack of information can thus result in distorted decision-making.

Ijagbemi (2009) was of the opinion that the challenges encountered in carrying out wetland valuation are the items of valuation – heads of claim – cannot be exchanged in the open market; non-availability of data for wetland resources and that most of the properties involved are not income yielding or offered in the market. After a comprehensive review of the various statutory provisions for compensation, Egbenta (2010) concludes that inadequacy of legal regulations is a major challenge frustrating wetland valuation. He is of the view that there is no comprehensive statutory provision for assessing compensation resulting from oil spills/pollution in the petroleum industry.

2.10 **Effects of Economic Activities on Wetlands**

Many wetland losses, the world over, are direct result of economic activities engaged in by man. These activities range from agriculture, construction, water diversion and a host of others. It is estimated that around 5 percent of agricultural land globally (264 million ha) is irrigated, with South Asia (35%), Southeast Asia (15%) and East Asia (7%) showing a high dependency on irrigation. China and India have 39 percent of the global irrigated area and Western Europe and United States have 13 percent, while sub-Saharan Africa and Oceania have less than 1 percent of their agricultural land irrigated (Pilot Analysis of Global Ecosystems P.A.G.E, 2000). Irrigation accounts for approximately 70 percent of the water withdrawn from freshwater systems for human use. Only 30 – 60 percent is subsequently used downstream, making irrigation the largest net user of freshwater. Estimates also show that the share of cropland that is irrigated has grown by 72 percent from 1996. Developing countries tend to have scarce water resources and relatively larger agricultural demands; and as such have greater water extractions, which in turn have greater impacts on associated wetlands (P.A.G.E, 2000).

Some of the established effects of agriculture on wetlands, as identified by Mironga, (2005), include:

i. Direct loss of wetlands due to draining and conversion to agricultural land;
ii. Indirect loss of wetlands area due to water withdrawal from rivers and streams for irrigation;
iii. Loss of wetland area and function due to damming for water storage;
iv. Loss of seasonal wetlands due to changed hydrologic cycle from water storage;
v. Loss of wetland function due to salinisation, sediment deposition, erosion, eutrophication;
vi. Pollution from use of pesticides and other chemicals; and
vii. Creation of wetland.

Water withdrawals for irrigation in some cases can act to exacerbate the effects of other stressors on the wetland ecosystems, resulting in effects that exceed those that would be expected from dewatering alone. Altinsacli and Griffiths (2001) identify Lake Kus in Western Turkey to be under stress from a growing use of the lake by the local human population. One of these stresses is the increasing pollution of the lake by organic materials. This, in conjunction with dewatering for irrigation, has resulted in the increasing eutrophication of the lake and changes in the aquatic biota toward an assemblage more characteristic of nutrient rich systems. Wildlife responses to the implementation of irrigation schemes can, in turn, result in stress to wetlands. Water withdrawal was also identified as a source of stress around Lake Kus. There is no known mechanically operated irrigation activity past or present in the Niger Delta. The major pressure is from oil exploration and reclamation and conversion of wetlands to development purposes, by the oil companies. In and around the Waza National Park in Cameroon, Tchamba, Drijver, Njiforti (1995) report that dewatering of the Logone River resulted in the loss of prime grazing habitat for wildlife. Populations of some ungulates such as reedbuck and kob have been lost or severely reduced. Elephants have been displaced from their traditional areas, resulting in damage to wetland habitats and more frequent interactions with farmers.

Tanner (1992), in a study conducted on Dune Lakes in Northland, New Zealand identifies the direct effects of livestock grazing on wetland ecosystem to include:

i. Consumption of plant biomass;
ii. Trampling of plants, including below-ground parts and soil;
iii. Nutrient inputs and bacterial contamination from dung and urine;
iv. Introduction and dispersal of seeds and other propagules.

The effects of livestock grazing on species composition have been found to ultimately affect the structure and function of wetland vegetation. In a study conducted in Southern Wisconsin, Middleton (2002) found that sedge meadows that were recovering from cattle grazing structurally changed into a dense shrub carr while sedge meadows that had never been grazed had a different species composition to grazed meadows but were still similar structurally. Several other studies report the effects of livestock grazing on wetland birds. These include the negative effects of tramping on nests (Beintema and Mueskens, 1987; Popotnik and Giuliano, 2000) and removal of vegetation biomass and structure which degrade bird habitats values (Moore, Ogle and Moynihan, 1984; Popotnik and Giuliano, 2000).

Mironga (2005), in a study conducted on Kisii District of Kenya, points out that drainage and other forms of disturbances associated with agriculture are the main contributors to wetland loss. Williams (1990), also states that globally, wetlands are been drained, primarily for agriculture and food production. In a study conducted in Zimbabwe, Madebwe and Madebwe (2005) conclude that growth in population, high drought incidence rates, national and economic developmental challenges resulted in many gardens being established on the fringes and within wetlands. Wetlands are exploited more during the dry seasons. Households take advantage of the wetlands' moist conditions to grow a variety of vegetables and root crops for sale or consumption.

Conducting a study in Delhi, India, Kumar, Love, Sharma and Rabu (2003) conclude that pressure for conversion of wetlands for developmental purposes is very high especially in case of urban riparian wetlands. These wetland ecosystems provide many tangible and intangible benefits on a sustainable basis not only to the urban society but also to the associated dependent ecosystems. Wetland areas, on the fringes of river channels in a city, are looked upon as a precious property resource with different potential land uses such as agriculture, site for human settlements, industries, civic construction and waste dumping sites, to mention just a few. All the literature sited above showed that economic activities such as grazing and draining wetlands for agricultural purposes have great effect on wetland ecosystems. Therefore this study would also examine the extent to which activities such as the conversion of wetland to residential and commercial uses have affected these important natural resources in the study area.

Rana, Chowdhury, Sohel, Akhter, and Koike (2009) conducted a study on the freshwater wetland of Bangladesh using a multi-stage random sampling technique to select a total of 84 households with a sampling intensity of 12%, from four villages, on which a semi-structured questionnaire was used for the interview which includes various socio-economic parameters such as literacy, occupation, farm size, land ownership, knowledge sharing, organizational participation, involvement in farm activities, participation in decision making, access and rights on haor resources, livelihood patterns. The selected respondents were personally interviewed for collecting reliable data and other information. The respondents were free to express their views on each of the topics. New avenues of questioning were pursued as the interview developed. The result identified over-exploitation of fish resources, use of excessive pesticides and gradual increase of human settlement in and around the haor as the most threatened events to wetland. Using residents as respondents may be a good source of data collection, the present study did not use households as respondents, rather, Estate Surveying and Valuation firms were used since the focus of the study is on the practice of wetland valuation.

While it is not in dispute that agricultural activities, in their various forms, result in wetland loss in the above studies, the studies ignored the effects that developmental activities such as conversion of wetlands to construction sites and oil exploration can have on wetland resources. This study focuses mainly on the effects that the prevailing activities in the study area – oil exploration, conversion of wetland to the development of the corporate offices and residential quarters of the multinational oil companies have on wetlands in Niger Delta. All these activities constitute great pressure on wetlands in the study area. Resulting from oil exploration activities are various oil spillages, in different communities within the study area and to compensate the affected individuals and/or communities, their losses must be adequately assessed using the appropriate valuation method(s).

2.11 Effects of Location on Wetland Values

The importance of location on nonmarket values of wetland has been highlighted in literature (Sutherland and Walsh, 1985; Bateman, Lovett and Brainard, 1999; Jiang, Swallow and McGonagle, 2005 and Giovanni, 2007). Sutherland and Walsh (1985) in a study conducted on the potential degradation of water quality due to coal mining activity in the Flathead River drainage system, Montana, United States point out that the main advantage of location tests is that it provides information about the substitution possibilities. Location is very important in the application of benefits transfer method in wetland valuation (Bateman, Lovett, and Brainard. 1999 and Jiang, Swallow, and McGonagle 2005). Giovanni (2007), investigate the relationship between distance and willingness to pay for environmental quality changes in Australia. The result shows that disregarding distance causes under-estimation of individual and aggregated benefits and losses, seriously misdirecting resource allocation. He therefore concluded that distance tests provide valuable information for policy/decision makers in regards to whether investment funding should come from Local, State or Federal governments. Sutherland and Walsh (1985) and Pate and Loomis (1997) argue that the omission of a location test produces biased parameters especially when the sample is geographically limited.

The location effect depends on the type of good involved, the use and nonuse values ratio for each attribute, the availability of information, the number of substitute goods and experience with the good (Stouffer, 1940). Clawson and Knetsch (1966) argue further that if the good is iconic or scarce, the willingness-to-pay (WTP) may be the same across different distances from that good. However, in some instances people who live close to an environmental amenity such as national park may value the good less than people who live further away (Espey and Onwusu-Edusei, 2001 and Imber, Stevenson and Wilks 1991). In their study, Espey and Onwusu-Edusei, (2001) estimate the net impact of proximity to parks and park type on residential property values in Greenville, South Carolina. In addition to park proximity, other factors taken into account are the age and quality of the house, the number of bedrooms and bathrooms, square footage of the house, lot size, whether or not the house had air conditioning, and whether or not the house had a garage. General neighbourhood differences are taken into account using census tract data. They studied a total of twenty four (24) parks varying in terms of the type of amenities available; including baseball fields, tennis courts, a Frisbee golf course, and playgrounds but all included some walking trails and more natural areas. They analysed all sales of single family houses in the city of Greenville between 1990 and 1999, with a total of 4153 sales included in the final analysis. The study reveals that the estimates indicate a negative impact of park proximity for houses within 300 feet of the small basic neighborhood parks, reducing property values by about 14 percent. On the other hand there was a significant positive impact on housing prices for houses between

300 and 500 feet of about 14 percent. Further, there was a significant positive, though smaller, impact on housing values for houses between 500 and 1500 feet of about 7 percent higher housing values. The study also shows that there was a significant positive impact of proximity to small attractive parks for houses within 600 feet but no significant impact beyond that. Good as this result is, the present study did not consider the effect of distance on wetland values since the focus is on the determination of value for compensation to the people who are directly affected, and these are people whose livelihoods depends on the wetland ecosystems.

Distance also influences the availability of information and consequently people's preferences (Beckmann, 1999). Herberlein, Wilson, Bishop and Schaeffer (2005) argue that people who know more about a good tend to value this good more than people who know less. The study conducted, in California, USA by Pate and Loomis (1997) on the effects of distance on willingness to pay values, revealed that there is a relationship between distance and knowledge and therefore concluded that distance affects willingness to pay for public goods with large non-use values. Bateman, Day, Georgiou and Lake (2006) however argue that average values should decline with increasing distance from a site as the number of users (who hold higher values than non-users) declines with the distance. In general, it is assumed that WTP for used goods declines with distance (Hanley, Schläpfe and Spurgeon, 2003).

Sutherland and Walsh (1985) and Hanley, et. al. (2003) has shown a negative relationship between WTP and distance. Some other studies such as Do and Bennett (2007) have shown a positive relationship between WTP and distance. These results contrast with those of Lutzenheiser and Netusil (2001) who did not find a significant impact on residential property values of proximity to what they called "urban parks." and Bolitzer and Netusil (2000), who estimated the impact of proximity to public parks to be less than 2 percent of the property value. Pate and Loomis (1997), Loomis (1996) and

Ozdemiroglua, Newcombea, Mouratob, Atkinsonc and deGarisd (2004) did not show any impact. Morrison and Bennett (2004), Hanley, et al. (2003), van Bueren and Bennett (2004) also showed differences in preferences between those within a study area and beyond. The impact of location on the WTP for improvements in environmental quality can also depend on the type of population tested (e.g. urban or rural) and socio-economic and attitudinal factors. The importance of accounting for different community types and their locations has been tested in a previous study of Rolfe and Bennett (2000). The study found significant differences in values held by people living in different community types (rural and urban) within Queensland. Above literatures show the various effects that location and or distance impact on individual and public willingness to pay for wetland resources. However, this assertions need to be clarified with respect to the study area.

2.12 **Wetland Functions**

The benefits rural people derive from wetlands are supported by the variety of environmental functions performed by these complex and sensitive environments. McCartney et. al. (2004) identifies eight major wetland functions: storage of precipitation and runoff, groundwater discharge, groundwater recharge, sediment retention, nutrient transformation, biomass production, maintenance of biodiversity, chemical cycling. Woodward and Wui (2001) add two other ones: habitat for aquatic species and habitat for terrestrial and avian species. These functions benefit not only people living within or nearby wetlands but have also effects on users downstream.

A number of goods and services provided specifically by wetlands have been identified and are now widely recognized. Wetlands can provide habitat and food for diverse range of species, aid in groundwater recharge and water retention, provide erosion and sedimentation controls between adjacent ecosystems, improve water quality through filtering sediment and metals from groundwater, and cycle nutrients to terrestrial and aqueous environments within the wetlands and between ecosystems. Wetlands are also important global sources, sinks, and transformers of various elements in the earth's various biogeochemical cycles (Mitsch and Gosselink, 2000; Greb and DiMichele, 2006).

Specifically wetlands, as transitional zones between land and water, provide a natural protection against extreme floods and storm surges. It is estimated that every kilometer of wetlands can reduce or lower storm surge by 5-7 centimeters (Stokstad, 2005). There is no gainsaying that wetland resources are abundant and diverse. From marshes to wooded swamps and bogs, from sedge meadows to peatlands and vernal pools, wetlands benefit the people in countless ways. They help prevent flooding by slowing down and absorbing water, which might otherwise end up on properties, or in basements. Wetlands gradually release stored water to rivers and streams to maintain flow throughout the dry season, and recharge ground water aquifers so that wells do not go dry. They protect shorelines from erosion by absorbing the shock of wave action, and preserve water quality by retaining sediment, nutrients and other pollutants. But wetlands do not exist only to serve man's needs. They provide critical habitat for a myriad of species that form a delicate and complex web of life. Frogs, salamanders, turtles, fish, insects, songbirds, waterfowl, deer and moose are just some of the creatures that depend on wetlands for food, shelter and/or breeding habitat. Adamus, Stockwell, Clairain, Morrow, Rozas, and Smith (1991) identify the functional values of natural wetlands that are important to society to include: groundwater recharge, groundwater discharge, floodwater alteration, sediment stabilization, sediment toxicant retention, nutrient removal transformation, production export, aquatic and wildlife diversity abundance, storm buffering, recreation, and uniqueness heritage. They went further to put the function into four major categories: life support; hydrologic buffering; water quality improvements; and historical cultural significance.

McCartney, Swallow and McGonagle (2004) and Woodward and Wui (2001) identify the various functions performed by wetlands, though not exhaustive, to include:

reservoirs of biodiversity; climate change mitigation; cultural value; flood control; groundwater replenishment; wetland products; including fish and shellfish, blueberries, cranberries, timber, and wild rice, as well as medicines that are derived from wetland soils and plants; recreation/tourism; sediment and nutrient retention and export; shoreline stabilisation and storm protection and water purification.

On his own part, Williams (1990) identified four categories of function; physical/hydrological, chemical, biological, and socio-economic as follows:

Physical/Hydrological Functions

i. Flood mitigation – temporary runoff stores protecting downstream areas,
ii. Coastal protection – wetlands reduce erosion and absorb wave energy,
iii. Recharging Aquifers – some, but not all wetlands suppress upwelling salt waters,
iv. Sediment trapping – clear suspended sediment and flocculate clay particles at the interface between fresh and salt waters, and
v. Atmospheric and Climatic fluctuations – wetlands may act as carbon sinks.

Chemical Functions

i. Pollution trapping – trap and filter out pollutants, especially nitrogen and phosphorous by plant uptake or bacterial metabolism,
ii. Removal of toxic residues – removed by ion exchange and absorption onto clay particles,
iii. Waste processing – by high primary productivity rates, sedimentation rates and bacterial action in the sediments.

Biological Functions

i. Productivity – highly productive ecosystems with many perennials and few woody species,

ii. Habitats – for a wide variety of plants and animals. Especially important for wildfowl and migrating bird species.

Socio-Economic Benefits and Values

i. Consumptive values which are all benefits gained from the wetlands and may lead to their modification or transformation.
ii. Food – the fundamental reason for wetland transformation throughout time.
iii. Fish, fowl and fauna – possibly as much as 60-65% of the world's fish and shellfish are caught in wetlands.
iv. Fuel – peat has been cut for centuries as a fuel source.
v. Fibres – forests provide important sources of fibres.
vi. Non-consumptive benefits. These include scenic, recreational, aesthetic, archaeological, scientific, heritage and historical benefits which are difficult to define or quantify.

2.13 **Wetland Services**

The overall economic value of a wetland is derived from the values associated with the services it is expected to provide overtime. Wetland services can include any outcome that contributes to a generally accepted measure of human welfare, including recreational and educational opportunities, aesthetic, spiritual enrichment, and market-based goods and services. The services provided by wetlands include beneficial outcomes associated with biodiversity support, carbon sequestration, and water filtration (King, Wainger, Bartoldus, and Wakeley, 2000). While some services associated with functions, (biodiversity support or carbon sequestration) are not site dependent (i.e. does not depend on the location of the wetland) others such as those related to aesthetics and educational/recreational opportunities are highly site dependent.

For the purposes of valuing wetland, it is useful to consider wetlands as “factories” of beneficial services. The capacity of wetland to provide these services is partially derived from its level of function and partially derived from location-specific. The authors mentioned above identified the various wetland services emanating from wetland functions grouping them into active or passive services.

Millennium Ecosystem Assessment (2005) identifies the underlisted services provided by or derived from wetlands, putting them under four main categories as contained in Table 2.3

Table 2.3: **Ecosystem Services provided by or derived from Wetlands**

	Wetlands Services	**Benefits to Human well-being**
Provisioning	Food	Production of fish, wild game, fruits and grains
	Fresh Water	Storage and retention of water for domestic, industrial and agricultural use
	Fiber and fuel	Production of logs, fuelwood, peat, fodder
	Biochemical	Extraction of medicines and other materials from biota
	Genetic Materials	Genes for resistance to plant pathogens; ornamental species, etc.
Regulating	Climate regulation	Source of and sink for greenhouse gases; influence local and regional temperature, precipitation and other climatic processes
	Water regulation (Hydrological flows)	Ground water recharge/discharge
	Water purification and waste treatment	Retention, recovery, and removal of excess nutrients and other pollutants
	Erosion regulation	Retention of soils and sediments
	Natural hazard regulation	Flood control, storm protection
	Pollination	Habitat for pollinators
Cultural	Spiritual and inspirational	Source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
	Recreational	Opportunities for recreational activities
	Aesthetic	Many people find beauty or aesthetic value in aspects of wetland ecosystem
	Educational	Opportunities for formal and informal education and training
Supporting	Soil formation	Sediment retention and accumulation of organic matter
	Nutrient cycling	Storage, recycling, and acquisition of nutrients

Source: Adapted from Millennium Ecosystem Assessment (2005)

2.14 Determinants of Property Values

Real property has no value if it has no utility, if it is not scarce and if it is not effectively demanded. Real property has significance only as it satisfies man's needs and desires. It is this man's collective desire for real property that gives rise to value (Olusegun, 2003). Thus, the ability of a property to satisfy man's needs and desires together with its degree of scarcity and utility compared with others makes man to ascribe value to it. Property value, therefore, according to Millington (1981) is the money obtainable from a person(s) willing and able to purchase property when it is offered for sale by a willing seller, allowing for reasonable time for negotiation and with the full knowledge of the nature and uses which the property is capable of being put.

Real property is a heterogeneous good that is comprised of a bundle of unique characteristics reflecting not only its location, but equally affected by other amenities such as the quality of neighbourhood and infrastructure. Ge and Du (2007) opine that property value is an essential aspect of property markets worldwide and determined by a variety of factors and the determination of those factors is a significant part of property valuation. The list of the main factors determining property values from various studies is contained in Table 2.3. Kamali, Hojjat and Rajabi (2008) group the variables determining property values into; environmental variables, neighbourhood variables, accessibility (location) variables and property variables (Fig 2.3).

Table 2.4 **Main Factors Determining Property Values**

Authors and Year	**Country of Study**	**Determinant**
Joslin, (2005)	UK	Age, Location, Size
Kauko, (2003)	Hungary	Location, Shopping Centres, Highways, Parks, Metro Neighbourhood Characteristics
Paz, (2003)	New Zealand	GDP, Level of Income, Migration, Construction Activity, Economic Activity Purchasing Power
Wong, Hui and Seabrooke, (2003)	Hong Kong	Interest Rate
Case and Shiller, (2003)	United States	Number of Employment
Han, Yu, Malone-Lee and Basuki, (2002)	Singapore	Land Area, Parks, CBD Schools
McCluskey, Deddis, Lamont and Borst, (2000)	Northern Ireland	Location
Blackley,(1999)	United States	Changes in Tax Policy Age Composition of the Population, Rate of Household formation
Meen and Andrew, (1998)	UK	Income, real interest rates, Nominal interest rates, General level of prices Household wealth, Demographic variables, Tax structure, Financial liberalization, Housing stock, Income, Interest rates, Demographic structure
Cheshire and Sheppard, (1998)	UK	Location, Level of Income, Population, Transport Policy, Neighbourhood Characteristics
Lenk, Worzala and Silva, (1997)	New Zealand	Number of bathrooms, Number of bedrooms, Age of House, lot Size Basement area, Total area of house, Number of fire place, Number of car garages
Olusegun (2003)	Nigeria	Location, Accessibility, Number of Bedrooms, Plot Size, Income, Interest Rate, Inflation
Oyebanji (2003)	Nigeria	Location, Contemporary Uses ,Institutional Factors Population, Changes in Fashion & Taste

Source: Adapted from Ge and Du (2007), Olusegun (2003), Oyebanji (2003)

Generally, it is evident from Table 2.3 that the predominant factors determining property values are location, plot size, level of income, interest rates, age of the building, and neighbourhood characteristics. On country basis, the three studies carried out in UK showed that location, level of income, interest rates and population are the major factors determining property values. In United States, the studies conducted showed that the main factors influencing property values are: number of employment, age composition of the population and rate of household formation. On the other hand, the studies in New Zealand revealed that property values are mostly influenced by the level of income, construction activities, economic activities, lot size, age of the house and other property characteristics. The Nigeria situation is not too different from that of the UK because according to Olusegun (2003) and Oyebanji (2003), the major factors influencing property values, among others, are location, plot size, income, interest rate and population.

