VEGETAL REMOVAL
IMPACTS AND IMPLICATIONS
A CASE STUDY OF THE NIGERIAN PRISONS.

BY

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DECLARATION

I declare that this project title vegetal removal impacts and implication. Case study of Nigerian prisons is my own creation and has never been submitted at any other institution for whatsoever reason.

Information derived from published and unpublished works of others have been duly acknowledged.

....29th Dec 2015

DALHATU T. MUSA **DATE**

STUDENT

CERTIFICATION

THIS IS TO CERTIFY THAT THIS PROJECT WORK BEING SUBMITTED BY DALHATU TIJJANI MUSA (PGD/GEO/03/2004/277) HAS NOT BEFORE SUBMITTED BY ANYBODY FOR ANY PURPOSE AND MEET THE REQUIREMENT GOVERNING THE AWARD OF PGD IN ENVIRONMENTAL MANAGEMENT IN DEPARTMENT OF GEOGRAPHY, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA - NIGER STATE.

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DEDICATION

THIS PROJECT IS DEDICATED TO ALMIGHTY GOD, MY PARENTS, ALHAJI A.T. DALHATU, MY MOTHER HAJIA RAMATU TIJJANI, MY BELOVED WIFE AISHA AND CHILDREN, MOHAMMED, BILKISU, YUSUF AND ENTIRE MEMBERS OF MY FAMILY.

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Finally all thanks and praise to ALLAH (SWT).

ABSTRACT

"Each day an inmate is fed a tree is felled"- therefore if the inmate was charged for committing social crime, then the government by their action should be charged for committing environmental crime".

The theme of this research is to attempt to spot light the silent and unmindful foliage and tree removals in the Nigerians prisons that has been depleting the forest resource and implications to environment.

The problems of deforestation locally, nationally and globally poses a serious threat to our survival on the earth surface.

Heavy amount of carbon dioxide and other pollutants is released daily into the atmosphere from our Prisons as result of large scale burning of fuel-wood for cooking of inmates food. That increases GHG level.

Also for security reasons the frequent removal of vegetation encouraged in our Prisons encourages soil erosion, which in turn gradually disintegrates the secured structures.

Unfortunately depletion of vegetal cover for the energy purposes, have had serious socio-economic and environmental implications to the prisons, the nation and the global community.

A sustainable environment is to be a right for all present and future generation. Thus the tragedy of the commons could be avoided by minimized exploitation of vegetations, so as to guarantee a balanced ecosystem.

Embarking immediately on reforestation program and utilizing other energy source that are eco-friendly is the only alternative option, so as to reverse the harm the done over 80 years ago and is still continued.

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CHAPTER ONE

Introduction

The Federal Prisons came to existence in 1871 and was established as a structure under the direct supervision of our Colonial British masters along side this development also emerged the Native Authority Prisons of the North and Western regions and administered directly by the Emirs and Chiefs of these areas.

The Nigerian Prisons Service in year 2000 has an inmate population of 43,312 and total admission of inmates was 201,177. (2000 annual reports) with a staff strength of 19,696. This can be compared to 1960 and 1970 inmate population figure of 14,705 and 21,113 respectively.

Since establishment of Prisons in Nigeria over 150 years ago, the basic and most commonly source of energy for cooking has been the fuel-wood. Inmates are formed as gangs for cutting down of trees and transporting them as logs on their heads back to the Prison facility, to be burned down as fuel for cooking.

Fuel-wood as energy resource was never considered as a scarce commodity and was never seen as a contributor to Green House Gas emissions that needed to be conserved, as such over-exploiting these available natural resource was for a very long time the rule of the game,

not until the establishment of Federal Environmental Protection Agency in 1989 and its subsequent directives to Nigerian Prisons, banning the use of fuel-wood for preparation of inmates food and gas cooking was then introduced as a substitute to fuel-wood cooking and desperate effort was made to ensure its compliance.

By the sight of most of our Prisons in both urban and rural areas one can see heavy heaps of felled trees, the sizes of these logs reveals their ages, and the distances the were brought from.

Invariably it is now commonly observed that, due to high rate of vegetal deflation, Inmates no longer get fuel wood at the backdoor of their cells, as was in the past. In most Prisons the inmates search for thick logs of wood was from the nearby forest, subsequently due to overexploitation they are now forced to travel several kilometers in search of the right size of logs they needed. This invariably exposes them to numerous security and health hazards.

The burning of fuel-wood in the Prison for cooking last as long as the sun shines, it is very common to see continues smoke rising up to the atmosphere of every Prison location. This reduces visibility and also produces chocking smoke that affects the nose and eyes by causing tears to flow out.

A lot of vegetal cover are also cleared, usually to allow for erecting of Prison facilities, which includes spaces for cell accommodations,

workshops, kitchens, clinics, programs, sporting fields, administrative blocks, perimeter walls, staff barracks sewers, access roads, etc.

Plants including trees, foliage and grasses are carelessly uprooted in the disguise of potential security threats. Thoughts and considerations are never given about the disruption of the biodiversity and impairment of the ecosystem.

The Sub-Saharan and Sahelian drought of the early 1970s and the Ethiopian famine of the 1980s tragically and dramatically called the attention to the problem of the environments in Africa. These incidents which are tragic in nature elicited support and sympathy from many parts of the world.

There is the need to understand the basic causes of these problems so that:

a) They do not repeat themselves

b) The environmental balance can be restored in order to sustain further development effort.

There is therefore the urgent need to stop the perpetuation of these environmental crimes of vegetal destruction and to resume to the culture of sustainability so as to ensure a better and healthier environment for the future generation.

