ENVIRONMENTAL IMPACT ASSESSMENT OF A CONSTRUCTION INDUSTRY (ROADS & HOUSING) ON THE ENVIRONMENT. (A CASE STUDY OF BWARI AREA COUNCIL FCT., ABUJA).

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BEING A DISSERTATION SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY, SCHOOL OF SCIENCE AND SCIENCE EDUCATION, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE.

AS A PARTIAL FULFILLMENT FOR THE AWARD OF POST-GRADUATE DIPLOMA (PGD) IN ENVIRONMENTAL MANAGEMENT.

CERTIFICATION

I certify that this work was carried out by Odefunso, Fasasi Ajani with registration number PGD/GEO.2000/2001/174 of the Department of Geography, Federal University of Technology, Minna, Niger State, and accepted for the award of Post Graduate Diploma in Environmental Management.

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DEDICATION

This dissertation is specially dedicated to my daughter – Amatur Rahman (A female servant of the Gracious God).

ACKNOWLEDGEMENT

I am grateful to Allah for making me an Ahadi Muslim (Alihamdu lilah), for His guidance mercy and protection over me throughout the programme.

I am beholding to my supervisor Dr. (Mrs) Odafen A. E. a dedicated and an academic per excellence who in the midst of numerous academic administrative and personal obligation, found time to read, digest, advise and correct my tedious topic, infact her total co-operation cannot be over emphasized.

I am short of words to express my sincere gratitude to the most influential and valuable people in my life Mr & Mrs. S. A. Odefunso, (Parents) Mrs A. O. M Odefunso (Wife), for their genuine love, kindness, understanding, moral and spiritual support.

I wish to state here that my errors, flaws and inadequacies found in this work is highly regretted for I am not a perfect being.

My deu appreciation goes to everybody who might have directly or indirectly contributed towards my successful completion of the programme.

May the blessings of Allah be upon every one of us (Amen).

ABSTRACT

Environmental Impact Assessment represents a legislative or policy-based concern for possible positive/negative, short/long term effect on our environment attributable to proposed or existing projects, program or policies of a public or private origin. Its purpose makes it inevitable in any proposed roads and housing or resources development. This project represents an effort to evaluate various methods of carrying out the impact assessment varying from checklist , overlays, matrix and almighty network approaches.

The study area of the project is Bwari Area Council with scope concerning construction industry limited to roads and housing development. It also offers a platform, for a pen-chart in being a clinician rather than a contributor to the already deteriorating environment, through various recommendations for the enforcement of environmental standards and guidelines for critical construction activities and the application of environmental management in construction as a pre-requisite criterion for tangible roads and housing construction in Bwari Area Council, Abuja and in Nigeria at large.

In carrying out the study conventional methodology was adopted – questionnaire and oral interview, and it was reliably gathered that environmental impact assessment studies has not ever being carried out because of the construction work they handle which has no significant negative impact on the environment.

From the study, it was concluded that construction activities in the Area Council has shown some of the adverse effect of erosion, pollution, deforestation, radiation etc. However, therefore, recommendation were spelt that any construction work should include environment management and social cost and others like proper implementation of provision of Decree on Environmental Impact Assessment No. 86 of 1992.

SYNOPSIS OF THE STUDY

There are five chapters in this project, which altogether focused on the same point. In chapter one, it includes introduction, aim and objectives, need for the project. Others are statement of the problem, philosophy of the project and also scope and the associated limitations.

Chapter two dealt with the study area – Bwari Area Council, F. C. T., Abuja. These encompasses the location, physical, biological and social environment, the construction activities and impact on the environment and associated effect of erosion, pollution etc.

Chapter three has the review of literature, which is an embodiment of research into the past work of some academicians in this subject matter. Collection of necessary data from textbooks.

The following chapter dealt with the methods used in collecting relevant data which encompasses questionnaire, oral interviews and field surveys – visual observation. It also analyzed data collected.

The last chapter, which is chapter five, was devoted to the conclusion and invaluable recommendations to serve as a guide to proposed development.

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CHAPTER ONE

1.0 INTRODUCTION

A major fallout of industrialization is the result on the integrity of physical, biological and social environment. The world's environment is in great danger as the rate of environmental deterioration is accelerating with the expansion of roads network and building structures, which culminate to ecological disaster. Environmental degradation arising from this has impacted either positively or negatively on the quality of life and in some cases posed serious threat to wildlife, ecosystem and the human race. The threat is such that, there exist today numerous organizations the world over, whose primary objectives and goals are the protection and preservation of the natural environment.

The project is to erotically examine the impacts assessment of construction industry in the areas of roads networking and building structures on the environment. Man's giant stride in improving his lot often generate actions and reactions which themselves pose serious threat to human life, it also describe methodology, menu for carrying out impact assessment and purpose of assessment that is, function of assessment.

In the construction industry, construction of roads, houses, office blocks, factory buildings and other structures on some site often lead to flooding, erosion and other forms of devastation of the physical environment. Construction project and development do not just stand on their own they exact impact on their environment and implication for traffic management, power and energy consumption. In other to reduce the magnitude of effect by construction industry on the environment the pre and post impact analysis should be carried out and made to be promoted and encouraged by the Government.

Environmental Impact Assessment therefore is the synthesis view which represents a legislative or policy-based concern for possible positive/negative, short/long term effects on our total environment attributable to proposed or existing projects, programs or policies of the public or private origin.

However, assessment on the existing development shall be carried out and also on proposed one as construction of internal road network and estate development are currently in progress in Bwari Area Council, so as to determine the magnitude of effects on the fragile environment on the account of improper analysis and non compliance of such Federal Government enacted laws on Environmental Impact Assessment of Act No 86 of 1992.

1.1 AIMS AND OBJECTIVES

The main aim of this project is to update the symbiotic relationship between the construction industry (road and building) and the Nigeria natural environment. Using Bwari Area Council as a case study and also how best the Environmental Impact Assessment be carried out for pre-project and post-project analysis, in line with set objectives.

a) To study ever-increasing distortion of Nigeria environment by construction industry.

b) To evaluate the various types of Environmental Impact Assessment analysis.

c) To create consciousness of environmental friendliness in Nigeria.

d) To describe how environmental impact assessment process can be used to mitigate adverse environmental effect.

1.2 SCOPE AND LIMITATION

For the project, one of the primary objectives is to study the ever-increasing distortion of Nigeria environment due to the impacts of construction activities.

Scope: The scope of this projects covers impact assessment of constructional methodology of roads and buildings and formation and integration of environmental policies and recommendations for Impact Assessment development.

Limitation: The scope of this project is however limited to Bwari Area Council in Federal Capital Territory.

1.3 PROJECT PHILOSOPHY

The issue of Environmental Impact Assessment, is not a new concept in the world over, Geographer have had a lengthy interest regarding man's impact upon the environment.

In 1864, Marsh published one of the earliest statement about human action on natural environment. He stressed that nature could not always rehabilitate because of frequent impoverish on the environment, Marsh, therefore now urge protective and precautionary measures to ensure that development design to minimize disturbances to the harmony in the native.

In 1938 Sawer emphasized cultural history and landscape change, he expressed human activity that altered the nature environment to produce a cultural landscape. But in 1955, Sawer and other geographers participated in an interdisciplinary symposium at New York entitled "Man's role in changing the face of the earth" Gbacken (1967) analyzed basic philosophies and attitudes associated with man-environment relationship.

Conscious of the importance of the environment for sustainable development, Environmental Impact Assessment (EIA) Act No. 86 of 1992.

1.4 NEED FOR THE PROJECT

The need for the project work was prompted by the ever-increasing distortion of Nigeria environment especially in the construction of roads network and other building structures which sometimes leads to degraded environment through such environmental hazard as flooding, deforestation, erosion and other forms of physical deterioration of environment.

The project also represent an effort to assess the positive and negative impact of roads network and buildings on the fragile environment and to equally promote the implementation of appropriate environmental policies in Nigeria.

1.5 STATEMENT OF THE PROBLEM

The fact that, there exist many observable environmental problems such as the distortion of the lithosphere, which is as a result of the direct and indirect effects of the works of roads and building construction in Nigeria more especially in Abuja. These shows that, there is either no blue print in integration of both the construction industry and the environment or that such policies are not being implemented by the various actors in the sector. Therefore, time has come for a proper and efficient harmonization of the works of these sectors if we must boost of a future for us and for the generation urban.

1.6 PROJECT CONSTRAINTS

Nothing good comes easy, this work could not have been effectively done without experiencing one form of constraint or another at one level or

the other, both government and private agencies responsible for both the construction industry and Nigeria Environment do not really have a reliable databank for resource material. Even on the strictly compliance of Environmental Impact Assessment Act No. 86 of 1992.

In addition, the reluctant of most private companies in the construction industry in offering reliable information as they fear any possible exposure as they neither consider nor take impact assessment analysis as their tool for Environmental Management.

