THE CONSTRUCTION INDUSTRY AND THE NIGERIAN ENVIRONMENT A CASE FOR SUSTAINABLE DEVELOPMENT

IN
ABUJA (FCT).

By

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

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 Ibecheole Julius U.N.O with istration number PGD/GEO/98/99/040 of the Department of Geography, Federal iversity of Technology Minna, and accepted for the award of a Post Graduate Diploma Environmental Management.

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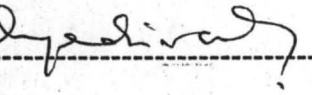

XTERNAL EXAMINER ~~& SIGNATURE~~ — DATE

DEDICATION

To God Jehovah Raah: The Lord my shepherd.

And

To Mr. Godfrey & Mrs Regina Ibecheole, My Parents.

ABSTRACT

This project is focused on the concept of sustainable Development. It views sustainable development as synonymous with sustainable construction, that is green construction or an environmentally minded construction practice. It x-rays the level of greening of construction practice in Nigeria, more especially in FCT Abuja, as a test of prove for these work. It also offers me a platform, for a pen-chart in being a clinician rather than a contributor to the already deteriorating Nigeria Environment, through the various recommendations for the enforcement of environmental standards and guidelines for critical civil construction activities and the application of environmental management in construction as a pre-requisite criterion for tangible civil construction practice in Abuja and Nigeria at large.

ACKNOWLEDGEMENT

I earnestly make grateful acknowledgement of Mrs. A.E Odafen, my supervisor for her constructive criticism and meaningful directives in the course of this work.

M.T. Usman (Ph.d) my co-ordinator for creating the enabling environment for the achievement of this project. My head of department and every other lecturer of the department of geography for their tutorial support.

Eng. Joe Chukwukelu my bosom friend and brother in Christ, who the Lord has used tremendously to ensure my attainment of this programme.

Finally to all my course mates, friends and person (s) whom I came in contact with over this project for their understanding and help.

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CHAPTER ONE

1.1 INTRODUCTION

A clean and healthy environments is a basic resource which is becoming scarce. The world's environment is in great danger as the rate of environmental deterioration is accelerating with the expansion of the industrial revolution and will culminate in all ecological disaster of an unimaginable proportion if urgent remedial measures are not taken to protect the environment.

Nigeria as a developing country, has urgent need to pursue both economic and social welfare developments. These development in part depend on the level of her economic, physical and social infrastructures and their environment sustainability. Until now the construction of our socio-economic and physical stocks have not been environmentally sustainable. Structures have not been assembled in environmentally benign manner, because their planning, design and documentation do not embody green consideration. Pollution of the environment by way of excessive noise, vibration, particulate, over-hurdled traffic, site dereliction, spillage of fossil fuel, fouling of surrounding waters, emissions of noxious gases, threatening of eco-systems and increasing disregard for health and safety of the public and work people, characterises the construction practice in Nigeria.

The Nigerian communities have become sensitive. This is evident from the increasing environmental reactions. The contention seem to be that communities socio-economic, cultural and political needs for survival should not be traded in for economic-driven environmental projects. Rather, both

should mutually and symbiotically co-exist. The Nigerian environmentalists and the rational public are asking for a mutual balance of ecology and man-made artifacts, to avoid over-manipulation and damage to the environment. The quest is for sustainable development, a development which will address social-infrastructure needs while exercising care to minimise potential negative impact. A development which would meet the needs of the present without compromising the ability of future generations to meet their own needs. It is my belief that such sustainable development rests on a pivot of green construction, which represents innovative, pragmatic, adhoc responses to the day to day environmental problems of construction projects.

1.1 AIMS AND OBJECTIVES

The aim of this project is to update the symbiotic existence between the construction industry and the Nigerian Environment. Using Abuja as a case study, with a view to high-lighting how best to synthesis this relationship for more sustainable development in line with the following, ~~using this~~ set objectives, to:

- establish the degree to which green techniques are exercised in Nigerian construction
- identify any problems(s) militating against the implementation of green construction and
- make recommendation based on the findings.

1.2 PROJECT PHILOSOPHY

The issue of sustainable development, actually may not have been a new concept in the world after all, as record dates back to 1987 of Brundtland commission's Report, lunched in London where it was first presented to the United Nations General Assembly as a way of exposing the fundamental challenges to human survival as it affects human, economic socio-economic activities and environment.

Hence, today this project work, has found relevance of the opinions and concerns of the likes of Erhlich et al, as it forms the pivot upon which this work is lied.

And I quote as follows:

"We are moving into a period of chronic, global and extremely complex syndromes of ecological and socio-economic interdependence. These emerging syndromes threaten to constrain and even reverse progress in human development. They will be manageable if at all only with a commitment of resource and consistency of purpose that transcends normal cycles and boundaries of scientific research and political action" (Clack and Holing 1985).

"While the intelligent application of technology fosters human wellbeing directly, a reducible but not removable burden of environmental disruption by the technology undermines wellbeing. This negative burden includes the direct effects of technology's accidents and effluents on human life and health"….. (Erhlich, et al 1970)

"States shall enact effective environmental legislation, Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply"..... (- Principle 11 of the Rio declaration 1992)

1.3 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 civil of construction in Nigeria more especially in Abuja, 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.

1.4 SCOPE OF THE STUDY

This dissertation work is a response to the growing concern about the state of the Nigerian Environment with regards to the ever-increasing distortion of this sector, due to impacts of civil construction which is not environmental benign. Hence, the scope of this study shall cover such area of interest as the dynamics of the natural environment, urban infrastructure development. Formation and integration of policies and recommendations for a sustainable development via a sustainable construction practices.

1.5 RESEARCH CONSTRAINTS

This work could not have been effectively done without experiencing any form of constrains at one level or the other, more so that most government and private agencies responsible for both the construction industry and the Nigerian Environment do not have a reliable database for resource material. Added to the fact, that the focus of this work (sustainable development through sustainable construction) is more or less a virgin concept, hence, leaving one with limited sources of data. Above all, the reluctance of most private companies in the construction industry, in offering reliable information as they fear any possible exposure.

1.6 EXPLANATION OF IMPORTANT CONCEPT

Sustainable Development:- This is simply a development which will address social-infrastructural needs, why exercising care to minimise potential negative impact.

Sustainable Construction:- This term refers to civil construction practice which explore the application of techniques in constructing for green construction.

Green Construction:- This term refers to any civil construction practice which is environmental friendly, i.e benign construction which has the value of the environment as the underling principle from the conception, design, implementation to maintenance stage.

CHAPTE TWO

2.1 ABUJA

Abuja, which is the New Federal Capital City, came into existence on 12th of December 1991. This came to be as a result of the recommendation of Late General Ramart Murtala Muhammed's panel to examine the question for a new capital for Nigerian in all its ramification.