1.1 Statement Of Problem:

Nigerian prisons for numerous decades have been providing custody to legally interned inmates. Some of these inmates stay in the prison for several years. It is always the responsibility of the authority to ensure the constant feeding of these inmates averaging 35,000 every day. It is identified that trees are cut down for cooking purpose, construction purpose and for security of inmates' in custody.

Fuel-wood has been the most stable primary source of energy for cooking in our prisons. With its banned in 1989, gas cooking was then adopted. This new source of energy brought about a dynamic change in the general prison environment, as inmates no longer have to travel miles in search of wood for their cooking. However its shortcomings provides a reasonable excuse for reverting to fuel-wood use.

Another cause for vegetal removal in the Prisons is that of site clearance for erection of facilities, with some covering an area of more than 20 hectares. Most especially the model Medium Security Prisons located nation wide such as Minna, Ile-Efe, Benin, Kontagora etc are but common examples. lack of awareness by some Prison administrators, towards Vegetal removals contributed to numerous environmental problems identified as; Extensive Regional Deforestation, Desertification, Erosion problems, Atmospheric Pollution, Global warming and loss of Bio-diversity. As a result, the

landscape is becoming increasingly barren of trees, especially in densely populated areas and near larger cities, where most of our Prisons are located.

1.2 AIMS AND OBJECTIVES

The main aim of this work is to educate the Prison administrators and people especially at the grass root level, as to be aware of their responsibilities for nurturing and wisely utilizing the environment and taking urgent steps towards restoring environmental balance wherever such balance has been upset.

The objectives of this project are thus stated as follows: -

(i) To study and document the state of vegetal cover depletion in a prison setting in order to determine the extent of the depletion of the vegetal cover

(ii) To analyze and assess critically the environmental impacts and implications of vegetal removal in Nigerian prisons.

(iii) To proffer meaningful and convincing solutions to vegetal removal so that the efficiency of the environment can be sustained.

1.3 JUSTIFICATION

Biological resources are renewable resources but its overexploitation leads to numerous environmental hazards.

Environmental hazards are problems that once identified needs to be tackled to avoid multiplication into other problems. Particularly problems that that relates to natural resources that touches not only socio-economic life of the of the locality involve, but that could affect the general economy of the nation in general.

Depletion of vegetation for fuel-wood is an activity that has been as old as the mankind himself. This activity is not only limited to Prison community alone, it is a problem that cut across the country and most mystifying in the northern parts of the country at varying the degrees.

Living the situation as it is like this means in the next 10 years the desertification activity that is moving at alarming rate from the northern parts to the southern part of the country will be faster and severe.

Identified forest that provides such logs are targeted and boldly and crudely attacked, axes and cutlasses are the weapons used, but for the most stubborn and massive attractive giant trees, fire is inflicted on to them. This perception ensures that all spirits and parasites residing within the trees are displaced and eventually the giant trees falls to the ground, this makes it easier for the forest colonial masters (prison consumers) to descend on them

day after day taking as much as they could back home and to be stored for indefinite use.

1.4 SCOPE AND LIMITATIONS

The scope of this project is limited to vegetal activities by the Nigerian Prisons, of which it has a Central Administrative Head Quarters Office at Abuja, the unavailability of data maps and of intricate security of the case study area affected the gathering of materials and data for this project and therefore prevented the spatial extension of this research effort.

In fact there has been no available map showing the distribution of our Prisons in relation to the vegetation zones of Nigeria. However this research has availed me the opportunity to come up with one.

The mode of operation of these prison are very similar as such what ever is identified and related to its head quarters office is treated and a common operation policy passed for adoption to all other formations.

1.5 STUDY AREA

The case study area is the "Nigerian prisons service"; it is one of the unique Federal security agencies that provide long term custody to legally interned inmates. Records have it that some of these prisons have been in existence since 1820 an example is Bauchi prison (Federal archives).

The Nigerian prisons service as at present has 237 large prison facilities, 76 satellites prisons, staff barracks, collages and Head Quarters Offices all geographically spread within Nigerian territory. There is similarity in respect of usage of fuel-wood and plants removal for security reasons. With this diversified distributions one common binding force that brings them together is the regimental guided administrative policies, which is similar in all formations, as such common policy are made for general implementation.

The Prison building structures are of only 2 major categories namely; the olden days type of campus dormitories arrangements usually smaller in land area than the larger cluster type, modern Prison designs. About 80% of the buildings in these campus types of Prisons, are of mud or clay bricks materials. Common structures found in the campus arrangements are; dilapidated fire wood kitchens and portions for unserviceable gas burners, and work shops.

CHAPTER TWO

Literature Review

2.1 GLOBALLY

Fuel wood problems globally:

Biomass fuel plays an important role in most low and middle income in developing countries. Yet energy planners often overlook them by energy statistician and more importantly. According to (FAO1982) reported that as many as 16 out of 45 countries in sub-Saharan in Africa are faced with fire wood deficit in this territory.

The unsustainable use of fuel wood may lead to socio-economic problems, increase in labor time spent on its collection increases, an increase in real price and switch to the less proffered fuel wood species or to other energy sources (*Kgathi 1992*). As the price of fuel wood or labor time increase, the economics of cooking may increases, the economics of cooking may change as house holds reduce the number meals cooked or develop strategies for using this energy more efficiently (*leach, 1987;kgathi 1992*).

The increase in labor time spent on wood collection may also affect the labor budget for its collection and hence house hold activities such as child care, cooking, food preparation and fetching of water (*Wisner 1988*).