CHAPTER TWO

2.0 THE STUDY AREA

This chapter encompasses the study of the studied area of the project – BWARI AREA COUNCIL. It examines the physical, social and biological environments and discuss the activities of the construction industry with possible environmental effect arising from the activities.

2.1 BWARI AREA COUNCIL

In October, 1st 1996, during the Head of States National Broadcast to the Nation, BWARI AREA COUNCIL was created alongside with Kwali Area Council in the Federal Capital Territory, bringing the area councils the six (6).

2.2 PHYSICAL ENVIRONMENT

2.2.1 *Location:*

Bwari is an aborigine settlement in the North-East area of Abuja, the Federal Capital Territory (F.C.T.). it is bounded in the East by Tafa Local Government Area of Niger State, in the West by Kagarko Local Government of Kaduna State. In the North and South, it is bounded by the Abuja Municipal and Gwagwalada Area Councils respectively and Nassarawa State. Before its creation as an Area council on October 1st 1996, it was known as the Bwari Development Authority. It became fully operational in December 1996.

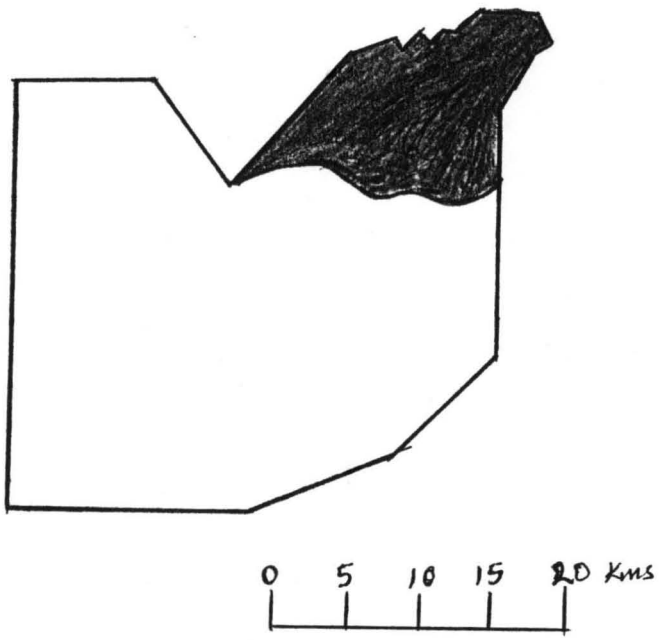


Figure 2.1 Map of Abuja Showing Bwari Area Council.

(Source: Abuja Hand Book)

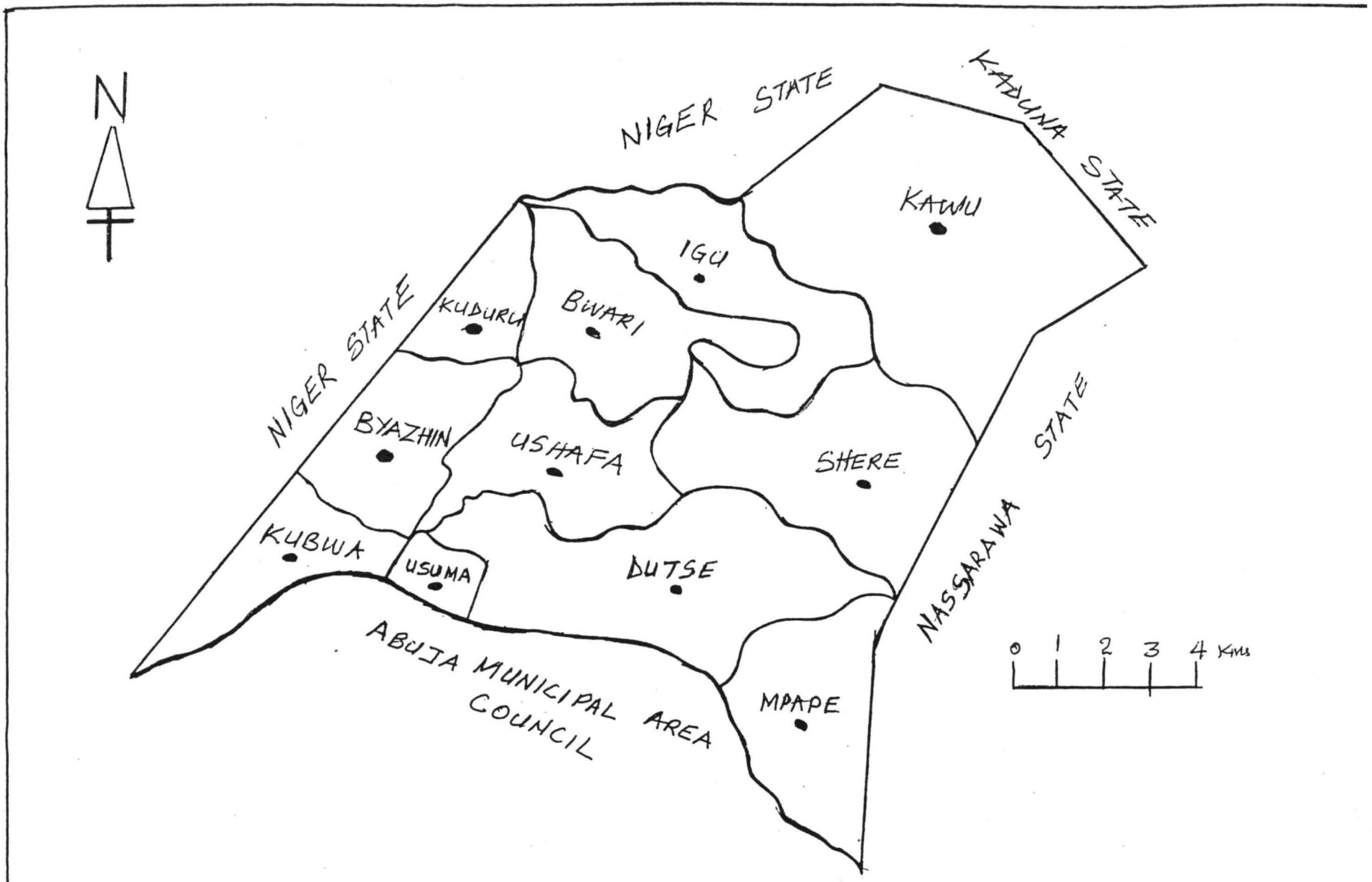


Figure: 2.2 Map of Bwari Area Council showing major towns and villages. (Source: ~~BAC Hand Book~~).

2.2.2 ***Climate:***

Bwari Area Council composes of nothing hills, isolated highlands and combines the savannah grassland of the North and the middle belt with richness of the tropical rain forest of the south, hence, the climate is neither too hot nor too cold all around the year as it falls within the climate transition zone between the essentially humid South and the sub-humid North of the country. In terms of physiological comfort, the high temperatures and the relative humidity in the Niger – Kaduna through gives Bwari a heat trap effect.

Rainfall in Bwari Area Council reflect the councils location on the windward side of Raduna, Jos Plateau and at the zone of rinsing air masses. The annual total is in the range of 1100mm of 160mm the duration of the rainy season, however decreases from about 240 days in the southern part to 190 days in the Northern areas, concentrating more in July, August and September. The mean annual potential evaporation in the council has between 1799mm to the south and 1277mm to the North and actual vapor-transpiration is well over 1000mm.

2.2.3 ***Geology:***

Apart from climate, topography, the underlying rocks score the most essential factors in understanding the native and spatial distribution of soils in the council. There are two broad geological provinces, namely the sedimentary belt in the southern and South-Western exterminates of the council and the pre-Cambrian basement complex rock which accounts for over 70 percent of the council.

2.2.4 ***Vegetation:***

Bwari Area Council in the Federal Capital Territory falls within the savannah zone vegetation of the West Africa sub-region, patches of rain forest, especially in the gullied train to the south and the rugged south eastern part of the council.

The dominant vegetation cover is classified into three savannah types.

Park or Grassy Savannah occupies about 47 percent of the total area of the council. The vegetation is annually and only a few tree species are found among the grasses, namely Albizia, Zypia, Butrospermum paradoxum, Daniellia Oliveri and Pakra clappertoniana.

Savannah woodland occurs mostly in the rugged and less accessible part of the council especially on the Baupma, Ushafa and Jayi plains and surrounding hills. They cover 10 percent of the council. The more common tree include butyroscorpus paradoium, upaca togonesis, zygia, vitex domiani, bombax costatum, afzelia African pterocarpus erinaceus and anogeissus leiocarpus.

Stub Savannah occurs extensively in rough terrain close to hills and ridges in all part of the council. It covers about 11.8 percent of the land.

The patches of rain forest contain such tree species are antaris africana, cieba pentandra chlorophora excels (iroko), Khaya grandilolia (Benin Mahogany), triminabia superb (afara) and dvaceana arborea. Certain tree species normally associated with wetter parts of the patches e.g. Cophira alata (ekiki), terminaties ivorensis (idigbo) and piptadeniatrum africannu (agboin). The rain forest patches constituted only 6.2 percent of the vegetation cover.