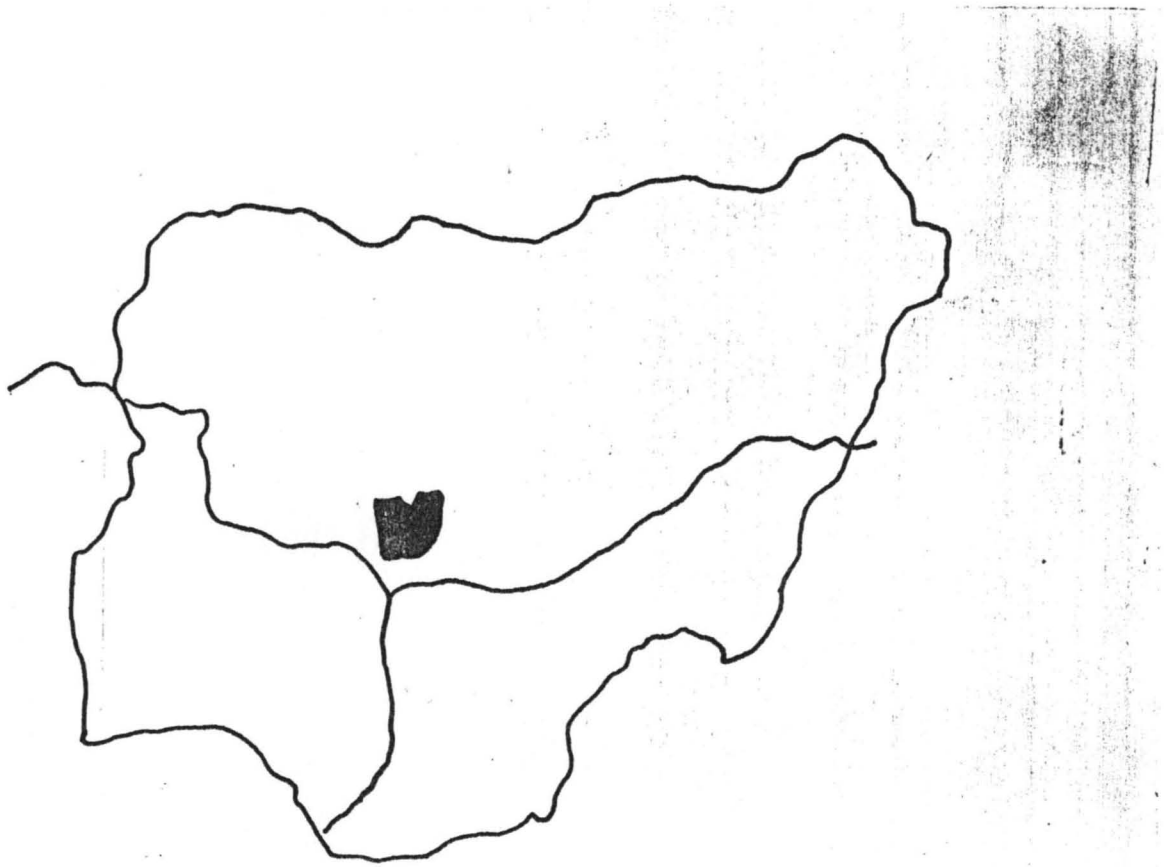

Figure 2.1 Map of Nigerian showing Abuja

(Source Abuja Hand Book)

2.2 PHYSICAL ENVIRONEMENT

2.2.1 Location: Abuja is located in the centre of Nigeria. It is bound on the North by Kaduna state, on the West by Niger State, on the East and South-East by Nassarawa State and on the South-West by Kogi State. It falls within latitude $7^0$25'N and $9^0$20' North of the Equator and longitude $6^0$45' and $7^0$39'.

2.2.2 Climate: Abuja composes of rolling 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 nether too hot nor too cold all round 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-Benue trough gives Abuja a heat trap effect.

Rainfall in the FCT reflects the territory's location on the windward side of Jos Plateau and at the Zone of rising air masses. The annual total is in the range of 1100mm of 160mm The duration of the rainy season, however decreases from about 240days 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 territory has between 1797 mm to the south and 1277mm to the North and actual evapotranspiration is well over 1000mm.

2.2.2.1 Vegetation: The area now designated Federal Capital Territory falls within the Savannah zone vegetation of the west African Sub-region, patches of rain lowest, however, occur in the Gwagwa plains, especially in the gullied terrain to the south and the rugged south eastern parts of the territory.

These area of the FCT form one of the surviving northern most occurrences of the mature forest vegetation in Nigeria.

The dominant vegetation of the territory is, however, classified into three Savannah types.

i. Park or Grassy Savannah occupies about 53 percent (i.e 42311 km) of the total area of the FCT. The vegetation is annually and only a few tree species are found among the grases, namely, Albizia, Zypia, Butrospermum paradoxum, Daniellia Oliveri and Parkra Clappertoniana.

ii. Savannah woodland occurs mostly in the rugged and less accessible parts of FCT especially on the Gurare, Ribo and Rubochi plains and surrounding hills. They cover 12.8 percent or 1026 km of the territory. The more common trees include afzelia african, anogeissus leiocarpus, butyroscorpus paradocum, deniellia Oliveri, Khaya Senegalerisis, prosopis Africana, Unpaca togonesis, albizia, Zygia, Vitex doniani, bombax costatum and pterocarpus erinaceus.

iii. Shrub Savannah Occurs extensively in rough terrian close to hills and ridges in all parts of the territory. It covers about 12.9 percent or 1032km of the land area.

The patches of rain forest contain such tree species as antaris africana, authocleista nobila, ceiba pentandra, Cola tigautea, celtis spp. Chlorophora excels (iroko), Khaya grandilolia (Benin mahogany) trminabia superb (afara), triplochiton sclerocylon, and draceana arborea, indeed, certain tree species normally associated with wetter parts of the patches, e.g piptadeniatrum africannu (agboin), Cophira alata (ekki) and terminalia ivorensis (idigbo). However, the rain forest patches constituted only 7.4 percent (592km) 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 woodlands yield high quality timber e.g anogeissus leiocarpus, daniellia oliveri, khaya senegalensis and pterocanpus, arenaceous.

A view of the present state of these vegetation cover reveals the negative effect of civil construction on the Abuja Environment. To be specific, the following defects are prominent amongst others

Plate 1 Picture Showing Vegetation cover in Abuja

2.2.2.2 Deforestation: The role of deforestation in global environmental dynamics is gaining increasingly, ranging from small village community in developing countries to international summits in developed nations. The expansion of the data base on the scale and rate of deforestation in recent years has evolved serious concern from the world public to the extent that there is now a growing perception that deforestation in one of the most pressing contemporary environmental problem in Nigeria and which is gaining an unobserved dimension. Deforestation is the indiscriminate falling of tress 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 consequency of civil construction brought about by the need for socio-economic infrastructure for development as a result of urbanisation and population pressure which is the most important direct factor causing large scale deforestation mostly in developing countries to which Nigeria is one; most especially in Abuja, that is currently the largest construction industry in Africa (Construction digest October, 1998). The entire landmass is devoid of its natural vegetation cover espousing the occupants to hazardious weather conditions such as increase in atmospheric carbon dioxide with the subsequent rise in temperature, decrease in rainfall, increased soil erosion and decline in soil fertility to the loss of species and biodiversity lowering of the water table, deforestation of ecological balance and increased rate of evaporation due to exposed soil.

Plate 2 Picture Showing Effect of Deforestation in Abuja

2.2.2.3 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 ozon 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 effect 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 is Abuja (UNEP Report 1998) The impact of civil construction, as the major contributor to this phenominum 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 radient 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 buildings. 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 construction are better imagined than experienced for their devastating effect on plant and animals, as today Abuja ranks as one of the hostest cities of the world (Meteorological Department - Ministry of Aviation Abuja 1999).

2.2.3 Geology: Apart from climate, topography and vegetation, the underlying rocks score the most essential factors in understanding the native and spatial distribution of soils in FCT. There are two broad geological provinces, namely the sedimentary belt in the southern and south-western extremities of the territory and the pre-cambrian Basement complex rock country which accounts for more than 80 percent of the territory. The state of these features are grately being threatened by such defects as Erosion, and flood.