The crises of increasing labor time for fuel wood collection is describe as crises of women *(Wisner 1988;agarwa 1986 Munslow et al 1998; Genapathy, 1981).*

The unsustainable use of biomass may lead to such environmental problems as reduced biodiversity and increase deforestation. Reduced biodiversity of fuel wood species may be caused by overexploitation of the most preferred species and may have many detrimental effects according to world commission on environmental and development 1988; species diversity is necessary for the functions of the ecosystems and the biosphere as a whole deforestation is associated with the emission of carbon dioxide, since trees squatters carbon, and may contribute to the global warming problem of the green house effects.

One of the major problems associated with these renewable energy resources is population increase. Evidence suggest that while population growth is constant or even declining in other parts of the world, in sub-Saharan Africa the population have increased from 2.5% per annum in 1960 to 3% in 1983 (*Pearce et al, 1991*) the world population shows that the natural increase in population was 35 in Africa and 2.3% in developing countries, in Africa this estimates was lower in north Africa (2.6%) and higher in western Africa (3%) eastern Africa (2.6%) and southern Africa (2.7%).

As population increase the availability of renewable resources such as fuel wood declines. For example increase in human population is associated with expansion of cropland and the increasing demand for forest products, thus deforestation particularly in Africa *(Pearce et al 1991-125*) fuel scarcity too.

Similarly the use of cow dung and crop residues has adverse effects on the environment, because it draws important nutrients and organic matter from the soil (*barnard, 190; peace and turner, 1990: 349; hall et al, 1982: 36-41*).

Another problem that associates scarcity is costs of transporting the fuel wood because increase of cost of petroleum fuel, the cost of collecting the fuel increases as distances increase due to declination of resources, this of course accelerates the price of the fuel wood for the consumer or end users. Instability in the fuel energy in developing world has increased the cost of procurement of fuel wood.

Global Environment:

The United Nations Environment Program (UNEP) encourages and coordinates sound environmental practices throughout the world. It grapples with ways to approach environmental problems on an international level, provides expertise to member countries, monitors environmental conditions

worldwide, develops environmental standards, and recommends alternative energy sources.

The first UN environment conference took place in Stockholm, Sweden, in 1972. It adopted general environmental principles, such as the idea that one country's actions should not cause environmental damage to another. It also raised awareness about the international aspects of environmental damage. A second conference was held in Nairobi, Kenya, in 1982. Nairobi is the headquarters of the UN Environment Program.

The Earth Summit also adopted a treaty on global warming, the environmental phenomenon in which the earth's temperature is increasing due to the burning of fossil fuels and other industrial practices. But the treaty did not commit countries that signed it to meet any targets by any particular date. The UN Environment Program works with the World Meteorological Organization (WMO) on this issue. The two organizations measure changes in global climate from year to year. The UN also sponsors the Intergovernmental Panel on Climate Change. Since 1989 that panel has served as an international forum for negotiations on global warming.

Another treaty adopted at the 1992 Earth Summit deals with the issue of biodiversity—that is, the variety of different living organisms in a particular habitat or geographic location. Under the treaty, nations agreed to preserve important habitats for animals and plants. Wealthier countries also agreed to

pay for the right to extract commercially profitable substances from rare species in protected areas of developing countries. The United States delayed signing the treaty because of fears that it could limit patent rights in biotechnology.

Global scale air pollution

Air pollution can expand beyond a regional area to cause global effects. The stratosphere is the layer of the atmosphere between 16 km (10 mi) and 50 km (30 mi) above sea level. It is rich in ozone, the same molecule that acts as a pollutant when found at lower levels of the atmosphere in urban smog.

Up at the stratospheric level, however, ozone forms a protective layer that serves a vital function: it absorbs the wavelength of solar radiation known as ultraviolet-B (UV-B). UV-B damages deoxyribonucleic acid (DNA), the genetic molecule found in every living cell, increasing the risk of such problems as cancer in humans. Because of its protective function, the ozone layer is essential to life on earth.

India

India's main environmental concern is its growing population, which is expected to increase 50 percent to 1.5 billion by the year 2050. In order to feed so large a population, more groundwater will be needed to irrigate crops, increasing the risk of poor soil quality due to salinization (increased

salt levels). More artificial fertilizer will likely be applied to crop fields, posing threats to drinking water.

The demand for meat has increased with greater levels of prosperity, resulting in overgrazing and increasing wasteland. The demand for fuel-wood has grown with rural populations, leading to the loss of trees and forests. To decrease reliance on fuel-wood, the government has promoted the use of *biogas* (a mixture of methane and carbon dioxide produced by decomposing organic matter) for cooking fuel.

Contributed By:Phil Oldenburg

Nepal

Deforestation is a major problem in Nepal. The country lost half its forests between 1950 and 1980 because of increased demand for fodder, fuel-wood, and land for agriculture and settlement. Much of the deforestation has taken place in the Tarâi, although the Middle and Great Himalayan regions have also experienced serious deforestation. With the assistance of the United States and international agencies, Nepal has embarked on several programs to extend and restore its forest cover

ContributedBy: PradyumnaP.Karan

Sustainable forest management can generate forest biomass as a resource

In all factors, but particularly in matters of sustainable resources practice, the need for accurate, up to date data on the resources that have to be managed is a primus interpares condition. And here in lies the importance of remote sensing and related geographic information system (GIS) as credible tools for generating, storing, retrieving and organizing data on any portion of the globe. *(Prof Baba.Lectures 2004).*

Some of this biomass can be substituted for fossil fuels; this approach has greater long term potential for reducing net emissions than does growing trees to store carbon. Establishing forests on degraded or non-forested lands adds to the amount of carbon stored in trees and soils. In addition, the use of sustainably-grown fuel-wood in place of coal or oil can help to preserve the carbon reservoir contained in fossil fuels left un needed underground.