Riparian vegetation includes both woodlands and rain forest of varying structure and floristic composition. Apart from the rain forest elements, some of the dominant tree species of the savannah woodland yield high quality timber e.g. damiellia oliveri, khoya Senegalese's and pterocanpus arendeeous.

2.3 BIOLOGICAL ENVIRONMENT

In Bwari Area Council, the biological environment constitute all the living and non-living things in the area. These are resident and migratory fauna, (animal), flora (plant) and micro-organisms. These classes of living things interdependent on each other and they ultimately dependent on their physical environment – air, soil, water, minerals temperature etc.

The flora photosynthetically trap energy from the sun and circulate it among the living things in the area. The flora are essentially perennial, biennial and seasonal. The perennial plants live for more than two years e.g. cashew, mango tree etc., biennial plants lives for two years, producing flowers in the second year e.g. Daniellia oliver and seasonal plant live and flourish during particular season of the year either during wet or dry season.

The micro-organisms convert atmospheric nitrogen into the nitrates which are essential for plant. In the Area Council both resident and migratory animals are present for human consumption. Man as part of biological environment manipulates the activities of the other elements of the environment. He cultivates useful plants to provide food, clothing and shelter and he revises farm animals, for their meat, milk etc.

2.4. SOCIAL ENVIRONMENT

In assessing the impact of a construction industry, social environmental factors has to be considered which is entirely man made. In Bwari Area Council, it represents the situation of man as a member of the

society, his family group, his village, culture, belief and attitudes, organization of society, politics and government laws and judicial system, the education system, transportation and communication.

Settlement patterns concerns the distribution of human habitation in groups in various forms of villages, towns, and hamlets in a given region or environment. The settlement pattern in Bwari villages is a aborigine indigenous rural communities nucleated type and scattered in plains inselbergs. Other open satellites settlement in the council (Kubwa satellite town) comprises of phases I, II, II and IV, Bwari town, villages includes Baupma, Mpape, Jigo, Gidan Jatau, Gbazango, Tudun Wakiti and many more.

Development is always about human beings and there is always the need to have a reasonable level of population growth. Bwari Area Council in the Federal Capital Territory has witnessed a rapid population growth. According to data collected from the National Population Commission, the Abuja population growth is abnormal, as it is far above the 2.3 rate of general growth rate in other state of the federation, the rate also holds for the population growth of the council.

2.5 THE IMPACT OF A CONSTRUCTION INDUSTRY ON THE ENVIRONMENT, BWARI EXPERIENCE.

In construction industry series of office and site activities takes place when considering roads and building development, form conception to design, planning and construction proper. Roads and building in any society are central to socio-economic development and their construction should be concerned with a number of negative environmental externalities such as emissions, and spillage of hazardous/toxic waste like fuel, diesel, lubricants and chemical that occur as a result of improper planning, design,

construction operation and/or maintenance. The potential environmental impact of roads and building development should be taken into consideration during site selection.

In practical terms, the physical developmental process has states of activities with a goal of bringing improved societal well-being of the populace. The activities include:-

Site Clearance:

In such development as roads and building clearing the location of the development on the environment means clearance of vegetation cover, destruction existing population, drainage obstruction, diversion of water course, and demolition of existing structures. Above mentioned activities will no doubt has an environmental problems.

Construction:

Site clearance in the early stage of development prepares ground for construction proper and this include transportation of construction material, use of hazardous construction materials, use of heavy (noisy) machinery, disposed of construction waste and waste from temporary workforce.

Construction development without considering the environment using environmental impact statement (EIS) gotten from environmental impact assessment (EIA) give such rise to negative impact.

Impact:

Bwari area council would not be an exceptions in the areas of negative impact of construction activities on the environment. Construction brings about social development to society by constructing good road network and modern residential and industrial buildings. Even the good intention of this industry brought about some unavoidable negative impacts

upon the environment which tend to have erosion, deforestation, pollution and flood.

Effect; Radiation:

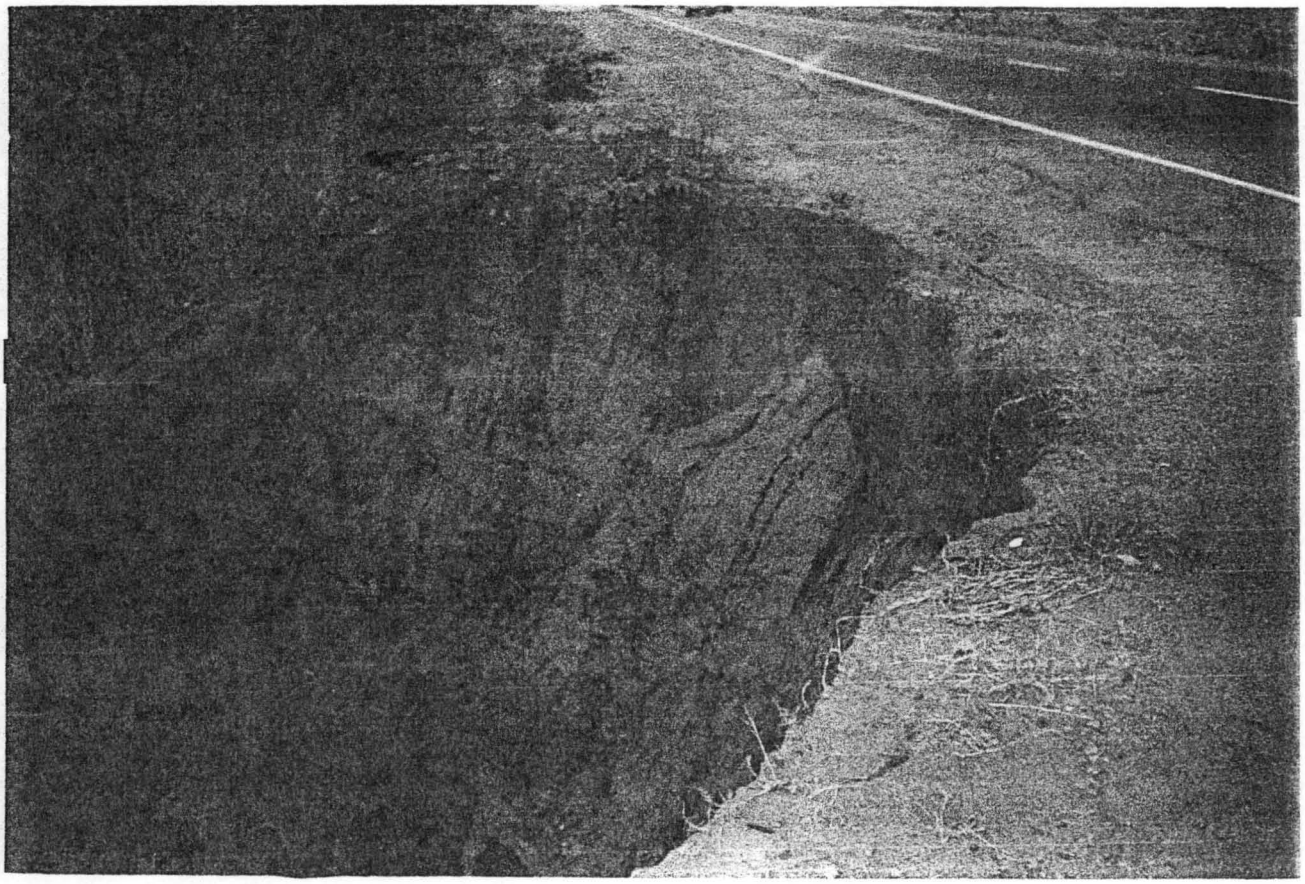
Radiation simply implies the emitted rays of heat from the sun through the space to the earth surface. These rays carry a very appreciable level of effect which can either be useful but in most times harmful to both plant and animal hence, a matter of concern as such disease as cancer are traceable to it. (Ajator 1999) In the present state of the world's atmosphere today, the effect of ozone depletion giving rise to a higher dosage of unscreened ultra-violet rays unto the occupant of the earth atmosphere has not helped issues, rather had been compounded by such factors as the green house effect of some gases as the green house of such gases as carbon dioxide, methane and the impact of civil construction which has in no small measure contributed to the high radiation level, being experienced through out the world, most especially in the urban cities of the world as in Abuja (UNEP Report 1998). The impact of civil construction, as the major contribution to this phenomenon can be viewed from two basic ways. Namely, the bye effect of deforestation, as having devoid the earth of its vegetative cover which act as absorbent material and medium for limiting the harmful radiant energy from the sun. this has earlier been extensively discussed as a heading of its own and secondly the bye effect of the use of metallic materials such as zinc and aluminum as roof cover on building. With the concentration of building all over the urban cities, and 99% of their roof cover being metallic materials there becomes a higher level of scattered reflection of sun rays which invariable increases the atmospheric temperature within the environment. Added to this, is the concrete paved floors within and

around most compounds of buildings which on its own, also brings about glare effect in the environment – Abeldo. All this effects, which are direct consequences of civil contraction are better imagined than experienced for their devastating effect on plant and animals, as today Abuja ranks as one of the hottest cities of the world (Meteorological Department – Ministry of Aviation Abuja 1999).

