THE IMPACT OF THE CONSTRUCTION OF GEN. M.I. WUSHISHI HOUSING ESTATE ON THE KAFFIN TELA COMMUNITY

[1]Idris Abdulrahman Baba, [1]Salihu Suleiman and [2]Usman Aliyu
[1]*Department of Architecture, Federal Polytechnic Bida*
[2] *IBB University Lapai*
E-mail: drsabdu120007@gmail.com

ABSTRACT

Human being requires shelter from adverse effect of weather, and this shelter is being provided mostly through construction. As human population increase so as increase in the rate at which buildings are constructed. This construction leads to the extensive exploitation of natural occurring vegetation which later result to; global warming, greenhouse effect, reduced soil cohesion, soil erosion and reduced biodiversity. The building industry is faced with the challenge of designing and construction of buildings which exploit the natural resources without destroying the ecological balance of the area. This paper examines the impact of the construction of Gen. M.I. Wushishi housing estate to Kaffin Tela community by sampling considerable hectare of land adjacent to the estate to know the nature of the vegetation at the site before construction and the extend of re-vegetation carried out by the resident after the completion of the project. The result shows that, apart from loss of species, there is significant increase in heat level and little has been done to revive the vegetation. It has been observed that an alternative approach to building construction that has positive impact to the environment is all about suitable practice, in terms of choice of material, their source, construction methodologies as well as design philosophy.

Keywords: Construction, Ecology, Vegetation, and Landscape.

INTRODUCTION

Construction is fundamentally about creating a man-made structure on a piece of land. The structure is traditionally the focus of concern, and the land is reshaped as necessary to support the structure's needs. Only in few cases is the land itself the focus, and only slightly less rarely are the land and the structure seen as equal partners. And even when both the client paying for the work and the architect or engineer specifying the details are sympathetic to the environmental context, the main priorities for the contractor to move the dirt and assemble the materials are likely to be centered on overcoming obstacles and getting the work completed, rather than on environmental stewardship. Globally, the construction industry is arguably one of the most resource-intensive and environmentally damaging industries in the world. Construction accounts for 40% of the total flow of raw materials into the global economy every year – some 3 billion cubic tons. Construction projects, whether commercial developments, housing estates, infrastructure or public sector projects all have the potential to impact on natural habitats, affecting wildlife and plant species. The construction sector is also an important user of resources, many of which are produced or derived through

Copyright © 2015 Cenresin Publications/www.cenresinpub.org

processes which impact on biodiversity (Waterman, 2009). Construction needs land and the use of land can have direct impacts in terms of destruction of habitats and more subtle effects on biodiversity such as disturbance and fragmentation the impact of fragmenting habitats on different species can be complex and can lead to gradual decline in populations which is difficult to attribute to a specific cause. The materials used and their processing and production will have a major impact on biodiversity. Timber, gravel, sand, iron ore, rocks etc are all major materials needed for the construction industry and the production of these materials can impact heavily on biodiversity (Wakely, 2009). It is the biodiversity on Earth that allows (at the moment) for animals, native plants and humans to share the planet. If one species is destroyed, several, maybe even hundreds more, may follow. Biodiversity is important because certain organisms have economic value (such as rainforest plants being made into medicine), they have value to the ecosystem and they are a source of natural beauty and recreation. Vegetation supports critical functions in the biosphere, at all possible spatial scales, from regulating the flow of numerous biogeochemical cycles, (most critically those of water, carbon, and nitrogen; local and global energy balances) to strongly affecting soil characteristics, (such as soil volume, chemistry and texture, which feed back to affect various vegetation characteristics, including productivity and structure). Vegetation serves as wildlife habitat and the energy source for the vast array of animal species on the planet. Perhaps most importantly, and often overlooked, global vegetation including algal communities which has been the primary source of oxygen in the atmosphere, enabling the aerobic metabolism systems to evolve and persist.