From time immemorial scientists, and academicians of high repute have been making scientific and theoretical statements concerning the interaction of man with the environment.

Human history is said to be "largely written in terms of the struggle between mans existence" (*Barkley and Secler 1972*).

According to *Erlich et al (1970)*: while the intelligent application of technology fosters human well-being directly, a reducible but not removable burden of environmental disruption by the technology undermines well-being. This negative burden includes the direct effects of technology's accidents and affluent on human life and health.

Since deforestation is a globally acclaimed problem, *Clark and Holling (1985)* in a historical analysis of environmental change.

In a revised edition, *Zimmermann (1951; 3-20)* elaborated upon functional interpretation of resources. He stressed that natural resources are dynamic, becoming available to man through a combination of increased knowledge and expanding technology as executed by elected or appointed officials in public or private sector.

In reaching decisions the resource manager will frequently seek guidance from the resource analyst, although the latter's advice usually represents one of many inputs to be considered in the decision process. In contrast resource development represents the actual exploitation or use of a resource during the transformation of "neutral stuff" into a commodity or service to serve human needs and aspirations.

Davis (1906; 3) expressed similar feelings to geographers awareness when commenting "our work will become more serviceable to others if it is presented in such a manner that its relations to the whole subject are made

clear.... We may often benefit ourselves by systematically setting forth the place of our individual studies in geography as a whole, for we may thereby led to discover that the systematic sequence of parts is interrupted here and there by gaps, which can be filled by well directed effort.

Forest,

Plant community, of trees or other woody vegetation, predominantly occupies extensive area of land. In its natural state, a forest remains in a relatively fixed, self-regulated condition over a long period of time. Climate, soil, and the topography of the region determine the characteristic trees of a forest. In local environments, dominant species of trees are characteristically associated with certain shrubs and herbs.

The larger and taller plants influence the type of vegetation on the forest floor, but because low vegetation affects the organic composition of the soil, the influence is reciprocal. Disturbances such as a forest fire or timber harvesting may result in a shift to another forest type (*see* Forest Fires; Lumber Industry). Left undisturbed, ecological succession will eventually result in a climax forest community (*see* Ecology). Human intervention is practiced to maintain some desirable forest types.

(Encyclopedia Britannica 99 extracts)

Appropriate Technology

Technology designed to be suitable to the needs and resources of a particular group of people. Appropriate technology relies on local skills and resources that fit into the local situation economically and culturally, and that do not harm the environment. A wider approach takes into account the processes of the development of technologies—the skills and knowledge that go into them. An explanation of *appropriate technology* and of the related idea *intermediate technology* requires a brief survey of the historical context in which these terms arose.

Extraordinary advances in the achievements of technology and science have marked the last 250 years of human history. By the end of the 19th century there was a mood of great optimism that technology and science would shortly provide the solutions to almost all human problems, particularly those associated with poverty.

This mood of optimism possibly reached its zenith in the 1960s, owing partly to the achievements of space travel and partly to the development of nuclear energy, which seemed to promise a future in which the world's energy needs would be met by inexpensive electricity.

However, these optimistic expectations had already begun to be undermined in the 1930s. One growing concern was the impact on the natural

environment of technological activities—pollution, waste, and over consumption of natural, and especially nonrenewable, resources. These made possible and were themselves driven by the rich nations' way of life, based on high consumption and ever-increasing economic growth.

A second area of concern arose in the context of attempts to alleviate poverty in developing countries. It was initially thought that the best way to do this was to facilitate in these countries the kind of technology that had led to such prosperity in the richer countries. However, as time passed, a number of economists, in particular the German-born British economist E. F. Schumacher, argued that advanced technology of wealthy nations was rarely appropriate to the situation of people in developing countries, and that an alternative technology was needed.

A classic example of inappropriate technology is that of tractors provided for agriculture in Africa. The necessary infrastructure and specialized skills to keep the tractors maintained were largely lacking, so that after a short period the tractors became heaps of rusting material. A second example is a project that introduced an automated factory to produce plastic sandals. The traditional sandal makers were put out of work, the raw material had to be imported, and, though economic growth according to conventional measurements occurred, poverty increased.

This led *Schumacher* to formulate the concept of *intermediate technology,* something, as he said, "between the sickle and the combine harvester." He proposed ways "to find out what people are doing, and help them to do it better," rather than wrecking local cultures and communities by the intrusion of technologies that ignore local materials and render local skills obsolete.

Schumacher also argued forcefully that the model of development that the wealthier nations practice is environmentally unsustainable. He said that "the earth cannot afford the 'Modern World.' It requires too much and accomplishes too little." The capital-intensive technology of developed nations was itself inappropriate, not only to developing countries, but to the planet as a whole. *Schumacher* was convinced that wealthier nations must adapt their way of life to be more local and more sustainable, thus prompting them to look at appropriate technologies.

Examples of successful appropriate technologies are small-scale hydroelectric facilities in Nepal, Wales, and Peru. Energy-efficient cooking stoves in Kenya and Sri Lanka provide employment for the producers, and save time and money for the users; food-processing courses in Bangladesh include not only the technical aspects of food processing, but the packaging and marketing of products.