2.5.1 ***Erosion:***

The process by which the surface larger of weathered rock is loosened and carried away by running water, wind, ice or the exposure of natural agent and lower horizon in the soil, which is termed erosion occurs in several parts of the council under different geological, climate and soil condition. However, considering the impact of construction industry in (Roads and Housing) in the Area Council, one realizes that there are two basis consequences of Roads and Building construction which give rise to both water and wind erosion respectively. These are the effect of deforestation brought about by the physical development of the environment for socio-economic needs, as the absence of the environmental vegetation which act as wind-breakers or canopy over the earth surface, against both common course of erosion (i.e. water and wind erosion).

Secondly , the construction of a pitched roofing system of a building which give rise to high frequency rate of water fall from the roof covering, hitting the earth surface couple with sloppiness of the area with an impact of gully erosion which cannot be obliterated by tillage as may be achieved in other cases.

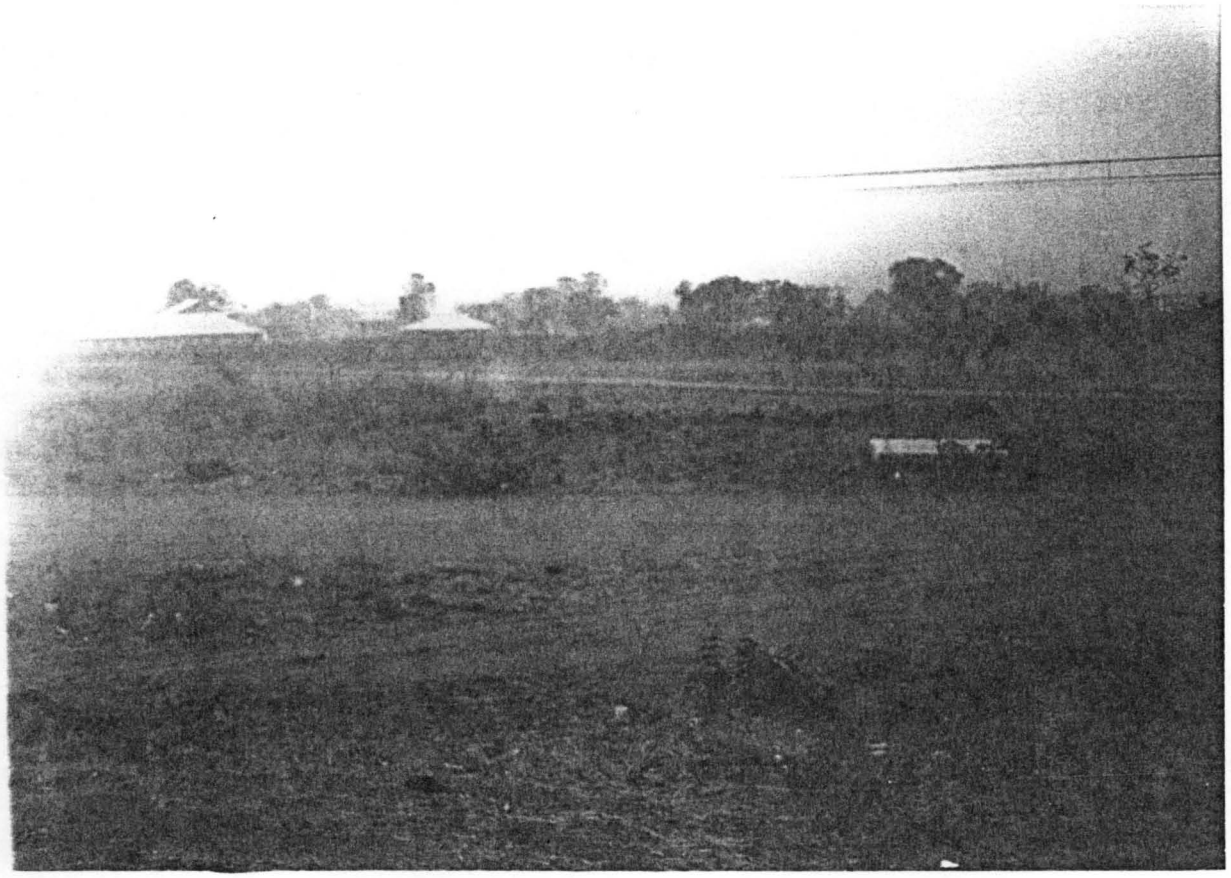


PICTURE SHOWING EROSION EFFECT DUE TO THE IMPACT OF CONSTRUCTION

2.5.2 ***Deforestation:***

The role of deforestation in global environmental dynamics is gaining increasingly, ranging from small village community in developing countries to international community in developed nations.

Deforestation is the indiscriminate falling of trees or wanton exploitation or clearance of the forest in a particular geographical location without any effort at replacing it. This is caused by both human and natural factors, but the most common factor is the human effect, which is the indirect consequence of construction industry brought about by the need for socio-economic infrastructure for development as a result of urbanization and population pressure which is the most important direct factor causing large scale deforestation in the council. Through the massive construction work, the entire land mass is fasting devoiding of its natural vegetation cover exposing the occupants to hazardous weather condition such as increase in atmosphere carbon-dioxide with the subsequent rise in temperature, decrease in rainfall, increase soil erosion etc.



PICTURE SHOWING A CLEARED EARTH SURFACE FOR HOUSING ESTATE

2.5.3 ***Pollution:***

Atmosphere pollution rimes high as constructional impact in Bwari Area Council environment. The chief type of air pollution is the pollution by sand dust from rock basting and excavation works coupled with noise hazard. It is common place to have ones body dusted with sand and rock particles (rock blasting at tipper garage junction) within most working hours through the area yet under construction such as Dustse – Kubwa internal road network, Kubwa –Bwari town road etc. the effect ranges from skin disease and eye problems, while noise from the vibrating machines, heavy duty equipments and activities of dynamite in blasting rock. The tolerable level decibels. A prolonged exposure to this situation hypertension, coronary-vascular problems and susceptibility to viral infection and toxic substances – (FEPA report on toxic and air pollution in Abuja).

2.5.4 ***Flood:***

Among all natural disaster, flood produces some of the highest death tolls and material damage. A flood is regarded as any relatively high water level or discharge above an arbitrary selected water level or water discharge. Hence, flood may be given as a body of water which rises to overflow land which is not normally submerged. If flood condition exists, discharge of water cannot be accommodated within the margins of its normal channels so that the water spreads over adjoining ground upon which crop or forest are able to flourish. During the floods, the water fill up the channels submerge the cleft, destroy villages, farmlands and property.

Floods result from three main causes, climatological, partchiniatological and structural. Structural is our concern for the purpose of this project work. Structured disturbances which have come to stay as a result of construction such as the erection of building and road, which tend to prevent and obstruct the natural channel of storm water flow after rainfall.

In the areas of the activities of construction of roads and building in Bwari Area Council, flood phenomenon has not really taken place, but yet the awareness needs to be revealed to guide against such impending disaster.

CHAPTER THREE

3.0 LITERATURE REVIEW

3.1 INTRODUCTION

Environmental Impact Assessment represents a legislative or policy based concern for possible positive/negative, short/long term effect on our total environment attributable to proposed or existing project, program or public or private origin [Mitchel and Turkheim, 1977; 49]. According to Dorney 1977; 184 environmental assessment should at least provide the following functions when assessing the level of distortions by the construction industry or any proposed or existing development.

a) Identify and articulate the environmental goals and objectives of the project as related to the overall goals of the project.

b) Identify human concerns.

c) Describe the proposed action or impact.

d) Describe alternatives.

e) Describe what changes will occur without intervention.

f) Describe the nature and magnitude of environmental effects.

g) For any weighting or aggregating process of various environmental factors, provide a clear statement as to the values incorporated into the solution or recommended action.

h) Identify remedial action.

i) Identify any positive results that can be developed by direct or indirect spin-off from the project.

j) Identify any trade-off necessitated.

k) Develop a baseline inventory capable of conversion to a monitoring system.

The output of Environmental Impact Assessment studies is an Environmental Impact Statement (EIS).

3.2 THE PURPOSE OF ENVIRONMENTAL IMPACT ASSESSMENT.

3.2.1 *An Aid to Decision Making* :

Environmental impact assessment is a process with several important purposes. It is an aid to decision making. For decision-maker in a local authority, it provides a systematic examination of the environmental implications of a proposed action and sometimes alternatives, before a decision is taken. The ELS can be considered by the decision-maker along with other documentation related to the planned activity. EIA a normally wider in scope and less qualitative than other techniques, such as cost-benefit analysis.