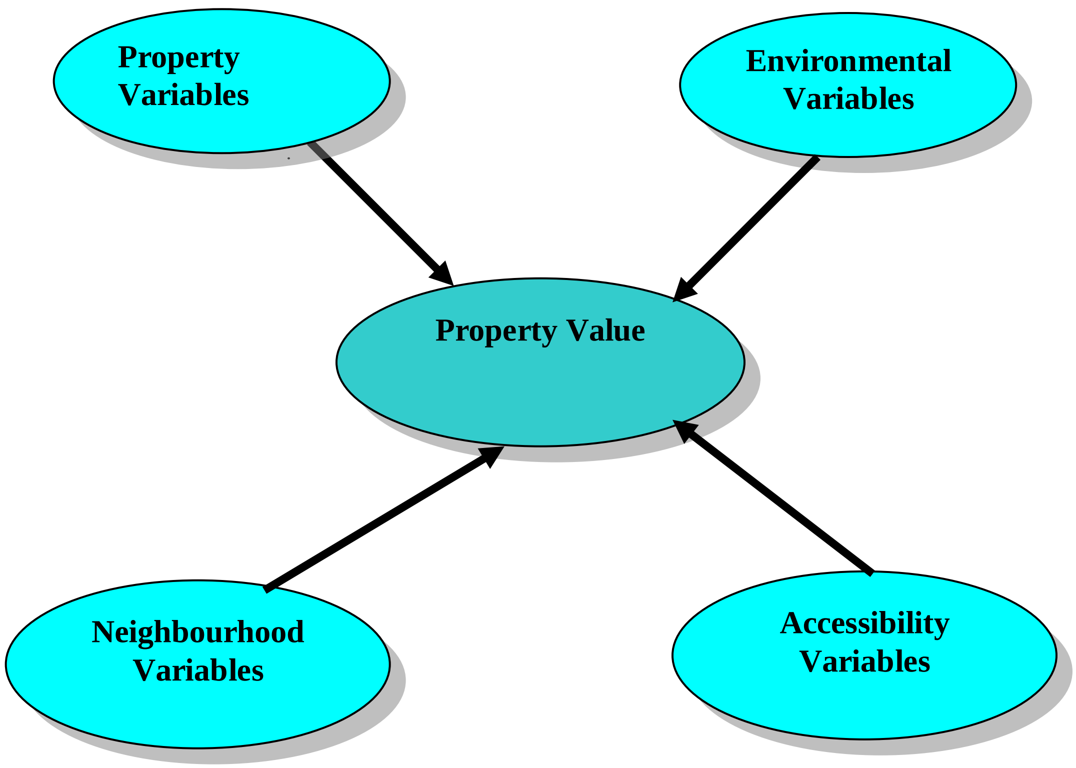

Fig. 2.3: Factors Determining Property Values
Source: Adapted from Kamali, Hojjat and Rajabi (2008)

Various earlier studies had been conducted on the effect of location on property values. These studies include Burgess (1925), Hoyt (1939), Pred (1966) and Isard (1956) Hendrikse (2003). Their various findings agreed that location is a major determinant of property value. Location is important in relation to proximity to the target market and sources of supplies; conditions and facilities are important in relation to attracting optimal rentals, and security is important in relation to tenant and visitor safety. However these studies ignore the effects of other factors (variables) in the determination of property values.

While McCluskey et al. (2000) measure the effect of location on residential house prices using the Ordinance Survey of Northern Ireland data and conclude that location and structural characteristics are the key determinants of residential property values. Kauko (2003) lists a set of attributes that have been commonly used in property valuation research including accessibility factors, neighbourhood level factors, specific negative externalities, public services, taxes and density factors.

In line with Fig. 2.3, Tse and Love (2000) identify four categories of attributes namely; structural, physical, neighbourhood and environmental, for measuring residential property values, using hedonic equation in Hong Kong. Similarly, Chau, Wong and Yiu (2004) studied the effect of balconies on the residential property values in Hong Kong and found a positive effect on the value of a property irrespective of the quality of the view.

Oyebanji (2003) identifies seven factors that affect property values. These factors are; population (increase or decrease), changes in fashion and taste, institutional factors (these are factors relating to people's culture, religious belief and government action), technological factors, economic factors, location and complementary uses. Olusegun (2003) also identifies these factors under three major groups as external factors, internal factors and economic factors. The external factors include location and accessibility, internal factors include the individual features of the property such as number of bedrooms, plot size, garage, number of toilet, and so on, economic factors include individual's purchasing power, the level of interest and inflation rates in the country. All the identified factors only addressed those aspects of value that are market determined. Kalu (2001) argues that major considerations for property value hinge on the property's ability to produce income, be in demand and have a good location relative to its use. He identifies other determinants of value to include scarcity, prospect of income growth, state of the economy, cost in use, government and political factors, physical attributes and taxation. The question therefore is, the fact that wetlands 'does not produce income', not in demand and in not too good a location, does it render them valueless? However, the current study will focus on both the market and nonmarket determined values under the environmental factors of which wetland is an important resource.

2.15 **Identified Gaps in Literature**

The classification on the basis of origin, as natural and constructed wetlands, adopted by Mitsch and Doeslink (1993), US EPA (1993) and Novotny and Olem (1994) may not be completely true of the study area as there is no known constructed wetland, in general, and the study area, in particular. Therefore, in this study, the classification made by Agbi, Abang and Animashaun (1995), on the basis of natural origin, was adopted. In other words, Nigerian wetlands consist of freshwater and coastal wetlands.

The picture painted by authors such as Pilot Analysis of Global Ecosystems (P.A.G.E, 2000), Mironga (2003), Altinsacli and Griffiths (2001) and Tichamba, Drijver and Njiforti (1995) was that only agricultural activities, in their various forms are the main economic activities resulting in wetland loss in their respective studies. Their studies ignored the effects that developmental activities, such as conversion of wetlands to construction sites and oil exploration, can have on wetland resources. The prevailing activities in the current study area include oil exploration and conversion of wetland areas to the development of corporate offices and residential quarters of multinational oil companies. All these constitute great pressure on wetlands in the study area. To compensate the affected individuals and/or communities, their losses must be adequately assessed using the appropriate valuation method(s).

There seems to be divergent views on the effects of location on wetland values. While studies by Pate and Loomis (1997), Bateman et al. (2006) and Do and Bennett (2007) revealed positive relationships between distance and wetland values, others such as Sutherland and Walsh (1985), Hanley et al. (2003) found negative relationships between location and wetland values, especially when adopting willingness to pay approach. However, the works cited above did not look at the effect that valuation practice could have on the value of wetlands. For this reason the focus of the current study is on the wetland valuation practice in the study area (Niger Delta).

The various literature reviewed on the factors determining property values show that majority of these factors can be determined based on the utility/satisfaction derived by the consumers and hence are priced in the open market on the basis of use value. Olusegun (2003) succinctly put it that real estate has no value if it has no utility, if it is not scarce and not effectively demanded. Even where environmental factors are considered, the focus has always been on the ones that are priced in the market on the basis of their use value. However, wetland ecosystems is a composite of both use and nonuse values. The nonuse value aspect of wetland resources are usually neglected or not accounted for by market forces (Robinson, 2001a).

Traditional methods of valuation had been variously criticised (Kalu, 2001; Blight and McFarlane, 2002; Ifediora, 2005 and Ogunba, Ajayi and Aluko, 2005) in valuing real estate. Their applications rest on availability of reliable market transactions data especially when using market comparison and income approaches. The success of the cost approach is subject to availability of information on construction costs and depreciation since traditional approaches determine real estate values using market transaction data. The traditional valuation tools may not be wholly applicable to valuing environmental resources since most of these tools are based on data that are observable in the market while most environmental benefits and costs are not bought or sold. There is therefore the need to adopt new valuation techniques that capture both use and nonuse values produced by environmental (wetland) resources.

A study of the various approaches to valuing wetlands (environmental) resources applied either directly or indirectly market based clearing system, except contingent valuation method. Benefits transfer method assumes that wetlands are homogeneous commodities that are provided in market clearing setting, forgetting that non-market valuation seeks to estimate values that are rarely observed. Hedonic method assumes a continuous functional relationship between the price of a house and its attributes using the price that people pay for a house as function of the marginal utility of each house attribute to its marginal price. The participatory approach, adopted by Emerton (1998), requires respondents to indicate the importance attached to wetland benefits using other locally important products or categories of value which are usually market determined. The application of cost-benefit analysis employed by Beaumis, Laroutis and Chakir (2007) requires the determination of costs and benefits based on products priced using the market clearing system. This approach emphasises economic returns at the neglect of the benefits of the environment and the negative consequences to the environment. The method privileges human well-being over that of the environment and thereby undervalues the benefits of the environment in ecological systems. Applying production methods sees the value of wetland resources as dependent on their contribution to the value of other products that are sold in the open market. It did not focus on the estimation of wetland values on its own. It can, at best, be useful in estimating a partial value of wetlands when there is a clear link between wetlands and the production of an economically valuable commodity. The contingent valuation method however goes beyond assessing the use value to include the nonuse values that are not traded in the market. This approach, though with some criticisms, considers wetland values holistically by ascribing values to aspects of wetland resources that are priced within and without the normal market clearing setting.

Wetland valuation, and by implication, environmental valuation, is a multidisciplinary assignment involving such disciplines as economics, sociology, microbiology, land surveying, environmentalists, etc. The works reviewed were carried out mainly by other professionals who were neither Estate Surveyors and Valuers nor professionals in real estate. For the purpose of this study, the researcher depended on such works to advance the roles of Estate Surveyors and Valuers in the valuation of wetland ecosystems.

Almost all researchers on wetland valuation employed the consumers as their respondents. For example, Earnhart (2001) in valuing Pine Creek Marsh, Fairfiled, Connecticut used homeowners. In their own study, Brown and Henry (1989) used questionnaire survey administered on visitors to major natural parks and lodges, in Kenya, to determine how much respondents were willing to pay to conserve Kenya elephants. In the same vein, Ranjani and Ramachandra (1999), in assessing the importance of Hebbal Lake in India conducted their research by administering questionnaires on residents living around the Lake. In their own study, on Seine Estuary Wetlands in France, Beaumis, Laroutis and Chakir (2007) used the employees of 576 establishments located within the wetland and residents. The reason for using the consumers as respondents could possibly be due to the focus of their studies, that is, to determine the value of the various wetlands. The focus of the present study is on wetland valuation practice; therefore the focused respondents are the Estate Surveyors and Valuers working in Estate Surveying and Valuation firms practicing in the study area.

Though various studies had been conducted on compensation, there is no known study, by the researcher, on wetland valuation for compensation purposes in Nigeria, as a whole and Niger Delta, in particular. Also, practicing Estate Surveyors and Valuers are yet to really explore wetland valuation. Therefore, they may need to update their knowledge since wetland valuation for compensation has become a serious issue in the Niger Delta, due to the activities of the oil companies that have continued to impact on this natural ecosystem.

CHAPTER THREE

CONCEPTUAL FRAMEWORK

3.1 Introduction

In this Chapter, attempt is made to articulate a concept for the study in the form of a framework of expectations for empirical examination. The approach is to bring out of the various literature reviewed a model for the various components of the practice of wetland valuation in the Niger Delta, Nigeria. Following this reasoning, the Chapter highlights and discusses author's conceptual views of the various factors influencing wetland values and valuation practice, and from these, teases out a wide ranging set of propositions which form the base for empirical investigations in subsequent Chapters.

The Chapter's discussion was carried out in line with the objectives of the study, by looking at the processes involved in the conduct of wetland valuation, basis and methods of wetland valuation; the factors influencing the choice of wetland methods and challenges faced in wetland valuation.

3.2 Wetland Valuation Process

The valuation process, generally, is a systematic procedure a Valuer follows to provide answers to a client's questions about real property value. It is an amalgam of the step-by-step approach adopted by a Valuer in the determination of the value of a property. According to Ifediora (1993), the valuation process can be seen as a sequential thought process with relevant questions posed at various stages to provide the answers that will illuminate the end objective of an opinion of value for a given property. The valuation process gives room for adaptation to suit the various types of assignments that may call for the valuation of property. In other words, it provides a pattern that can be used in any valuation assignment to perform market research and data analysis, to apply valuation techniques, and to integrate the results of these activities into an opinion of defined value. In wetland valuation exercise, the Valuer is expected to follow appropriate steps in the conduct of his work. Various authors identified the stages and steps that would result in proper conduct of wetland valuation. Figure 3.1 shows the author's concept of wetland valuation process

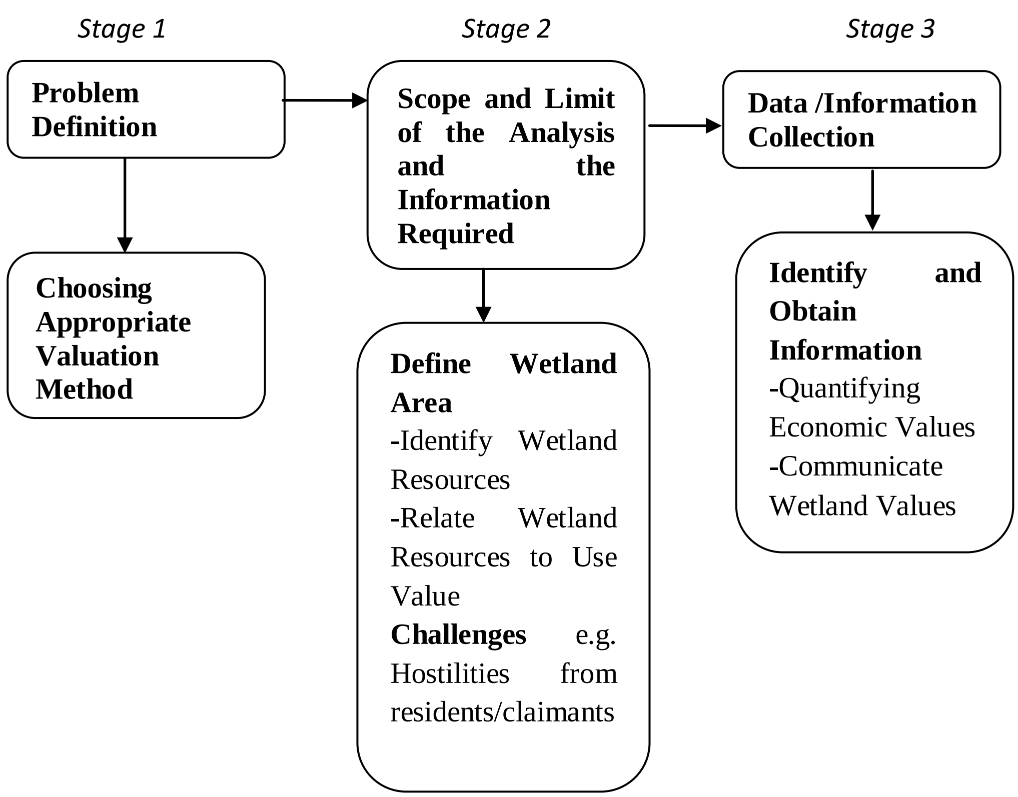

Fig 3.1 Author's Concept of Wetland Valuation Process

The first stage in wetland valuation process is to define the overall problem or objective. This has to do with choosing the type of valuation method to adopt depending on the problem confronting the Estate Surveyor and Valuer. The various methods available include: benefits transfer, contingent valuation, travel cost, participatory, hedonic and market approaches. The second stage is the determination of the scope and limit of wetland boundary. The work required at this stage is to define the wetland area and then identify the resources involved. This may be done using various data sources such as scientific studies, consultancy reports and national resource inventories, to produce a definite list of components, functions and attributes present in the wetland. The next thing is to determine whether each of the components, functions and attributes is associated with a direct use, indirect use or non-use. This can be achieved through interviews with local communities, use of census data and consultancy reports.

In addition to determining the scope and limit of the analysis, the Valuer has to identify the challenges confronting wetland valuation. Of importance is the issue of hostility from the residents or claimants. No matter the level of hostility, if not properly accounted for in the valuation process it may have adverse effects on the determination of compensation figure(s). Hostile claimants may not be cooperative in the supply of information required for the determination of the scope and limit of work; they may equally not be ready/willing to volunteer any interview. The third and final stage in wetland valuation process is data /information collection. It involves identifying the source and obtaining information required for the valuation. Data collection should begin with a literature survey of available statistics, existing studies, and their analysis for the region. Quantifying wetland values using appropriate method is very important and this will depend on the resources being valued. Once the assessment has been done, the value arrived at is to be communicated to the client(s) involved. The most appropriate form and approach to the dissemination of valuation findings to stakeholders will of course vary depending on the purpose of the valuation work and the types of stakeholder involved.

3.3 Basis and Methods of Wetland Valuation

In assessing the worth of an interest in any property, there are a variety of approaches available to the Estate Surveyor and Valuer. Howbeit, the approach chosen is usually a function of a variety of factors such as the purpose of the valuation, the type of property, the basis of valuation. In the valuation of land and buildings the methods commonly used include; comparison, income capitalization, cost/contractor, profit/account and residual. The adoption of any of these methods requires experience of the Estate Surveyor and Valuer involved with regards to paying attention to neighbourhood and property characteristics. One would have expected that these traditional approaches could be wholly adopted in the valuation of environmental resources such as wetland ecosystem, but literature has shown that the traditional approaches had failed to capture the true value of wetland resources due to the fact that environmental (wetland) resources are largely not priced within the normal market that favour the operation of the traditional methods.

Wetland resources are composite in nature producing both use and nonuse resources. While the use values of wetland resources can be captured, to some extent, using the traditional methods of valuation, capturing the nonuse values requires the use of other techniques and approaches such as the concept of total economic value (TEV). In capturing the total economic value of wetland resources, there is an amalgam of contemporary approaches available to the Estate Surveyor and Valuer. These contemporary approaches include; contingent valuation, hedonic pricing, travel costs, replacement cost, market prices, benefits transfer, productivity function, cost-benefit analysis (trade-off analysis) and participatory approach. Since there is no single existing market for valuing wetland benefits, different approaches that discern value through more intuitive means, such as surveys that measure man’s willingness to pay for certain benefits, must be examined. Figures 3.2 and 3.4 are the author’s diagrammatical presentation of the concept of basis and methods of wetland valuation.

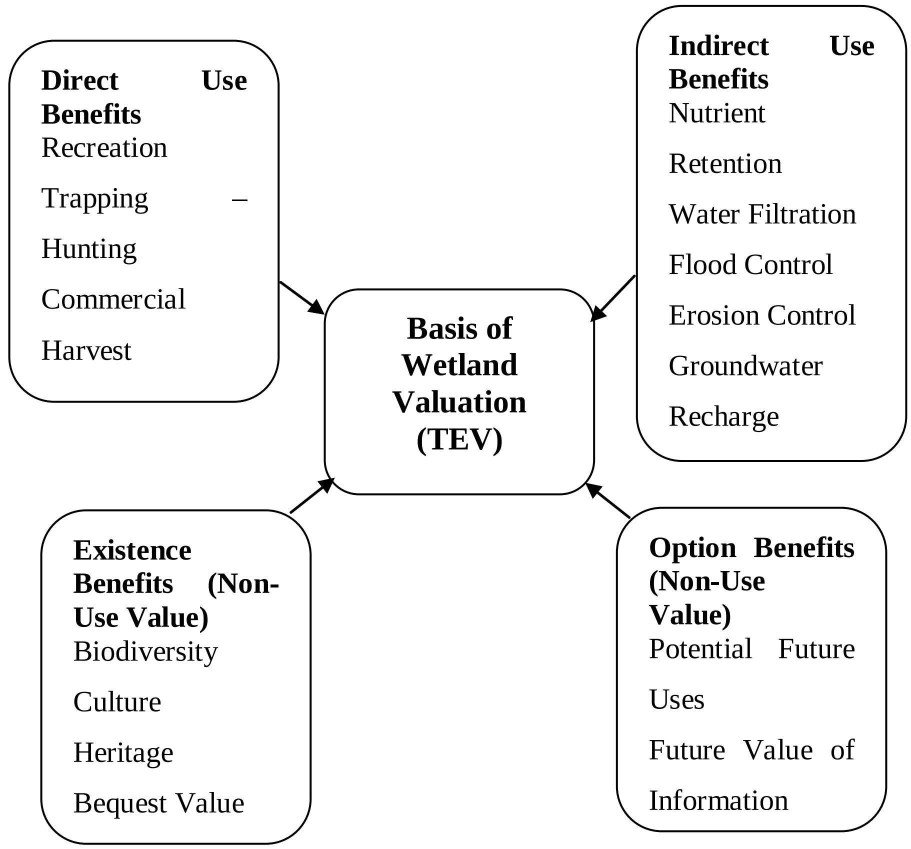

Fig. 3.2 Author's Concept of Basis of Wetland Valuation

In Nigeria, the Nigerian Institution of Estate Surveyors and Valuers (NIESV, 2006) Valuation Standards and Guidance Notes on Property Valuation, in section 4.0 regognises only two bases of valuation (open market value and depreciated replacement cost). These bases do not totally capture the true value of wetland resources because most of them are not traded in the open market hence total economic value (TEV) basis should be adopted for wetland valuation. The TEV framework is based on the presumption that individuals can hold multiple values for ecosystems. It provides a basis for taxonomy of these various values or benefits. Any taxonomy of such values is somewhat arbitrary and may differ from one use to another. The TEV framework is necessary to ensure that all components of value are given recognition in empirical analyses and that "double counting" of values does not occur when multiple valuation methods are employed. It is important to state that the TEV framework does not imply that the "total value" of an ecosystem should be estimated for each policy of concern. Even a marginal change in ecosystem services can give rise to changes in multiple values that can be held by the same individual. TEV framework simply implies that all values that an individual holds for a change of use should be counted. In the simplest form, TEV distinguishes between use values and nonuse values. The use value refers to those values associated with current or future (potential) use of an environmental resource by an individual while nonuse values arise from the continued existence of the resource and are unrelated to use. Typically, use values involve some human "interaction" with the resource whereas, nonuse values do not. The distinction between use and nonuse values is similar but not identical to the distinction between instrumental and intrinsic value. Clearly, use values are instrumental and utilitarian but the concept of existence value is not identical to the notion of intrinsic value

Within the TEV framework, an individual can hold both use and nonuse values for the services of an aquatic ecosystem. For example, an oil spill on a popular coastal beach resulting in forgone recreational trips to the beach – this is a lost use value. In addition, the oil spill could damage the ecosystem in ways that would not affect beach use and that beach users would never observe. It might, for example, kill marine mammals that live off the beach and are not seen by beach users, and beach users as well as those who do not visit the beach, might experience a loss because of this ecosystem damage. The loss by those who do not visit the beach would be a loss of nonuse value, though there could also be a loss of nonuse value on the part of beach users. The TEV framework implies that analysts proceed to investigate the potential loss in use and nonuse values of beach users and nonuse values of people who do not visit the beach. It is not necessary to estimate the total value of the coastal ecosystem, only the total loss in value associated with the oil spill.

Although varied in detail and application, the distinction between use and nonuse values is a fundamental theme. The TEV framework, as applied to typical aquatic system services for the purposes of this work, is illustrated in Table 3.1.

Table 3.1 **Classification and Examples of Total Economic Values for Aquatic Ecosystem Services**

Use Values		**Non-Use Values**
Direct	**Indirect**	**Existence and Bequest Values**
Commercial and recreational fishing Aquaculture Transportation Wildlife resources Potable water Recreation Genetic material Specific and educational opportunities	Nutrient retention and cycling Flood control Storm protection Habitat function Shoreline and riverbank stabilization	Cultural heritage Resources for future generations Existence of charismatic species Existence of wild places

Source: Adapted from Barbier (1994) and Barbier et al. (1997).

3.3.1 **Use Values (UVs)**

Use values are generally grouped according to whether they are direct or indirect. The former refers to both consumptive and non-consumptive uses that involve some form of direct physical interaction with the resources and services of the system. Consumptive uses involve extracting a component of the ecosystem for purposes such as harvesting fish and wild resources. They are commonly measured using market valuation approaches. In contrast, non-consumptive direct uses involve services provided directly by aquatic ecosystems without extraction, such as use of water for transportation and recreational activities. Although, non-consumptive uses do not involve extraction and hence diminution in the quantity of the resource available but they may diminish the quality of aquatic ecosystems through pollution and other external effects.

In determining the value of non-consumptive direct uses, the use of shadow – pricing is usually employed especially where it is necessary to adjust the prices and costs when market distortions are suspected.