VEGETATION OF NIGERIA

Plate 1.0: Vegetation of Nigeria

Nigeria is covered by three types of vegetation (Plate 1.0): forests (where there is significant tree cover), savannahs (insignificant tree cover, with grasses and flowers located between trees), and montane land. The latter is the least common, and is mainly found in the mountains near the Cameroonian border. Both the forest zone and the savannah zone are divided into three parts. Some of the forest zone's most southerly portion, especially around the Niger River and Cross River deltas, is mangrove swamp. North of this is fresh water swamp, containing different vegetation from the salt water mangrove swamps, and north of that is rain forest. The savannah zone's three categories are divided into mm' Guinean forest-savanna mosaic, made up of plains of tall grass which are interrupted by trees, the most common across the country; Sudan savannah, similar but with shorter grasses and shorter trees; and Sahel savannah patches of grass and sand, found in the northeast (Wikipedia 2014).

NIGER STATE VEGETATION

The Southern Guinea Savannah vegetation covers the entire landscape of the state. Like in other states of similar vegetation, it is characterised by woodlands and tall grasses interspersed with tall dense species. However, within the Niger trough and flood plains occur taller trees and a few oil palm trees. In some areas, traces of rain forest species can be seen. The southern margins of the Guinea savanna has been altered by humans that it is also called the derived savanna were created by repeated burning of forest until only open forest and grassland were left. The burnings destroyed important fire sensitive plant species and contributed to erosion by removing ground cover. Tropical forest is giving way to the Guinea savanna at such a rate that the only forests expected to survive the next generation are in reserves (onlinenigeria.com 2012).

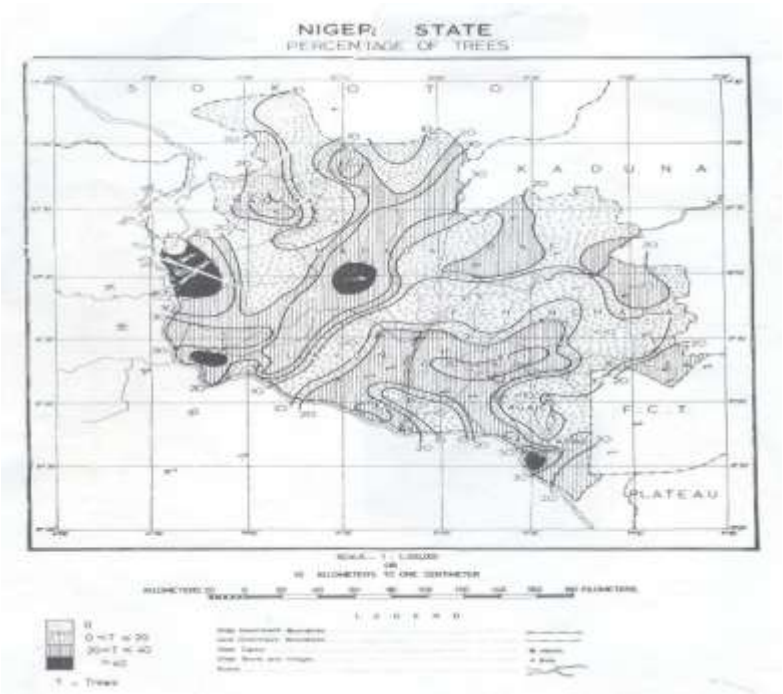

Plate 2.0: Vegetation of Niger State

BACKGROUND OF THE STUDY AREA

Public housing in Minna can be traced back to 1959, with the 21 number 2 bedroom bungalow built and occupied by colonial masters, which became public housing estate for the government workers. From the houses built by the colonial masters, through the various national development plans (between 1962-1975), the impact of housing was not felt in Minna until the creation of Niger State in 1979, Minna was made the capital. As a result, there was influx of both Federal and state government workers into the state capital as various ministries and parastatals were established. The provision of adequate accommodation for both government workers and individuals became a problem. This then brought about the provision of housing estate; of which every government make sure one housing estate is constructed before the end of their regime.

Plate 3.0: Gen. M.I. Wushishi Housing Estate Layout.