2.2.3.1 Erosion: The process by which the surface lager 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 as erosion occurs in several parts of Nigeria under different geological, climatic and soil condition, occurs in various degrees throughout the country and Abuja is no exception. However, considering the impact of civil construction in Abuja, one realises that there are two basic consequences of civil construction which gives 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-breaks or canopy over the ground surface, against both common course of erosion (i.e water and wind erosion) are destroyed without any replacement. Secondly the construction of very high pitched roofing system which give rise to high frequency rate of water fail from the roof covering, hitting the ground surface with an impact of gully erosion which can not be obliterated by tillage as may be achieved in other cases, and also concrete channeling of drains, as seen from the picture below.

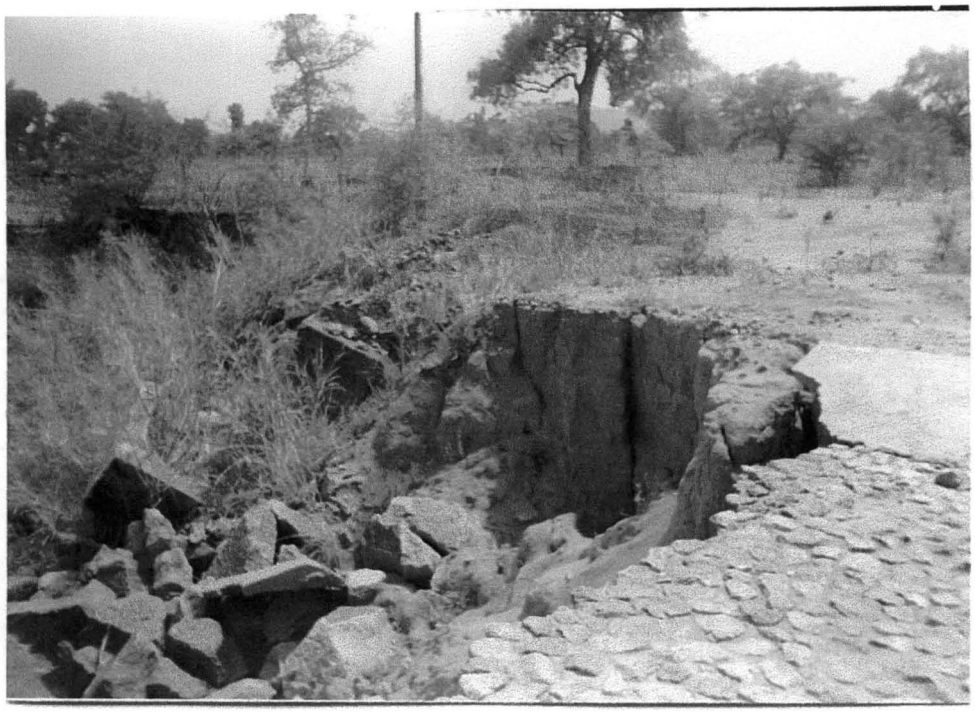

Plate 3Picture Showing Erosion Effect due to the Impact of Construction

Thirdly the indiscriminate excavation of sand and rock stones for hard core and gravel from the land environment, without any attempt at maintaining or back filling such site. This in no small measured contributed drastically to the menace of soil erosion in Abuja which in itself is an indirect consequence of construction practice.

2.2.3.2 ***Flood:*** Among all natural disaster, flood produces some of the highest death toils and material damage. A flood is regarded as any relatively high water level or discharge above an arbitilariry selected water level or water discharge. Hence, a general definition of 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 cliffs destroy villages, farmlands and property,

water logging, be it seasonal as in the flood plains of the Niger or tidal as in the breakish water swamps in the mangrove environment of southern Nigeria causes hydromophision and bad soil accretion. Soils that experience these fluctuating water regimes are very difficult to manage. They are intensively eroded on the river banks in the farmlands, they are removed by sheet wash, will wash and gulling. Floods result from three main causes, namely chimatological, partchiniatological and structural. Structural disturbances which have come to place as a result of civil construction such as the erection of building and road which tend to prevent and obstruct the natural channel of storm water flow after rain falls which is a common feature in Abuja and the failure of dams which are designed to constrain water are the most source of flood in most urban cities as in Lagos and other major developed towns of Nigeria. The effects of flooding may be primarily caused by flood or secondarily by disruption and malfunction of services and system associated with flood. Primary effect included injury and loose of life and damage caused by swift currents debris and sediment to farms, homes, buildings, railways, bridges, roads and communication systems. Erosion and deposition of sediment in rural and urban landscape may also involve of considerable soil vegetation while the secondary effects, may include short term pollution of rivers, hunger and disease and displacement of persons who lost their homes.

2.3 HUMAN EVIRONMENT

Settlement: settlement Patterns concern the distribution of human habitation in groups in various forms of villages, towns and hamlets in a given region or environment. The settlement pattern of the indigenous rural communities in the FCT are nucleated type and scattered in plains and

inselbergs. Typically, a village is made up of wards or harmlets, while a word is made up of households, which are usually closed up in security and defence purpose. Few narrows passages between wards left as street. An open space is left in front of villages head residence as a village square for festivals.

The master plan divides the Abuja city into sectors. Each sector is divided into districts, the sectors are fashioned in such a way that each sector should accommodate a population between 100,000 to 250,000 each. The development of the city is in four phases. Phase one of the city consists of the central Business District, the three Arms Zone comprising of the offices of the presidency, National assembly, and the judiciary, Maitama, Wuse I, Wuse II, Garki I & II and Asokoro Districts. While Phase II consist of Katampe. Ncabushi, Utako, Wuye. Dummi, Gudu, Jahi, Kado, Jabi Dakibiyu, Kaura, Duboyi, Gaduwa, Dutse and Kukwaba national park. The detailed land plan for phase III & IV are not yet prepared: expect for Garimpa II one of the proposed northern districts of phase III.

With the Nigerian Federal Structure which revolves around three tripods: the Federal, State and Local Government, Abuja as one of the state of the federation according to the 1979 constitution is not left out of the provision of grassroots administration which is carried out by the local government councils hence, there are six area councils which are namely.

1. Municipal Area Council, with headquarter at Wuse.
2. Abaji Area Council, with headquarters at Abaji.
3. Bwari Area Council, with headquaters at Bwari.
4. Gwagwalada Arae Council, with H.Q at Gwagwalada]
5. Kwali Area Council, with headquarters at Kwali
6. Kuje Area Council, with headquarters at Kuje