3.3.2 **Nonuse Values (NUVs)**

Many natural environments have substantial existence values. Individuals who do not make use of these environments nevertheless wish to see them preserved “in their own right” (Bishop and Welsh, 1992; Boyle and Bishop, 1987; Freeman, 1993b; Madariaga and McConnell, 1987; Randall, 1991; Smith, 1987). The terms “existence,” “nonuse,” and “passive” use are generally used synonymously in literature. For the purposes of this study, nonuse values refer to all values people hold that are not associated with the use of an ecosystem good or service. Nonuse values need not arise from services provided by an aquatic ecosystem; rather, people may benefit from the knowledge that an ecosystem simply exists unfettered by human activity. Other motivations for nonuse values are bequest and cultural or heritage values. The model for the various components of TEV is shown in Fig. 3.3

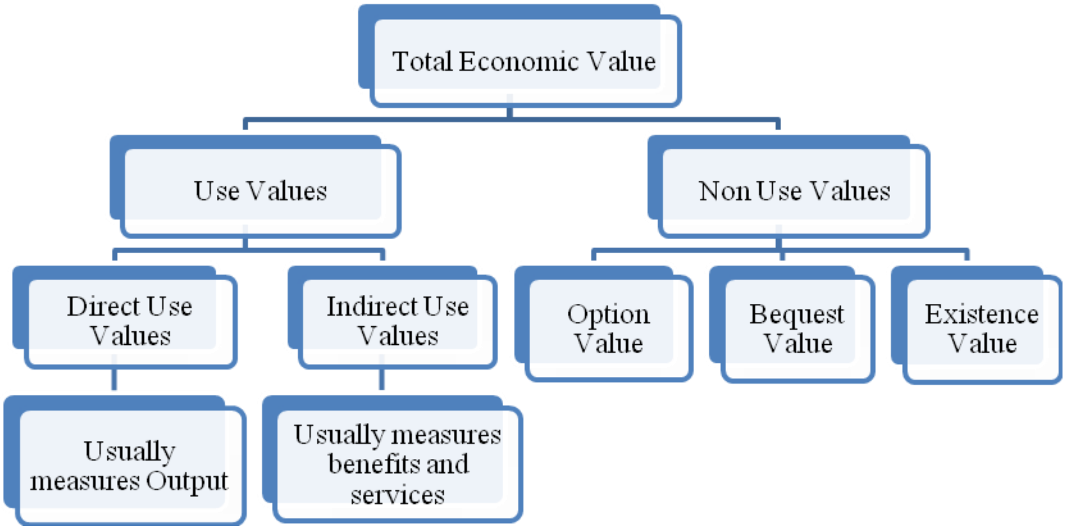

Fig. 3.3 Components of Total Economic Value
Source: Adapted from Dixon (2008)

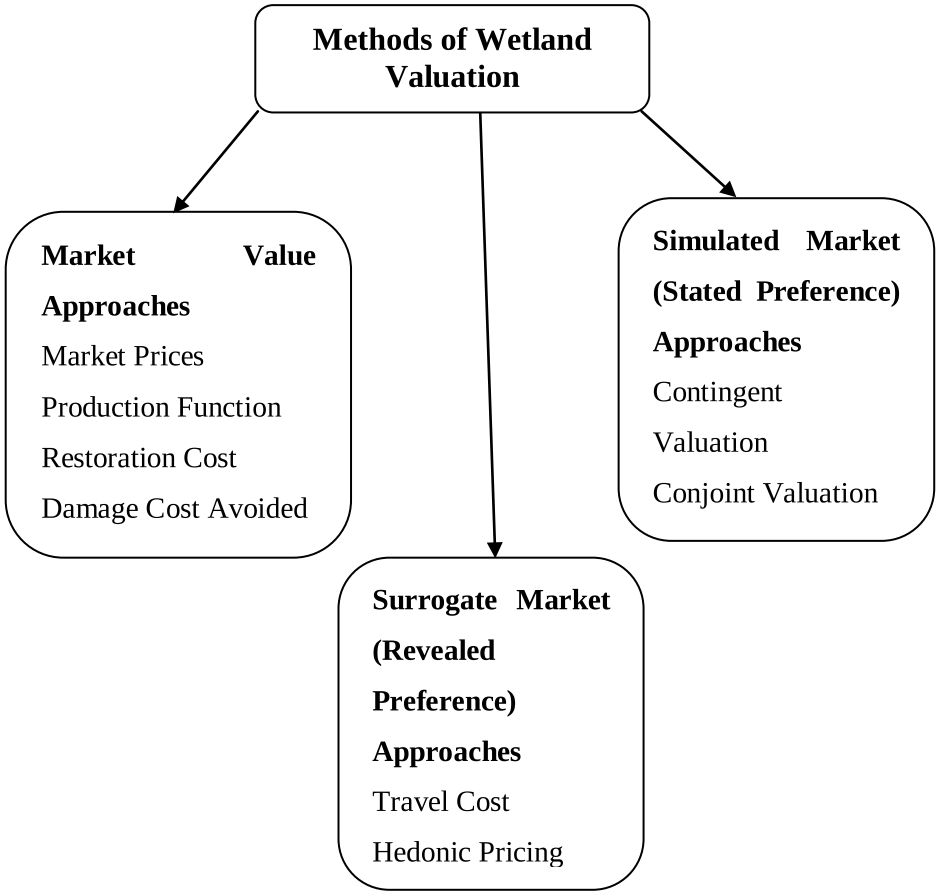

Fig. 3.4 Author's Concept of Methods of Wetland Valuation

The approaches to valuing wetland resources can be grouped to market-value approaches, surrogate-market approaches and simulated market approaches. Market value approaches are valuation techniques based on market data or opportunity costs. They use market sales data or market cost data where such exist, as direct proxies for the value of environmental goods/services. Such methods include market prices, production function, restoration cost and damage cost avoided. Surrogate market (revealed preference) approaches are valuation techniques which use indirect proxies of the value of wetland (environmental) resources. In other words, they use market-based prices and costs, but not to establish value directly; market-based prices and costs are used only to establish a relationship between observed market behaviour and the actual environmental good being valued. Pricing is based on observed behaviour of individuals in respect to related markets. Examples of methods in this category include the hedonic pricing method, the travel time/travel cost method and the benefit transfer method. Simulated market (stated preference) approaches are valuation techniques used where no market based proxy is available. In order to value environmental (wetland) benefits and damages under such circumstances, environmental valuers often have to simulate markets through research surveys. Simulated market (or 'Stated preference') methods provide the only means of estimating option and non-use values, and have also frequently been applied to the measurement of recreational use value. The methods commonly used are contingent valuation and conjoint valuation (also known as choice modelling or contingent ranking methods).

3.4 Factors Influencing the Choice of Wetland Valuation Method(s)

Wetland valuations are used in a variety of contexts for regulatory, planning, management, and educational purposes among others. The first step in addressing the full economic picture of wetland benefits is to recognise that the non-market benefits produced by wetlands are as important as traditional commodity (good) values. The idea behind putting an economic value on some of these wetland benefits before ecosystem-altering decisions are made is to recognise these potential costs up-front so as to put wetland-related decisions on a more economically sound footing. Functional performance provides goods and services that are of value to society, therefore the value of these functions reflects human preferences for sets of goods and services in demand. Although it is difficult to value wetland functions, as there is no direct demand for them yet, it is plausible to value their corresponding goods and services. In making a choice of a wetland valuation method to be adopted in the valuation of land and buildings, the Estate Surveyor and Valuer needs to take into consideration the type of property, availability of data and purpose of valuation. In ascribing value to wetland resources, a variety of factors equally call for the attention of the Estate Surveyor and Valuer, these factors include; availability of data, type of wetland resources, people's perception, purpose of valuation, people's level of education, importance of wetland and quality of site. Author's concept of the factors to consider in making the choice of wetland valuation method(s) are shown in Figure 3.5.

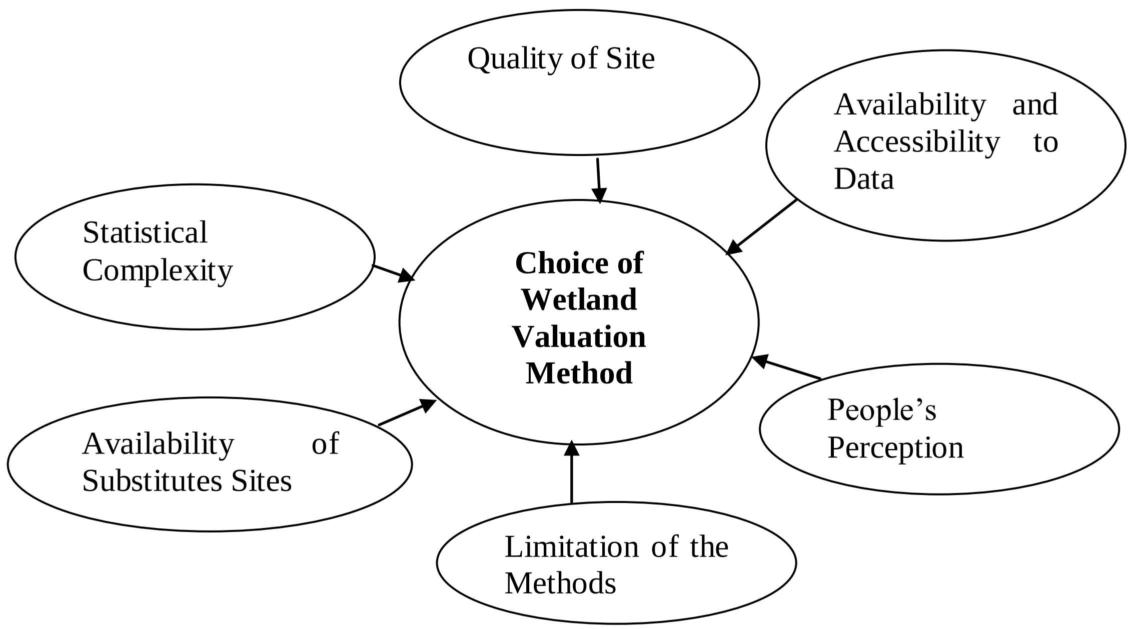

Fig. 3.5 Author's Concept of Factors Influencing the Choice of Wetland Valuation Method

The various factors to take into consideration in making a choice of wetland valuation method include statistical complexity, availability and accessibility to data required, people's perception, limitation of the method, quality of site and availability of substitute sites. The complexity and limitations of the methods are critical in making a choice of wetland valuation method, not all available methods can be used in measuring values of the component parts of wetland resources. Some of the methods such as contingent ranking, replacement cost and hedonic pricing require more sophisticated statistical techniques to estimate willingness to pay. Availability of substitute sites will affect values. Where there are sites that can be substituted for the one in question the tendency is to have a lower value for such site while on the other hand high value will be attached where there is no substitute site. The time and expense required to carry out a valuation depends on the availability and accessibility of data. Market data may only be available for a limited number of goods and services provided by wetland resource and may not reflect the value of all productive uses of a resource. Individual's perception/view/opinion about a thing, at times, determines the value attached to such a thing. For example, the travel cost method assumes that people perceive and respond to changes in travel costs the same way that they would respond to changes in admission price.

In addition to the factors discussed above the issue of hostility from residents has serious implications on the choice of methods adopted for wetland valuation. Some of the methods such as contingent valuation depend more on the participation of the residents on whom the survey instrument (questionnaire) has to be administered. Any attempt to overlook the implication of hostility on the choice of method may have adverse result on the compensation figure due to the adoption of wrong method.

3.5 **Challenges Faced in Wetland Valuation**

Though it is difficult to value wetland functions, as there is no direct demand for them, it is plausible to value their corresponding goods and services. Ascribing value to something abstract, as wetland ecosystems could be a difficult task especially because of the complexity of the ecosystem and the requirement for multi-disciplinary services in the determination of its various components. The author's concept of the challenges faced in wetland valuation is represented in Figure. 3.6.

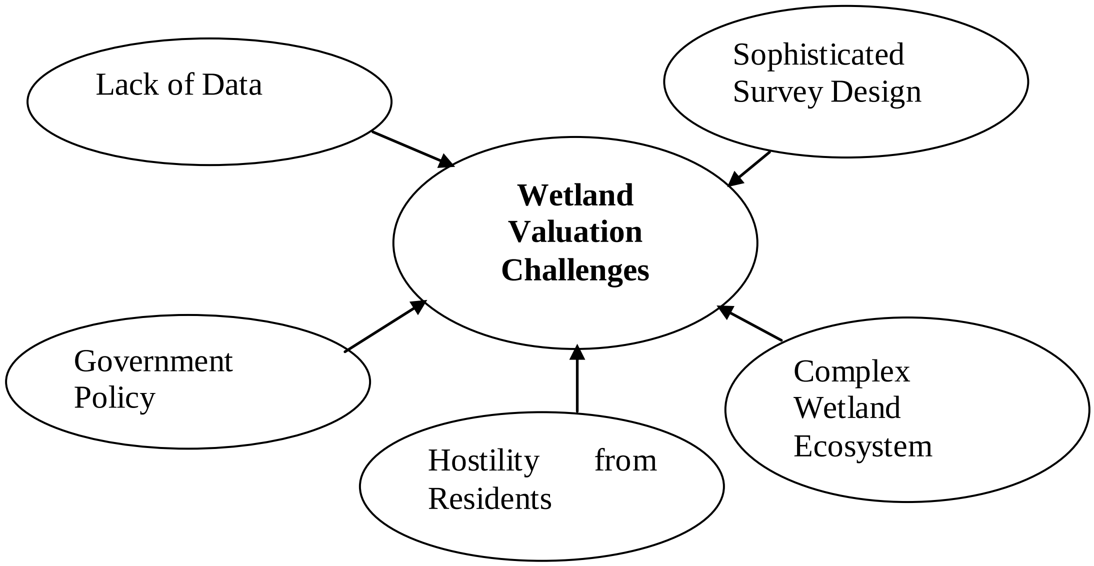

Fig. 3.6 Author's Concept of Challenges of Wetland Valuation

Various challenges faced in conducting wetland valuation were sieved from literature however figure 3.6 contains those ones conceptualised by the author. These are lack of data, sophisticated survey design, complex wetland ecosystem, hostility from residents and government policy. Just like the general valuation, wetland valuation depends on the availability and accessibility to current and relevant data. This is very important bearing in mind that wetland is a complex ecosystem requiring the input of various professionals. Most of the methods used in wetland valuation require complex and sophisticated survey instrument that wetland Valuers should be conversant with else the valuation may not produce the expected result. Government policy in terms of the legislation and statement about handling and management of wetland ecosystem is of importance. Without adequate legislation, there is no doubt; human action will continue to degrade wetland. Hostility due to agitation over inadequate compensation in the Niger Delta has been on the increase and this constituted a great challenge towards wetland valuation in the area. This has however impacted on the procedures adopted in wetland valuation and the methods used for such assignment.

CHAPTER FOUR

STUDY AREA

4.1 Introduction

This Chapter focuses on the study area. It looked at each of the three states that constitute the core Niger Delta one after the other, paying particular attention to their geographical location, climate, demography and economic activities in each state.

4.2 Bayelsa State

Bayelsa State was created on October 1, 1996 out of the old Rivers State. The name, Bayelsa, is an acronym of three former Local Government Council Areas – Brass, Yenagoa and Sagbama – in the then Rivers State, which had earlier on comprised the entire area now constituting Bayelsa State. The then Brass Local Government Council Area is what makes up the present Nembe, Brass and Ogbia Local Government Council Areas; the then Yenagoa Local Government Council Area consist of the present Yenagoa, Kolokuma/Opokuma and Southern Ijaw Local Government Council Areas and the then Sagbama Local Government Council Area is what makes up the present Sagbama and Ekeremor Local Government Council Areas. The tradition in the old Rivers State, which is still the norm in Bayelsa State now, is the use of acronyms for local government areas. People referred to Brass Local Government Area as BALGA, for short; Yenagoa was simply YELGA, while Sagbama was SALGA. Since personalities from BALGA, YELGA, and SALGA made up the State Creation Movement prior to the 1996 exercise, the proposed name agreed upon was BAYELSA (2009, http://www.bayelsa.gov.ng/). The Sate is composed of 90% water and 10% land while 60% of the land is wetland. It has the largest wetland in the Niger Delta. Bayelsa State is home to most of the creeks in the Niger Delta. Figures 4.1 – 4.3 are some of such creeks.

Fig. 4.1 Nembe Creek, Bayelsa State
Source: Field Survey (2011)

Fig. 4.2 Nembe Creek, Bayelsa State
Source: Field Survey (2011)

Fig. 4.3 Nembe Creek, Bayelsa State
Source: Field Survey (2011)

4.2.1 **Geography**

Bayelsa State is geographically located within Latitude 04^{o} 15’ North, 05^{o} 23’ South and longitude 05^{o} 22’ West and 06^{o} 45’ East. It shares boundaries with Delta State on the North, Rivers State on the East and the Atlantic Ocean on the West and South. Bayelsa has a riverine and estuarine setting. A lot of her communities are almost (and in some cases) completely surrounded by water. In addition to being home to Apoi Creek Forests (one of Ramsar’s wetland site), the State is also home to the Edumanom Forest Reserve, which is the last known site for chimpanzees in the Niger Delta, in June 2008

(Chemonics International Inc. 2008). The Edumanom Forest Reserve is a Freshwater Swamp Forest with an area of 9,324 hectares (Beak Consultants 1998). The habitat has been degraded by oil-industry and logging operations (Baker, and Olubode, 2007). The forest is also under threat from expansion of oil palm plantations. All these activities had in one way or the other affected wetland ecosystems in the state and called for determination of compensation due to the affected communities.

4.2.2 **Climate**

Bayelsa State is a picturesque tropical rain forest, with an area of about 21,110 square kilometres. More than three quarters of this area is covered by water, with a moderately low land stretching from Ekeremor to Nembe. The area lies almost entirely below sea level with a maze of meandering creeks and mangrove swamps. The network of several creeks and rivers in the South, all flow into the Atlantic Ocean via the major rivers such as San Bartholomew, Brass, Nun, Ramos, Santa Barbara, St. Nicholas, Sangana, Fishtown, Ikebiri Creek, Middleton, Digatoro Creek, Pennington and Dobo. The vegetation here is characterised by the mangrove forest. In the North, it has a thick forest with arable lands for cultivation of various food and cash crops.

4.2.3 **Demography**

According to the results of the 2006 census, there are 1,703,358 inhabitants in Bayelsa State, made up of 902,648 males and 800,710 females. The State has a total landmass of 10,773km^2. The State has eight (8) Local Government Council Areas – Brass, Ekeremor, Kolokuma/Opokuma, Nembe, Ogbia, Sagbama, Southern Ijaw and Yenegoa. Figure 4.4 shows the map of Bayelsa State with the eight Local Government Council Areas.

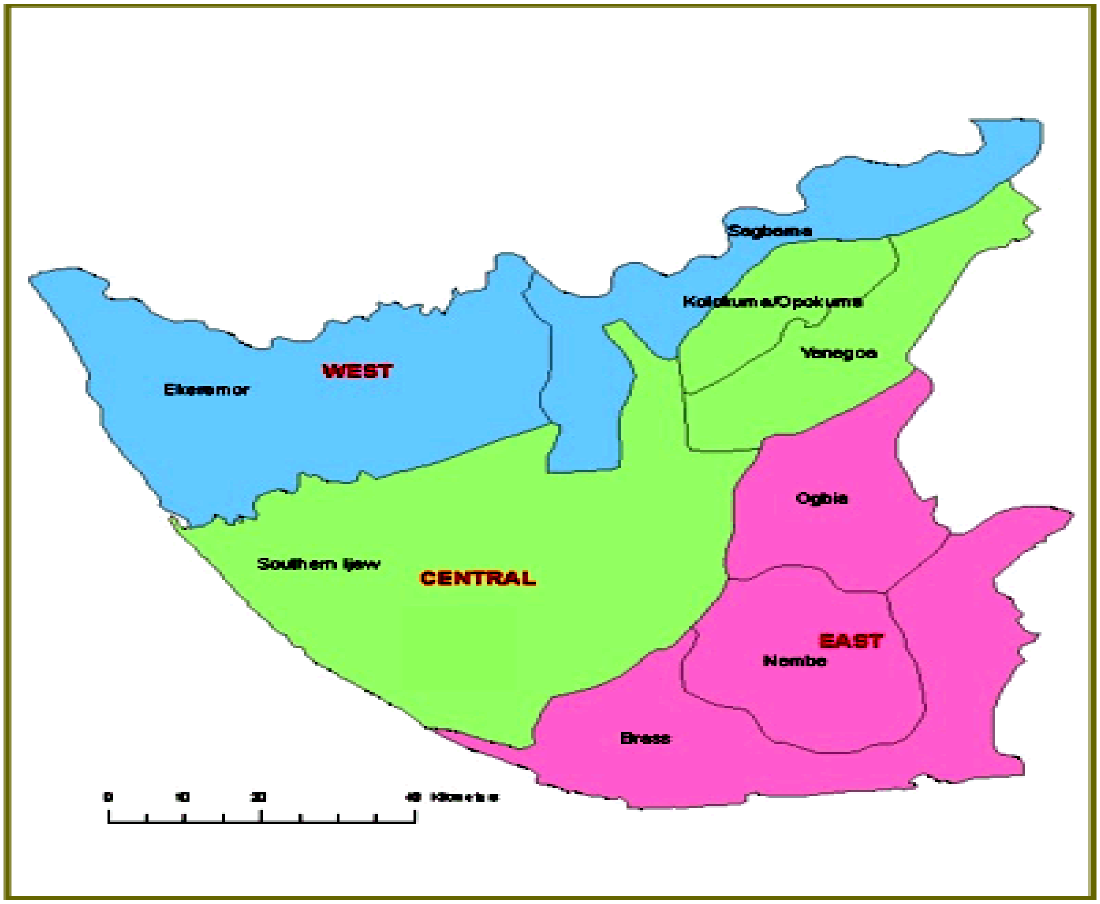

Fig. 4.4: Map of Bayelsa State
Source: http://www.nairaland.com/nigeria/topic-286903.0.html

4.2.4 **Economy**

Bayelsa State is a major oil and gas producing area and it contributes over 30% of Nigeria's oil production. There are hundreds of oil wells and flow stations across the state. Oloibiri in Ogbia Local Government Area of the state is where oil was first struck in Nigeria in commercial quantities in 1956. The State has one of the largest crude oil and natural gas deposits in Nigeria. As a result, petroleum production is extensive in the state; this is evidenced by the maze of oil pipelines shown in Fig 4.5. However, the majority of Bayelsans live in poverty. They are mainly rural dwellers due to its peculiar terrain and lack of adequate transportation, health, education or other infrastructure as a result of decades of neglect by the central governments, state governments, and petroleum prospecting companies. This has been a large problem in the state since its creation and successive state governments have not been able to address and repair the issue. The state, as a result, has an almost non-existent commerce. Though successive state governments have, however, embarked on various industrial projects (even venturing into the oil and gas sector), and "poverty-alleviation" programmes to reverse this situation, there is nothing on ground to show for huge sums of money spent for development by successive and present state governments. The local populations engage in fishing on a subsistence and commercial level. All the above clearly showed that the various activities of the oil companies have negatively impacted the wetland that constitute the major source of livelihood of Bayelsan and need to be compensated, hence a look at how compensation figure is being determined is necessary.