The idea of constructing General M. I. Wushishi housing estate was conceived by the present government of Dr Mu'azu Babangida Aliyu to provide 500 housing unit (plate 3.0) for the intermediate and low income earners which is to be completed within three (3) month. From the inception of the project, site clearance was done without considering the natural habitat existing in the area. This clearing of lands for construction leads to the loss of wildlife habitats, erosion and sedimentation associated with the use of heavy machinery, loss of native plant life, and contamination of soils and surface and groundwater.

METHODOLOGY

It is the logic that links the data to be collected to the initial questions of a study (Yin 1994). The study aims at looking into the impact of the construction of Gen. M.I. Wushishi housing estate to Kaffin Tela community. It tries to understand the natural vegetation of the area by sampling considerable hectare of land adjacent to the

estate to know the nature of the vegetation at the site before construction and the extend of re-vegetation carried out by the resident after the completion of the project. The areas observed during the survey are divided into two;
The vegetation before construction and Revegetation after construction

In the vegetation before construction points observed are;

a. The existing Native Plant.
b. Types of Native Plant.
c. Economic important of the Native Plant.

In the re-vegetation after the construction points observed are;

a. No of houses that has plant. Native or non native.
b. No of plant per house.
c. Type of plant.
d. The most populous plant.

DATA COLLECTION METHODS

This study intends to use sources of information like observations and survey, because such use allows an investigator to address a broad range of issues (Yin 1994). The study of impact of construction on the environment is complex and entails studying human activities during and after construction. The research will therefore use surveys and observations as methods of data collection.

THE VEGETATION OF THE SITE BEFORE CONSTRUCTION

Plate 4.0: The Vegetation at the Adjacent Site

An inductive reasoning was adopted to know the nature of the site vegetation before the commencement of the construction. Five hectares of land adjacent (plate 4.0) to the housing estate was taking into study at random to ascertain; the existing native plant, the type of native plant and the economic important of the plant. It was

observed that the vegetation of the area of study compasses of scattered trees such as; Mangoes, Cashew, Nimes, Guava and 'Marke' in Hausa (plate 5.0).

Plate 5.0: Marke Tree

The grasses are rather uniform in basic vegetative structure, and several features are characteristic. The main roots are usually fibrous; secondary roots, called adventitious roots, often arise from the nodes (joints) of the stems, as in the prop roots of corn. The stems are usually herbaceous or hollow, but exceptions occur, such as the pithy stems of corn and the woody stems. The leaves, which are borne at the nodes along the stem, are in two rows and consist of two parts: the sheath and the blade (plate 6.0). The sheath, a distinctive feature of the grasses, encircles the stem and gives support to the area just above each node. This area needs support because it is composed of soft growth tissue called meristem. Indeed, the grass stem increases in length not from the tip, as do most plants, but by growth all along the stem above each node. And the shrubs are the usual perennial plants, that is, they live for at least three years, shrubs are generally shorter and have more stems than trees.

Plate 6.0: grasses

THE RE-VEGETATION OF THE SITE AFTER CONSTRUCTION

Re-vegetation (landscaping) is building up a site or plant community to strengthen its natural defenses, preventing soil, land degradation and protecting the natural habitat. There are two approaches that can be used to restore vegetation to a more stable, desirable state: Passive re-vegetation and Active re-vegetation. Passive re-vegetation means replanting by natural processes. Nature itself becomes the restoration agent. This method requires the least effort and expertise to restore native vegetation. While active re-vegetation means planting by hand, it usually involves installing and maintaining through irrigation system (Re-vegetation Plan Guidelines, 2008). Active re-vegetation (landscaping) is also divided into two: Soft and Hard landscape. Soft landscaping, by means of planting trees, performs a valuable function at many levels. It supports biodiversity, especially if it is indigenous species that are planted. Grasses and shrubs are as effective at converting Carbon dioxide as the trees. Soft landscaping has the added advantage of attenuating the movement of groundwater to minimise erosion. The use of natural bio-systems can make it possible to deal with many of the consequences of groundwater management without making it someone else's problem. While, hard landscaping has at least two negative environmental impacts; it collects and reflects heat, requiring additional cooling capability, and it speeds up the movement of rainwater, placing an additional burden on disposal systems and times. Landscaping should rather attenuate climatic conditions: alternative materials and responses should be applied if heat build-up is problematic, and to slow down the rate of rainwater disposal, thereby allowing groundwater replenishment. There are many design devices that can be used, such as retention ponds, to assist in this matter.