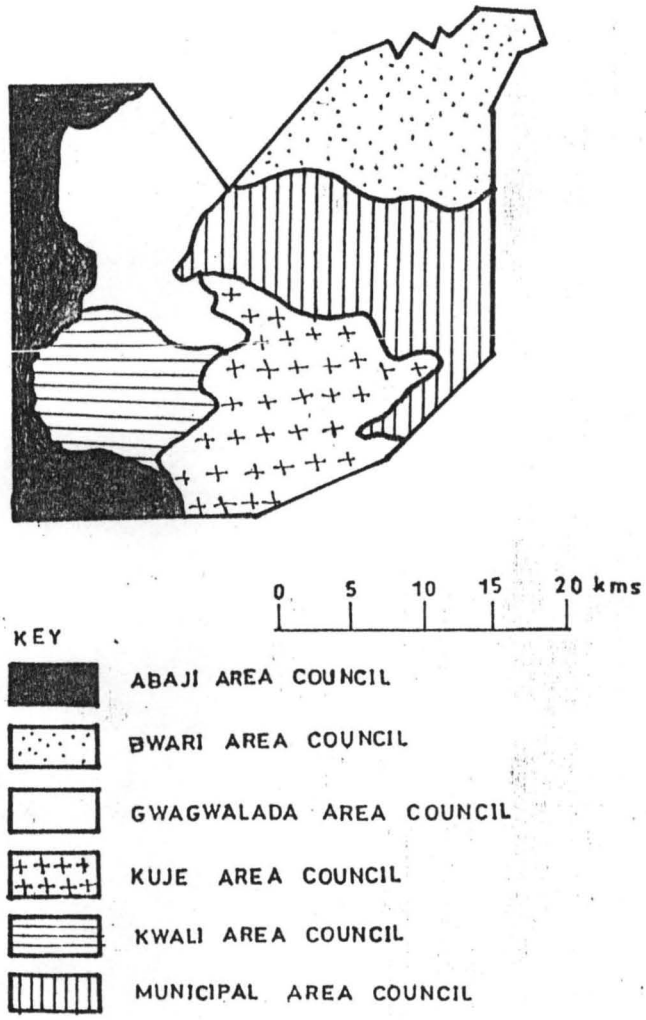

Figure 2.3 Map of Abuja showing the six area councils (Source: Abuja Hand Book)

Population/Distribution

Development is always about human beings the hung railways, the utra-modern airports and sky-scrappers, all serve human purpose. However, there

has to be a healthy balance between the resource and the rate they are depleted, hence the need to have a reasonable level of population growth.

The master plan for the Federal Capital Territory adequately took into account the need for systematic growth. It also took into consideration elements of the Nigerian City tradition, making room for flexibility as well as reflecting the symbolism of the city. It provides a general frame work of development within which planing for various systems and sectors can continue, making allowance for changes and uncertainties. As prepared and approved by government the master plan put the ultimate population of the city at three million inhabitants. This means that the congestion, characteristic of many large cities especially capital cities in the developing world is likely to be reassuming, but absent for a very long time to come. However, the situation now on ground is almost alarming as the phase 1 is already three times over populated as government had not been able to open up the phase II for further development. 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 states of the federation, hence the actual population at this time is not available, but reference is still being made to the 1991 census figure of 371,674.

Infrastructural Development in Abuja and the Agency and Companies responsible: The provision of infrastructure in the capital city which is the sole responsibility of the Federal Capital Development Authority (F.C.D.A) can be said to have measured about 80% within the phase I which is the Federal Capital City area, while work is gradually taking place in phase II. So far the phase III and IV of the city is yet to be infrastructurally defined.

Among the basic infrastructure on ground in Abuja includes, Road network, telephone , traffic control signal, electricity lines, water pipeline and public structures, such as schools, hospitals and to a lower extant housing infrastructure, which is the major problem associated with Abuja. This account for the over-crowded nature of the municipal area as it is favoured with the highest concentration of facilities, hence, leading to over-utilization of existing facilities in the area.

As earlier said, the Federal Capital Development Authority which serves as a parastatal under the ministry of Federal Capital territory is the sole agency in charge of the FCT but does achieve this through the authorized works of several multinational and national construction companies some of which are as follows:

1. Julius Berger Nigeria limited located at Berger bus stop-utako district
2. G-Cappa Nig. Limited, located at pape
3. Fuge Role limited located at idu-karmo
4. Dantata & sawoe Nig. Limited-located at the central area, in Area II, Garki.
5. Strabag limited-located at Gwarimpa, Kubwa raod.
6. Bonge Nig. Limited-located at central area.

7. Bullet Nig. Limited-located at central area in Area II.
8. Arab Contractors Nig. Limited-located at Kubwa Raod, Gwarimpa
9. Jagal Nig. Limited-located at area 11.

This are few amongst the various organised construction companies in Abuja. However, there are also the presence of local contracting companies, most of which are not really organised which makes it difficult for one to make reference to any of such, but, their collective effect as it concerns their impact on the environment is enormous.

Pollution: Cumulatively the effect of this companies, which can be readily observed from most areas in the FCT in the pollution of the atmosphere. Air population ranks high as constructional impact on the Abuja environment. The chief type of air pollution here is the pollution by sand dust from rock blasting and excavation works coupled with noise harzard. It is common place to have ones body dusted with said and rock particles within most working hours through out the area yet under construction such as Gwarimpa, utako etc The effect ranges from skin disease and eye problems; while noise from the vibrating machines, heavy duty equipment's and activities of dynamite in blasting rock. The tolerable level of noise by human ear in between 80-90 decibels. A prolonged exposure to this situation can lead to physiological disorder such as hypertension, Coronery disease, ulcer, migrainous headaches, cardio-vascular problems and susceptibility to viral infection and toxic substances – (FEPA report on toxic and air pollution in Abuja).

Plate 4 Picture Showing Pollution of Atmosphere due to construction Activities

CHAPTER THREE

LITERATURE REVIEW

3.1 THE STATE OF THE WORLD'S ENVIRONMENTAL AWARNESS

According to Professor J.M Baba (FUT-Minna,) human history is said to be largely written interms of the struggle between man and nature over the terms of man's existence". This simple statement of fact summerises a complex set of processes and relationships which have been the pre-occupation of all disciplines, but of Environmental Management in particular. The statement alludes to the age long contest between man and the natural environmental on which are pivoted all economic and socio-cultural activities.

The amazing technological advances and organisational skills of human being in the last three centuries, or so gave the impression that man had mastered and subdued his environment, which would now enable him to settle down to a second and comfortable living, apparently consistent with the divine mandate given to him at creation -----"subdue the earth and have dominion over the fish of the sea and over the fowl of the air, and over every living thing upon the earth" Genesis 1:26.

But that victory has tuned out to be an illusive mirage. The negative impacts of man's activities on the environment now stand as grave dangers to human survival and wellbeing (like a boomerang that bounces back to hurt or destroy its thrower). There is now a deepening realisation that technology has a limit after all, that limit being determined by how far a technology helps to destroy

or preserve the primary stage of its operation – the environment. This scenario is summed up in the word of Erhlich et al (1970) thus

"While the intelligent application of technology factors human well being directly, a reducible but not removable burden of environment disruption by the technology undermines well being. This negatives burden includes the dirty effort of technology accidents and effluents on human life and health".
"Clark and Holing (1985) in a historical analysis of environmental change since the 2nd world war also made the incisive and plumy statement."
"We are moving into a period of chronic global and extremely complex syndrome of ecological and economic interdependence. These emerging syndromes threaten to constrain and even reverse progress in human development. They will be manageable if it all only with consistency of purpose that transcends normal cycles and boundaries of scientific research and political action".

These strong statements are symptomatic of a new realization. As it were it has now dawned on man that the divine mandate alluned to about carries a responsibility which must be equally executed to guarantee his survival and well being "Be fruitful and multiply and replenish the earth" (Geneses 1: 28a). This new realisation now furies the basis of a deepeing global concern that as become in the second half of the 20th century a very strong issue in furring international co-operation the light to sure the worlds environment.
The famours UN sponsored international conference at Stockholm (sweden) held in December, 1972 set the ball rolling as a concerted effort on the part of the international community to raise awareness about the dangers which

human activities poso to the environment and ultimately to man himself. An out come of that initiative has been a series of global institutional arrangement to address Environmental issue, for example the world Environmental day (June 5 of every year) was instituted in the same year, 1972, for the promotion of global environmental awareness. There was also the creation of the United Nations Environment Programmme (UNEP) headquartered at Nairobi Kenya as a specified agency for mountoring the state of the world's environment. Another significant step was the institution in 1983 of the Breadth and commission to undertake a comprehensive study of global environment vis avis development, the report of which was published in 1987. Finally, there has been another on the plat from of the U.N a major Earth summit on population and environment which held in Brazil by June, 1992.