3.2.2 *An Aid to the Formulation of Development Actions:*

Environmental Impact Assessment (EIA) provides a framework for considering location and design issues and environmental issues in parallel. It can be an aid to the formulation of development actions, indicating areas where a project can be modified to minimize or eliminate altogether its adverse impacts on the environment. The consideration of environmental impacts early in the planning life of a development can lead to environmentally sensitive development; to improved relations between the developer, the planning authority and the local communities, to a smoother planning permission process; and sometimes, as argued by developers such as British Gas, to a worthwhile financial return on the extra expenditure incurred (Breakell & Glasson 1981). O'Riordan (1990) lives such concepts of negotiation and redesign to the current dominant environmental themes of "green consumerism" and "green

capitalism". The emergence of a growing demand by consumers for goods that do not environmental damage, plus a growing manat for clean technologies, is generating a response from developers. EIA can be the signal to the developer of potential conflict; wise developers may use the process to negotiate "green gain" solutions, which may eliminate or offset negative environmental impacts reduce local opposition and avoid costly public enquiries.

3.2.3 *An Instrument for Sustainable Development:*

Another purpose of EIA which is centered and ultimate is to achieve a sustainable development. Development that does not cost the earth. Existing environmentally harmful developments have to be managed as best they can. In extremes cases, they may be closed down but hey can still leave residual environmental problems mitigate the harmful effects in advance, at the planning stage or in some avoid the particular development altogether. Prevention is better than cure. Economic and social developments must be placed in their environmental context the EIA to achieve sustainability in both.

3.3 PRE-PROJECT ANALYSIS:

Many techniques have been developed for estimating the environmental impact of proposed activities, the techniques varies from checklists overlays matrices and networks. It should be stressed, however that no single technique is perfect though each has strengths and weaknesses. A more realistic approach is to identify the relative merits of alternatives therefore combination of techniques can be chosen to meet the need of a particular problem.

In evaluating the merits of alternative techniques, it is desirable to make such assessments against an explicit set of criteria.

Ideally, an assessment technique should identify all of the impacts (primary and secondary) and indicate their timing and duration. Not only should individual impact be identified. Those arising from the interaction of two or more separate impacts should also be noted. Following identification, the technique should measure the magnitude (high, mediums, low) of the impacts with the magnitude known, the technique should then suggest the significance of the impacts. An impact with high magnitude may not automatically have strong significance. Conversely, a low magnitude impact should have serious social significance.

Each assessment techniques has its own increase comprehensiveness and accuracy, it may also have committed additional resources and sacrifice simplicity in presentation of results. Below are the assessment techniques.

3.3.1 *Checklists:*

Checklists represent the simplest approach to environmental impact statement. This normally include a range of items to be considered when preparing an assessment statement. The items on the checklists may be designed for general use or for a specific project. The general categories includes ecology, environmental pollution, aesthetics and specific has to do with human interest. In fact emphasis was upon primary rather than secondary or interaction impacts. The idea of the approach was to ensure that a broad range of consideration would be examined, and that key impact would be highlighted or 'flagged' there are various checklists approach for EIA.

Most checklists are used to ensure that important environmental considerations are not overlooked. That is, they focus attention upon

specific considerations. In their basic form, they do not consider the interaction, magnitude nor important of impacts. However, this type of information could be incorporated into a checklists. At their best, they draw attention to significant concerns. At their worst, they generate a voluminous amount of information which is not integrated into an overall plan of analysis.

Checklists of possible components of roads and settlement development projects.

a) Site Clearance

- Clearance of vegetation
- Removal of existing population
- Drainage or infilling of land
- Leveling and compaction
- Diversion of existing structures

b) **Construction**

- Transportation of construction materials
- Road and building and construction activities
- Use of heavy (noisy) machinery
- Introduction of temporary workforce
- Construction and use of temporary accommodation an access routes
- Disposal of construction waste, and wastes from temporary workforce.

c) **Operation/Use**

- Relocation of communities

- Increased population density
- Disposal of domestic and industrial waste
- Water supply and sewage disposal
- Generation of industrial air, water and noise pollution
- Increased traffic generating noise and risks of accident.

3.3.2 *Overlays:*

The overlay approach involves several phases, first phase the study area is divided into units based either upon a grid system, topographic features or different land use. Using aerial photography, topographical and resource inventory maps, field observation, public meetings and discussions with local scientific and cultural groups, data are collected for climate, historical geological, hypsography, hydrology, soils, plant associations, animals and land use.

Second phase, the eight categories of information are examined for their positive, negative or neutral effect on prospective development, o for the effect of development upon them. Once values have been decided upon for the eight categories, they are mapped on transparent overlays. Categories assigned high value are given a dark shading: intermediate values are coloured in gray; low values are lightly shaded or left clear. When the various overlays are superimposed, the cumulative effect of shading highlights those areas where impact would be the greatest and the least.

The overlays approach has many merits. It is simple and generates an effective visical display. The resource manager can implore the impact of proposed development by changing the values assigned to different overlay maps and by varying the number of features included in the analysis. The approach can be adapted for

computer analysis, with weighting and mapping done by a computer. The approach is not with limitations, however. It is application normally requires considerable information which may not always be readily available. Once data are collected, the overlay system can become confusing when large number of transparencies are superimposed. The shades of gray on different overlays produce an aggregate pattern which is either black or clear. Intermediate shades are obscured, and difficult to distinguish. The composite map also is a function of the values assigned to different features. This aspect can be a strength, allowing decision makers to identify different consequences when weights are varied. On the other hand, unless the values are made explicit, the investigator can predetermine results by the emphasis placed upon various features. When these strengths and weaknesses are balanced, it seems as if the overlay method is most useful as a 'first cut' technique to identify major areas of concern.

"In 1968, McHarg – first applied this approach to the location of an interstate highway. Separate overlays were prepared for topography land values, urbanization, residential quality, historic features, agricultural value, recreational value, wildlife value, water values and susceptibility to erosion. After the ten overlays were superimposed alternative routes were identified".

3.3.3 *Matrices:*

Numerous matrices have been developed for environmental assessment work (schlesinger and Datetz, 1973; Acgerter and Messerli 1983). Many of these build upon earlier studies which sought to develop framework to incorporate the ecological dimension into environmental planning and management. Matrices differ in sophistication, ranging from extension of checklists to

others involving several states or multiple dimension, regardless of level of complexity, they have several common characteristic, they tone consideration of the impact of each aspect of a proposal for a range of environmental concerns; and they consider both the magnitude and importance of impacts.

A matrix was designed to assess impacts resulting from a range of projects, matrix itself identified 100 project actions along one axis and 8 environmental conditions and characteristics on the other axis.

Matrix is used in the following manner. All actions which are part of the proposed development are identified. A slash is placed in each cell for which an action has a possible impact upon an environment characteristic or condition. (Table 3.1) in the upper left hand corner of each cell with a slash, a number from 1 (least) to 10 (maximum) is inserted to indicate magnitude of impact. In the lower right hand corner, a number from 1 (least) to 10 (greatest) indicates the importance of the impact. The number are not added, but rather are used to identify concerns arising from the interaction of project activities with the environment.

Leopold's checklist and identifies first-order interactions. The concepts of impact is broken into 'magnitude' and 'importance' components, a valid and important contribution Leopold's matrix suggest a direct cause and effect relationship which nearly occurs. Immediate and long-term impacts are not differentiated, although separate matrices could be prepared for different time periods. The list is heavily biased towards the physical biological environment (67 items out of 88). The scoring of magnitude and importance is left to the judgment of the assessor. Different assessors could produce different appraisals.

Unlike checklist, matrix ignored anything other than first-order impacts. Recognition of the complex patterns of interaction which occur in the real world lad other investigator to develop technique which emphasize network and the feedback among impacts.

Environmental Characteristic and condition	a-m							a – t	renewal a-e				
A. Physical and chemical xteristic. 1. Earth a. Mineral resources b. Construction materials c. Soils d. Land form 2. Water a-g 3. Atmosphere a-b 4. Processes a-l	a	b	c	d	e	f	m						
B. Biological condition 1. Flora a-t 2. Fauna a-l													
C. Cultural factors 1. Land use a-c 2. Recreation a-g 3. Aesthetic and human interest a-j 4. Cultural Status a-d 5. Man-made facilities and activities a-g													
D. Ecological relationship such as a-g													
Others													

TABLE 3.1 THE LEOPOLD MATRIC

(Leopold et al, US Geological Survey Circular 645, 1971)

3.3.4 *Networks:*

The intent of network techniques is to identify the chain of interaction which may be triggered by proposed development. In other words, networks recognize that identifying cause-and-effect relationships between project activates and environmental characteristics is not sufficient. A change in one environmental characteristic may lead to other environmental consequences. To illustrate, a large reservoir may change the micro-climate. Where vegetation has been existing near the margin of its tolerance threshold, a change in micro-climate may result in the demise of the plants. Without vegetation, the soil becomes susceptible to erosion, which is turn increases sediment levels in the reservoir and affects organisms in the water. It is such interactions in ecosystems that network techniques seek to trace.