Today there is a fierce contest between the proponents of high technology and those who increasingly support the appropriate technology approach. Advocates of appropriate technology argue that the high-consumption way of life of the richer countries must be abandoned, and appropriate technologies must be adopted in place of those that increase unemployment and damage the environment.

(Encyclopedia Britannica 99 extracts)

Conservation of global resources:

Historically, development and conservation have been in conflict, because conservation was understood as the protection of resources, and development as the use, or exploitation of resources. Recognizing the need for both, the United Nations appointed, in 1980, a commission to advise on development and conservation. In their report "Our common future" they emphasized the concept of sustainable development.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development thus aims to improve the quality of human life while living within our ecological means. This reflects a changed view of development, as it takes into account environmental concerns. It is

compatible with a more enlightened view of conservation as the wise use (not only protection) of natural resources.

TOPICS FOR DEBATE

* The rich must live more simply, so that the poor may simply live.

* Is development without an increase in throughput really possible? Describe examples of this type of development, from both First and Third Worlds.

* The Third World is plagued not so much by a lack of development, but by its disadvantaged place in a world economic order in which the interests of the First World are paramount.

* Sustainable development may become a verbal formula for glossing over the harsh political realities that the concept requires, e.g. the need for income redistribution, reduced population growth and reduced natural resource consumption.

- South Africa is often described as a microcosm of the world because it has both First World and Third World characteristics in one country. With this in mind, what approach to development would be best for this country

Energy Resources globally:

Forest resource provides not only timber, food, medicinal products but also, service functional habitats for different plant and animal species human pressure has led to uncontrolled degradation deforestation and conversion of this resource to other uses such as agriculture.

Unsustainable consumption pattern have manifested. Fortunately forest resources are renewable and can be managed. Areas of management that remotely sensed data can contribute include, forest inventory to provide information on the conditions extent and growth characteristics of forest, monitoring of forest conditions, forest fires, dieses and damages, timber harvests and reforestation assessment, assessment of deforestation etc.

Energy which is described as a force, vigor and capacity to do things or get things done, and also power available for working, have been the back bone of many countries technology, industrial and socio economic development. Every human action requires the use of energy, be it eating moving or lifting loads. In addition to muscular energy, which has proved insufficient, human kind has harnessed the environment to provide other sources of energy. Fire for cooking steaming for travel and electricity, petroleum in most all fields because of its efficiency and convenience as well as frequently, its lower costs.

A sudden and unexpected changed occurred in energy planning and use, as a result of first petroleum crisis After the second petroleum (rises in 1979, energy conservation, energy planning and policy gained their importance. In that framework, the United Nations conference on new and renewable energy resources was held in Nairobi in 1981.

During the conference, countries resolved to review their respective energy policies to consider other sources of energy such as (natural gas, biomass and solar energy) the aim of this new policies was to make the best use of energy resources in order to promote socio economic development and improve the well- being of the world population. Self-sustaining and durable socio-economic development.

There are different types of resources that are as primary energy source, this includes, biomass (wood, charcoal, crop residues, etc) and fossil fuels such as (oil, gas, coal, electricity,LPG), solar energy, wave energy, and wind energy.Wood And Charcoal

This the simplest and most widely used for the poor, particularly in developing countries, where planning policy, management of energy resources is not or still being developed. This wood resource is used for cooking, social center and even for defense against wild animals. The growth in population, poor economic strength and lack of forestry management and energy planning accounts for deforestation by the use of wood for energy *(HOWE and gulic,1980).*

Crop residues

In New Zealand's ethanol production for purpose grown crops such as potatoes, grain sugar or fodder beet (brown 1981). But has great potential in terms of yields of fuel and lower processing cost. Ethanol can be used in various proportion in modified petrol engines, but is not particularly well suited for diesel substitution.

Coal

Is another source for energy, but requires more sophisticated and expensive plant, if the inefficiency in using I is not more than offset, its long-term greater availabity and lower price.

Solar energy

Is another primary energy source but relatively too expensive to develop, and is only used by large, and developed countries.

Natural gas

This forms another source of energy supply used by particularly developed and industrialized country, its cost of transformation from primary to end use is very high.

Fossil fuel

Crude oil, diesel, gasoline, kerosene, fuel oil and auto diesel all plays important role in primary energy supply for transportation of all classes of vehicles, small scale electricity generation, lighting, cooking, hydro electrical power schemes industrialization, technological developments and a good substitutes for gas, coal and nuclear energy.

The affordability of these resources largely depends on the countries economical strengths, as the cost of importations, of these resources are not stabilized. The constant rise of importation costs has had a significant impact on the ecosystem. Thus making it difficult for substitution from biomass energy system to commercial fuel by the rural areas that depends largely the use for fuel wood. Thus, increasing the dependence on biomass energy demand by the rural and urban poor, whose income makes it difficult to switch to commercial energy.

Hydro - electricity.

Hydroelectric power generates energy that are most used in developed and developing countries. The significant of this energy development is much felt in industrialization, technological and even in residential use. This is because the end use is more largely spread and cheaper than other end user.

Hydro electricity accounts for 30% new zealands primary energy supply micro- hydroelectric systems (under 250kw, are used in some many streams) they are economical where national electricity grid is not available. Over 50 schemes are presently in the country (*blakely and oconnor,1981*) firms in Newzeaelnd produce and seell turbines, water heels and even hydraulic rams Micro hydro turbines have been built by enthusiasts (*harriso smith 1981*).

In Nigeria, hydroelectric power generates 80% of energy used in all industrialized and house needs in urban areas.