Fig. 4.5 A Maze of Oil Pipelines in Bayelsa State
Source: Field Survey (2011)

4.3 **Delta State**

Delta State was carved out of the former Bendel State in 1991. The State was once integrated in the Mid Western State from 1963 to 1976 and later Bendel State, from 1976 to 1991. The name "Bendel" (Ben-Del) meant Benin-Delta to reflect the integration of Benin and Delta provinces. The state got its name as a result of its location within the delta of River Niger. The State is dotted with many creeks such as the one in Fig. 4.6

Fig. 4.6 One of the numerous Creeks in Delta State
Source: Field Survey (2011)

4.3.1 **Geography**

Geographically, Delta State lies between longitudes 05^o 00' and 06^o 45' east and latitudes 05^o 30' and 06^o 30' north. Delta State is bounded on the North by Edo State, on the South-West by Bayelsa State, on the East by Anambra and Rivers States, on the North East by Kogi State, to the North-West by Ondo State, while to its South lays the Atlantic Ocean. On the southern flank is the Bight of Benin which covers approximately 160 kilometres of the State's coastline. The State is made up of 50% land and 50% water and more than 50% of the land falls within wetland ecosystems.

4.3.2 **Climate**

Delta State is located in the tropics and therefore experiences a fluctuating climate ranging from the humid tropical in the South to the sub-humid in the Northeast. The lessening of humidity towards the North is accompanied by an increasingly marked dry season. In other words, the State experiences two seasons, viz: the dry season, which normally spans November to April and the rainy season which commences from May and run through to October with a brief spell of dry period in August (August break). December to February is usually marked with the dry North-East Trade Winds which is known as the harmattan. Annual rainfall averages some 266.5mm in the coastal areas and 190.5mm in the extreme north of the State. Temperature increases from the South to the North. In Warri, located in the South, for example, the average daily temperature is 30^{o}C while the temperature in Asaba, in the Northeastern area is 44^{o}C. The State is inhabited by five major ethnic groups, namely: Igbo, Ijaw, Isoko, Itsekiri and Urhobo. Apart from the capital city Asaba, the State has several other urban towns. These include: Warri, Sapele, Agbor, Ughelli, Abraka, Effurun, Agbarho, Oleh, Ozoro, Ibusa, Issele-Uku, Ogwashi-Uku and Patani. The State is extensively low-lying, overlooking wide coastal belts which form part of the Niger Delta. The vegetation of the State presents varying belts. The coast is dominated by thick mangrove swamp forest which leads into a broad zone of deciduous and evergreen forests.

4.3.3 **Demography**

The population of Delta State, according to the 2006 census figures, is put at 4,098,391inhabitants, made up of 2,074,306 males and 2,024,085 females. The State has a landmass of approximately 18,050 square kilometers with about one third of the area made up of the deltaic swamps and brackish water type of wetland. There are twenty-five

(25) Local Government Council Areas that make up the State – Aniocha North, Aniocha South, Bomadi, Burutu, Ethiope East, Ethiope West, Ika North East, Ika South, Isoko North, Isoko South, Ndokwa East, Ndokwa West, Okpe, Oshimili North, Oshimili South, Patani, Sapele, Udu, Ughelli North, Ughelli South, Ukwuani, Uvwie, Warri North, Warri South and Warri South West (Fig. 4.7).

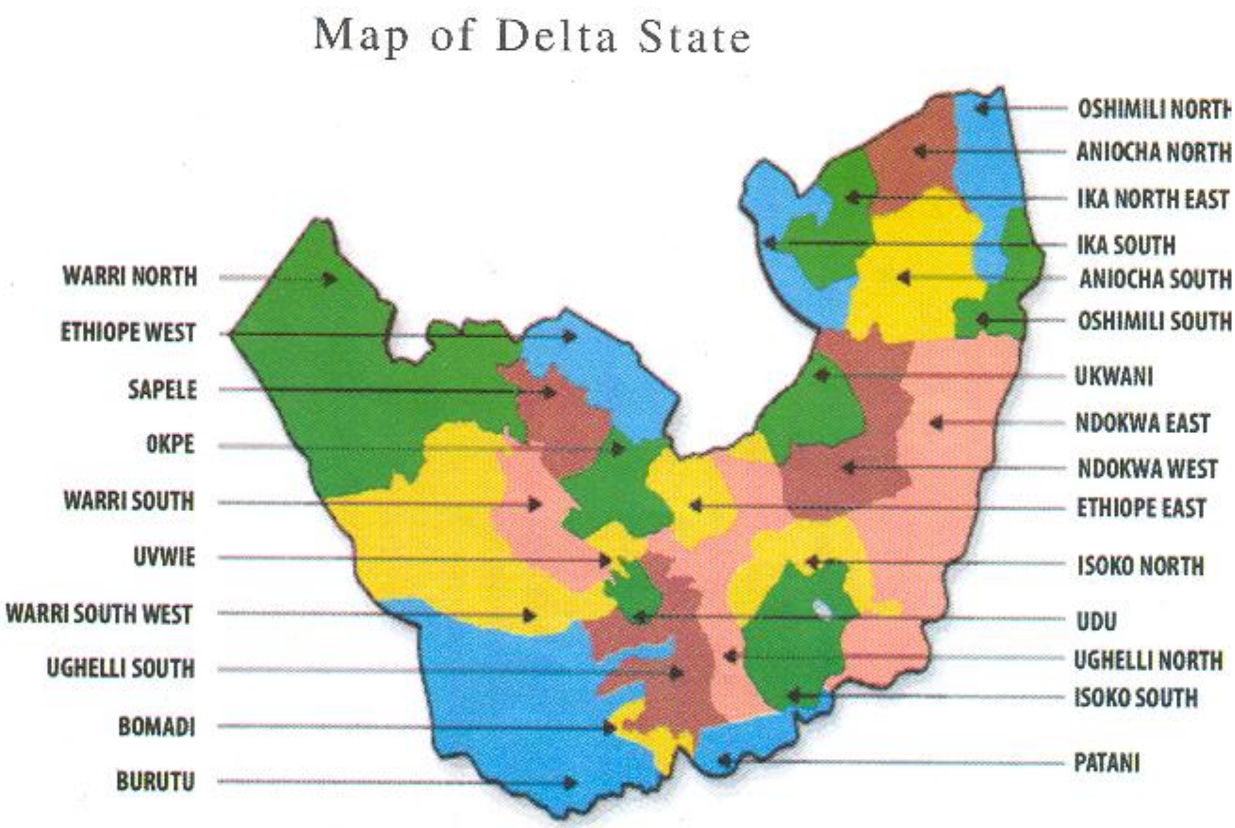

Fig. 4.7: Map of Delta State showing the Twenty-five Local Government Areas
Source: Odemerho (2008) and http://www.nairaland.com/nigeria/topic-286903.0.html

4.3.4 **Economy**

Delta State accounts for one third of the entire volume of Oil and Gas produced in the country. The State also accommodates some of the country's major oil-based industries and facilities. They are: a refinery at Ekpan, a gas plant at Okpai, a steel complex at Ovwian/Aladja, two gas fired electricity stations at Sapele and Ughelli and an oil export terminus at Forcados. For its complexity in terms of diverse ethnic configuration and strategic position in the national economy, Delta State which is often referred to as a Miniature Nigeria, goes by the slogan the "Big Heart of the Nation". Generally, the people of the State are predominantly farmers and fishermen, while a few engage in trading and other businesses. There are various solid mineral deposits within the state – industry clay, silica, lignite, kaolin, tar sand, decorative rocks, limestone, etc. These are raw materials for industries such as brick making, ceramics, bottle manufacturing, glass manufacturing, chemical/insulators production, chalk manufacturing and sanitary wares, decorative stone cutting and quarrying. With about 50% of the land mass constituting wetlands, it is important to examine how wetland resources are assessed for compensation purposes.

4.4 **Rivers State**

Rivers State was created out of the old Eastern Region of Nigeria on May 27, 1967. Until 1996 the present Bayelsa State used to be part of Rivers State. Rivers State, named after the many rivers that border its territory, was part of the Oil Rivers Protectorate from 1885 till 1893, when it became part of the Niger Coast Protectorate. In 1900 the region was merged with the chartered territories of the Royal Niger Company to form the colony of Southern Nigeria. The State capital, Port Harcourt, is the nerve centre of the famous Nigerian Oil industry and over ninety industrial concerns, including the Shell Petroleum Development Company of (Nigeria) Limited, AGIP, Texaco, Elf, NPRC, Michelin, West African Glass Industry, Alcan Aluminium, Metaloplastica, Risonpalm, NAFCON, Pabod Breweries, to mention a few (Ejibunu, 2008).

4.4.1 **Geography**

With a total landmass of 11,077km^2, River State is bounded in the South by the Atlantic Ocean, in the North by Anambra, Imo and Abia State, in the East by Akwa Ibom State and in the West by Bayelsa and Delta States. The state is made up of 50% land and 50% water with about 60% of the land being wetlands.

4.4.2 **Climate**

Rivers State is located in the Southern part of Nigeria in which the inland part of the State consists of tropical rainforest, towards the coast. The tropical river delta environment features many mangrove swamps. Rivers State contains mangrove swamps, tropical rainforest. The State features a tropical monsoon with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualify as dry season months in the state. The hamattan, which climatically influences many cities in West Africa, is less pronounced in the State. Rivers State's heaviest precipitation occurs during September with an average of 370 mm of rain. December on average is the driest month of the year; with an average rainfall of 20 mm. Temperatures throughout the year in the State are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25°C and 28°C in the State. The climatic condition in the state has helped in the continuous existence of wetland ecosystems, though seriously degraded by the economic activities of the multinational oil companies.

4.4.3 **Demography**

According to the results of the 2006 census, there are 5,185,400 inhabitants in Rivers State, made up of 2,710,665 males and 2,474,735 females. The State has a total landmass 11,077km^2 and twenty-three (23) Local Government Council Areas – Abua/Odual, Ahoada East, Ahoada West, Akuku-Toru, Andoni, Asari-Toru, Bonny, Degema, Eleme, Emohua, Etche, Ikwere, Gokana, Khana, Obio-Akpor, Ogba/Egbema/Ndoni, Ogu/Bolo, Okrika, Omuma, Opobo/Nkoro, Oyigbo, Port Harcourt and Tai (Fig. 4.8).

Fig. 4.8: Map of Rivers State showing the Twenty-three LGAs
Source: http://www.nairaland.com/nigeria/topic-286903.0.html

4.4.4 **Economy**

Rivers State has one of the largest and fast growing economies in Nigeria, mainly because of its crude oil. The State has two major refineries, two major seaports, two airports, and various industrial estates spread across the state, particularly in the State capital. Rivers State is one of the wealthiest states in Nigeria in terms of gross domestic product and foreign exchange revenue from the oil industry, crude oil being its main export earner. Agriculture is the main occupation of the people of Rivers State and the agricultural policy of the state government is anchored on food production. This provides employment for young school leavers and university graduates. These agricultural activities are grouped' under Community Block Farming Scheme, Community Fishing Scheme, Livestock Scheme and Rabbitry. However, it is the production of oil and gas that Rivers State is most famous. With enormous reserves of crude oil and natural gas, Rivers State account for more than 40% of Nigeria crude oil production (Ejibunu, 2008). Apart from this, there are many petrochemical related industries in the state which also harbour the first petroleum refinery in Nigeria. Nigeria's gigantic Liquefied Natural Gas (LNG) project is located in Bonny Island in the state. With the heavy presence of oil industries and their activities in the state, wetland ecosystems had been seriously impacted by pollution and degradation, therefore the need to compensate affected inhabitants give rise to assessing how such compensation is determined.

Fig. 4.9: A Section of Orashi Forest in Rivers State
Source: Field Survey (2011)

CHAPTER FIVE

RESEARCH METHODS

5.1 Introduction

The various approaches used in achieving the aim and objectives of the study were the focus of this Chapter. The researcher discusses the research design, study population, the sample frame, sample size and its characteristics, the sampling methods adopted, sources and instruments of data collection, data analysis and presentation. The researcher also explains the use of pilot survey for ascertaining the validity and reliability of data collection instrument (questionnaire).

5.2 Research Design

There are three main categories of research design. These are survey, experimental and *ex post facto* designs. Survey design could be cross-sectional and longitudinal design; experimental design could be experimental with control and succession quasi-experimental design, while *ex post facto* is a one-case design with researchers using symbols in such designs (Asika, 2005). The researcher employed survey method in carrying out the study. This was done to enable the researcher reach all the respondents in the study area. It was used to collect primary data for the study. Both descriptive and exploratory approaches were used for literature review and in gaining information about the study area, while explanatory approach was used in analysing the data collected.

5.3 Study Population

This research identified two aggregations of study groups for investigation. These are firms of Estate Surveyors and Valuers and institutions of higher learning where Estate Management courses are offered. Estate Surveyors and Valuers are the people legally and professionally qualified to assess the worth of interest in land and landed properties, hence they were used for the purpose to identify the processes involved in wetland valuation, the methods adopted in valuing wetlands in the Niger Delta, examine the factors considered in the selection of the methods and the challenges faced in the valuation of wetland ecosystems in the study area. On the other hand, the institutions offering Estate Management courses were involved with the aim of establishing the status of environmental valuation in their curriculum.

Based on the current NIESV National Directory 2009, (7th Edition), there are fifty (50) registered Estate Surveying and Valuation firms in the study area. However, the researcher considered this obsolete for a study of this nature. Therefore, to be able to make a generalisation that will stand the test of time, the researcher decided to use the number of Estate firms in the Niger Delta, based on the information supplied by the Institution's (NIESV's) Branch Secretary in the respective states (Bayelsa, Delta and Rivers). Table 5.1 shows the location of the various firms within the study area. There is only one (1) university in the study area offering Estate Management – Rivers State University of Science and Technology – Port Harcourt. Since graduates of Estate Management from the universities are expected to have comparable training, the researcher extended the interview to include all the universities offering Estate Management in the Southern part of the country where more than sixty (60%) percent of such universities are located. To ascertain whether or not environmental valuation is taught, all Heads of Department of Estate Management of the eleven universities offering Estate Management courses in the Southern part of the country were contacted. Furthermore, interview was conducted on the village heads in Nembe, Fishtown and

Bony to elicit information on the cause of hostility from the villagers. Finally, the researcher extended his work to include the NIESV with a view to ascertaining the inclusion of environmental valuation in the curriculum for professional examinations.

Table 5.1 **Locations of Estate Surveying and Valuation Firms in the Study Area**

Firm's Location	NIESV (Directory, 2009)	State Branch (Register, 2011)
Bayelsa State	1	3
Delta State	10	18
Rivers State	39	99
Total	**50**	**120**

Source: NIESV National Directory (2009) and Field Survey 2011

5.4 Sample Frame

Sample frame refers to the complete list of all units of population under study and determines the structure of enquiries (Olaseni, Solola, Laoye and Alade, ed. 2004 and Aledare, 2004). The sample frame for this study consists of the 120 Estate Surveying and Valuation firms in Bayelsa, Delta and Rivers States, as contained in the lists made available by the NIESV's Branch Secretaries in the three States and Heads of Department of all the Universities offering Estate Management in the Southern part of Nigeria.

5.5 Sample Size

A sample size comprises the total number of population elements or sampling units that are selected (i.e. sampled) for investigation in a research study (Olatunde-Aremu, 2004). For the purpose of this study, the 120 Estate Surveying and Valuation firms and the Heads of Department of Estate Management of Universities offering Estate Management courses in the Southern part of Nigeria constitute the sample size for this study.

5.6 Sources and Instrument for Data Collection

Data for this study was generated from two sources: primary and secondary.

5.6.1 Primary Data:

Primary data was collected by the researcher during fieldwork. They usually emanate from direct observation, personal interview, postal surveys, telephone surveys or questionnaires. For the purpose of this study, questionnaires, personal and telephone interviews were used with a view to extracting information about respondents' academic and professional qualifications, working experience and status. This is to establish that the respondents' opinion can be relied upon. Questions were also asked on wetland valuation process, basis and methods adopted for the valuation, the factors considered in choosing the method(s) adopted and the challenges encountered in the conduct of wetland valuation, all in the bid to achieve the study objectives.

5.6.1.1 The Questionnaire:

The questionnaire was designed to elicit information from the firms of Estate Surveyors and Valuers. The questionnaire was divided into two sections; Sections A and B. Section "A" covered the personal data of respondents, such as name, sex, academic, status in the firm and professional qualification of respondents with a view to establishing that the right type of respondents were consulted in the conduct of the study. On the other hand, Section "B" contained questions which were structured based on the areas of research interest. Estate Surveyors and Valuers were asked about wetland valuation process, basis and methods adopted for the valuation, the factors considered in choosing the method(s) adopted and the challenges encountered. These questions were asked for the purpose of achieving the study objectives.

5.6.1.2 **Personal and Telephone Interviews:**

As a supplement to the use of questionnaires, personal and/or telephone interviews were conducted on Estate Surveyors and Valuers, who have had the privilege of attending seminar/workshop/training on wetland. This was done to find out whether the seminar/workshop/training equipped the respondents with the various techniques for environmental valuation, in general, and wetland valuation, in particular and also to ascertain what the firms actually valued within wetland ecosystems and the exact approach(s) used in carrying out the valuation assignment(s). Personal and/or telephone interviews were conducted on the Heads of Department of Estate Management of the various Universities offering Estate Management in the Southern part of Nigeria, to ascertain whether environmental valuation is being taught in the affected institutions. Equally, personal/telephone interview was conducted on the officials of Nigerian Institution of Estate Surveyors and Valuers, to ascertain whether environmental valuation is included in the curriculum for NIESV professional examinations.

5.6.2 **Secondary Data:**

These are data that had been collected and processed into a useable form by other people (authors). For the purpose of this study, such information emanated from sources such as textbooks, professional journals, Internet browsing, the Nigerian Institution of Estate Surveyors and Valuers (NIESV) among other sources. The data collected from textbooks, professional journals and Internet browsing were used for literature review while NIESV 2009 Directory supplemented by records from NIESV Branch Secretaries of the three States was used for the determination of the population, sample frame and sample size of Estate Surveyors and Valuers and Estate Surveying and Valuation Firms for the study.

5.7 Data Analysis and Presentation

The data collected in Section ‘A’ (personal data of respondents) of the questionnaire were descriptive in nature hence were analysed and presented using tools such as frequency distributions and percentages. On the other hand, Section 'B' contained quantitative questions set to elicit information on the main thrust of the study and were therefore analysed and presented using frequency distributions and statistical tools that include relative importance index (RII) and principal component analysis (PCA). The various methods adopted for data analysis are as explained below:

5.7.1 **Frequency Distributions and Percentages**

In presenting data generated for the study, frequency distributions and percentages were employed. It shows either the actual number of observations falling in each range or the percentage of observations. Frequency distribution tables can be used for both categorical and numeric variables. Frequency distribution tables were used to summarise the data collected for the study.

5.7.2 **Relative Importance Index (RII)**

The idea behind the adoption of scaling approaches is borne out of the need that, instead of wanting to establish whether or not a respondent is favourably inclined to an issue can be deduced from the answers given to question(s) in the questionnaires, one can get a measure and a reasonably reliable actual position of the respondent(s) on the attitude continuum with the aid of Relative Importance Index. Under Relative Importance Index measure, variables are to be rated against a scale to assist in assessing the significance of each factor. The scale was then transformed into an index otherwise known as Relative Importance Index (RII) for each factor to determine the ranks of the different factors. The Relative Importance Index (RII) is evaluated using the following expression:

$$RII = \frac{\sum a_i n_i}{\sum x_j}$$

Where: i= response category index

x_j= the sum of j factors 1,2,3 ……….N

a_i= constant expressing the weight given to the ith response.

n_j= the variable expressing the frequency of the ith

5.7.3 **Principal Component Analysis**

Factor analysis is a statistical method used to describe variability among observed variables in terms of a potentially lower number of unobserved variables called factors. In other words, it is possible, for example, that two or three observed variables together represent another, unobserved variable, and factor analysis searches for these possible combinations. There are two types of factors analysis: exploratory factor analysis (EFA) used to uncover the underlying structure of a relatively large set of variables and confirmatory factor analysis (CFA) that seeks to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of pre-established theory. The different methods of extracting the factors from a set of data include principal components analysis (PCA), principal factors analysis (PFA), image factoring analysis (IFA), maximum likelihood factoring, alpha factoring, unweighted least squares and generealised least squares. The most commonly used of these methods is principal component analysis and it is the one adopted in this study.

The objectives of PCA are to discover or to reduce the dimensionality of the data set and to identify new meaningful underlying variables. The mathematical technique used in PCA is called eigen analysis: where calculation is made for the eigenvalues and eigenvectors of a square symmetric matrix with sums of squares and cross products. The eigenvector associated with the largest eigenvalue has the same direction as the first principal component. The eigenvector associated with the second largest eigenvalue determines the direction of the second principal component. In this study eigenvalues greater than 1 were required and used to explain the components (factors) that account the variance.

5.8 Treatment of Research Questions and Objectives

For better comprehension of the methods adopted in the collection and treatment of data for each of the objectives set for the study, the following paragraphs present the administration of data gathering instruments, characteristics/nature of data collected and the treatment of the data.

Data Characteristics: The data for this study are both qualitative and quantitative in nature. The qualitative data include the personal characteristics of the respondents and the firms. The quantitative data include those on Estate Surveyors and Valuers perception about wetlands, functions and services provided by wetlands. As earlier stated the data used for this study was generated through the questionnaire administered on the respondent Estate Surveying and Valuation firms practicing within the study area, while personal/telephone interviews were conducted on Heads of Department of Estate Management of the various Universities offering Estate Management in the Southern part of Nigeria.

Objective No. 1: Examine wetland valuation processes for compensation.

Questionnaire: To answer the second research question on the processes involved in wetland valuation for compensation, the researcher included the objective. The questions used to achieve this objective are contained in the questionnaire (Appendix 1).

Data Analysis: In analysing the data for this objective, the descriptive statistical tools such as frequency and percentage table were adopted. This was done to establish whether respondents in the study area followed the identified steps in their conduct of wetland valuation for compensation.

Objective No. 2: Identify the basis and methods used for wetland valuation for compensation in the study area.

Questionnaire: The various bases and methods of valuation for real estate and environmental resources were identified from literature and are listed in the questionnaire (Appendix 1). The questions are meant to answer research question three and to achieve objective two of the study. Both the traditional methods and the environmental methods were included. The motive is to ascertain whether the traditional methods were used for wetland valuation in the study area and also to ascertain which of the environmental methods were adopted by the respondents.

Data Analysis: In analysing the data for objective ii both descriptive and inferential statistical tools were adopted. The descriptive statistical tools used include the frequency and percentage tables. They were used in analysing the data on both the traditional methods and environmental methods, to give preliminary idea about the various methods used in wetland valuation in the study area. Further analysis was conducted on the environmental valuation methods so as to identify the most important method used by the respondents in valuing wetland resources. To achieve this, respondents were asked to rank the methods using 5-point Likert Scale of 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important. To identify the most important environmental method used for wetland valuation in the study area, the responses were analysed using relative importance index (RII) approach.

Objective No. 3: Identify the factors responsible for the choice of wetland valuation method in the study area.

Questionnaire: To achieve this objective and answer the research question, the various factors responsible for choosing a particular wetland valuation method were identified from literature and were included in the questionnaire (Appendix 1). This is to test whether the factors considered in the study area are in line with those considered in other areas.