While the need for network techniques has been recognized, they have proven difficult to develop. In this direction a 'stepped' matrix was developed to trace project and environment interactions. The matrix was also extended to counter the problem that 'conventional environmental matrices have, by and large, failed to recognize the dynamic nature of the environmental systems which they attempted to describe. Ecological modeling and interaction matrices can be combined to trace the interactions among biophysical processes and cultural stresses.

3.3.5 ***Comparison of the Techniques:***

Conceptually, the network approach is superior to those based upon checklists, overlays and matrices, regardless of the criteria applied. It identifies the magnitude of impacts, and may be used as a basis for determining their significance. Relationships between

project activities and environmental considerations are explicitly considered.

Investigators have turned to techniques which are conceptually less sophisticated but operationally more feasible checklists and/or overlays are often used during initial stages to identify environmental concerns. At subsequent stages, a matrix or simplified network approach is used to asses the consequences of development at a specific site. No matter what criteria are used in final evaluation, each technique has strengths and limitations. The investigation must pick the one, or combination, which most closely satisfies the context and needs for a given development proposal. (Table 3.2) show alternative techniques for environmental impact assessment.

S/N	TECHNIQUE	CHARACTERISTICS
1	Checklist	Present a specific list of environmental considerations to be investigated. Do not require the establishment of direct cause - effect links to project activities.
2.	Overlays	Rely on a set of maps of environmental characteristics (physical, social, ecological, aesthetic) for a project areas. The maps are superimposed to produce a composite picture of a regional environmental impacts are identified by noting the impacted environmental characteristics lying within the project boundaries.
3.	Matrices	Incorporate a list of project activities in addition to a checklist of potentially impacted environmental characteristics. The two list are related in a matrix which identify first-order cause-effect relationship between specific activities and impacts.

4.	Networks	Works from a list of project activities to establish cause-condition-effect networks. They recognize that a series of impact may be triggered by a project action.

TABLE 3.2 ALTERNATIVE TECHNIQUE FOR EIA

3.4 POST-PROJECT ANALYSIS

One way to improve predictions of environmental impacts arising from resource development is to study developments which have been completed. Studying environmental impacts after-the-effect is a specific application of evaluation research. Post project analysis has been used for many years and has been the focus for several international conferences.

Day et al (1977) suggested a general framework for the hindsight evaluation of environmental impacts. This framework involves stages. The stages involves:

3.4.1 *Values and Objectives:*

The social values and objectives underlying project actions should be identified. Without knowing original project objectives, the investigator normally cannot differentiate between intended and unintended effect.

3.4.2 *Project Environment:*

If environmental changes arising from a project is to be measured, benchmark data are needed. These data about the project environment are used in addressing two question? What would the environment have been like without the project? Which changes are attributable to natural and cultural processes, and which are due to the project itself.

3.4.3 ***Institutional Arrangement:***

This stage involves examination of legislation and administrative structures to determine responsibility for and constraints on actions. These aspects are labeled 'institutional arrangements'.

3.4.4 ***Project Actions:***

This evaluation of environmental project actions spelt the investigator document actual with attention to type of activity (construction, operation) as well as to time and monetary expenditure required.

3.4.5 ***Project Impacts:***

With the appreciation of all above-mentioned stages, it is then necessary to account for project impacts. The impacts may be biophysical, economic, ecological or social and should be classified either as primary or secondary. Intended and unintended effect should be differentiated. In this manner, the investigator traces as outlined in the network approach in pre-project analysis.

3.4.6 ***Project Process and Adequacy:***

After identification and description of project, it is then necessary to judge the adequacy of the project and the significance of the impacts. In accounting for (in)adequacy, the analysts should study processes which have influenced the development of the project. These may range over resource allocation, procedures, perceptions, attitudes and behaviour, institution arrangements and policy or decision processes.

3.4.7 ***Utilization of Findings:***

Finally, it is beneficial for the researcher/investigator to see in what manner their findings can be applied to improve project effectiveness.

The framework developed by Day et al (1977) indicates that resource development project usually create a complex pattern of impacts which may arise over an extended period of time. Gardner (1992 – 73) felt that impacts could be triggered at several stages of development, ranging from planning, contraction, operation, to termination he then called for a heightened historical temporal perspective in environmental impact research. Such perspective often can only be obtained by monitoring a project throughout its lifetime and then gained an insight that can be applied to estimating the impact of future project (Environmental Impact Statement).

Post project research has been conducted on other types of resource development such as energy resource, water resource, even though they have particularly revealing with regard to ecological and social impacts the fact is still remains that post project analysis of development offers a basis to investigator to decide what to do with natural vegetation and other environmental impacts that may arise in the future.

Post project analysis has the potential to aid environmental impact assessment in at least two ways.

a) By monitoring actual interaction over time, which should improve understanding of relationships and processes in the environment.

b) By experience and understanding acquired from earlier developments should make the design and implementation of nature one more effective.

3.5 ANALYSIS OF PROCEDURE

Analysis of procedure focus has considered the way in which environmental impact procedures are implemented. As impact assessment varies from one country to another, there has been continuously modification of the procedures, however, there is value in identifying the basic questions being posed and noting some investigations which have been alone.

A range of questions has arisen as researchers examine procedures in different countries. The following identify the general issues.

a) Under what terms of reference (legislation, administrative directive) are environmental impact assessments conducted? How do these terms of reference relate to existing legislation, regulations and policies.

b) What criteria are used to determine which projects receive an environmental impact assessment? Who or what agency determines the criteria?

c) What is the prescribed content for environmental assessment statements?

d) Who, or which organization, is responsible for arranging and carrying out the environmental impact assessment for a project?

e) Who decides which projects are assessed?

f) Who decides whether an environmental impact statement is adequate?

g) Who decides whether a project will be approved or stopped?

h) What role does the public have in the environmental impact assessment procedure?

i) How many environmental impact assessments have been conducted? What types of projects have been studied.

j) How much time is required to complete an environmental impact statement?

k) How much has it cost to conduct assessments in terms of total project costs and/or pre-project feasibility costs.

l) How many project have been rejected as a result of environmental impact assessment? How many project design have been altered, and what adjustments have been made?

m) To what extent have environmental controls, recognized during the assessment process, been implemented and enforced.

In United State, environmental impact assessment was formalized by National Environmental Policy Act of 1969. the approach was based upon legislation and the courts, generated a large number of environmental impact assessments and lawsuits.

In Britain, British took matters by administrative route rather than passing legislation specific to environmental assessment. With this approach in Britain, it is considered that all government departments would be expected to consider environmental aspect as one of many variables when making decisions.

In Canada, Canadian jurisdictions rejected specific environmental assessment legislation because of a fear of generating an avalanche of assessments which would overwhelm the courts. Then, at Federal level, the procedures given considerable discretionary power to the minister

concerning which project are assessed, what information is disclosed and what role the public may have.

Appraisal of procedure for environmental impact assessment represents a significant research area. Ideas and concepts which appear conceptually sound may not be effective if they are not well implemented. The transition from conception to implementation of ideas is fraught with difficulties which often can only be identified and assessed by detailed studies of actual procedures and operating practices.

In Nigeria, the output of Environmental Impact Assessment (EIA) studies for either give or post project development is an Environmental Impact Statement (EIS). There are two legislations that provides for the execution of EIA studies under certain conditions. These are the Federal Environmental Impact Assessment Decree No. 86 of 1992, official gazette No 73, vol. 79 December 31 and Nigerian Urban and Regional Planning Decree No. 88 of 1992.