Direct solar utilization

Dairy farms have a well specified (in time, location, quantity and temperature) demand for hot water, which can be met by solar water heaters. In New Zealand a test using 18 solar panels of 0.75m2 as a pre heaters for an electric heating system, 30% of the heat requirements was obtained from the sun (*Raine and Isaacs, 1981*). Electric fences have been powered by the sun using photoelectric cells (*Sangster 1981a*) this makes electric fencing far more portable than before. Commercial solar energizers are used and have proved reliable.

Utilizing the winds:

Despite *Cherry's (1976*) findings there are no plans for large-scale electricity generation from wind energy new Zealand 1982). However,

numbers of small winds mills are used through out the county. They have traditionally been employed to provide mechanical power (pumping water for stock or irrigation) but more recently for electricity generation to power electric fences and navigational lights. Unit of both functions are available commercially (*Isaacs and Mowbray, Eds, 1981*). Enthusiasts also build windmills.

Research on wind energy conservation has been undertaken at the universities of Auckland Canterbury. A 10 kw system is scheduled for installation on *Chalham* island off NewZealand coast, but problems of operation have been experienced during testing. Wind appears to be a competitive proposition only for remote locations.

Finally, energy resources availability depends on locations, technological development, planning and managerial efforts of such country. According to (*Dessai 1978*) he illustrated that poor countries do not grow simply by using fuel as they develop economically. The economics of poor countries are to grow, they will need to use commercial energy and the cheaper this can be provided, the better, and this largely depends on the country energy policy, planning technological managerial efforts and economical strength.

Global Rural Energy Availability And Use

Biomass energy, which essentially are (woods, vegetable oil animal dung. Ethanol crop residues etc) is an important source of energy not only for the rural areas, but for 75% of the population living in the developing worlds total energy consumption (*Hall, 1991, Karenzi1994*).

In sub-Saharan Africa (excluding south Africa) this source of energy constitutes 73% of toal energy consumption *(Ardayfio-Sschandrf) 1993: David son and Karezi 1993; o penshaw,1990)* the use of biomass ranges from as low as 43%and 46% of total energy consumption in countries such as Zimbabwe and Mauritius to as high as 86%,94%,95% and 97% in Kenya, Mozambique, Sudan and Rwanda respectively (*Hall and Rosslo- Calle, 1993*).

Wood fuel is undoubtedly the most important source of biomass energy and its increasing scarcity is a subject of major concern in Africa and the rest of the developing world. This problem is caused by rapid increase in human population, as well as market and policy failures. Market failure is refers to the failures to price a resource at full social cost of production, where as, policy failures means non intervention by government when it is necessary to do so, or introduction of distorted policy *(Panyatou 1993;sosssan et al 1992;Openshaw and Feinstein, 1989).*

According to (*yirendra et al 1994*) population growth is a driven force behind the process of deforestation, which is linked directly with the wood fuel problem because it leads to an increase in agricultural land

clearing and wood fuel demand. On the other hand, market and policy failure are accelerating forces mainly because of lack of property rights in the developing countries, which encourages over exploitation of woodland resources.

Though biomass is largely consumed in the rural areas of sub Saharan Africa, it also provides energy for the urban poor as well as for small scale industries like bakery, clay pot making, black smiths etc (Rosillo-Calle and Hall 1992).

For millions of family in the rural areas depends on this cheapest means of energy for cooking, warming, light producing alcohol and defense against wild animals. Except of the governments of he developing countries initiate policy and action programmes to transform the use of their renewable energy to a sustainable scale the environmental problem and health and the depletion of these resources would lead to further socio economic crises.

Green House Gas Globally:

Since 1896 it has been known that these gases reduce the escape of the earth's infrared radiation into space and thus function to maintain the earth's relatively warm temperature. (This is called the greenhouse effect.) Although there is broad agreement that human activity, such as burning fossil fuels, has reached a scale that is beginning to influence climate, there

is much uncertainty and debate over how much and how fast the climate will warm.

Elevated global temperatures could result in coastal flooding and the shifting of major climatic zones and may have serious implications for agricultural productivity.

Global biodiversity:

Global biodiversity on the earth is well known for larger organisms such as mammals (over 4000 species). However, total biodiversity can only be estimated, because most species of insects, deep-sea invertebrates, and microorganisms have yet to be described. Estimates of total terrestrial biodiversity range from 10 million to 100 million species, most of them insects.

Recently, equal numbers of deep-sea species, mostly small invertebrates, have been estimated. Natural ecological systems generally support higher biodiversity than agricultural or urban landscapes, particularly in the tropics, where natural diversity is greatest.

The increasing human population threatens biodiversity. Some ecologists believe that more than 50 percent of existing species will be lost in the next 100 years. Laws have been designed to protect threatened and endangered species, but legal and biological difficulties in defining species

or other groups used for measuring biodiversity make such laws controversial. Moreover, experience has shown that species' survival depends on the preservation of their habitats.

Conflict over use of the earth's remaining natural wildlands will increase the focus on measuring, evaluating, and preserving biodiversity. Each taxonomic group usually receives equal value in estimating biodiversity, but certain species are sometimes assigned greater value. For example, the tuatara of New Zealand is an endangered lizard like reptile with no close relatives. Because it is more genetically distinct than any species of true lizard, it contributes more to the diversity of the world's fauna. Some species maintain the diversity of particular habitats.