Data Analysis: The data collected for this objective was analysed using both descriptive and inferential statistical tools. The descriptive statistical tools used involved the grouping of data, computation of frequencies and percentage. Furthermore, respondents were asked to rank the various factors responsible for their choice of wetland valuation methods using 5-point Likert Scale ranging from 5 = very important, 4 = important, 3 = indifferent, 2 = not important, to 1 = not very important. The responses were analysed using relative importance index (RII) approach so as to identify the most important factor for consideration in choosing the method(s) adopted in carrying out wetland valuation in the study area. Further treatment was given to this data, using principal components analysis (a variant of factor analysis) to extract the factors that account for the differences in the variables.

Objective No. 4: Examine the challenges faced in wetland valuation in the study area.

Questionnaire: Various challenges facing wetland valuation had been identified from literature. These challenges are contained in the questionnaire (Appendix 1), so as to achieve this objective, answer the research question and to test for the significant challenges faced in wetland valuation in the study area.

Data Analysis: In analysing the data for this objective both descriptive and inferential statistical tools were adopted. The descriptive statistical tools used include the frequency and percentage tables, to explain the general characteristics of the challenges faced in conducting wetland valuation in the study area. Furthermore, the respondents were asked to rank the factors using 5-point Likert Scale of 5 = very significant, 4 = significant, 3 = indifferent, 2 = not significant, 1 = not very significant. To identify most significant challenges facing wetland valuation in the study area, the responses were analysed using relative importance index (RII) approach.

5.9 **Pilot Study**

Pilot study was conducted within two weeks interval using ten (10) copies of the questionnaire, administered on Principal Partners of ten (10) Estate Surveying and Valuation firms within the study area. This was carried out to test the validity and reliability of the research instrument – questionnaire as well as to ensure the adequacy of the questionnaire or its inadequacy in achieving the objectives of the study so as to make necessary amendments to the questionnaire, before going to the field for final data collection. Some parts of the draft questionnaire were improved, rearranged, and modified in the light of the practical experience gained from the pre-test. It was then finalised and questions were listed in logical sequence, so that the respondents could answer easily.

5.9.1 **Validity Testing**

A research design is said to be valid if it enables the researcher to elicit the correct responses from the sample subjects; otherwise, it is a faulty design and may not lead to correct findings (Asika, 2005). The concept of validity of findings is usually applied in two areas of research – validity of findings and validity of measurements. Validity of findings mainly focuses on the adequacy of a research design in eliciting the type of responses that it is designed to generate. If it fails to accomplish this, the designs are faulty and will eventually lead to findings that are not valid. Validity of measurement is the ability of the instrument to measure what it is supposed to measure. This is measured in three ways: content validity, criterion-related validity and construct validity (Last, 2001, Bateman, et al. 2002).

In this study, the validity test was conducted by subjecting the questions in the questionnaire to the opinion of respondent Estate Surveyors and Valuers used for the purpose of the test. The process however revealed that while some of the questions were not necessary, a few important questions germane to the achievement of the study objectives were left out. The necessary corrections were made to ensure that the questions contained in the questionnaire cover all areas of the study that would enable the researcher meet all the research objectives and answer research questions.

5.9.2 **Reliability Testing**

Reliability focuses on the consistency between independent measurements of the same phenomenon. It is the stability, dependability, predictability, accuracy or precision of a measuring instrument. Reliability is concerned with the consistency in the results given by the same instrument and this is tested using any of test-re-test technique, multiple (alternate) forms, split-half technique and Cronbach's alpha test (Asika, 2005). While carrying out the pilot study, the test-re-test reliability approach was adopted in testing the reliability of the questionnaire. This was accomplished by taking two separate measurements (through administration of questionnaire) of the sample population within a two-week interval. The first measurement was carried out by administering a copy of the questionnaire on each Principal Partner of ten selected firms of Estate Surveyors and Valuers. This was repeated a week later with new copies (10) of the questionnaire, administered on same Principal Partners of firms of Estate Surveyors and Valuers. The result obtained from the second measurement was correlated with the ones obtained from the first measurement. This was carried out to ascertain whether the questionnaire adequately covers the scope of the topic and capable of providing answers to the research questions. Minor areas that could have made the instrument unreliable were critically reviewed and necessary corrections made before administering the final copies of the questionnaire on the respondents.

Table 5.2 **Treatment of Research Questions and Objectives**

S/No	Objective	Data Required	Data Analysis
1	Examine wetland valuation processes for compensation	Qualitative and nominal in nature	Descriptive statistical tools such as frequency and percentage were adopted.
2	Identify the basis and methods used for wetland valuation for compensation in the study area	Qualitative with interval (for ranking)	Descriptive statistical tools used include the frequency and percentage. 5-point Likert Scale was also used in ranking the methods. Relative importance index (RII) approach was adopted to identify the most important environmental method used for wetland valuation in the study area.
3	Identify the factors responsible for the choice of wetland valuation methods in the study area	Qualitative with interval (for ranking)	Descriptive statistical tools used include the frequency and percentage. 5-point Likert Scale was also used in ranking the factors. Also, relative importance index (RII) approach was adopted to identify the most important factor of consideration in choosing the method(s) adopted in carrying out wetland valuation in the study area. Equally, principal components analysis (PCA) test was conducted to reduce the factors to the most important ones.
4	Examine the challenges faced in wetland valuation in the study area	Qualitative with interval (for ranking)	Descriptive statistical tools used include the frequency and percentage. 5-point Likert Scale was also used in ranking the challenges. Relative importance index (RII) approach was adopted to identify the most significant challenge(s) faced in the valuation of wetland ecosystems.

Source: Author's Field Survey 2011

CHAPTER SIX

PRESENTATION AND INTERPRETATION OF DATA

6.1 Introduction

This Chapter presents a comprehensive analysis of data collected from the questionnaire administered on Principal Partners of Estate Surveying and Valuation Firms in the Niger Delta. The analysis contained in this Chapter has been structured into two sections; preliminary survey details and wetland valuation practice.

6.2 Preliminary Survey Details

Data used for this study was collected between the months of August and September 2011. The various responses were subsequently coded and analysed in between September and October 2011, using Statistical Package for Social Scientists (SPSS version 17.0). The sample size for the study was made up of Principal Partners of the 120 Estate Surveying and Valuation firms in the Niger Delta (Bayelsa, Delta and Rivers).

6.2.1 Questionnaire Distribution and Retrieval

In conducting the survey, a total number of 120 questionnaires were administered, out of which 72 questionnaires (60%) were returned and found useful for the study. The analysis of questionnaire distribution and retrieval are contained in Table 6.1.

Table 6.1 **Questionnaire Distribution and Retrieval**

State	Questionnaires Distributed	Questionnaires Retrieved	Percentage
Bayelsa	3	3	100.0
Delta	19	13	68.4
Rivers	98	56	57.1
Total	**120**	**72**	**60.0**

Source: Author's Field Survey, 2011

Table 6.1 shows the number of questionnaires distributed to and retrieved from the firms of Estate Surveyors and Valuers. Copies of the questionnaire were distributed to all the 120 firms of Estate Surveyors and Valuers in the Niger Delta based on the lists of Estate Surveying and Valuation firms obtained from the State Branch Secretaries of NIESV in the three States. All the firms in Bayelsa State (3, 100%) returned the questionnaire administered on them, while 13 out of 19 firms (representing 68.4%) in Delta State returned the questionnaire. In Rivers State, 56 out of 98 firms (representing 57.1%) returned the questionnaire. The overall level of questionnaires retrieved and found useful (60%) was considered appropriate for this study compared with 40% advocated by Nwana (1981). Indepth interviews with Estate Surveyors and Valuers in Bayelsa State revealed that the fewer firms operating in the State is due to the fact that Bayelsa State was created out the old Rivers State, and most of the firms already established offices in Port Harcourt. They therefore prefer to operate form Port Harcourt rather than opening another office in Yenegoa, the Bayelsa State capital.

6.2.2 Respondents' Academic Qualifications

The issue of academic qualification of any practicing Estate Surveyor and Valuer was considered very important because one's level of education has direct relationship with individual's knowledge about the profession he belongs, the culture of the people, the ethics of the profession and the expected due process in the handing of matters especially as it relates to human psychological feelings about real estate matters, over time. Findings about academic qualifications of the respondents, in the field of Estate Management are as shown in Table 6.2.

Table 6.2 **Respondents' Academic Qualifications**

Academic Qualification	**Frequency**	**Percentage**
OND	1	1.4
HND	11	15.3
B. Sc.	49	68.0
M. Sc.	10	13.9
PhD	1	1.4
Total	**72**	**100.0**

Source: Author's Field Survey, 2011

Table 6.2 reveals that 68.0% of the respondents held B. Sc, 15.3% held HND, 1.4% held OND all in Estate Management, while only 13.9% and 1.4% respectively held higher degrees, that is, M.Sc. or PhD. The fewer number of respondents with higher degrees might not be unconnected with high demand for Estate Surveyors and Valuers in both State and Federal Ministries, Local Government Council Offices, banks, insurance companies and in other areas of businesses, coupled with good remunerations, in those days. Situation has changed and Estate Surveyors and Valuers now find solace in engaging in academic with job security and good remuneration. An indepth interview conducted among the respondents with higher qualifications indicated that pursuing higher degrees is a recent development, especially among those who have the focus of going into academic in later years. It can therefore be inferred that majority of the respondents, in the study area, have the required academic qualifications for practicing as Estate Surveyors and Valuers.

6.2.3 Respondents' Working Experience

Working experience is vital to the performance of any individual as it enables the individual to make significant contributions to a company overall performance, encourages effective socialsation, sourcing and organisation of information, working in group situation and application of theoretical knowledge vis-à-vis practical context. A good combination of academic qualifications, professional qualifications and on-the-job experience should, under normal condition, produce better value judgment. For this reason, years of working experience of the respondent Estate Surveyors and Valuers were sought and the data collected were analysed as shown in Table 6.3.

Table 6.3 **Working Experience as Estate Surveyor and Valuer**

Experience	Frequency	Percentage
≤ 5 years	4	5.6
6 - 10 years	15	20.8
11 - 15 years	20	27.8
Above 15 years	33	45.8
Total	**72**	**100.0**

Source: Author's Field Survey, 2011

Table 6.3 displays the number of years of experience acquired by the respondents. The Table indicates that respondents with more than 15 years of experience accounted for 45.8% while the others followed a downward trend (27.8%, 20.8%, and 5.6%). Apart from 26.4% of the respondents who stated that they had between one and ten years working experience, as Estate Surveyors and Valuers, a greater proportion of the respondents (45.8%) had worked for more than fifteen (15) years. With more than fifteen (15) years of experience, it can be deduced that majority of the respondents have requisite experience for carrying out valuation assignments and their opinion of value can be relied upon.

6.2.4 **Respondent's Status in the Firm**

Being a member of a profession, a team leader must know what he valued, must stand by that value arrived at and must be explicit about it so as to attract customers' confidence and goodwill and at the same time that of subordinates under him. The status of the professional espouses moral and ethical approaches to practice and demands from practitioners under and around him an endless critical examination of their beliefs. It is the responsibility of the head of unit to establish a strong sense of corporateness as a means of competitive advantage over other firms and this is achieved by shaping the culture and identity of the firm. As a means of confirming this assertion, information about the respondents' status was sought and the identified levels or status of respondent Estate Surveyors and Valuers are listed in Table 6.4.

Table 6.4 **Respondents' Status in the Firm**

Status	**Frequency**	**Percentage**
Principal Partner	31	43.1
Managing Partner	15	20.8
Associate Partner	15	20.8
Senior Partner	5	6.9
Senior Surveyor	6	8.4
Total	**72**	**100.0**

Source: Author's Field Survey, 2011

Table 6.4 shows that 41.3% of the respondents are Principal Partners, 20.8% are Managing Partners and Associate Partners respectively, Senior Partners (6.9%) and Senior Surveyors (8.4%). Approximately 91.6% of respondents' status is Principal Partner, Managing Partners, Associate Partners or Senior Partners. This is in consonance with the Nigerian mentality in the identity structure among professionals. The variations in the title given to professionals are common among professionals in practice. Within the Estate Surveying and Valuation profession the choice of Principal, Managing, Associate or Senior Partner depends on the organisational structure of the firm in relation to the number of branches, geographical spread and departmentalisation by each firm. It can be deduced from Table 6.4 that a larger proportion of the respondents constitute the decision making authority in their respective firms. The reason for high percentage of this category could probably be due to the quest for freedom from control.

6.2.5 **Firm's Age**

The success of a firm derives from a distinctive system of professional norms, approach to serving clients, personnel policies, organisation governance and ownership which encourage members of staff of the firm to identify with short, medium and long term interests of the firm. Question on the age of the firm is considered important because, like human beings, firms with long years of existence are expected to be more experienced than firms just being established in recent years. Table 6.5 shows the age groupings of the various respondents' firms.

Table 6.5 **Firm's Age**

Age of Firm	**Frequency**	**Percentage**
< 5 years	9	12.5
6 - 10 years	11	15.3
11 - 15 years	21	29.1
> 15 years	31	43.1
Total	**72**	**100**

Source: Author's Field Survey, 2011

Table 6.5 reveals that only 12.5% of the respondent Estate Surveying and Valuation firms had existed for up to 5 years, while firms with 6 – 10 years and 11 – 15 years of age are 15.3% and 29.1% respectively. A larger proportion of the respondent Estate Surveying and Valuation firms (43.1%) were established more than 15 years ago. The conclusion that can be drawn from Table 6.5 is that with longer years of existence, majority of the respondent Estate Surveying and Valuation firms should be able to offer dependable value judgments.

6.2.6 Registered Estate Surveyors and Valuers Employed

The real estate market is very competitive when it comes to customers and agents, so it is crucial to always stay ahead of happenings in the property market. In this era of information technology, there is the need to put persons with the knowledge of the right techniques to handle the jobs/assignments of the firms. The more the number of registered Estate Surveyors and Valuers in the employment of a firm, the faster the possibility of achieving targets in given assignments and output are to be expected to be dependable. Table 6.6 contains the number of registered Estate Surveyors and Valuers employed in the respondents' firms.

Table 6.6 **Registered Estate Surveyors and Valuers Employed**

Registered Surveyor	Frequency	Percentage
< 5	63	87.5
6 – 10	4	5.5
11 – 15	2	2.8
> 15	3	4.2
Total	**72**	**100.0**

Source: Author's Field Survey, 2011

Table 6.6 shows that more than eighty percent (i.e. 87.5%) of the respondent firms employ less than five (5) registered Estate Surveyors and Valuers, while at the lower rung of the ladder, only 4.2% of the respondent firms have more than fifteen (15) registered Estate Surveyors and Valuers in their employment. This result is not unexpected because the paramount desire of a graduate of Estate Management is to become a registered Estate Surveyor and Valuer and establish his own firm within the shortest possible time. The inference from Table 6.6 is that there is a preponderance of firms with less than five registered Estate Surveyors and Valuers in their employment and this can be due to the freedom enjoyed by such qualified individuals to set up their practice after induction by ESVARBON. Also, the situation may arise from the quest by the individual Estate Surveyor and Valuer to be free from the control of another colleague.

6.2.7 Firm's Affiliation with Professional Bodies

Membership of professional bodies either by an individual or corporate body confers a lot of benefits that cannot be derived by going solo. Membership of NIESV helps in promoting the reputation of the member firms, it serves as the voice of members on any issues at all levels of government and even strengthens the political aspiration of some individual members. The question on firm's professional affiliation was raised so as to be sure that the respondent firms are the ones that are, by law, legally permitted to practice. The data gathered in respect of firm's affiliation is as shown in Table 6.7.

Table 6.7 **Firm's Affiliation with Professional Bodies**

	Responses	
Firm's Affiliation	**No**	**Yes**
NIESV	0 (0.0%)	72 (100.0%)
ESVARBON	13 (18.1%)	59 (81.9.0%)
RICS	71 (98.6%)	1 (1.4%)
IVCS	71 (98.6%)	1 (1.4%)
FIABCI	71 (98.6%)	1 (1.4%)

Source: Author's Field Survey, 2011

Table 6.7 shows that all (100%) the respondent Estate Surveying and Valuation firms are affiliated to NIESV while only 81.9% are affiliated with ESVARBON. This situation could arise from the fact that an Estate Surveyor and Valuer can be in practice pending the time his firm's registration is approved by ESVARBON. It is also evident that one of the respondent firms is affiliated to professional bodies outside Nigeria. The conclusion therefore is that all the firms are recognised by the two bodies regulating real estate profession in Nigeria and by implication; they are competent to engage in the practice of Estate Surveying and Valuation anywhere in the country.

6.3 Wetland Valuation Practice for Compensation

The valuation practice is made up of different components such as the process of valuation, the basis and methods of valuation, challenges encountered and factors considered in the choice of valuation methods as all these components impact on the practice of wetland valuation for compensation in the Niger Delta. An Estate Surveyor and Valuer is expected to be acquainted with these components. Therefore, this section is devoted to the analysis of data collected in respect of wetland valuation practice in the study area.

6.3.1 Estate Surveyors and Valuers' Perception of Wetland

Individual's view about a thing, at times, determines the value attached to such a thing. In the case of wetland ecosystems, it is not different; the Valuer's perception would determine so many things about wetland. His perception would determine what he values from within wetland, the method he uses in carrying out his valuation and also the data used in the valuation. This question was therefore asked so as to help the researcher determine Estate Surveyors and Valuers' perception about wetland, especially in the study area. Table 6.8 contains respondents' answers to this question.

Table 6.8 **Estate Surveyors and Valuers' Perception of Wetland**

Description	Responses No	Yes
Wasteland	61 (84.7%)	11 (15.3%)
Poorly Drained Land	23 (31.9%)	49 (68.1%)
Swampy land	13 (18.1%)	59 (81.9%)
Infested land	59 (81.9%)	13 (18.1%)
Marshland	17 (23.6%)	55 (76.4%)

Source: Author's Field Survey, 2011

Table 6.8 reveals that the highest proportions of the respondents described wetland either as swampy land (81.9%), marshland (76.4%) or poorly drained land (68.1%). Other descriptions used for wetland include infested land (18.1%) and wasteland (15.3%). This position could possibly have given rise to the way wetland resources are being treated in the study area, that is, parcels of land to be converted to uses that can only be supported by economic activities of the multinational oil companies even at the expense of the livelihood of the common man in the region. It could therefore be inferred that this would also affect the basis and choice of method(s) adopted in the valuation.

6.3.2 Frequency of General Valuation Assignments

Valuation is an important aspect of the profession of Estate Surveying and Valuation. It is the aspect that requires professional licensing before anyone can practice. The question on regularity of valuation assignments in the respondent's firm was asked to be sure that the respondent firms have experiences in valuation. The researcher believes that firms that regularly carry out valuation assignments would have better value judgment and be able to identify the processes involved in valuation and also adopt the appropriate basis and method(s) for their valuation assignment. The response of the firms to this question is contained in Table 6.9.

Table 6.9 **Frequency of General Valuation Assignments**

Valuation Assignment	Frequency	Percentage
Very Often	47	65.3
Often	24	33.3
Rarely	1	1.4
Total	**72**	**100.0**

Source: Author's Field Survey, 2011

Table 6.9 shows that all the firms had been involved in general (property) valuation assignment at one time or the other. While 65.3% stated that they carry out valuation assignments very often (regularly), 33.3% stated that they do valuation often. A negligible proportion – 1.4% rarely carry out valuation assignment. The import of the situation shown in Table 6.9 is that majority of the respondent firms (98.6%) carry out valuation. This result is not unexpected in view of the presence of the activities of oil companies that impact on wetland resources in the Niger Delta region.

6.3.3 Involvement in Wetland Valuation Exercises

The Land Use Act stipulates that land is held in trust by the Governor of a State for the use and benefits of all Nigerians. By this provision, valuation of land owned by an individual is carried out to determine the worth of unexhausted improvements on such land. Since wetlands areas are not, in most cases, usually improved upon by human efforts, valuation exercises in this region are uncommon except in cases of compulsory acquisition either by government or oil companies, of large tracts of land owned/occupied by families. Respondents were asked if they had been involved in wetland valuation so as to determine whether or not the respondents had at any time participated in any wetland valuation exercises. The question was asked to establish from the respondents how the valuation was carried out, the methods used, factors considered in choosing the method(s) and to identify the challenges faced in carrying out wetland valuation. Analysis of data obtained on the involvement of Estate Surveyors and Valuers in wetland valuation exercises in the study area is contained in Table 6.10. Subsequent analysis in the study was based on the number of respondents that had participated in wetland valuation, in the study area.

Table 6.10 **Involvement in Wetland Valuation Exercises**

Wetland Valuation Exercise	Frequency	Percentage
No	17	23.6
Yes	55	76.4
Total	**72**	**100.0**

Source: Author's Field Survey, 2011

Results as contained in Table 6.10 show that majority of the respondent Estate Surveyors and Valuers (76.4%) have at one time or the other participated in wetland valuation. This situation is not unexpected since a chunk of the Niger Delta land is made of wetlands and a high proportion of these have either been acquired by multinational oil companies or their activities have resulted in the pollution of wetland ecosystems and valuation is usually required to determine the compensation payable to the affected people or community as the case may be. The high rate (76.4%) of participation in wetland valuation by Estate Surveyors and Valuers in the study area could be due to incessant oil spillages and physical development resulting from continuous expansion of companies involved in oil exploration.

6.3.4 Components of Wetland Valued

Literature showed that the three components of wetlands commonly valued are attributes, services and functions. Respondents were asked about what exactly they value within wetland ecosystems. The main thrust of this question is to determine what the respondents actually valued, to be sure that there is not a mix-up between wetland valuation proper and the valuation of other assets contained within the wetland environment. The data generated is contained in Table 6. 10.

Table 6.11 **What Estate Surveying and Valuation Firms Valued**

What was Valued	**Responses**	
	No	**Yes**
Attributes	41 (74.5%)	14 (25.5%)
Functions	39 (70.9%)	16 (29.1%)
Land	21 (38.2%)	34 (61.8%)
Buildings	47 (85.5%)	8 (14.5%)
Services	35 (63.6%)	20 (36.4%)
Crops	11 (20.0%)	44 (80.0%)

Source: Author’s Field Survey, 2011

Table 6.11shows that 80.0% of the respondents valued crops and 61.8% valued land, the components of wetland environment that are capable of assessment, using the market support approaches. Other components that are not traded in the open market (attributes, functions and services) were rarely valued by respondent Estate Surveyors and Valuers. This could be attributable to the non-recognition of such components by NIESV guidance notes on property valuation. The preponderance of valuation of crops and land within wetland sites in the study area can be attributable to the incessant conversion of wetland sites to other uses, supported by economic justifications and pollution of wetland resources due to oil spills and gas flaring, regular occurrences in the Niger Delta region. This could also result from the compensation provisions in the Land Use Act 1978, Oil Pipelines Act 1990 and 1999 Constitution which all provided for compensation on land, buildings and crops or profitable trees at the expense of wetland components.

6.3.5 Services Provided by Wetlands

Evidence abounds in literature that there are twelve services provided by wetlands. In an attempt at ascertaining the available services from wetlands within the study area, respondents, who had been involved in wetland valuation, were asked to identify which of these twelve services are provided by wetlands within the study area. Respondents were asked to check the services in order to confirm what they valued in wetland ecosystems. Data so obtained are analysed and presented in Table 6.12. To further examine the understanding of the services provided by wetlands in the study area, the respondents were asked to rank the importance attached to the various services identified from literature. The ranking was done using the Likert Scale 1 to 5 i.e. 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important. The result of the ranking is contained in Table 6.13.