On the African continent evidence of this new awareness has been manifested through the cano plan or the Environment (AMCEN) started in 1985 and which has become a major form for co-operation away African nations on matter affecting the environment. To institutional outfit, or network structures, including Regional coordination units (RCUS) and six centres in environmental education and training network (ETNET) of which two are in Nigeria, at Obafemi Awolowo University, Ile Ife and Federal University of Technology, Minna. The purpose of the (ETNET)is to create and develop centres of excellence in environmental training for all categories of decision makers and practitioners.

At the national level, there has also been a rapid growth in environmental consciousness. Nigeria in recent years, a tread that culminated in December 1989, in the inauguration of the Federal Environmental Protection Agency, an apex environmental , parastatal charged with the responsibility of formulating

environmental protection policies, monitoring the state of the nations environment and prosecuting violators of established environmental laws and regulations. The agency has metamorphosed in to Federal Ministry of Environment.

It's mandate which has now been integrated into the function of the newly metamorphosed Federal Ministry of Environment.

The decree 58 of 1988 as amended by the FEPA (Amendment) Decree No59 of 1992 first in FEPA the overall responsibility for biodiversity conservation and sustainable development of Nigerians natural resources. It also specifically mandates FEPA to.

(a) Prepare a comprehensive national policy for the protection of the environment and conservation of natural resource, including procedure for environmental impact assessment of all development projects,

(c.) Advise

i The Federal government on nation environmental policies and priorities, the conservation of natural resources and sustainable development, and scientific and technological activities affecting the environment and natural resources.

(f) Carry out such activities as are necessary or expedient for full discharge of the functions of the Agency under the Decree. The Decree also confers additional powers on the Agency to:

i. Prescribe standards for and make reputations on water quality. Effluent limitations., air qualify, atmosphere protection, ozone protection, noise control as well as the removal and control of substances; and.

ii. Monitor and enforce environmental protection measures. (soured from: Anniversary Brochure FEPA 10th year 1988-1998)

Nigeria been one of the first African governments to launch a National Policy on the Environment, (Manifold. UNEP 1989) With the following as some of the goals of the National Policy on the environment which in armed at achieving sustainable development:

i Secure for all Nigerians a quality of environment adequate for their health and well being.

ii Conserve and use the environment and natural resource for the benefit of present and future penetrations

iii Raise public awareness and promote understanding of essential linkages between environment and development and to encourage individual and community participation in environmental improvement effort:

(source: National Policy on the Environment FGN 1989).

Would yet be seen as not having been able to really achieve it's aims as implied in the world bank report 1990 study on environmental conditions and trends in Nigeria.

3.2 THE STATE OF THE ENVIRONMENT IN NIGERIA.

In 1986. The department of forestry, Federal Ministry of Agriculture collaborated with the Nigerian conservation Foundation, in close Co-operation with many Nigeria scientists and institutions in the public and private sectors, prepared the first National conservation strategy sectoral summaries have traditionally been produced by various ministries in their annual reports.

Also in the recent past i.e in June 1991, another group of Nigerias, the Nigerian environmental study action Team NEST) published a report titled "Nigerian threatened environment a national profile" Based in the foregoing

the following summary assessment of the present state of the Nigerian environment has been prepared. This assessment also draws extensively on the background reports and findings of the would Bank study on environmental conditions and trends in Nigeria (World Bank, 1990).

This report is sumed up under the following headings:

Water Pollution

The inland waters are polluted by domestic sewage. Industrial effluents, sitting, pesticides and fertilizers from agricultural run-offs into the water bodies from the catchment areas. Many other rivers and lakes are badly polluted with sewage of human Origin , laundering and parable introduced through numerous drains and sewers, source these pollutants have however led to centrophication of these water bodies and the production of extensive word cover and silting up in some areas.

AtmosphericHazards

The impacts of atmospheric hazardsx in Nigeria namely air pollution, Noise Pollution, thunderstorms, sandstorms, Fog and heat waves are tremendous. In recent years several of these hazards have disrupted economic planning and development with their effects ranging from simple destruction of property to complete wreckage and loss of lives.

Sandstorms an also particularly widespread in northern Nigeria and in the dry season.

Waste in the Environment

In many urban and rural areas in Nigeria, arrangements for waste disposal have been insufficient and ineffective. Per capital production of domestic solid waste is estimated at 20kg per annum, studies show that with increasing urbanization this rate may have doubled by the end of last century.

Human Settlement and Housing

In spite of the rapid rate of urbanization in Nigeria within the last three decades, the countries population is still about 79% rural.

The directorate of food, Roads and Rural infrasfuncture (DFFRI) has determined that. Over 80 million rural population is settled in more than 100,000 villages and hamlets. The urban population is however becoming increasingly dominant with its share increasing from 30% in 1985. Current estimates put the urban population share at about 35% of the total close to 60% of the urban population is settled in cities of over 500,000 inhabitants of which there are now not less than ten.

Vegetation:

There is hardly any vegetation in Nigeria infected by human activities. Farming logging. Praising, hunting, urbanization, road construction and other development activities by the rapidly expanding population have together reduced plant cover to isolated remnants. Studies on these vegetation remnants and their distribution indicate that the country cover consisted of 20% forest concentrated in the south with savanna covering the remaining 80% of our national territory.

The principal geographical zones:

For the purpose of this work, Nigeria can be divided into the following three principal geographical zones

Semi-arid and dry sub-humid areas, part of the sub-humid area with the southern borders being taken as the natural limit of forest.

Humid and sub-humid areas to the north of the bimodal rainfall zone. This zone includes all of the plateau areas in central Nigeria. Very humid and flood prove areas, with BI-modal rainfall.

These main zones correspond to the eight smaller soil erosion and land resource zones as follow: Northern (zones) and (2) mid (zones 3, 4 and 7). And southern (zones 5, 6 and 8).

The zones characteristics and borders periodically shift with slight changes in temperature, rainfall and other climatic conditions. As a result of recurrent droughts in the northern zone the dessert has now extended into the savanna. In the south most anemone species are now dependant for their survival on the remaining tropical rain forest.

3.3 UP-DATE ON CIVIL CONTRUCTION IN NIGERIA

The concept of civil construction as means of erecting house and in infrastructure for human socio-economic needs emerged as a resulting of permanency in man's settlement. This resulting from the nomatical life style of earlier men, their arose not only the need for defined from of house but also defined part way and roads linking one settlement region to another viz-viz their gathering centres market etc. It would be recalled that these event had actually processed a long period of time evolving series of charges through man's development.

According to Markus T.A, Morris E.N. (1980) this beginning of the erection of houses is as old as the discovery of fire and indeed of languages. At first, houses were in cares, bent boughs and even nests. Forked stakes were set-up, connected with twigs and covered in muds and wall. The flat roofs later became inadequate to keep out the rain and an advancement of pitched roofs came to be with leave covering. This account describes the begining of real houses with proper foundation, using brick or stone walls and roofs of timber with tiles:

This has the history of civil construction. As man grew in wisdom and knowledge with the advancement of technology, the civil construction industry began to advance equally with sophistication both in the design of equipment and the methodology of application or execution of project. This advancement simitanoiusly sew to the formation of individual and groups specialised in the execution of distinct types of work associated with the civil construction such as read and bridges and house.