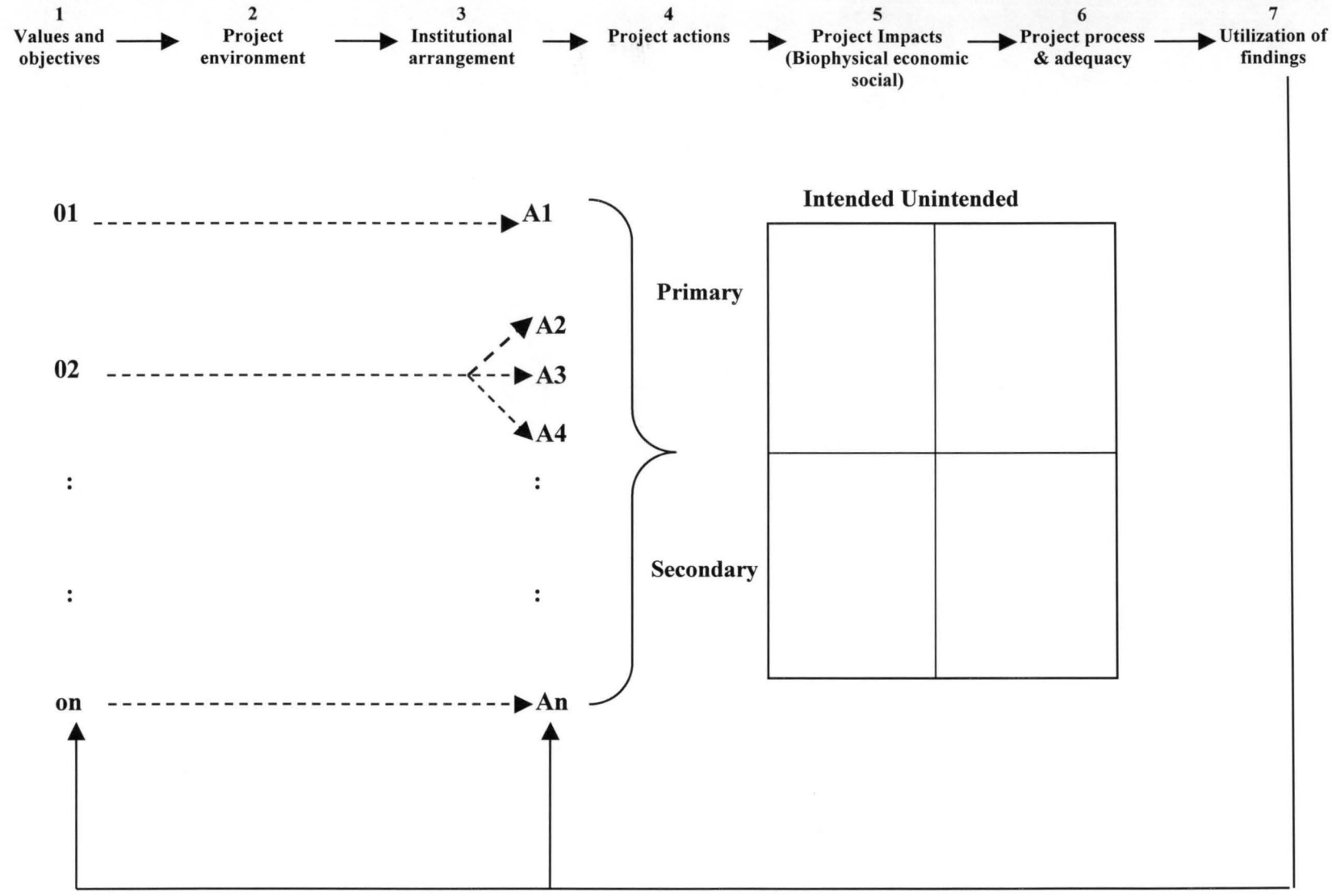


TABLE 3.3 EVALUATION PROCEDURES

(Day et al, 1977)

3.6 THE ENVIRONMENTAL IMPACT ASSESSMENT DECREE NO. 86, 1992.

The Environmental Impact Assessment (EIA) Decree No. 86, of 1992 among other things, sets out the procedure and methods to enable the pour consideration of environmental implications of any proposed public or private projects or development. The Decree also gives specific powers to FEPA to facilitate environmental assessment on projects. The objectives of the EIA Decree are:-

a) To take into account, before embarking on any project o activity, the likely impacts and the extent of these impact on the environment.

b) To promote the implementation of appropriate policy in all Federal Lands consistent with all causes and decision making processes through which the goal of this Decree may be realized.

c) To encourage the development of procedures for information exchange, notification and consultation between organs and persons when the proposed activities are likely to have significant environmental effects on boundary or translate or on the environment of bordering towns and villages.

3.7 THE OBJECTIVES OF THE EIA STUDY

a) To establish the baseline ecological conditions (sediment and benthic characteristics and the water quality) of the study area.

b) To establish the environmental and socio-economic sensitivities.

c) To identify, evaluate and predict the impact of the project on the ecological and socio-economic settings with adequate interfacing and project interaction;

d) To develop control strategies with a view to mitigate and ameliorate significant impacts the project would have on the totality of measurable marine environmental characteristics;

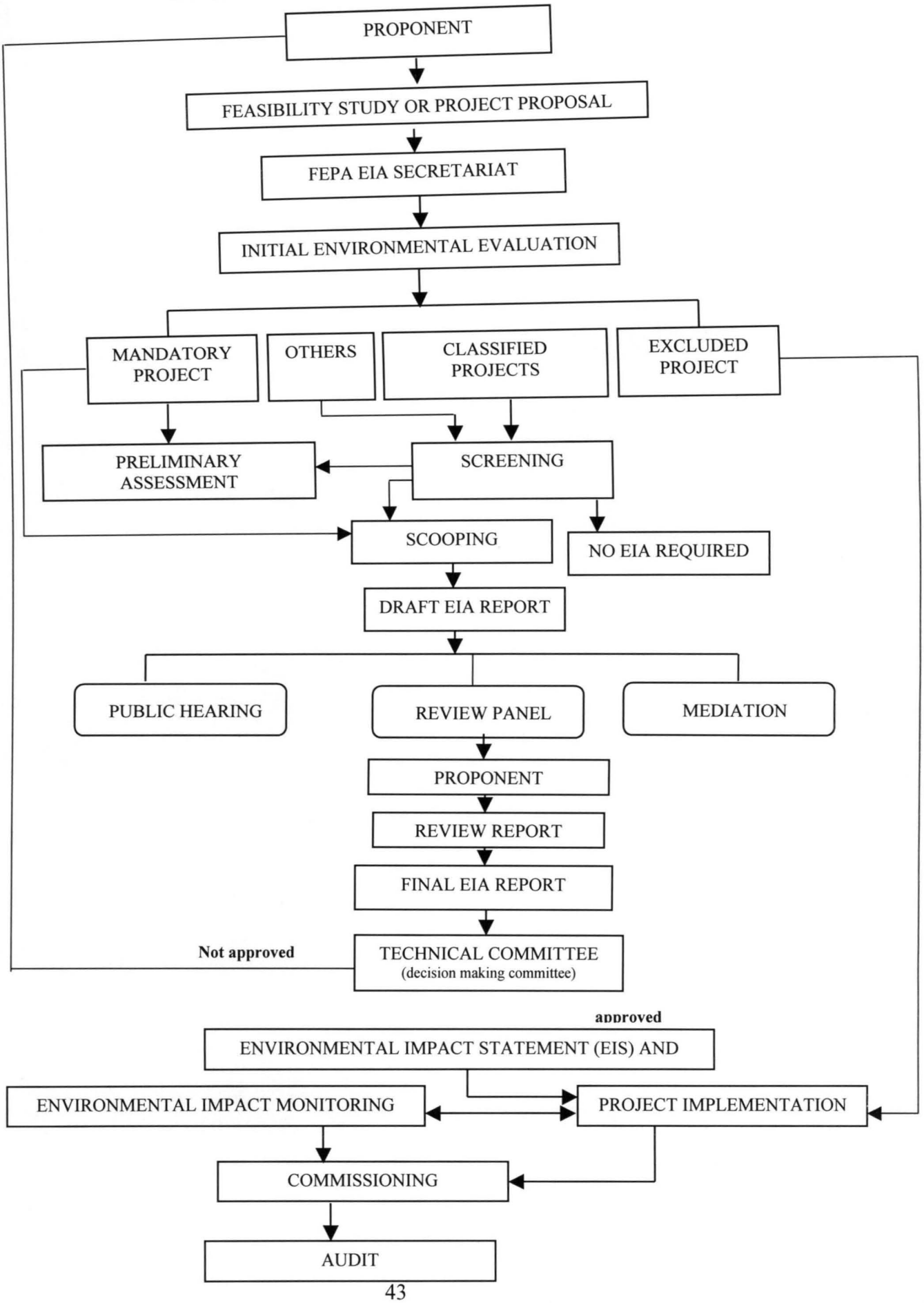
e) To provide modeling and simulation of accidental activities of a development.

f) To develop an effective environmental management plan for the project.

g) Assist project design and planning by identifying and decommissioning which may cause adverse environmental, social, health and economic effect to the immediate environment.

h) Identifying any environmental issues and concerns which may in the future effect the development.

FEPA FLOW CHART FOR EIA PROCEDURE



CHAPTER FOUR

4.0 RESEARCH METHODOLOGY AND DATA ANALYSIS

4.1 RESEARCH METHODOLOGY

The articulation of this project work is based on data collected from both primary and secondary sources. The direct, personal observations made at project sites, in terms of physical damage done on the environment, forms the primary source of data, together with verbal discussions through personal interviews which was conducted amongst the officials of works department of Bwari Area Council, people living around the project site, and project contractors.

While responses for the study were obtained from questionnaires issued to respondent, sampled within the officials of Bwari Area Council and people living around the project site of the Area Council using cluster systematic and sampling random techniques.

The secondary data were from library researchers from magazines, journals, commissioned reports, seminars papers and textbooks on the matter pertaining to this study.

4.2 DATA ANALYSIS

4.2.1 *Questionnaire:*

This principally sought information in the carrying out Environmental Impact Assessment studies of project within the area council, and studying possible effect of the activities of construction industry on the environment to those living around the project sites. The questionnaire were administered in two separate paper – one administered to the officials of Bwari Area Council and other to those living around project sites in the town and villages in the Council.

Below figured present the tabulation response of the respondents.