DATA ANALYSIS

From the surveyed and the observation carried out of the area of study, active re-vegetation (land scaping) is the approach of the resident of this housing estate. This done by looking at; the soft and hard landscaping, the number of houses that has plant; native or non native, number of plant per house, type of plant, the most populous plant and important of the plant.

Table 1.0: Number of houses occupied

No of Houses Occupied	No of Houses Not Occupied
187	313
37.4%	62.6%

Source: Barr. Umar. Head of the Estate Committee

Table 1.0 shows that 313 houses (62.6%) more half the houses are not yet occupied. The observation and the survey carried out are on the 187 houses (37.4%) of the houses occupied in the estate.

Table 2.0: Number of houses that has plant

No of Houses that has Plant	No of Houses that has not Plant
43	144
22.9%	77.1%

(Source: Authors Field survey, 2014)

From table 2.0, it was observed that 43 houses (22.9%) of the 187 houses occupied has plant while 144 houses (77.1%) has no plant. This analysis shows that more than half of the houses occupied clear up the surrounding and did plant anything.

Table 3.0: Number of plant per house

Number of plant	Number of house	Percentage %
1 - 3	17	39.6
4 - 6	13	30.2
7 - 9	8	18.6
10 - 13	5	11.6

(Source: Authors Field survey, 2014)

From table 3.0, 17 houses (39.6%) have plants between 1 and 3, in 13 houses (30.2%) the plants are between 4 and 6, in 8 houses (18.6%) the plants are between 7 and 9, and in 5 houses (11.6%) the plants are between 10 and 13. These results indicate that majority of the houses have about 1-3 plants.

Plate 7.0: 6no of plant per house

Plate 8.0: 1no of plant per house

TYPES OF PLANTS

In the study, the plants in the estate have been divided into two type; **shrubs** and **trees.** The shrubs are mainly: Yellow and White bush, Red and White alcalipha, Red and White edge master, aloe vera (plate 9.0), and Carpet grass. The trees are: masquerade tree (plate 10.0), palm trees (plate 11), satellite tree, and umbrella tree

Plate 9.0: Aloe vera

Plant plate 13: White Alcalipha

Plate 10.0: Palm tree

Plate 10: Masquerade tree

The most populous plant on estate is the white and the yellow bush, this is because they adopt to their new environment faster and not expensive. Although, from the survey the vegetation at adjacent site there is no much tree but, one will think the resident would plant more tree than flower. Trees modify air cooling in dry season and air warming in cold. They provide shade to buildings and landscape surfaces thereby reducing the 'heat sink' effect. They stabilise ground conditions, preventing soil erosion. They absorb groundwater and slow the movement of rainwater across the ground surface. More specifically, they absorb Carbon dioxide emissions from the air. The flower are aesthetically beautiful and serve in some place as weed control

but, their need more trees to serve as wind breakers. It has been observed from the survey that the government and residence of this estate has done little on reviving the vegetation loss as a result of providing shelter for them. The survey also shows that the little effort of re-vegetation carried out by the residence was done with mostly non-native plant of that area. The native plants are those that naturally occur in a given habitat. A species that is native to one area of the world may not be native to another. However, native plants are generally well adapted to their particular environment and are more likely to thrive there. Once established, they provide an ecologically appropriate and environmentally sound habitat. The native plant are the primary source of food for domestic and wild grazing animals, which feed on pastures and grasslands and which are fed hay and silage harvested from them. Insects, birds and other animals cannot survive without the food and shelter that plants provide. Native plants usually offer far more to our native wildlife than introduced plants. Few insects or other invertebrates will be found on the introduced species and its leaves will be virtually untouched, whereas by comparison a native tree harbours innumerable invertebrates. Planting native species has additional practical advantages such as:

- Local plants are adapted to local soils and climate and have low maintenance requirements.
- Once established, native plants usually withstand long periods of dry weather.
- Many will grow in difficult areas with little or no need for fertilizer.
- Local plants are the essence of regional identity and preserve the character of each countryside (Wakely, 2009).