Events in Nigeria, have also kept abreast with international charges in this regard, hence,, it would not be over-emphasized that this sector in Nigeria as observable in Abuja has comparatively being able to cope with the increasing demand and challenger of our time.

However, this sector in Nigeria at large is get to embrace the concept of green construction which is fundamental to sustainable development via sustainable construction.

3.3 THE DEVELOPMENT PROCESS AND ENVIRONMENTAL DEGREDATION IN NIGERIA.

In practical terms, developmental process is ominibus, into which may be fitted a wide range of activities in different social and socio-economic sectors. There is however, a common goal on which these activities are expected converged: to achieve improve societal well-being through increased output of goods and services and a fair distribution in society of the benefits derived therefore.

The activities may either be spontaneously generated to such potent factors as population growth, commercial motivation and modernisation.

They, may on the other hand be induced by an external agent such as government and its agencies. While changes of the former category often come insidiously and uplaned, in the latter case activities are planned and may come as a capital project calculated to achieve some set goals Both channels of change however, share a common stage of operation (i.e the environment) and do separately and collectively impact upon that stage: An analytical study of

this stage need be done in other that the impact of the civil construction may be evaluated.

The Environment

The term environment is used in its restrictive physical sense (rather than the broad socio-anthropological sense) it connotes the componets and system of the geosphere (e.g soil i.e land, flura, climate) as commonly applicable in the natural sciences. The environment in this context is a reservoir of resources on which man draws to sustain his economic activities, and assure his survival and well-being (Baba J.M 1998)

It is largely through the allocation of land to activities and the use of capital to adapt that land by constructional works is the enjoinment of cities, Town and countryside is changed. The physical environment in its aspects, provides fairly unique locations in space for particular human activities. Activity system extend through space and spatial interaction between activity location is therefore an important dimension of activity system. In these term between-place activities and within-place activities can be distinguished,. The former are communication activities by which volumes of information, many materials, goods and persons are transferred from one location to another; transport telecommunications, waste discharges are activities of this kind, The latter within space activities are located at points in space at which goods are produced or consumed. Manufacturing, recreation, residence are activities of cause are related and mutually supportive. Each could not be substain without the other, for the activities of production and consumption need contineous

supply and removal of materials and goods as much as communications are generated by production and consumption's.

These systems of located activities junction within spaces adapted to provide accommodation. These includes dwellings, roads, railways., fectories, parts, seashores, pipelines, forests, airfields, quarries and so on, representing a variety of ways in which physical spaces have been adapted to better accommodate the pursuit of activities. The form of adaptation also relates closely to the intensity of the activities. For within space activities intensity is normally measured in relation to space-persons per hectare, sales per square metre, for example-whereas for between place activities it is frequently measured in relation to time-liters per day vehicles per hour, for example; Generally the greater the intensity of activities, the more elaboration and capital intensive the adaptation of space will be.

This adoption of space not only provides accommodation for the activities. It is, also the process by which the external environment changes, in particular in terms of its sentient qualities of appearance, sound and small, Building, Constructions, surface and planting are the visual elements which make up the manmade townscape and landscape of the environment. At the same time the activities themselves, particularly through discharge of the waste, can have a direct impact on the external environment, extending beyond visual to aural and olfuntory impacts in the form of land dereliction, air and water pollution and noise. These qualities are as much characteristics of the physical environment as buildings themselves; which in themselves are environmental degradation of the geosphere. (Paraphresed from Ajator 1999)

Environmental degradation affects all nations of the world and respects no bandaries whether we like it or not, the world is at a turning point. The environment cannot be allowed to deterriorate further. We need to look for global solution to save the endangered plant in addition to local and national solution.

CHAPTER FOUR

4.1 REASERCH METHODOLOGY

The articulation of this research work is based on data collected from both primary and secondary sources. The direct, personal observations made at project sites, in terms of the physical damage done on the environment, forms the primary source of data, together with verbal discussions through personal interviews which was conducted amongst constructional professional consultants, environmental practioners, project contractors.

While responses for the study were obtained from questionnaires issued to 200 respondents sampled from 12 construction site/neighborhoods of the six area councils of the Federal Capital Territory, using cluster systematic and simple random techniques.

The secondary data were from library researches from magazines, Journals, commissioned reports, seminar papers and test books on the matters pertaining to this study. A copy of the questionnaires and the questions that formed the basis of the interviews in attached at the index.

4.2 DATA ANALYSIS

From that first Questioners issue to those living around site neigbhourhood.

Total Number of circulated questionnaire	-	100	
Total Number of respondents	-	100	
Number of those living constitution site		-	100
Number of those who feel disturbed by the activities of the			
Number of those who do not feel disturbed	-	10	
Construction companies		-	90
Number of those who think the activities of the company			
pollute their environment by noise, fume, and sand dust	-	98	
Number of those do not think so		-	2
Number of those who have noticed some impact on the			
on the environment resulting from the activities of the			
construction company.		-	80
Number of those who did not notice any		-	20
Number of those who think deforestation and erosion			
are impact of construction activities	-	80	
Number of those who think otherwise		-	20
Number of those who think the companies do not			
care about the environment	-	40	
Number of those who think otherwise		-	60
Number of those who think government has			
done nothing in protecting the environment	-	80	
Number of those who think otherwise		-	20

Using frequency and percentage count in analysis the data where the values of X & Y are constant, while value label represent the responses.

Hence

QUESTION 2

Value Label	Value	Frequency	Percentage	Value Percentage	Cumulative Percentage
Those disturbed	5	90	90	90	90
Those not disturbed	2	10	10	10	10
TOTAL					100

Source: Personal field survey, 1999

90 percent of the respondent from the table above answered yes, to disturbances from construction activities, while 10 percent says no.

QUESTION 5

Value Label	Value	Frequency	Percentage	Value Percentage	Cumulative Percentage
Those who think deforestation and erosion are impact of construction activities.	5	80	80	80	80
Those who think otherwise	2	20	20	20	20
TOTAL					100

Source: Personal field survey, 1999

80 percent of the respondent, from the table above answered yes to deforestation and erosion been impact of construction activity, while 20 percent says no.

QUESTION 7

Value Label	Value	Frequency	Percentage	Value Percentage	Cumulative Percentage
Govt. has done nothing in protecting the environment	5	80	80	80	80
Those who think otherwise	2	20	20	20	20
TOTAL					100

Source: Personal field Survey, 1999

80 percent of the respondents, from the table above answered say to the fact that government has not done much to protect the environment from the activities of the construction companies while 20 percent says no.

From the second questionnaire, used to those working at construction site.

Total Number of circulated questionnaire	-	100
Total Number of respondents	-	100
Number of those working at construction	-	100
Number of those who have worked for 5 to 10 years	-	70
Number of those who have not worked up to 5 years	-	30
Number of those who work in big construction companies	-	60
Number of those who work in small construction companies	-	40
Number of those who think the companies do care about the Safety and health of their worker	-	30
Number of those who think otherwise	-	70
Number of those who assess the companies plants and machines are of modern technology	-	10
Number of those who think otherwise	-	90
Number of those who are aware of environmental defect, arising from the activities of the companies	-	85
Number of those who are not aware	-	15
Number of those who are not aware of any environmentalist in the working site or companies Management	-	90
Number of those who think otherwise	-	10

QUESTION 4

Value Label	Value	Frequency	Percentage	Value Percentage	Cumulative Percentage
The Companies Cares .	5	30	30	30	30
The companies do not care.	2	70	70	70	70
TOTAL					100

Source: Percent field survey, 1999
70 percent of the respondent, from the table above, did say that the companies do not care about site workers, while 30 percent says the companies care.