These include the sea otter off the Pacific Coast of North America, which maintains diversity in sub tidal waters by preying on sea urchins that would otherwise graze kelp forests to near extinction, thus removing the habitat for invertebrates and fishes. *ContributedBy:JudithH.Myers*

Global Desertification;

Desertification is found on every continent except Antarctica, but international attention has focused mostly on Africa, particularly the region known as the Sahel, the region of northern Africa immediately to the south of the Sahara desert. Desertification has been recognized as a problem since the Dust Bowl of the 1930s in the Midwestern United States, but it only became

an international issue during the Great Drought in the Sahel between 1968 and 1973. (*Encyclopedia Britannica 1999 edition*)

2.2 Regional Literature Review

Africa:

The second largest of the earth's seven continents, covering about 30,330,000 sq km (about 11,699,000 sq mi), including its adjacent islands. It comprises about 22 percent of the world's total land area. In 1990 about 12 percent of the world's population, an estimated 642 million people lived in Africa, making it the world's second-most populous continent after Asia.

Straddling the equator, Africa stretches 8050 km (4970 mi) from its northernmost point, Ra's al Abyad (Cape Blanc) in Tunisia, to its southernmost tip, Cape Agulhas in South Africa. The maximum width of the continent, measured from the tip of Cap Vert in Senegal, in the west, to Raas Xaafuun (Ras Hafun) in Somalia, in the east, is about 7560 km (about 4700 mi). The highest point on the continent is the perpetually snowcapped Kilimanjaro (5895 m/19,340 ft) in Tanzania, and the lowest is Lake 'Asal (153 m/502 ft below sea level) in Djibouti. Africa has a regular coastline characterized by few indentations. Its total length is only about 30,490 km

(about 18,950 mi); the length of the African coastline in proportion to its area is less than that of any other continent.

The African continent is characterized by plateau land, with a few distinct mountain ranges and a narrow coastal plain. The continent is commonly divided along the lines of the Sahara Desert, the world's largest desert, which cuts a huge swath through the northern half of the continent. The countries north of the Sahara make up the region of North Africa, and include such large and populous nations as Egypt and Algeria.

In general, these nations are more developed than those countries to the south, due in part to the location here of the Nile, the world's longest river. Most of Africa's population lives in the region south of the Sahara, known as sub-Saharan Africa. In this area, eastern Africa includes such countries as Ethiopia, Somalia, and Uganda. Among the nations of Central and West Africa are Angola, Cameroon, Ghana, Nigeria, and the Democratic Republic of the Congo (DRC, formerly Zaire).

Southern Africa is dominated by the country of South Africa, and also includes Botswana, Lesotho, and Namibia. Africa also encompasses many islands, the largest of which is Madagascar, located off the southeastern coast of the continent. As a whole, Africa encompasses about 50 nations, ranging from Nigeria, a country of an estimated 127 million people, to small island republics such as Comoros, with a population just over 500,000.

It is widely believed that human life began in Africa sometime between 5 million and 8 million years ago. The continent was home to one of the world's first great civilizations, the Egyptian empire that was unified more than 5000 years ago. However, the last 500 years in Africa have been dominated by foreign colonization and political and ethnic struggles that have hampered industrial and social development.

The continent remains mostly rural, despite urban growth in the second half of the 20th century. Africa's economy is the least developed of any continent after Antarctica. Agriculture is still the main economic activity. Devastating famine and outbreaks of disease are common, exacerbated by poor roads and the lack of medical personnel.

Africa is rich in natural resources, and part of its economic base is the export of this wealth. Many African nations depend on foreign investment and aid, or on the trade of one or two resources that are subject to market fluctuations.

Regional Natural Environment:

Except for the northern coast and the Atlas Mountains in the northwest, the terrain of Africa consists of a vast, rolling plateau, marked by a number of large, saucer-shaped basins.

Regional Climate:

The climate of Africa, more than that of any other continent, is generally uniform. This results from the position of the continent in the Tropical Zone, the impact of cool ocean currents, and the absence of mountain chains serving as climatic barriers. (*Encyclopedia Britannica 99)*

Regional Vegetation:

African vegetation can be classified according to rainfall and climate zones. The tropical rain forest zone, where the average annual rain is more than 1270 mm (more than 50 in), has a dense surface covering of shrubs, ferns, and mosses, above which tower evergreens, oil palms, and numerous species of tropical hardwood trees.

A mountain forest zone, with average annual rainfall only slightly less than in the tropical rain forests, is found in the high mountains of Cameroon, Angola, eastern Africa, and parts of Ethiopia. Here a ground covering of shrubs gives way to oil palms, hardwood trees, and primitive conifers. A savanna woodland zone, with annual rainfall of 890 to 1400 mm (35 to 55 in), covers vast areas with a layer of grass and fire-resistant shrubs, above which are found deciduous and leguminous fire-resistant trees.

A savanna grassland zone, with annual rainfall of about 500 to 890 mm (about 20 to 35 in), is covered by low grasses and shrubs and scattered, small deciduous trees. The thornbush zone, a steppe vegetation, with an

annual rainfall of about 300 to 510 mm (about 12 to 20 in), has a thinner grass covering and a scattering of succulent or semi-succulent trees.

The sub desert scrub zone, with an annual rainfall of 130 to 300 mm (5 to 12 in), has a covering of grasses and scattered low shrubs. The zone of desert vegetation, found in areas with an annual rainfall of less than 130 mm (less than 5 in), has sparse vegetation or none at all.

(*Encyclopedia Britannica 99)*

Regional Forestry and Fishing

Although about one-quarter of Africa is covered by forest, much of the timber has little value except as local fuel. Gabon is a major producer of okoume, a wood used in making plywood; Côte d'Ivoire, Liberia, Ghana, and Nigeria are major exporters of hardwoods.