Table 6.12 **Services Provided by Wetlands**

	Responses	
Services	**No**	**Yes**
Food Supply	22 (40.0%)	33 (60.0%)
Freshwater Supply	37 (67.3%)	18 (32.7%)
Raw materials for production	29 (52.7%)	26 (47.3%)
Climate regulation	15 (27.3%)	40 (72.7%)
Groundwater recharge	32 (58.2%)	23 (41.8%)
Erosion control	11 (20.0%)	44 (80.0%)
Flood control	11 (20.0%)	44 (80.0%)
Cultural heritage and amenity	11 (20.0%)	44 (80.0%)
Spiritual and Inspiration	18 (32.7%)	37 (67.3%)
Recreational	37 (67.3%)	18 (32.7%)
Educational	47 (85.5%)	8 (14.5%)
Aesthetic	44 (80.0%)	11 (20.0%)

Source: Author’s Field Survey, 2011

A look at Table 6.12 reveals that erosion control (80.0%), flood control (80.0%), cultural heritage (80.0%), climate regulation (73.6%) and spiritual and inspiration (67.3%) are the prominent services provided by wetlands in the Niger Delta region. The choice of erosion and flood control services might not be unconnected with the fact that the study area is always prone to annual flooding and the adverse effects that would have been suffered are usually curtailed, to some extent, through temporary retention of flood water in the wetlands region. The presence of shrubs and other trees within wetland environment reduces the damaging effects of erosion on both top soil and properties near and within wetland environments. Wetland sites are always centres for traditional religious and spiritual activities, hence the choice of cultural heritage and spiritual and inspiration were chosen to take care of the religious and spiritual attachment people have with the wetland sites. Climate regulation was also chosen, taking into consideration that Nigeria, as a whole, is a tropical region with high temperature all the year round, and wetland sites in the study area serve the purpose of dousing the adverse effects of heat on the region. The choice of food supply (58.3%) is not unexpected as the people of the region depend on the wetlands for their livelihood.

Table 6.13 **Ranking of Wetlands Services**

Wetland Services	**5**	**4**	**3**	**2**	**1**	**Total**	**RII**	**Ranking**
Food Supply	12 a_in_i = 60	8 a_in_i = 32	16 a_in_i = 48	11 a_in_i = 22	8 a_in_i = 8	55 170	3.09	7th
Freshwater Supply	4 a_in_i = 20	16 a_in_i = 64	11 a_in_i = 33	16 a_in_i = 32	8 a_in_i = 8	55 157	2.85	9th
Raw materials for production	4 a_in_i = 20	18 a_in_i = 72	14 a_in_i = 42	11 a_in_i = 22	8 a_in_i = 8	55 164	2.98	8th
Climate regulation	9 a_in_i = 45	23 a_in_i = 92	11 a_in_i = 33	3 a_in_i = 6	9 a_in_i = 9	55 185	3.36	5th
Groundwater recharge	8 a_in_i = 40	18 a_in_i = 72	14 a_in_i = 42	8 a_in_i = 16	7 a_in_i = 7	55 177	3.22	6th
Erosion regulation	16 a_in_i = 80	21 a_in_i = 84	3 a_in_i = 9	0 a_in_i = 0	15 a_in_i = 15	55 188	3.42	4th
Flood control	24 a_in_i = 120	18 a_in_i = 72	2 a_in_i = 6	1 a_in_i = 2	10 a_in_i = 10	55 210	3.81	1st
Cultural heritage and amenity	23 a_in_i = 115	15 a_in_i = 60	8 a_in_i = 24	1 a_in_i = 2	8 a_in_i = 8	55 209	3.80	2nd
Spiritual and inspiration	23 a_in_i = 115	10 a_in_i = 40	7 a_in_i = 21	7 a_in_i = 14	8 a_in_i = 8	55 198	3.60	3rd
Recreational	1 a_in_i = 5	9 a_in_i = 36	30 a_in_i = 90	11 a_in_i = 22	4 a_in_i = 4	55 157	2.85	9th
Educational	0 a_in_i = 0	6 a_in_i = 24	8 a_in_i = 24	24 a_in_i = 48	17 a_in_i = 17	55 113	2.05	10th
Aesthetic	0 a_in_i = 0	3 a_in_i = 12	9 a_in_i = 27	15 a_in_i = 30	28 a_in_i = 28	55 97	1.76	11th

Source: Author’s Field Survey, 2011

Table 6.13 illustrates the ranking of wetland services by the respondents. Flood control, with RII of 3.81was ranked as the most important service provided by wetlands in the study area. This was closely followed by cultural heritage and amenity (RII = 3.80), spiritual and inspiration (RII = 3.60) and erosion regulation (RII = 3.42), which were ranked 2nd, 3rd and 4th respectively. The result in Table 6.13 could be due to the incessant flooding experienced and cultural and/or spiritual attachment to the creeks and water bodies in the study area.

6.3.6 **Functions of Wetlands**

Literature revealed that wetlands are capable of performing eleven functions. However there is need to establish from Estate Surveyors and Valuers the major functions performed by wetlands in the study area. Respondents were asked to check the functions in order to confirm what they valued in wetland ecosystems. A further check was conducted to ascertain the importance attached to wetland functions, using Likert Scale 1 – 5. The ranking was done in the order of 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important and the results are shown in Tables 6.14 and 6.15.

Table 6.14 **Functions of Wetlands**

Functions	**Responses**	
	No	**Yes**
Climate change mitigation	22 (40.0%)	33 (60.0%)
Groundwater replenishment	31 (56.4%)	24 (43.6%)
Sediment retention	22 (40.0%)	33 (60.0%)
Storm protection	15 (27.3%)	40 (72.7%)
Shoreline stabilisation	18 (32.7%)	37 (67.3%)
Water purification	47 (85.5%)	8 (14.5%)
Reservoir of biodiversity	25 (45.5%)	30(54.5%)
Nutrient transformation	49 (89.1%)	6 (10.9%)
Recreation and tourism	11 (20.0%)	44 (80.0%)
Storage of precipitation and runoff	23 (41.8%)	32 (58.2%)
Biomass production	39 (70.9%)	16 (29.1%)

Source: Author's Field Survey, 2011

Table 6.14 shows that recreation and tourism (80.0%), storm protection (72.7%), shoreline stabilization (67.3%), climate change mitigation (60.0%), sediment retention (60.0%), storage of precipitation and runoff (58.2%) and reservoir of biodiversity (54.5%) were wetland functions found to be prominent in the study area. Storm surges and other coastal weather disturbances can cause immense damage through flooding and direct destruction of property, not to mention the loss of human life. The cost of maintaining artificial bank reinforcement to prevent erosion is usually very high. Seasonal flooding is a natural phenomenon in most of the world's rivers. Inland floodplains and coastal deltas are the natural "overflow" areas that slow the velocity of the floodwaters, allowing the nutrients and sediments to settle. Heritage sites are able to generate considerable income from tourist and recreational uses.

Table 6.15 **Ranking of Wetland Functions**

Wetland Functions	**5**	**4**	**3**	**2**	**1**	**Total**	**RII**	**Ranking**
Climate change mitigation	12 a_in_i = 60	18 a_in_i = 72	12 a_in_i = 36	8 a_in_i = 16	5 a_in_i = 5	55 189	3.44	4th
Groundwater replenishment	2 a_in_i = 10	11 a_in_i = 44	15 a_in_i = 45	19 a_in_i = 38	8 a_in_i = 8	55 145	2.64	8th
Sediment Retention	14 a_in_i = 70	11 a_in_i = 44	11 a_in_i = 33	14 a_in_i = 28	5 a_in_i = 5	55 180	3.27	6th
Storm protection	21 a_in_i = 105	18 a_in_i = 72	3 a_in_i = 9	2 a_in_i = 4	11 a_in_i = 11	55 201	3.65	1st
Shoreline stabilization	14 a_in_i = 70	21 a_in_i = 84	6 a_in_i = 18	7 a_in_i = 14	7 a_in_i = 7	55 193	3.51	2nd
Water purification	3 a_in_i = 15	6 a_in_i = 24	21 a_in_i = 63	15 a_in_i = 30	10 a_in_i = 10	55 142	2.58	9th
Reservoirs of biodiversity	6 a_in_i = 30	17 a_in_i = 68	8 a_in_i = 24	11 a_in_i = 22	13 a_in_i = 13	55 157	2.85	7th
Nutrient transformation	0 a_in_i = 0	12 a_in_i = 48	13 a_in_i = 39	14 a_in_i = 28	16 a_in_i = 16	55 131	2.38	10th
Recreation/tourism	6 a_in_i = 30	27 a_in_i = 108	15 a_in_i = 45	2 a_in_i = 4	5 a_in_i = 5	55 a_in_i = 192	3.49	3rd
Storage of precipitation and runoff	8 a_in_i = 40	24 a_in_i = 96	9 a_in_i = 27	4 a_in_i = 8	10 a_in_i = 10	55 181	3.29	5th
Biomass production	2 a_in_i = 10	5 a_in_i = 20	6 a_in_i = 18	17 a_in_i = 34	25 a_in_i = 25	55 107	1.95	11th

Source: Author's Field Survey, 2011

Table 6.15 shows that storm protection was ranked as having the highest importance (RII = 3.65). Other functions ranked in order of importance are shoreline stabilization (RII = 3.51), recreation/tourism (RII = 3.49) and climate change mitigation (RII = 3.44). The ranking of storm protection as number one is not unexpected taking into consideration the fact that the Niger Delta region is subject to coastal disturbances and climactic heat. Niger Delta is dotted with various types of creeks that offer tourist attraction hence the ranking of recreation/tourism as one of the prominent wetland functions in the region.

6.3.7 Wetland Valuation Process for Compensation

Literature has shown that there are seven steps involved in wetland valuation process (choosing appropriate valuation method, define wetland area, identify wetland resources, relate wetland resources to use value, data/information collection, quantify economic values and communicate wetland values). In an attempt at establishing whether Estate Surveyors and Valuers in the study area were adopting the identified steps in their conduct of wetland valuation, question bothered on this was put across. This provided answer to research question (ii) and achieve objective (i) of the study. The data collected is analysed in Table 6.16.

Table 6.16 **Wetland Valuation Process for Compensation**

Process	**Responses**	
	No	**Yes**
Choosing Appropriate Valuation Method	17 (30.9%)	38 (69.1%)
Define Wetland Area	53 (96.4%)	2 (3.6%)
Identify Wetland Resources	13 (23.6%)	42 (76.4%)
Relate Wetland Resources to Use Value	23 (41.8%)	32 (58.2%)
Data/Information Collection	16 (29.1%)	39 (70.9%)
Quantify Economic Values	0 (0.0%)	55 (100.0%)
Communicate Wetland Values	15 (27.3%)	40 (72.7%)

Source: Author’s Field Survey, 2011

Table 6.16 reveals that all the respondents (100.0%) quantify economic value, 76.4% identify wetland resources, 72.2% communicate wetland values, 70.9% collected data for wetland valuation, 69.1% considered choosing appropriate wetland valuation method, 58.2% relate wetland resources to use values and only 3.4% were involved in defining wetland area. It is obvious from Table 6.16 that all steps identified in literature were adopted by respondent Estate Surveyors and Valuers, in varying proportions. The proportion of respondents (3.4%) involved in defining wetland area might be due to the fact that it is the responsibility of clients to define the scope of valuation exercise which the Estate Surveyors and Valuers are expected to work upon. It can therefore be concluded from the Table 6.16 that Estate Surveyors and Valuers, in the Niger Delta follow the appropriate steps in assessing wetland resources.

6.3.8 Valuation Basis and Methods used in Wetland Valuation for Compensation

The basis of valuation constitutes the bedrock for the determination of the choice of method to adopt in carrying out any valuation. Respondents were asked to identify the basis of wetland valuation to provide answer to Objective Two (ii) set for this research work and it would also help in providing solution to research Question iii. The data collected was collated, analysed and presented in Table 6.17.

Table 6.17 **Basis of Wetland Valuation for Compensation**

Basis	Frequency	Percentage
Open Market	31	56.4
Cost	15	27.3
Total Economic Value	9	16.3
Total	**55**	**100.0**

Source: Author's Field Survey, 2011

Table 6.17 shows that 56.4% of Estate Surveyors and Valuers in the Niger Delta adopted open market basis for wetland valuation. This was followed by the adoption of cost basis (27.3%) and total economic value basis (16.3%). Table 6.17 clearly shows that the respondents’ basis of valuation ignored those aspects of wetland ecosystems that are not traded in the open market. The adoption of both open market and cost bases for wetland valuation could be due to Estate Surveyors and Valuers familiarity with the two bases which has their application rooted in the use of market data. The adoption of these two bases could also be as a result of their provision in the valuation standards and guidance notes of the Nigerian Institution of Estate Surveyors and Valuers as the only bases for valuation. It could also be deduced that Estate Surveyors and Valuers are not very familiar with the total economic value basis of wetland valuation since majority of them did not have any training on environmental valuation. The adoption of the two bases could equally be due to non provision of the laws for non use aspects of wetland ecosystems.

6.3.8.1 Use of Traditional Methods in Wetland Valuation for Compensation

Estate Surveyors and Valuers are conversant with the use of traditional (conventional) methods of valuation and it is not impossible that they have been applying such methods to the valuation of wetland ecosystems. Respondents were asked to identify any of the traditional methods used for wetland valuation. Response so obtained would provide answer, in part, to objective two (ii) of this research work (identify the basis and methods used for wetland valuation for compensation in the study area). The response to this question is as analysed in Table 6.18.

Table 6.18 **Use of Traditional Methods in Wetland Valuation for Compensation**

Method	Responses No	Yes
Comparison	32 (58.2%)	23 (41.8%)
Income Capitalisation	33 (60.0%)	22 (40.0%)
Cost/Contractor	40 (72.7%)	15 (27.3%)
Profit/Account	55 (100.0%)	0 (0.0%)
Residual	55 (100.0%)	0 (0.0%)

Source: Author's Field Survey, 2011

Table 6.18 reveals that only three of the methods were adopted by Valuers in wetland valuation. About forty-one percent (41.8%) adopted comparison, 40.0% adopted income capitalisation and 27.3% adopted cost/contractor. The greater frequency of usage of the three traditional methods might probably be as a result of what respondents valued within wetland locations (crops and land) as earlier revealed by the study's analysis in Table 6.11. The reason for the adoption of tradition methods could also be due to the method specified for compensation valuation in the Land Use Act of 1978.

6.3.8.2 **Contemporary Methods in Wetland Valuation for Compensation**

Literature shows that there are nine methods for valuing wetland resources. To identify which of the methods employed in the valuation of wetland resources in the study area, respondents were asked to select the method(s) they adopted in their conduct of wetland valuation. This is meant to be a further treatment of objective two (ii) set for the study. The descriptive analysis of the data collected is contained in Table 6.18 while a further analysis was conducted using Likert Scale 1 – 5 to rank wetland valuation methods they adjudged to be appropriate. The ranking was done in the order of 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important and the result is shown in Table 6.19.

Table 6.19 **Contemporary Methods in Wetland Valuation for Compensation**

Method	Responses	
	No	**Yes**
Contingent Valuation	22 (40.0%)	33 (60.0%)
Hedonic Pricing	25 (45.5%)	30 (54.5%)
Travel Costs	44 (80.0%)	11 (20.0%)
Replacement Cost	27 (49.1%)	28 (50.9%)
Market Prices	19 (34.5%)	36 (65.5%)
Benefits Transfer	47 (85.5%)	8 (14.5%)
Production Function	43 (78.2%)	12 (21.8%)
Cost-Benefit Analysis (Trade-off Analysis)	22 (40.0%)	33 (60.0%)
Participatory Approach	55 (100.0%)	0 (0.0%)

Source: Author's Field Survey, 2011

Table 6.19 shows that apart from participatory method, other methods were adopted by the respondents in valuing wetland resources. The methods are market prices (65.5%), contingent valuation (60.0%) cost-benefit analysis (60.0%), hedonic pricing (54.5%) and replacement cost (50.9%). Other methods adopted by the respondents are production function (21.8%); travel costs (20.0%) and benefits transfer (14.5%). With the exception of contingent valuation, all the other methods with high level of usage capture values based on the interplay of market forces. On the other hand the lower usage of methods like travel costs and benefits transfer might be due to the fact that the respondents had no formal training in environmental valuation.

Table 6.20 **Ranking of Contemporary Methods in Wetland Valuation for Compensation**

Methods	5	4	3	2	1	Total	RII	Ranking
Contingent Valuation	16 a_in_i = 80	11 a_in_i = 44	4 a_in_i = 12	6 a_in_i = 12	18 a_in_i = 18	55 166	3.02	2nd
Hedonic Pricing	9 a_in_i = 45	16 a_in_i = 64	6 a_in_i = 18	7 a_in_i = 14	17 a_in_i = 17	55 158	2.87	4th
Travel Costs	1 a_in_i = 5	2 a_in_i = 8	14 a_in_i = 42	18 a_in_i = 36	20 a_in_i = 20	55 111	2.02	7th
Replacement Cost	9 a_in_i = 45	13 a_in_i = 52	9 a_in_i = 27	6 a_in_i = 12	18 a_in_i = 18	55 154	2.80	5th
Market Prices	17 a_in_i = 85	14 a_in_i = 56	2 a_in_i = 6	4 a_in_i = 8	18 a_in_i = 18	55 173	3.15	1st
Benefits Transfer	0 a_in_i = 0	3 a_in_i = 12	7 a_in_i = 21	5 a_in_i = 10	40 a_in_i = 40	55 83	1.50	8th
Production Function	0 a_in_i = 0	12 a_in_i = 48	13 a_in_i = 39	15 a_in_i = 30	15 a_in_i = 15	55 132	2.40	6th
Cost-Benefit Analysis (Trade-Off Analysis)	8 a_in_i = 40	21 a_in_i = 84	6 a_in_i = 18	1 a_in_i = 2	19 a_in_i = 19	55 163	2.96	3rd
Participatory Approach	0 a_in_i = 0	0 a_in_i = 0	2 a_in_i = 6	6 a_in_i = 12	47 a_in_i = 47	55 65	1.18	9th

Source: Author's Field Survey, 2011

Table 6.20 shows respondents' ranking of wetland valuation methods in order of importance. The Table reveals that market prices method was ranked as having the higher level of usage with RII of 3.15. This was closely followed by contingent valuation method, with a RII of 3.02 coming in second position. Other methods ranked in order of frequency of usage are cost-benefit analysis (RII = 2.96), hedonic pricing method (RII = 2.87) and replacement cost method (RII = 2.80). Comparing Tables 6.19 and 6.20 it is evident that these five methods were commonly adopted by Valuers when valuing wetland ecosystems. This is not unexpected because all these methods, except contingent valuation, wholly rely on market evidence with which the Valuers are conversant, as earlier established in Table 6.19. Though the adoption of contingent valuation method presupposes the assessment of both use and non-use components (values) of wetland ecosystems, it could be inferred that only the marketable components of wetland resources were assessed by respondent Estate Surveyors and Valuers.

6.3.9 Factors Influencing Choice of Wetland Valuation Method for Compensation

In the valuation of property, the factors that influence the choice of method adopted by an Estate Surveyor and Valuer include the purpose of valuation, type of property and availability of current data. However, wetlands by their peculiar nature have other factors such as availability of substitute sites, people’s perception and quality of site that must be taken into consideration in choosing the valuation method. To achieve objective three (iii) of the study, Estate Surveyors and Valuers were asked to choose among the factors already conceptualised as impacting on wetland valuation methods. Table 6.21 contains the presentation of result of analysis of data collected. Further treatment of the objective was conducted using Likert Scale of 1 – 5 to rank the factors influencing their choice wetland valuation methods. The ranking was done in the order of 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important and the result is shown in Table 6.22.

Table 6.21 **Factors Influencing Choice of Wetland Valuation Method for Compensation**

Factors	**Responses**	
	No	**Yes**
Availability and Accessibility to Data	12 (21.8%)	43 (78.2%)
Availability of substitute Sites	31 (56.4%)	24 (43.6%)
People's Perception	32 (58.2%)	23 (41.8%)
Limitations of Methods	20 (36.4%)	35 (63.6%)
Statistical Complexity	50 (90.9%)	5(9.1%)
Quality of site	40 (72.7%)	15 (27.3%)

Source: Author's Field Survey, 2009

Table 6.21 shows that 78.2% of the respondents were of the opinion that availability and accessibility to data is a major factor influencing the method adopted in wetland valuation. Limitation of the methods (63.6%) equally influenced the choice of wetland valuation method used by the respondents. Other factors include availability of substitute sites (43.6%), people's perception (41.8%), quality of site (27.3%) and statistical complexity (9.1%) Availability of data is very important in the application of the various wetland valuation techniques: hedonic pricing, benefits transfer, travel cost, etc. Limitations of the methods are equally important taking into consideration the fact that not all the identified methods can be adopted in the valuation of wetland resources, especially the non-use components. Though the three factors chosen can and do influence the choice of method(s) for wetland valuation, it can be inferred that respondent Estate Surveyors and Valuers, in the study area, are yet to fully appreciate how important other factors could be in choosing wetland valuation method.

Table 6.22 **Ranking of Factors Influencing the Choice of Wetland Valuation Method for Compensation**

Factors	**5**	**4**	**3**	**2**	**1**	**Total**	**RII**	**Ranking**
Availability and Accessibility to data	38 a_in_i = 190	3 a_in_i = 12	3 a_in_i = 9	7 a_in_i = 14	4 a_in_i = 4	55 229	4.16	1st
Availability of substitute Sites	12 a_in_i = 60	21 a_in_i = 84	9 a_in_i = 27	8 a_in_i = 16	5 a_in_i = 5	55 192	3.49	2nd
People's Perception	5 a_in_i = 25	21 a_in_i = 84	11 a_in_i = 33	5 a_in_i = 10	13 a_in_i = 13	55 165	3.00	4th
Limitations of Methods	15 a_in_i = 75	14 a_in_i = 56	13 a_in_i = 39	8 a_in_i = 16	5 a_in_i = 5	55 191	3.47	3rd
Statistical Complexity	2 a_in_i = 10	9 a_in_i = 36	14 a_in_i = 42	15 a_in_i = 30	15 a_in_i = 15	55 133	2.41	6th
Importance of Wetland	0 a_in_i = 0	21 a_in_i = 84	10 a_in_i = 30	12 a_in_i = 24	12 a_in_i = 12	55 150	2.72	5th
Quality of Site	2 a_in_i = 10	5 a_in_i = 20	6 a_in_i = 18	6 a_in_i = 12	36 a_in_i = 36	55 96	1.74	7th

Source: Author's Field Survey, 2011

Table 6.22 reveals that availability and accessibility to data (RII = 4.16) was ranked first among the factors influencing the choice of wetland valuation method. Availability of substitute sites (RII = 3.49) was ranked second while limitations of methods (RII = 3.47) was ranked third. The ranking of availability and accessibility to data (RII = 4.16) as number one could emanate from the general understanding that valuation thrives on the availability and accessibility to reliable data. On the other hand, the fact that each of the valuation methods has its specific area of application could account for ranking limitation of the methods (RII = 3.49) in the second position. It could therefore be deduced that the factors conceptualised are very important in choosing wetland valuation method.