QUESTION 5

Value Label	**Value**	Frequency	Percentage	Value Percentage	Cumulative Percentage
Companies plants & machines modern	5	10	10	10	10
Companies plants & machines not modern	2	90	90	90	90
TOTAL					100

Source: Percent field survey, 1999
90 percent of the respondent says the companies plants and machines are not modern, while 10 percent says they are.

QUESTION 7

Value Label	**Value**	**Frequency**	**Percentage**	**Value Percentage**	**Cumulative Percentage**
Environmental defect	5	85	85	85	85
No Environmental deffect	2	15	15	15	15
TOTAL					100

Source: Percent field survey, 1999
85 percent respondent says the companies activities leads to environmental defect of deforestation and erosion, while 15 percent say no to it.

QUESTION 8

Value Label	**Value**	Frequency	Percentage	Value Percentage	Cumulative Percentage
Environmentalist involved	2	10	10	10	10
Environmentalist not involved	5	90	90	90	90
TOTAL					100

Source: Percent field survey, 1999
90 percent of the respondent says the companies to not engage a environmentalist in the implementation of project, while 10 percent says otherwise.

CHAPTER FIVE

5.1 THE IMPACT OF CIVIL CONSTRUCTION ON THE NIGERIAN ENVIRONMENT, ABUJA EXPERINECE

It is not far fatched a truth to say that every coin in life in two-sided.

This axion holds same for the construction industry in Abuja-Nigeria, that is her calculated measure to bring about soci-economic development to the Nigerian Society by way of erecting modern civil structures to meet the increasing demand for both the ever-increasing populations residential need and the metropolitants settlement for industrialization, she has in-turn bought about some unavoidable negative impacts upon the environment which tend to have adverse effect on the human populace, such as deforestation, flooding, erosion, high radiation, pollution etc.

According to my investigation, these defects are obviously so, as environmental practice is novel in word in Abuja-Nigeria.

The nascent state of environmental constancy result in despicably how level of environmental consultants in construction projects. In Abuja-Nigeria, this disparity is even wider because most construction professionals are yet to develop green sense. Many professionals could not apprehend the input of environmental consultants in construction projects. This is not professional rivalry, because some environmentalist felt they are limited in skill to manage green projects. Generally, there is gap in knowledge of possible construction of principal actors of the construction industry to green construction. Clients/governments role as the initiator and catalyst for green construction was under-estimated.

The design team have not reasonably considered embodied energy in selecting component materials for construction. Similarly, plants and equipment specifications are not the best practical or available technology (BPT/BAT) equipment with dust, fumes vibration and noise atenuating devices. As a result, site externalities such as comfort disturbances, high noise levels, particulate emissions and spillage of hazardous/toxic wastes like fuel, diesel, lubricants and chemicals have remained unabated in construction sites. Revegetation or bioticland scaping of development sites for ecological harmony and hydrological balance as still theoretical concepts. Level of application of environmental (green) tools in the management of construction varied from project. And also depends on the clients, design team and contractors involved. Projects to project subjected to a balanced dose of green tools (Environmental Assessment EA, Environmental impact-statement EIS, Green Structure, Environmental Management Programme and Green Audit) in the project cycle emerged benign, sustainable and community friendly.

There is stop-gap measure in the application of green tools in most project as observed and this has not helped green development. Green efforts orientating from the client through environmental assessment, design and documentation in most cases did not extend to contractor selection in balanced implementation of environmental management system.

Put the other way-pro-green contractors had not built green because the design and documentation were not green. For instance, except a community welfare programme from parts of the contract package, green contractor can not implement it. However, our construction industry is get to acquire average

structure and know how to implement environmental management system. The Nigerian Construction practice has not been environment oriented and this characterized has led to increased environmental impasse with project. Communities. Equally, our socio-economic, legal and political policy implementation appear unsupportive, but rather contributory to the perpetuation of anti-green construction in Nigeria. The worst culprits are the power of eminent domain, compulsory acquisition of properties without prompt and adequate compensation to the disenfranchised communities, bulkanization of important national projects and projects siting politices all of which negates the principle of sustainable development in the strength of the foregoing exposure, it is evident that.

- Our construction practice had not been significantly green-orientated.
- Our socio-economic and political framework do not sufficiently support the emergence of green construction.
- The aggregate effects of these points above have resulted in the development of unsustainable social and economic infrastructions.

5.2 THE OVER RIDING FACTORS.

This are some political polities which has not encouraged sustainable construction.

Project Siting Politics

This obviously is a point that can not be overlooked as political motive overrides all known technical, environmental expediency for location of capital projects. The siting of some projects facilities like the headquarters of a ministry as in the case of the agencies and parastatals under the ministry of Transport in Abuja, which defy comparative economic advantage concept, have proved uneconomical and environmentally unsustainable as such projects would not have only destroyed the bio-diversity of the environment but denied the availability of land space to any other environmentally benign project.

BULCANIZATION OF PROJECTS.

Variation in value of project in a contractual phenomenon. But some variations are political in nature. A rolling plan may call four university or health centres or technical colleges to be sited in certain states but political expediency may dicate an inclusion of other areas not favoured on the original scheme. The funds earmarked for four projects would then be used for twelve without a corresponding increase in budget allocation and environmental planning in expanded projects. The usual result of poor funding causes disregard for quality and environmental considerations leading to unsustainable development.

Indiscriminate Award of Contract Project

The unprofessional manner in which government has exercised its authority in awarding construction contracts has also not helped issues as it concerns the environment. This is so, as contractors who do not pooses the technical know how in the field of construction talk more of having environmental considerations are usually awarded contract projects which are of great value resulting in shaby executive of the projects without implementing or observing the necessary environmental regulation.

Compulsory Acquisition of Community Land.

This issue has caused a great deal of heat and dissatisfaction to the affected communities. Much of this, apart from the degradation arising from the development projects emanate from unsatisfactory acquisition procedure, inadequate compensation and absence of proper appeal machinery for the aggrieved party and general poor administration and implement of acquisition and compensation policies, such as non-uniform payment approval practices, over payment and under payment of some expropriated rights. These have all combined in some communities to fuel wide spreed apathy and sensitive to additional degradation arising from the construction activities as observable from the existing case between the Gwari communities in the Federal Capital Territory Abuja and the Federal Government of Nigeria.

CHAPTER SIX

6.1 CONCLUSION

Conclusively, it is pertinent to report that the long militerilization of the Nigeria civil government has really not encouraged sustainable development in partially all the sector of the Nigeria economy, more so in the environmental industry. This is so, as my findings reveal of the actual existence of the agencies and laws for an enabling green construction practices but for their non-functional and implementation. Researches are not carried out to investigate developments, efforts are not gared into regulating practices and where they do, high authorities prevent proper implementation of guidelines. For example, the Abuja environmental protection board do not in practical teams have access to evaluate the Environmental impact Assessment (EIA) of any construction project before they are implemented. This explains why the green areas and buffer zones has all been built up, regardless of environmental regulations which categorises them as reserved areas.

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 work as their thoughts are that green construction will reduce contract profit whereas if it were documented and priced, it would rather enhance profit. While, also the general public has not in any formal way shown dissentients of the impact of civil construction as a way of sensitising the government into its responsibility.