APPENDIX I: *Questionnaire administered to the officials of BAC and responses.*

Question	Alternatives	No of respondents	% of Respondents
Those living within Bwari Area Council	Yes	40	100
	No.	-	-
Total		**40**	**100**

Question	Alternatives	No of respondents	% of Respondents
Those council officers that worked in construction company before.	Yes	38	95
	No.	2	5
Total		**40**	**100**

Question	Alternatives	No of respondents	% of Respondents
Are this construction company environmental conscious?.	Yes	36	90
	No.	4	10
Total		**40**	**100**

Question	Alternatives	No of respondents	% of Respondents
Construction that conduct EIA studies before or after project	Yes	3	7.5
	No.	37	92.5
Total		**40**	**100**

Question	Alternatives	No of respondents	% of Respondents
Whether the council conduct EIA studies or not	Yes	-	-
	No.	40	100
Total		**40**	**100**

Total number of circulated questionnaire 50

Total number of respondent 40

APPENDIX 2: *Questionnaire administered to those living around construction site and responses*

Question	Alternatives	No of respondents	% of Respondents
Those living around construction site	Yes	90	100
	No.	0	0
Total		**90**	**100**

Question	Alternatives	No of respondents	% of Respondents
Those disturbed by the activities of construction company	Yes	86	96.56
	No.	4	4.44
Total		**90**	**100**

Question	Alternatives	No of respondents	% of Respondents
Those that thinic construction company pollute the air.	Yes	88	97.78
	No.	2	2.22
Total		**90**	**100**

Question	Alternatives	No of respondents	% of Respondents
Those that believe erosion, deforestation are product of the activities of construction company	Yes	86	96.56
	No.	4	4.44
Total		**90**	**100**

Question	Alternatives	No of respondents	% of Respondents
Those that believe that construction companies are environmental conscious.	Yes	10	11.11
	No.	80	88.89
Total		**12**	**100**

Total number of circulated questionnaire - 100

Total number of respondent - 90

4.2.2 ***Oral Interview:***

Oral interview as part of field survey entails asking relevant questions about the environment and carrying out environmental impact assessment. Responses were above arranged, when interviewed. The data stated below were extracted.

- That Bwari Area Council has no environmental management unit.
- That they have never carried out environmental impact assessment studies unless only assessment of payment of compensation to which a development affected.
- That Bwari Area Council carried out such construction works with no significant on the environment.
- That many construction companies pretend to be unaware of the environment because of the money involve in carrying out EIA.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Conclusively, it is pertinent to report here that conducting Environmental Impact Assessment Studies before carrying a minor and major construction work could greatly reduce Bwari geo-environmental degradation and in Nigeria at large. It is indeed one of the most important tools for achieving sustainable roads and settlement development. The finding actually revealed the existence of the agencies and laws for an enabling sustainable construction practices but for their non-functional and implementation. For example, the Abuja Environmental Protection Board do not in practical terms have access to evaluate the Environmental Impact Assessment (EIA) of any construction project before they are implemented or carrying out monitoring and assessment studies after the project.

On the other hand, the construction companies apart from not being well educated concerning environment, are rather scared of involving environmental management in the execution of the project for the fear of cost and also even though the general public remoteness of the impact of roads and housing construction as a way of sensitizing the government into its responsibility.

Finally, as far as the Area Council is concerned there exist no environmental management unit where when project is to be executed, the impact assessment could be carried out. Moreso, most jobs carried out by the council are such minor job which has little or no impact on the environment, nevertheless inculcation of environmental education be encouraged at all levels of government to create awareness and give room for such assessment for sustainable environment. In addition, both the government, the construction companies, professional bodies and the

general public in Abuja and Nigeria need to be oriented concerning the importance for sustainable development through sustainable construction and courtesy of conducting Environmental Impact Assessment Studies for pre and post project.

5.2 RECOMMENDATIONS:

Environmental degradation affects all nations of the world of which Nigeria would not be an exception especially in the project study area. Whether we like it or not the world is at turning point and the environment cannot further allowed deterioration. Therefore the following recommendations are proffer to reduce, instigate such effect which may be arising from any construction or resources developments.

a) Human Development Index (HDI), these connote creating awareness and education about the environment. There firstly should be massive conscious awareness and education through all forms of avenue regarding the importance of impact assessment studies of project, so that both construction companies and government personnel be fully conscious of the study.

b) Proper implementation of the set objectives of the provision of Environmental Impact Assessment Studies decree of number 56 of 1992 as they relate to construction be ensured, by strengthening her effort to promote sustainable construction.

c) The Government should as a matter of basic principle, ensure that project assessment include environmental and social cost, that the relationship between a community and if environment be considered as an integral part of sustainable development.

d) That professional bodies like the Nigerian Institute of Building (NIOB), Nigeria Institute of Quantity Surveyor (NIQS), Nigerian Institute of Architects (NIA), Nigeria Society of Engineers (NSE), Institute of Environmental Management (IEM) etc. be involved in creating increasing awareness on the importance of Environmental Impact Assessment Studies through seminars, workshops, technical exhibitions for increased sensitization and development of improved sustainable construction.

e) In order to promote understanding of the essential linkages between the environment and development, government should step up increase learning of environmental education across the three levels of education institution in the country.

f) At corporate level, environmental management practices in construction should be made a pre-selection criteria for contract placement. Only construction firms which have the required know – how to implement environmental management system will be selected to execute project with significant environmental impact. Sanctions, fines, penalty for non-compliance with environmental guidelines should be strictly enforced as a sign of Government commitment to the implementation of environmental laws.

g) Government should take bold step to establishing reliable, achievable and measurable environmental management unit at federal, state, local and word level of government.

h) Construction plants should have device to prevent excessive loads being execrated, attenuate noise and vibration noxious-gases fumes, particulate fosse-fuel consumption and spillage.

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RESEARCH QUESTIONS

This study is structured to explore the conducting of environmental impact assessment studies by a construction firm before any development for sustainability. Using the following research questions which formed the bases of my personal interview with the various professionals.

a) Are our construction professionals environmentally conscious?

b) Do environmental consultants from part of our project development and implementation team?

c) Do we lack environmental knowledge?

d) How can construction company be made environmentally conscious?

e) Do construction company carry out environmental impact assessment studies before executing a project vis-a-vise Bwari Area Council?

f) How can construction activities be laid out, administered to damage to existing sensitive developments and eco-system, enhance safety and reduce injuries and death to work force and the general public?

g) Can alteration to natural vegetated surface be managed to modify loss of Albedo surface roughness, thermal and hydrological properties?

h) Should all environmental laws be strictly implemented or formulate tougher environmental laws?

APPENDIX 1

QUESTIONNAIRE FOR THE ASSESSMENT OF THE CONDUCT OF ENVIRONMENTAL ASSESSMENT STUDIES OF CONSTRUCTION ACTIVITIES IN BWARI AREA COUNCIL (ISSUE TO THE OFFICIALS OF B.A.C.).

NAME: _____

AGE: _____

PROFESSION: _____

RANK: _____

ORGANIZATION: _____

NOTE: Please mark ☑ where appropriate and comment where necessary.

1) Do you live within Bwari Area council? Yes☐ No ☐

2) Have you worked in a construction company before? Yes☐ No ☐

3) If yes, for how many years? Yes☐ No ☐

4) Is the company environmentally conscious? Yes☐ No ☐

5) If no, is it because of lack of awareness about the environmental? Or _____ Yes☐ No ☐

6) If yes, do they conduct environmental impact assessment studies for projects? Yes☐ No ☐

7) For how long have you being working in the Area Council? Yes☐ No ☐

8) Do the council conduct environmental impact assessment studies on project? Yes☐ No ☐

9) If yes, on which road network or housing estate?_____ Yes☐ No ☐

10) If no, give reason? _____

_____

11) Should the environmental laws be properly implemented? Yes☐ No ☐

APPENDIX 2

QUESTIONNAIRE FOR THE ASSESSMENT OF EFFECT OF CONSTRUCTION PRACTICE ON THE BWARI ENVIRONMENT (ISSUE TO PEOPLE LIVING AROUND CONSTRUCTION NEIGHBOURHOOD)

NAME: _____

AGE: _____

PROFESSION: _____

RANK: _____

ORGANIZATION: _____

NOTE: Please mark ☑ where appropriate and comment where necessary.

		Yes☐ No ☐
1)	Do you live around any on going construction site?	Yes☐ No ☐
2)	Have you ever been disturbed by the activities of construction company?	Yes☐ No ☐
3)	If yes, then do you think the construction company's pollute our environment with noise, dust, spillage of fossil fuel?	Yes☐ No ☐
4)	Apart from pollution, are there any other effect of the activities of the construction company on the environment?	Yes☐ No ☐
5)	If yes, in your own opinion, could erosion and deforestation be an impact of this activities?	Yes☐ No ☐
6)	If no, state any impact known to you?	Yes☐ No ☐
	_____	
7)	In your own opinion, are the construction company environmental conscious?	Yes☐ No ☐
8)	If no, suggest ways to make them conscious of the environment	

_____

_____

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