6.3.10 **Principal Components Analysis (Factor Analysis)**

To further check the factors influencing the choice of wetland valuation methods, Factor Analysis was conducted on the factors conceptualised to be considered in choosing wetland valuation method. The analysis was conducted, using Principal Component Analysis, with a view to reducing the factors to most important ones. The results of these are contained in Tables 6.23 – 6.25.

Table 6.23 **Communalities**

	Initial	**Extraction**
Availability and Accessibility to Data	1.000	.407
Availability of Substitute Sites	1.000	.599
People's Perception	1.000	.632
Limitations of Methods	1.000	.804
Statistical Complexity	1.000	.899
Quality of Site	1.000	.734

Source: Author's Field Survey, 2011

Table 6.23 indicates the amount of variance in each variable that is accounted for i.e. it extracts only that proportion that is due to the common factors and shared by several items. Initial communalities are estimates of the variance in each variable accounted for by all component or factors. Extraction communalities are estimates of the variance in each variable accounted for by the components. The communalities in Table 6.22 are all high indicating that the extracted components represent the variables well.

Table 6.24 **Total Variance Explained**

	Initial Eigenvalues			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**
1	1.946	27.806	27.806	1.946	27.806	27.806	1.945
2	1.652	23.596	51.402	1.652	23.596	51.402	1.651
3	1.073	15.329	66.731	1.073	15.329	66.731	1.075
4	.879	12.552	79.283				
5	.644	9.194	88.477				
6	.351	5.011	100.000				

Source: Author’s Field Survey, 2011

Table 6.24 shows the variance explained by the initial solution (initial eigenvalues), extracted components and rotated components. Under the initial eigenvalues, the total column gives the amount of variance in the original variables accounted for by each component; the percent of variance column gives the ratio of the variance accounted for by each component of the total variance in all of the variables. In Table 6.24, eigenvalues greater than 1 was extracted and this show that the first three principal components (availability of data, availability of substitutes, and people's perception) form the extracted solution accounting for 66.7% of the total variability in the original six components (variables) so that the complexity of the data set can considerably be reduced using the extracted components.

Table 6.25 **Component Correlation Matrix**

	Component		
	1	**2**	**3**
Availability and Accessibility to Data	-.289	.560	-.102
Availability of Substitute Sites	.747	-.108	-.170
People's Perception	-.003	.771	.197
Limitations of Methods	-.356	-.809	.149
Statistical Complexity	-.051	.078	.943
Quality of Site	.779	-.212	.286

Source: Author's Field Survey, 2011

Table 6.25 shows the rotated component matrix of the three components that accounted for 66.7% of the total variability in the original seven variables. The first component (availability of data) is most highly correlated with quality of site (0.779) and availability of substitute (0.747), however it is less correlated with people's perception. The second component (availability of substitute sites) is most highly correlated with people's perception (0.771) and the third component (people's perception) is most highly correlated with statistical complexity (0.943). Table 6.25 reveals that the correlations between the three components are not very strong.

6.3.11 Challenges Encountered in Valuing Wetland Resources for Compensation

In carrying out wetland valuation, Estate Surveyors and Valuers are normally expected to face some challenges. This is due to the nature of wetland ecosystems, in addition to environmental circumstances of the nation's economy (capitalist economy) in which every venture, either in the private or public sector is determined by its level of monetary returns over others. Data obtained on the possible challenges that could come up in the course of conducting wetland valuations are shown in Table 6.26. In order to determine the greatest challenge faced in the valuation of wetland ecosystems, Estate Surveyors and

Valuers were requested to rank the identified challenges in literature. The ranking was done in the order of 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important and the result is shown in Table 6.27.

Table 6.26 **Challenges Encountered in Valuing Wetland Resources for Compensation**

Challenges	**Responses**	
	No	**Yes**
Lack of Data	7 (12.7%)	48 (87.3%)
Complex Wetland Ecosystems	11 (20.0%)	44 (80.0%)
Sophisticated Survey Design	20 (36.4%)	35 (63.6%)
Inadequate Government Policy	17 (30.9%)	38 (69.1%)
Hostility from Residents within and around Wetlands	37 (67.3%)	18 (32.7%)

Source: Author's Field Survey, 2011

Table 6.26 shows that major challenges faced by respondents, in the conduct of wetland valuation were lack of data (87.3%), complex wetland ecosystems (80.0%), inadequate government policy (69.1%) and sophisticated survey design (63.6%). Lack of data is a common challenge with the valuation of assets using market supported approaches. Wetland is made up of complex ecosystem that at times makes identification near impossible. The services/functions and the attributes are not easily assessable using the market based approaches that Estate Surveyors and Valuers are familiar with. Various government policies on compensation due to affected persons/communities have not helped situation since they do not make provision for compensation for non-use wetland resources.

Indepth interviews conducted on village heads in Nembe, Fishtown, (Bayelsa) Bony (Rivers) revealed that hostility among the villagers was due to prolong agitation over inadequate compensation and impropriety in the Niger Delta region. Further interview revealed that hostility by residents arise due to claimants' perception of connivance among the community heads, Estate Surveyors and Valuers and the oil companies. While individual claimants prefer direct and personal representation, they see the community heads as the ones determining what comes down to them as pittance and this does not go down well with them. Though hostility has a relatively small effect (31.9%) it is very important to consider it seriously in wetland valuation as its effect may result in the adoption of wrong process and method of valuation which may culminate into inadequate compensation figure(s). The inference therefore, is that the choice of methods and the approaches used by respondents in carrying out wetland valuation were actually constrained by a series of factors.

Table 6.27 **Ranking the Challenges Encountered in Valuing Wetland Resources for Compensation**

Challenges	5	4	3	2	1	Total	RII	Ranking
Lack of Data	29 $a_i n_i$ = 145	6 $a_i n_i$ = 24	10 $a_i n_i$ = 30	2 $a_i n_i$ = 4	8 $a_i n_i$ = 8	55 211	3.84	1st
Complex Wetland Ecosystem	28 $a_i n_i$ = 140	11 $a_i n_i$ = 44	3 $a_i n_i$ = 9	0 $a_i n_i$ = 0	13 $a_i n_i$ = 13	55 206	3.75	2nd
Sophisticated Survey Design	2 $a_i n_i$ = 10	12 $a_i n_i$ = 48	9 $a_i n_i$ = 27	12 $a_i n_i$ = 24	20 $a_i n_i$ = 20	55 129	2.35	5th
Inadequate Government Policy	13 $a_i n_i$ = 65	15 $a_i n_i$ = 60	13 $a_i n_i$ = 39	3 $a_i n_i$ = 6	11 $a_i n_i$ = 11	55 181	3.29	3rd
Hostility from Residents within and around wetlands	3 $a_i n_i$ = 15	13 $a_i n_i$ = 52	8 $a_i n_i$ = 24	8 $a_i n_i$ = 16	23 $a_i n_i$ = 23	55 130	2.36	4th

Source: Author's Field Survey, 2011

Table 6.27 reveals that respondents were of the opinion that lack of data (RII = 3.84), complex wetland ecosystem (RII = 3.75) and inadequate government policy (RII = 3.29) constituted greatest challenges facing wetland valuation in the study area. Hostility from residents around wetlands (RII = 2.36) and sophisticated survey design (RII = 2.35) were ranked fourth and fifth respectively. The ranking of lack of data as number one could emanate from the general understanding that the valuation outcome is as good as the data used for the assignment. On the other hand, ranking complex wetland ecosystem second could be due to the fact that generally wetland ecosystem is made of various components that at times require the inputs of diverse professionals before a valuation assignment could be successfully carried out.

6.3.12 Environmental Valuation as Part of School Curriculum in Higher Institution

Teaching of environmental valuation is a recent development as revealed by the interviews held with Heads of Department (Estate Management) of the institutions offering Estate Management courses. In order to identify the respondents that had undergone training in environmental valuation, they were asked to indicate if their school curriculum included a course in environmental valuation. This was to ascertain the depth of respondents' knowledge of environmental resources and their exposure to wetland valuation during their undergraduate days on the premise that this knowledge would impact on their perception and subsequently their approaches to wetland valuation. The data collected, as given by the respondents, is analysed as shown in Table 6.28

Table 6.28 **Environmental Valuation as part of School Curriculum in Higher Institution**

Curriculum	**Frequency**	**Percentage**
Yes	3	5.5
No	52	94.5
Total	**55**	**100.0**

Source: Author's Field Survey, 2011

The result as contained in Table 6.28 shows that only (5.5%) of the respondents took any course in environmental valuation during their undergraduate school days. Indepth interviews with respondents who claimed that environmental valuation was part of school curriculum in their higher institutions revealed that they trained in institutions outside Nigeria. Personal interviews held with the Heads of Department of Estate Management in institutions offering Estate Management courses revealed that environmental valuation has been included, as a topic, in the valuation curriculum for either or both at M. Sc. and final year undergraduate classes in University of Lagos, University of Nigeria – Enugu Campus, Obafemi awolowo University Ile-Ife, Federal University of Technology Akure, Cross River State University of Technology Calabar, University of Uyo and Covenant University Ota. On the other hand, environmental valuation is being taught as a course, at undergraduate level in Rivers State University of Science and Technology. However, it is yet to be so included in the valuation curriculum of institutions such as Enugu State University of Technology Enugu, Abia State University Uturu and Imo State University. The interview further revealed that the teaching of environmental valuation is a development that started about five years ago. Also the personal interview conducted on the research department of NIESV revealed that environmental valuation is yet to be included in the Institution's curriculum for professional examinations. The import of all the above therefore was that Estate Management graduates are yet to be fully armed with adequate training in environmental valuation and by implication, wetland valuation and this may affect their perception and the choice of method used in wetland valuation.

6.3.13 **Training/Workshop/Seminar on Wetland Valuation between 2005 and 2010**

Having observed earlier in the study that not all the higher institutions included environmental valuation in their curriculum in Nigeria coupled with the fact that NIESV professional examinations did not include environmental valuation, respondents were asked if they had participated in any training/workshop/seminar on valuation of wetland resources between 2005 and 2010. The opinions of the respondents as analysed are shown in Table 6. 29.

Table 6.29 **Training/Workshop/Seminar on Wetland Valuation between 2005 and 2010**

Training/Workshop/Seminar on wetland valuation	Frequency	Percentage
Yes	41	56.9
No	31	43.1
Total	**72**	**100.0**

Source: Author's Field Survey, 2011

Table 6.29 shows that 56.9% of the respondents had attended training/workshop/seminar on wetland valuation within the specified period. From the result obtained, it could be inferred that majority of the respondent Estate Surveyors and Valuers (56.9%) in practice within the study area have the knowledge of wetland ecosystems. The 56.9% achieved, as contained in the Table 6.28 could be attributable to the conferences organised by the Nigerian Institution of Estate Surveyors and Valuers in Port Harcourt (2005) and Warri (2007) where issues relating to aspects of wetland as a natural resource were discussed.

6.3.14 **Number of Training/Workshop/Seminar attended between 2005 and 2010**

Respondents who claimed to have attended training/workshop/seminar on wetland valuation were further asked to indicate the number of such training/workshop/seminar on wetland valuation they had attended. It is intended to identify whether the respondents have had training/workshop/seminar, on wetland valuation that would help them in determining the choice of valuation method or identification of specific wetland resources for valuation purposes. The responses given by respondents are contained in Table 6.30.

Table 6.30 **Number of Training/Workshop/Seminar attended between 2005 and 2010**

	Frequency	Percentage
Less than 5	41	56.9
5 – 10	0	0.0
Above 10	0	0.0
None	31	43.1
Total	**72**	**100.0**

Source: Author's Field Survey, 2011

Table 6.30 reveals that all the respondents (56.9%) who claimed to have attended training/workshop/seminar had actually attended less than five of such training/workshop/seminar within the specified period. The reason for this could be traced to the few number of training/workshop/seminar on wetland valuation organised by NIESV and ESVARBON, coupled with the fact that such training/workshop/seminar were not mandatory. It could be inferred from the table that Estate Surveyors and Valuers in the study area might had limited training on wetland valuation and this will impact on their perception and valuation of wetland resources.

CHAPTER SEVEN

SUMMARY, RECOMMENDATIONS AND CONCLUDING REMARKS

7.1 Introduction

While a comprehensive analysis of data with the aid of appropriate statistical techniques as well as its interpretation was undertaken in Chapter Six, this Chapter focuses on providing a closing summary of the research, followed by recommendations and concluding remarks. Attempt is also made at identifying opportunities for further research in the area of wetland valuation.

7.2 Distillation of Findings

This study examined wetland valuation practice in the Niger Delta from the perspective of Estate Surveyors and Valuers practicing within the region. Deductions made from data analysis were based on the objectives set for achieving the aim of the study. Major highlights of the results obtained from the analysis are as follows:

1. A review of the various laws on compensation showed that provisions were made only for use goods. The Nigerian constitution, Oil Pipeline Acts and the LUA variously made provision for assessment and payment of compensation on land, buildings and crops. None of the laws made provision for compensation on non-use goods which constitute a large proportion of wetland resources.

2. From literature, the study identified seven steps involved in wetland valuation process for compensation purposes. The study showed that Estate Surveyors and Valuers in the study area follow all steps. However their involvement in defining wetland area was limited because the respective clients determine the scope of work and only request the services of Estate Surveyors and Valuers in determining the compensation payable/receivable.

3. Considering the basis and methods of wetland valuation for compensation in the study area, the study revealed that majority of the Estate Surveyors and Valuers (56.4%), in the Niger Delta adopted open market and cost bases (27.3%) for wetland valuation. Respondents ignored total economic value basis (16.3%) which take cognisance of non-use value aspects of wetland ecosystems that are not traded in the open market. The study showed that traditional methods cannot be wholly applied to the valuation of wetland ecosystems as such methods cannot be adopted in the valuation of attributes, functions and services which are not traded in the open market.

4. The study showed that of the nine methods available for wetland valuation, market prices method was ranked as having the highest importance (RII = 3.15) followed by contingent valuation method (RII = 3.03), cost-benefit analysis (RII = 2.96), hedonic pricing method (RII = 2.87) and replacement cost method (RII = 2.80). In other words, the study revealed that respondents in the study area adopted methods that rely more on market evidence, except contingent valuation, which considers evidences both within and outside of open market. From the preponderance of the adoption of market based methods, it could be concluded that only the marketable components of wetland resources were assessed by respondent Estate Surveyors and Valuers.

5. Of the seven factors influencing the choice of wetland valuation method for compensation, identified from literature, the study revealed that only four factors have major influences on the choice of wetland valuation method adopted in the study area. These are; availability and accessibility to data (RII = 4.16), availability of substitute sites (RII = 3.49), limitations of valuation methods (RII = 3.47) and people's perception (RII = 3.00).

6. The study also revealed that valuing wetland resources in the study area is fraught with various challenges such as lack of data (87.3%, RII = 3.84), complex wetland ecosystems (80.0%, RII = 3.75), inadequate government policy (69.1%, RII of 3.29), sophisticated survey design (63.6%, RII = 2.35) and hostility from residents within and around wetlands (32.7%, RII = 2.36).

Among other findings from the study are the ones considered below:

1. Among the services provided by wetlands, erosion control (80.0%), cultural heritage (80.0%), flood control (80.0%), climate regulation (72.7%) and spiritual and inspiration (67.3%) are the prominent services provided by wetlands in the Niger Delta region. The ranking done by respondent Estate Surveyors and Valuers showed that Flood control, (RII = 3.81), cultural heritage and amenity (RII = 3.80), spiritual and inspiration (RII = 3.60) and erosion regulation (RII = 3.42) were ranked as the most important services provided by wetlands in the study area.

2. Of the eleven functions of wetlands, the study confirmed that storm protection (RII = 3.65), shoreline stabilization (RII = 3.51), recreation/tourism (RII = 3.49) and climate change mitigation (RII = 3.44) were given prominent place in the selection and ranking of wetland functions in the study area.

3. The study established that 76.4% of respondent Estate Surveyors and Valuers have at one time or the other participated in wetland valuation. This is as a result of preponderance of wetland sites in the Niger Delta a high proportion of which have either been acquired by multinational oil companies or their activities have resulted in the pollution of wetland ecosystems and valuation is usually required to determine the compensation payable to the affected people or community as the case may be.

4. The study showed that only 5.5% of the respondents took any course in environmental valuation during their undergraduate school days. Also environmental valuation has not been included in NIESV Professional valuation curriculum. About 43.1% of respondent Estate Surveyors and Valuers claimed they had never attended any training/workshop/seminar on wetland valuation. Indepth interview conducted on Heads of Department of the universities offering Estate Management courses in the Southern part of the country showed that the teachings on environmental valuation, generally, is a recent development and is yet to cut across all Universities offering Estate Management courses. The interview further revealed that while graduates from some institutions already have an understanding of environmental valuation, those from other institutions are yet to have any understanding of environmental valuation and this may affect their perception of wetland resources and eventually the choice of method(s) for their valuation.

7.3 **Recommendations**

In line with the findings that wetlands provide a range of valuable ecosystem services, attributes and functions and that many decisions, by private landowners or public agencies are taken without considering the consequences of their decisions on these wetlands, the following recommendations are hereby put forward for consideration.

a. The principle of compensation rests upon justice and equity. To achieve these, the study recommends an overhaul of the laws relating to assessment of compensation payable to take account of the fact that a claimant loses more than goods that are traded in open market. The non-use components of wetland resources should be adequately provided for in the laws relating to compensation assessment.

b. Estate Surveyors and Valuers are advised to adopt the total economic value basis for wetland valuation as against open market value and cost bases that capture only the use value components of wetland ecosystems. Since traditional methods had been found not to fully capture the true value of wetland resources, there is need for practicing Estate Surveyors and Valuers to adopt the contemporary methods, especially the contingent valuation method, that capture the true value (both the use and non-use values) of wetland resources.

c. Also, practicing Estate Surveyors and Valuers would need to update their knowledge since wetland valuation for compensation has become a serious issue in the Niger Delta, due to the activities of the oil companies that has continued to impact on this natural ecosystem. Estate Surveyors and Valuers should, individually and collectively endeavour to be current through embarking on further readings, attending professional courses within and outside Nigeria, to broaden the professional base and by making Internet searches on topical issues such as environmental valuation and the likes.

NIESV should include environmental valuation in the curriculum for professional examinations (training). In addition, NIESV should organise mandatory training/workshop/seminar on wetland valuation and similar topical issues as they may arise from time to time to keep members up-to-date with the appropriate techniques available. Also, ESVARBON should mandate Institutions offering Estate Management courses to include environmental valuation as a Course, rather than treating it as a topic, as is currently done in majority of the universities. This is to ensure a detailed coverage of the various aspects of environmental valuation.

NIESV and ESVARBON should begin to think about specialisation in the field of valuation. Environmental valuation is an aspect of valuation that requires skills that go beyond the ones used for general valuation; hence for a Valuer to adequately handle such assignment he must have acquired the required expertise for it. In other words, the Valuer must understand the components of the environment (attributes, functions and services), the appropriate methods for their valuation and the various multidisciplinary skills required for such valuation. The two bodies should make regular attendance and participation at professional trainings a condition for annual renewal of membership and seal. In addition, the Valuation Standards and Guidance Notes should be reviewed with a view to including total economic value as one of the bases of valuation and also include the identified environmental valuation methods as these will make adequate provision for proper valuation of wetland and other environmental resources.

Also, NIESV and ESVARBON should encourage further research to practicalise the steps identified for wetland valuation by this study. Such further studies on wetlands could be funded by the Institution to identify and prioritise wetland components, functions and attributes with a view to advising government on ways and means of making wise use of wetlands.

d. Lack of data (87.3%, RII = 3.84) was identified as a great challenge facing wetland valuation in the study area. Since difficulties in accessing relevant data (from the public domain and from governmental agencies) and the paucity of data on wetland valuation in the region may significantly impinge on the process of choosing valuation methods, there is need for collaboration between the professional body and government to provide data bank for the valuation of environmental (wetland) resources. Also, inadequate government policy (69.4%, RII = 3.29) was identified and ranked third among the challenges encountered in valuing wetland resources. Therefore, there is urgent need for the Federal Government to formulate a clear cut policy for wetland use and management. Such policies should include wetland conservation and management. This could also include policies compelling the multinational oil companies adopting contemporary (environmental) valuation methods in the determination of the compensation payable to the claimants.

7.4 Opportunities for Further Research

This study is probably a pioneering work into wetland valuation practice in the Niger Delta, Nigeria. There is a need to carry out more research in other wetland locations in Nigeria as this will ascertain the general application of the findings of the present effort. In addition, there are other areas (forest, water resources etc) of environmental valuation that this study did not touch and which could constitute good research opportunities for other researchers.

Other areas of wetland valuation practice such as element of care, market survey and analysis and stakeholder analysis also constitute areas for further studies. The current study did not focus on the application of various techniques e.g. contingent valuation, hedonic pricing, travel costs, replacement costs, market prices, benefits transfer, production costs and cost-benefits analysis/trade-off analysis; useful for wetland valuation. These techniques could be taken up by researchers in future studies. The focus of this study was on valuation for compensation, there are other purposes for which wetland could be valued (sales, purchases, mortgage, etc.). All these purposes could be considered by other researchers.

7.5 Concluding Remarks

The study examined the practice of wetland valuation for compensation in the Niger Delta. The study showed that there seems to be no specific policy regarding wetlands generally and by extension this has affected the valuation of this important ecosystem in the study area. The statistical results show that the appropriate basis was not adopted for the valuation of wetland resources in the study area. The findings in this study would be of immense use to various policy and decision makers in and outside government in their individual or collective actions at enhancing the management of wetland ecosystems nationally. It is hoped that the framework and the recommendations given in the study will help in the assessment of wetland resources for compensation purposes.

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APPENDIX I

QUESTIONNAIRE ON WETLAND VALUATION PRACTICE

Department of Estate Management,
School of Environmental Sciences,
College of Science and Technology,
Covenant University,
Ota. Ogun State.

Dear Noble Colleague,

This questionnaire is designed to elicit information on the topic – **A Study of Wetland Valuation Practice in the Niger Delta,** a PhD research project in the Department of Estate Management, Covenant University, Ota, Ogun State, Nigeria.

Kindly supply your information by filling the spaces provided.

All information supplied will be strictly used for academic purposes only and kept confidential.

Thank you.

M. O. Ajibola
June, 2011

SECTION A

1. Name (optional): ……………………………………………………………

2. Office Address: ………………………………………………………………

3. Sex: (a) Male [ ] (b) Female [ ]

4. Academic Qualifications:
   (a) OND [ ] (b) HND [ ]
   (c) B. Sc [ ] (d) M. Sc [ ]
   (e) PhD [ ]
   (f) Others (please State) …………………..

5. Professional Qualifications:
   (a) ANIVS [ ] (b) FNIVS [ ]
   (c) Others (please state) ……………………….

6. Working Experience as Estate Surveyor and Valuer
(a) Up to 5 years [ ]
(b) 6 – 10 years [ ]
(c) 11 – 15 years [ ]
(d) Above 15 years [ ]

7. What is your status in the firm?
(a) Principal Partner [ ]
(b) Managing Partner [ ]
(c) Associate Partner [ ]
(d) Senior Partner [ ]
(e) Senior Surveyor [ ]
(f) Others (Please state) …………..