Finally, therefore both the government, the construction companies, the professional bodies and the general public in Abuja and Nigeria need to be orientated concerning the importance for sustainable development through sustainable construction.

6.2 RECOMMENDATIONS

It is no doubt that Environmental degradation affects all nations of the world and respects no boundaries. Whether we like it or not the world is at a truing point. The environment cannot be allowed to deteriorate further. We need to look for global solution to save the endangered plant in addition to local and national solution which would be best assessed via the rate of socio-economic development and improvement is the quality of our environment which in invariably linked to the rate of the development of environmental practice.

Hence, government should evolve means of supporting environmental practitioners in order to make the industry virile. Apart from the Ministry of Environments mandate in this regard, government should evolve appropriate local incentives like tax rebate VAT- free environmental practice, credit grants and quarantees and appointment of environmental consultants into the development and implementation team for all environmentally – significant projects in Abuja and Nigeria at Large. This will imbue our environmentalist with the necessary skill and experience to handle environmental management of construction.

Government should strengthen her efforts to promote sustainable construction by fortifying regulations, norms and standards which stipulate minimum levels of environmental performance for projects. In this regard, the recently created Ministry of Environment, should evolve thresholds for controlling all aspects of construction activities. This will fine-tune the provisions of the EIA Decree number 86 of 1992 as they relate to civil construction.

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 projects 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. Also awards and incentives should be given to green contractors" to encourage their efforts towards sustainable building practices.

While many of the fundamental of safety apply to all kinds of construction, an effective programme must be developed to fit the particular operations, such as steel erection, pile driving, excavation, drilling and blasting, form erection, tunneling etc. Each operation has its own impact and hazards and a safety programme should be developed to cope with the particular hazards.

May countries have issued standards for the manufacture of construction plants to ensure that a proper consideration is given to safety, embodied – energy, vibration, noise levels, gas and particulates emissions. It is obviously wise to

censor importation of construction plants and equipment to confirm to the appropriate international standards.

The construction plants should have device to prevent excessive loads being lifted, attenuate noise and vibration, noxious gases, fumes, particulates, fossil-fuel consumption and spillage.

In planning, massive development projects like the gwarinpa Housing Estate in F.C.T Abuja, including linear facilities, overlay/geomorphological mapping for terrain assessment to highlight possible appropriate standards problems should be applied. siting/routing corridors should be thoroughly evaluated. And the communities whose lands are acquired for the project should be paid prompt and adequate compensations. Contract appointment into the project of skilled and qualified members of the community may present an added goodwill that would lead to community support. However, the latter should not be used to enthrone mediocrity in project execution, as they will exacerbate the environmental crisis.

The National Federation of Building/Civil Engineering Contractors should strengthen their membership and show great interest in educating and persuading its members to build green. They should emulate the oil-industry "clean Nigeria club" to form a "Green Construction Club" with articulate programmes in support of environment – friendly development. They should voluntarily circulate approved codes of practice, publish annual environmental reports and monitor and publicize the environmental performance of various types of buildings.

Similar efforts and programmes as above are required of the professional bodies like the Nigerian Institute of Architects, Nigerian Institute of Building, Nigeria Institute of Quantity Surveyors, Nigeria Society of Engineers and the Institute of Environmental Management to create increasing awareness and education of construction professionals through seminars, workshops, technical exhibitions, for increased sensitization and development of improved techniques for 'green construction'. The ripple benefits of this would permeate the consumers (public) who would be made more aware of the environmental performance of projects and of the construction industry thereby enabling them make more informed decision.

Awareness should also be stepped up on the issue of facility management as a viable option in the life-cycle sustenance of green development.

That Government should as a matter of basic principle, ensure that project assessments include environmental and social costs. That the relationship between a community and its environment be considered an integral part of sustainable development.

In order to rise public awareness and promote understanding of the essential linkages between environment and development, government should step up the learning of environmental education across the three level of educational institution in the country.

INDEX

RESEARCH QUESTIONS

This study is structured to explore the application of green techniques in constructing for sustainability using the following research question which formed the bases of my personal interview with the various professionals as stated in my chapter 4.

1. How can Nigerian civil construction process be made green?
2. Are our construction professionals environmentally conscious?
3. Do environmental consultants form part of our project development and implementation team?
4. What should be the green roles of construction professionals in the project development and process phases?
5. In what way can Nigeria contractors contribute to the prevention and / or management of environmental effects of construction development?
6. Do construction plants /equipment currently in use have the innovative technologies (such as attenuating devices for noise, vibration, dust exhaust emissions, diesel and lubricant spillages etc) to improve productivity and operating efficiency of construction?
7. How can construction activities be laid-out, administered to minimize waste, aesthetic nuisancse, damage to existing sensitive developments and eco-systems, enhance safety and reduce injuries and death to work forces and the general public?
8. Can alteration to natural vegetated surface be managed to modify loss of Albedo surface roughness, thermal and hydrological properties?

9. What enabling environmental laws and other legislations have been enacted to regulate and control construction development to ensure harmony with the environment?
10. And how have they been implemented or enforced to achieve sustainable development?

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QUESTIONNAIRE FOR THE ASSESSMENT OF THE NEGATIVE IMPACT OF CONSTRUCTION PRACTICE ON THE ABUJA ENVIRONMENT

ISSUED TO PEOPLE LIVING AT CONSTRUCTION NEIGHBOURHOOD

NAME:.....

AGE:.....**SEX:**.....

OCCUPATION:.....

ADDRESS:.....

(please tick √ in the appropriate box)

1. Do you live around any on going construction site?

   Yes ☐ / No ☐

2. Have you ever been disturbed by the activities of this company?

   Yes ☐ / No ☐

3. If yes, then do you think the construction company's pollute our environ ment by noise, sand, dust, spillages of fusille fuel?

   Yes /No ☐ ☐

4. Outside these disturbances that you experience from the construction company, are there any noticeable impact of the works of this company on the environment that you know?

   Yes /No ☐ ☐

5. In your opinion is deforestation and erosion an environmental impact from the activities of this company?

   Yes /No ☐ ☐

6. Do you think the construction company care about the environment?

   Yes /No ☐ ☐

7. Do you think that government has done any thing in protecting the environment especially from the effect of construction practice?

   Yes /No ☐ ☐

QUESTIONNAIRE FOR THE ASSESSMENT OF THE DEGREE OF GREEN CONSTRUCTION PRACTICE IN ABUJA

ISSUE TO CONSTRUCTION WORKERS AT SITE LOCATION

Name:.....

Age:.....

Sex:.....

Profession/

Trade::.....

Level of Education:

Skilled:.....

Unskilled::.....

(Please tick √ in the appropriate box)

1. Do you work in any construction company in Abuja?

   Yes / No ☐ ☐

2. Have you work for over five to ten years on construction in Abuja?

   Yes /No ☐ ☐

3. Is the construction company you work for a big one?

   Yes / No ☐ ☐

4. Does the management of the company care about you safety and health?

   Yes /No ☐ ☐

5. In your assessment, are the company's plant and machines for site work modern technology?

   Yes / No ☐ ☐

6. Do you think the company care to protect the environment?

   Yes / No ☐ ☐

7. Are you aware of any environmental defects, the activities of your company has ever caused e.g deforestation and erosion.

   Yes / No ☐ ☐

8. Do you know of any environmentalist that has ever worked with this company alongside your construction work at any site before?

   Yes / No ☐ ☐