SUSTAINABLE DESIGN

"Sustainable Design," is defined as an increased commitment to environmental stewardship and conservation, and results in an optimal balance of cost, environmental, societal, and human benefits while meeting the mission and function of the intended facility or infrastructure. The main objectives of sustainable design are to avoid resource depletion of energy, water, and raw materials; prevent environmental degradation caused by facilities and infrastructure throughout their life cycle; and create built environments that are livable, comfortable, safe, and productive. Creating sustainable buildings starts with proper site selection, including consideration of the reuse or rehabilitation of existing buildings. The location, orientation, and landscaping of a building affect the local ecosystems, transportation methods, and energy use. Incorporate Smart growth principles in the project development process, whether it is a single building, campus or military base. Siting for physical security is a critical issue in optimizing site design, including locations of access roads, parking, vehicle barriers, and perimeter lighting. Whether designing a new building or retrofitting an existing building, site design must integrate with sustainable design to achieve a successful project. A sustainable building is constructed of materials that minimize life-cycle environmental impacts such as global warming, resource depletion, and human toxicity. Environmentally preferable materials have a reduced effect on human health and the environment and contribute to improved worker safety and health, reduced liabilities, reduced disposal costs, and achievement of environmental goals (WBDG, 2014). The developing countries, especially our own is on a path of rapid growth. This unsustainable construction could stress our natural resources beyond acceptable limits. The

government should established polices, regulation and agency that will look into these modern environmental issues, and also the building guidelines and committees should be set that will not only check and approve an environmental friendly design but, ensure that the rule and regulation adhere to.

CONCLUSION

Developing countries are yet to realize the environment threat, real or potential, to the quality of life. There is need to begin an environmental movement for the realization of these potentials in all sector of the country, including Business, Manufacturing, Transportation and Architecture. The Architecture that encourages the folk-traditions closely related to the culture and life of the people as it is really lived, rather than the alienation of styles borrowed from elite houses or foreign cultures in the name of fashion. It has been observed that an alternative approach to building construction that has positive impact to the environment is all about suitable practice, in terms of choice of material, their source, construction methodologies as well as design philosophy.

REFERENCES

"Nigeria". *Encarta*. Microsoft Corporation. Retrieved 2007-07-19.

Centre for Excellence in Sustainable Development(2007). 'Sustainability Tomorrow' a quarterly brought out by the CIIITC

Environmental Building News: A Bimonthly Newsletter on Environmentally Sustainable Design & Construction." RR1 Box 161, Brattleboro, VT 05301.

Field Guide for Sustainable Construction (2004) by the Pentagon Renovation and Construction Program Office, Department of Defense.

Geographical Alliance of Iowa. University of Northern Iowa. I. Retrieved 2007-08-13.

OnlineNigeria.com. Copyright 1998 - 2014

Peter Wakely(2009) Association for Environment Conscious Building

Pollution Prevention/Environmental Impact Reduction Checklist For Building/Housing Construction

Waterman, J.(2009); Construction Industry Research and Information Association (CIRIA):

Wikipedia, the free encyclopedia (2009).

Yin, R. (1994): *Case Study Research and Design and Methods*, SAGE Publications, London

Reference to this paper should be made as follows: Idris Abdulrahman Baba, Salihu Suleiman and Usman Aliyu (2015), The Impact of the Construction of Gen. M.I. WUSHISHI Housing Estate on the Kaffin Tela Community. *J. of Environmental Sciences and Resource Management,* Vol. 7, No. 1, Pp. 6 – 17.