8. How old is your firm?
(a) Up to 5 years [ ]
(b) 6 – 10 years [ ]
(c) 11 – 15 years [ ]
(d) Above 15 years [ ]

9. How many registered Estate Surveyors and Valuers are employed in your firm?
(a) Up to 5 [ ]
(b) 6 – 10 [ ]
(c) 11 – 15 [ ]
(d) Above 15 [ ]

10. Which of the following professional bodies is your firm affiliated to?
(a) NIESV [ ]
(b) ESVARBON [ ]
(c) RICS [ ]
(d) IVCS [ ]
(e) FIABCI [ ]
(f) Others please state ………….

SECTION B: WETLAND VALUATION PRACTICE

11. How often does your firm carry out valuation assignments generally?
(a) Very often [ ]
(b) Often [ ]
(c) Rarely [ ]
(d) Not at all [ ]

12. How would you describe wetland?
(a) Wasteland [ ]
(b) Poorly Drained Land [ ]
(c) Swampy land [ ]
(d) Infested land [ ]
(e) Marshland [ ]
(f) Others, please state …………

13. What in your opinion, are the main services provided by Wetlands generally? (You can thick as many as you wish)
(a) Food Supply [ ]
(b) Freshwater Supply [ ]
(c) Raw materials for production [ ]
(d) Climate regulation [ ]
(e) Groundwater recharge [ ]
(f) Erosion regulation [ ]
(g) Flood control [ ]
(h) Cultural heritage and amenity [ ]
(i) Spiritual and inspiration [ ]
(j) Recreational [ ]
(k) Educational [ ]
(l) Aesthetic [ ]
(m) Others, please state …………………

14. Rank the underlisted wetland services in order of importance 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important.

S/No.	**Wetland Services**	**1**	**2**	**3**	**4**	**5**
a.	Food Supply					
b.	Freshwater Supply					
c.	Raw materials for production					
d.	Climate regulation					
e.	Groundwater recharge					
f.	Erosion regulation					
g.	Flood control					
h.	Cultural heritage and amenity					
i.	Spiritual and inspiration					
j.	Recreational					
k.	Educational					
l.	Aesthetic					

15. What in your opinion are the major functions of Wetlands? (You can thick as many as you wish)
(a) Climate change mitigation [ ]
(b) Groundwater replenishment [ ]
(c) Sediment Retention [ ]
(d) Storm protection [ ]
(e) Shoreline stabilization [ ]
(f) Water purification [ ]
(g) Reservoirs of biodiversity [ ]
(h) Nutrient transformation [ ]
(i) Recreation/tourism [ ]

(j) Storage of precipitation and runoff [ ]
(k) Biomass production [ ]

16. Rank the underlisted wetland functions in order of importance 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important.

S/No.	**Wetland Functions**	**1**	**2**	**3**	**4**	**5**
a.	Climate change mitigation					
b.	Groundwater replenishment					
c.	Sediment Retention					
d.	Storm protection					
e.	Shoreline stabilization					
f.	Water purification					
g.	Reservoirs of biodiversity					
h.	Nutrient transformation					
i.	Recreation/tourism					
j.	Storage of precipitation and runoff					
k.	Biomass production					

17. Have you ever been involved in any wetland valuation exercise? (a) Yes [ ]
(b) No [ ]

18. If your answer to question 17 above is 'YES' what exactly did you value?
(a) The Attributes [ ]
(b) The Functions [ ]
(c) The Land [ ]
(d) The Buildings [ ]
(e) The Services [ ]
(f) Crops [ ]

19. What are the steps involved in wetland valuation process?
(a) Choosing Appropriate Valuation Method [ ]
(b) Define Wetland Area [ ]
(c) Identify Wetland Resources [ ]
(d) Relate Wetland Resources to Use Value [ ]
(e) Data/Information Collection [ ]
(f) Quantify Economic Values [ ]
(g) Communicate Wetland Values [ ]

20. What was the basis of valuation adopted?
(a) Open Market [ ]
(b) Cost [ ]
(c) Total Economic Value [ ]

21. Which of the underlisted traditional methods did you use for Wetland valuation?

(a) Comparison [ ]
(b) Income Capitalisation [ ]
(c) Cost/Contractor [ ]
(d) Profit/Account [ ]
(e) Residual [ ]

22. Which of the underlisted contemporary methods did you use for Wetland valuation? (You can thick as many as you wish)

(a) Contingent Valuation [ ]
(b) Hedonic Pricing [ ]
(c) Travel Costs [ ]
(d) Replacement Cost [ ]
(e) Market Prices [ ]
(f) Benefits Transfer [ ]
(g) Productivity Function [ ]
(h) Cost-Benefit Analysis (Trade-Off Analysis) [ ]
(i) Participatory Approach [ ]

24. Rank the following wetland valuation methods in order of importance 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important.

S/No.	**Methods**	**1**	**2**	**3**	**4**	**5**
a.	Contingent Valuation					
b.	Hedonic Pricing					
c.	Travel Costs					
d.	Replacement Cost					
e.	Market Prices					
f.	Benefits Transfer					
g.	Productivity Function					
h.	Cost-Benefit Analysis (Trade-Off Analysis)					
i.	Participatory Approach					

25. What factors determine your choice of Wetland valuation method? (You can thick as many as you wish)

(a) Availability and Accessibility to Data [ ]
(b) Availability of substitute Sites [ ]
(c) People's Perception [ ]
(d) Limitations of Methods [ ]
(e) Statistical Complexity [ ]
(f) Quality of Site [ ]

26. Rank the following factors in order of importance 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important.

S/No.	Factors	1	2	3	4	5
a.	Availability and Accessibility to data					
b.	Availability of substitute Sites					
c.	People's Perception					
d.	Limitations of Methods					
e.	Statistical Complexity					
f.	Quality of Site					

27. What are the challenges you encountered in valuing wetlands? (You can thick as many as you wish)

(a) Lack of Data [ ]
(b) Complex Wetland Ecosystems [ ]
(c) Sophisticated Survey Design [ ]
(d) Inadequate Government Policy [ ]
(e) Hostility from residents within and around wetlands [ ]

28. Rank the following wetland valuation challenges in order of importance 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important.

S/No.	Challenges	1	2	3	4	5
a.	Lack of Data					
b.	Complex Wetland Ecosystems					
c.	Sophisticated Survey Design					
d.	Inadequate Government Policy					
e.	Hostility from Residents with and around wetlands					

29. What are the factors influencing wetland value?

(a) Location [ ]
(b) Economic Activities [ ]
(c) People's Awareness [ ]
(d) Services/Functions [ ]
(e) Attributes [ ]
(f) Purpose of Valuation [ ]
(g) Methods of Valuation [ ]

30. Rank the factors influencing wetland values in order of importance 5 = very important, 4 = important, 3 = indifferent, 2 = not important, 1 = not very important.

S/No.	**Factors**	**1**	**2**	**3**	**4**	**5**
a.	Location					
b.	Economic Activities					
c.	People's Awareness					
d.	Services/Functions					
e.	Attributes					
f.	Purpose of Valuation					
g.	Methods of Valuation					

31. Was Environmental Valuation part of the school curriculum in your higher institution?

(a) Yes [ ]
(b) No [ ]

32. Have you ever attended any training/workshop/seminar on wetland valuation?

(a) Yes [ ]
(b) No [ ]

33. If your answer to question 32 above is 'YES' how many of such training/workshop/seminar have you attended between 2005 and 2010?

(a) Up to 5 [ ]
(b) 6 – 10 [ ]
(c) Above 10 [ ]
(d) None [ ]

APPENDIX II

Accredited Universities Offering Estate Management in Southern Nigeria

S/No	University	Location	Means of Contact
1	University of Nigeria	Nsukka, (Enugu Campus)	Telephone
2	Obafemi Awolowo University	Ile-Ife	Personal
3	Rivers State University of Technology	Port Harcourt	Personal
4	University of Lagos	Akoka, Lagos	Personal
5	Enugu State University of Technology	Enugu	Telephone
6	Abia State University	Uturu	Telephone
7	Federal University of Technology	Akure	Personal
8	Cross Rivera State University of Technology	Calabar	Telephone
9	Imo State University	Owerri	Telephone
10	University of Uyo	Uyo	Telephone
11	Covenant University	Ota	Personal

APPENDIX III

List of Estate Surveying and Valuation Firms in Niger Delta

a. **Bayelsa State**

S/No	Firm	Address
1	David Okalai & Co.	Havila Estate, Ekeki. Yenegoa
2	Iboroige-Edaba & Associates	Commissioners' Quarters Road, Yenegoa
3	Vivian Owei Co.	Suite 2, Fak Estate, Fak Street, Yeneze Gene, Yenegoa

b. **Delta State**

S/No	Firm	Address
1	Andy Umunadi & Partners	41, Effurun/Warri Road, by UBA Plc, Effurun
2	Bello Musili & Partners	23, Effurun/Warri Road, by Enerhen Junction, Warri
3	Ben Akporaiye & Co.	Omimi Flats, 30, Warri Sapele Road, Warri
4	Edna Emuakpeje &Co.	157, Jakpa Road, Effurun/Warri
5	Erhimona & Co.	42, Effurun/Warri Road, Opp. Union Bank, Effurun, Warri
6	Harriman & Co.	21A, Warri/Sapele Road, Warri
7	James Omeru & Co.	7, Okumagba Avenue, Warri
8	Knight Frank & Co.	Old Kingsway Building Enerhen Junction, Effurun
9	Lawyer-Egbe & Co.	15, Effurun/Sapele Road, Opposite Mobil Filling Station, Enerhen Junction, Effurun/Warri
10	M. O. Origbo & Co.	1, Abeke Layout, Fonseca Junction, New Ogorode Road, Sapele
11	O. E. Oputa & Co.	42, Okumagba Avenue, Warri
12	Ogbo Ode & Co.	Plot 24, GRA Effurun
13	Omeru & Associates	7, Okumagba Avenue, Warri
14	Peter Ojarikre & Co.	33, Enerhen Road, Enerhen. Warri
15	S. I. O. Esealuka & Co.	56, Nnebisi Road, Cable Point, Asaba
16	Tennyson Ogungbemi & Co.	81, Agboghoroma Way, Sapele
17	Umukoro & Co.	255, Effurun/Sapele Road, by Oceanic Bank, Effurun
18	Vita Ekwujuru & Co.	62, Ezenei Avenue. Asaba

c. **Rivers State**

S/No	Firm	Address
1	Adefila & Partners	206, Aba Road, LAAS Building, Rumuola, Port Harcourt
2	Ahiwe Associates	30, Mbonu Street, D/Line Port Harcourt
3	Akan Umo-Otong & Partners	206, Aba Road, Port Harcourt
4	Akin Ojumoro & Co.	2nd Floor, 92, Aba Road, Port Harcourt
5	Ajileye & Co.	PAB Building, 3, Azikiwe Road, 1st Floor, Port Harcourt
6	Akujuru Associates	1, Azikwe Road, (Supabod Building) Port Harcourt
7	Amakiri Associates	12, Azikwe Road, Port Harcourt
8	Aninwezi & Co.	84/86, Aba Road, Opp. Govt. Craft Center, Port Harcourt
9	Anyaibe Cima & Partners	1, Azikwe Road, (Supabod Stores), Port Harcourt
10	Assam Idong & Partners	71, Stadium Road, Port Harcourt
11	Banjo Adeleke & Co.	39, Emekuku Street, D/Line Port Harcourt
12	Bebe Israel & Associates	3A, Emekuku Street, D/Line, Port Harcourt
13	Ben Alamina & Partners	30, Mbonu Street, D/Line, Port Harcourt
14	Bode Adediji Partnership	22B, Forcesn Avenue, Old GRA, Port Harcourt
15	Cele Ugonbo & Co	31, Aba Road, Port Harcourt.
16	Claudius Mbachu & Associates	290, Port Harcourt/Aba Road, 1st Artillery, Obio, Port Harcourt
17	Chima Pius & Associates	3, Emekuku Street, D/Line, Port Harcourt
18	Chukwujindu & Partners	2, Chinda Street, Off Stadium Road, Port Harcourt
19	Chris Ejiofor & Co.	121, Aba Road, by Wami Street, Oroworukwo, Port Harcourt
20	Collyns Owhonda Associates	30, Emekuku Stree, D/Line, Port Harcourt
21	Dapo Olaiya Consulting	117, Olu Obasanjo Road Port Harcourt
22	Dennis Jude Nworgu & Co.	58, Ikwere Road, Port Harcourt
23	Don Diboye-Suku & Co.	10, Niger Street, Port Harcourt
24	Dotun Faleye & Co.	86B, Okporo Road, Road Port Harcourt
25	Ebiye Kpun & Co.	Suite 224, 2nd Floor NIPOST HQ, 10, Station Road, Port Harcourt
26	Ekere & Associates	6, Khana Street, Off Olu Obasanjo Road, D/Line, Port Harcourt
27	Elias Icheku & Co.	7, Aba Road, Port Harcourt
28	Elliot Orupabo & Associates	203, Niger Street, Port Harcourt
29	Eloh Mba & Co.	3, Azikiwe Road, Port Harcourt
30	Emeka Obianefo & Co.	55, Old Aba Road, Port Harcourt
31	Emma Douglas & Co.	PAB Building, 3rd Floor, 3, Azikiwe Road, Port Harcourt
32	Emma Akpa & Co.	Plot 1, Road 1, Presidential Housing Estate, Port Harcourt
33	Emma Wike & Partners	88, Olu Obasanjo Road, 2nd Floor, NARCDB Building, 2nd Floor, Port Harcourt
34	Eze Ihekwaba & Co.	11, Eastern By-Pass, Ogbunabali, Port Harcourt
35	Ezurike & Partners	43, Aba Road, Port Harcourt
36	Femi Ajiniran & Co.	11, Ohaeto Street, D/Line, Port Harcourt
37	Gerry Iputu & Partners	10, Mbonu Street, D/Line, Port Harcourt

38	Gilbert Nwanna & Partners.	87, East- West Road, Rumuodara Junction, PH.
39	Gloria Briggs & Associates	Nipost Building 2nd Floor, Suite 22A, Station Road, Port Harcourt
40	Godwin Udosen & Associates	26, Mbonu Street, D/Line, Port Harcourt
41	Gogo Ekang & Co.	142, Ikwere Road, by Ikoku Junction, Port Harcourt
42	G.R. Paret & Co.	129/131, Olu Obasanjo Road, Port Harcourt
43	Hamilton Odom & Co.	88, Olu Obasanjo Road, Port Harcourt
44	Ibimina Kakulu & Associates	Last Floor (Left Wing), Zuma Suits 28, Kaduna Street, Port Harcourt
45	Ideozu & Partners	4B, Agudama Street, D/Line, Port Harcourt
46	Ifeanyi Uzonwanne & Co.	84/86B, Aba Road, Port Harcourt
47	Iloabuchi & Associates	36, Aba Road, Port Harcourt
48	Ipali Harry & Associates	11B, Benjamin Opara Street, Off Olu Obasanjo Road, Port Harcourt
49	Jide Taiwo & Co.	25, Aba Road, Port Harcourt
50	Joe Etoniru & Associates	11, Aba George Road, Mgbuoba, Port Harcourt
51	Johnson & Partners	105, D-Line Street, Port Harcourt
52	Jossy Wogu & Co.	19, Ikwerre Road, Port Harcourt
53	K. C. Orannekwu & Partners	219, Port Harcourt/Aba Road Expressway, Port Harcourt
54	Kelechi Iloegbu & Co.	50, Aba Road, 2nd Artillery, Port Harcourt
55	Ken Nweke & Co.	3rd Floor, Lansar House, 219, Aba Road, Port Harcourt
56	Ken Nwugba & Partners	Suite 429, 4th Floor PAB Building 3, Azikiwe Road, P/H
57	Kitoye Igoni & Partners	7A, Eligbam, Port Harcourt
58	Kitoye-Rufus & Co.	169, Aba Road, Port Harcourt
59	Koko & Partners	3, Azikiwe Road, Port Harcourt
60	Kunle Ogunlusi & Associates.	172A, Aba Road, (Banax Building), Port Harcourt
61	Mannbull & Associates	97A, Road 2, Federal Housing Estate, Agip, Port Harcourt
62	Marth Frank-Alli Associates	4, Forces Avenue, Old GRA, Port Harcourt
63	Mike Nwogu & Partners	19, Oromineke Street, D/Line, Port Harcourt
64	Monsi Associates	3, Omoku Street, D-Line, Port Harcourt
65	Ndubisi Emelike & Co.	9, Rumuogba Estate Road, Rumuogba, Port Harcourt
66	Knight Frank	66, Olu Obasanjo Road, Port Harcourt
67	Njideka Aguome & Co.	26, Col. Larry Crescent, Port Harcourt
68	Nuel Mark & Partners	142, Ikwere Road, Suite 305, Port Harcourt
69	Nwokoma Associates	LANCER House (Plot 219), Aba Express Road, Rumogba, Port Harcourt
70	Nwokoma Nwankwo & Co.	193, Aba Roa, Rumuola Junction, Port Harcourt
71	Nwosu& Partners	69, Rumuola Road by Eligbam Junction Port Harcourt
72	Phil Anozia & Co.	51 Ikwere Road, Port Harcourt
73	Prince Adesanmi & Co.	29, Mbonu Street, D/Line Port Harcourt
74	Princewill Nwaobilor & Co.	Ohiamini/psychiatric Road, Rumuoigbo, Port Harcourt.
75	O. C. Asiegbu & Co.	21, Igboukwu Street, D/Line, Port Harcourt
76	Odili Okoli & Associates	Suite 202 (2nd Floor) Delta HTL, 169, Aba Road, Port Harcourt
77	Odudu Odudu & Partners.	114B, Aba Road, Port Harcourt

78	Ofoma Associates	193, Aba Road, Port Harcourt
79	Okey Chinda & Co.	88, Olu Obsanjo Road, Port Harcourt
80	Okereke Uduak & Partners	40, Mbonu Street, D/Line, Port Harcourt
81	Okirie & Associates	Suite 227/228, 2nd Floor, 3 Azikiwe Road, Port Harcourt
82	Okolo & Associates	84/86, Aba Road, Port Harcourt
83	Okoronkwo Associates	200, Aba Road, Adjacent NEPA Sub-Station Port Harcourt
84	Oleru Associates.	89 Olu- Obasanjo Road PH
85	Omosigho Omorodion & Partners	1, Azikiwe Road, Port Harcourt
86	Onwuchuluba & Associates	120, Rumuola Road, Port Harcourt
87	Onyeneke & Partners.	7, Igboukwu Street D/Line Port Harcourt
88	Osas & Oseji	26, Aba Road, Port Harcourt
89	Osoroh & Co.	30, Trans Woji Road, Port Harcourt
90	Philanozia & Co.	51, Ikwere Road, (1st Floor), Port Harcourt
91	Ramoni Austin	1, Ilorin Street, (1st Floor), Port Harcourt
92	Ramani Abah & Co.	4, Forces Avenue, Old GRA, Port Harcourt
93	Robbert Okpara & Partners	25, Igboukwu Street, Port Harcourt
94	Sam Oduve & Partners	97, Aba Road, Port Harcourt
95	Tom Obetoh & Partners.	24 Old Aba Road, Port Harcourt
96	Udoetuk & Associates	27, Harbour Road Town, Port Harcourt
97	Uloho & Co.	144B, Aba Road, Port Harcourt
98	Utchay Okorji Associates	1, Khana Street, D/Line, Port Harcourt
99	W. A. George & Co.	43, Harold Wilson Drive, Borikiri, Port Harcourt

APPENDIX IV

Some Severely Oil - Polluted Sites in the Niger Delta

Location	Environment	Impacted Area (ha)	Nature of Incidence
Bayelsa State			
Biseni	Freshwater Swamp Forest	20	Oil Spillage
Etiama/Nembe	Freshwater Swamp Forest	20	Oil Spillage & Fire Outbreak
Etelebu	Freshwater Swamp Forest	30	Oil Spill Incidence
Peremabiri	Freshwater Swamp Forest	30	Oil Spill Incidence
Adebawa	Freshwater Swamp Forest	10	Oil Spill Incidence
Diebu	Freshwater Swamp Forest	20	Oil Spill Incidence
Tebidaba	Freshwater Swamp Forest Mangrove	30	Oil Spill Incidence
Nembe Creek	Mangrove Forest	10	Oil Spill Incidence
Azuzuama	Mangrove	50	Oil Spill Incidence
9 sites			
Delta State			
Opuekeba	Barrier Forest Island	50	Salt Water Intrusion
Jones Creek	Mangrove Forest	35	Spillage & Burning
Ugbeji	Mangrove	2	Refinery Wastes
Ughelli	Freshwater Swamp forest	10	Oil Spillage – Well Head Leak
Jesse	Freshwater Swamp Forest	8	Product leak/burning
Ajato	Mangrove		Oil Spill Incidence
Ajala	Freshwater Swamp Forest		Oil Spill Incidence
Uzere	Freshwater Swamp Forest		Oil Spill Incidence
Afiesere	Freshwater Swamp Forest		Oil Spill Incidence
Kwale	Freshwater Swamp Forest		Oil Spill Incidence
Olomoro	Freshwater Swamp Forest		Oil Spill Incidence
Ughelli	Freshwater Swamp Forest		QC
Ekakpare	Freshwater Swamp Forest		Oil Spill Incidence
Ughuvwughe	Freshwater Swamp Forest		Oil Spill Incidence
Ekerejegbe	Freshwater Swamp Forest		Oil Spill Incidence
Ozoro	Freshwater Swamp Forest		Oil Spill Incidence
Odimodi	Mangrove Forest		Oil Spill Incidence
Ogulagha	Mangrove Forest		Oil Spill Incidence
Otorogu	Mangrove Forest		Oil Spill Incidence
Macraba	Mangrove Forest		Oil Spill Incidence
20 sites			
Rivers State			
Rumuokwurusi	Freshwater Swamp	20	Oil Spillage
Rukpoku	Freshwater Swamp	10	Oil Spillage
Ebubu-Ochani Eleme	Freshwater Swamp	25	Oil Spillage
Bomu	Freshwater Swamp	12	Oil Spillage
Obigbo	Freshwater Swamp		Oil Spillage
Umuechem	Farm Bush Mosaic		Oil Spill Incidence

Obrikom	Freshwater Swamp		Oil Spill Incidence
Okpomakiri	Mangrove Forest		Oil Spill Incidence
Ke-Dere	Mangrove Forest		Oil Spill Incidence
Krakrama	Mangrove Forest		Oil Spill Incidence
Orubiri	Mangrove Forest		Oil Spill Incidence
Ekrikene	Mangrove Forest		Oil Spill Incidence
Ekulama	Mangrove Forest		Oil Spill Incidence
Oshie Ahoada	Freshwater Swamp	15	Oil Spillage
Oshika	Freshwater Swamp		Oil Spill Incidence
Oyakama	Freshwater Swamp		Oil Spill Incidence
Ebocha	Freshwater Swamp	10	Oil Spillage
Rumuekpe	Freshwater Swamp	25	Oil Spillage
Nonwa	Mangrove Forest	25	Oil Spillage
Ekuleama	Mangrove Forest	20	Oil Spillage
Bodo West	Mangrove Forest	10	Oil Spillage
Bonny	Mangrove Forest	20	Oil Spillage
Okrika	Mangrove Forest	10	Discharge of Refinery Wastes
24 sites			
Abia State			
Owaza	Freshwater Swamp Forest	50	
1 site			

Source: Obot, Antonio, Braide, Dore, Wicks, and Steiner, (2006)