Inland fishing is concentrated in the Great Rift Valley lakes and in the increasing numbers of fish farms. Ocean fishing is widespread for local consumption; it is commercially important off Morocco, Namibia, and South Africa. (*Encyclopedia Britannica 99)*

Regional Energy:

Nigeria, Libya, Algeria, and Angola are major world producers of petroleum. Africa's natural-gas exports are centered in Algeria. Coal is

concentrated in Zimbabwe and South Africa; the bulk of their production is used internally.

The rest of Africa must import fuels. Although Africa has some 40 percent of the world's hydropower potential, only a relatively small portion has been developed due to high construction costs, inaccessibility of sites, and their distance from markets.

Since 1960, however, a number of major hydroelectric installations have been constructed; these include the Aswân High Dam on the Nile River, the Akosombo Dam on the Volta River, and the Kariba Dam and Cabora Bassa Dam on the Zambezi River.

2.3 Nationally

Nigeria:

Federal Republic in western Africa, bounded by Cameroon to the east, Chad to the northeast, Niger to the north, Benin to the west, and the Atlantic Ocean to the south. Until 1991, the capital was the largest city, Lagos, on the southwestern coast; at that time, the new city of Abuja, in the country's interior, became capital. Nigeria has a federal form of government and is divided into 36 states and a federal capital territory.

Nigeria is by far the most populated of Africa's countries. Its many ethnic groups give the country a rich culture but also pose major challenges

to nation building. The economy is dominated by the production of petroleum, which lies in large reserves below the Niger Delta. While oil wealth has financed major investments in the country's infrastructure, Nigeria remains among the world's 20 poorest countries in terms of per capita income.

In pre-colonial times, the area was home to several kingdoms and tribal communities; in spite of European contact that began in the 16th century, they maintained their autonomy until the 19th century. The colonial era began in earnest in the late 19th century, when Britain consolidated its rule over Nigeria. In 1914 the British merged their northern and southern protectorates into a single state called the Colony and Protectorate of Nigeria. Nigeria became independent of British rule in 1960. Since then, the country has endured decades of on-and-off military rule.

Land And Resources In Nigeria

Nigeria covers an area of 923,768 sq km (356,669 sq mi). At its widest, it measures about 1200 km (about 750 mi) from east to west and about 1050 km (about 650 mi) from north to south. The country's topography ranges from lowlands alo

g the coast and in the lower Niger Valley to high plateaus in the north and mountains along the eastern border. Much of the country is laced with productive rivers.

The Nigerian ecology varies from tropical forest in the south to dry savanna in the far north, yielding a diverse mix of plant and animal life. Human population and development pose serious threats to both the ecological and the human environment. (*Encyclopedia Britannica 99)*

Nigerian Climate and Vegetation

Nigeria has a tropical climate with sharp regional variances depending on rainfall. Nigerian seasons are governed by the movement of the inter-tropical discontinuity, a zone where warm, moist air from the Atlantic converges with hot, dry, and often dust-laden air from the Sahara known locally as the *harmattan*.

During the summer, the zone of inter-tropical discontinuity follows the sun northward. As a result, more and more of the country comes under the influence of moisture-laden tropical maritime air. As summer wanes, the zone shifts southward, bringing an end to the rainy season.

Temperatures are high throughout the year, averaging from 25° to 28° C (77° to 82° F). In the higher elevations of the Jos Plateau, temperatures

average 22° C (72° F). Northern Nigeria typically experiences greater temperature extremes than the south.

Rainfall varies widely over short distances and from year to year. Parts of the coast along the Niger Delta, where the rainy season is year-round, receive more than 4000 mm (160 in) of rain each year. Most of the country's middle belt, where the rainy season starts in April or May and runs through September or October, receives from 1000 to 1500 mm (40 to 60 in).

Within this region, the Jos Plateau receives somewhat more rain, due to its higher elevation. In the dry savanna regions, rainfall is especially variable over distance and time. The region along Nigeria's northeastern border receives less than 500 mm (20 in) of rain per year, and the rainy season lasts barely three months. (*Encyclopedia Britannica 99)*

Nigeria Vegetation:

Varies dramatically at both the national and local level in relation to climate, soil, elevation, and human impact on the environment. In the low-lying coastal region, mangroves line the brackish lagoons and creeks, while swamp forest grows where the water is fresh. Farther inland, this vegetation gives way to tropical forest, with its many species of tropical hardwoods, including mahogany, iroko, and obeche.

However, only in a few reserves—protected from the chainsaw and the farmer—is the forest's full botanic diversity intact. Elsewhere, forest is largely secondary growth, primarily of species like the oil palm that are preserved for their economic value.

Immediately north of the forest is the first wave of savanna: the Guinea, or moist, savanna, a region of tall grasses and trees. The southern margins of the Guinea savanna—which has been so 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 decimated 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. Beyond the Guinea savanna lies the drier Sudan savanna, a region of shorter grasses and more scattered, drought-resistant trees such as the baobab, tamarind, and acacia.

In Nigeria's very dry northeastern corner, the semidesert Sahel savanna persists. Throughout these drier savannas, drought and overgrazing have led to desertification—the degradation of vegetation and soil resources.

(*Encyclopedia Britannica 99)*

Nigerian Environmental Issues:

Several Nigerian groups have campaigned actively, but with little success, to compel the government and major oil companies to introduce environmental safeguards. In 1988 the government created the Federal Environmental Protection Agency (FEPA) to address problems of desertification, oil pollution, and land degradation, but the FEPA has had only a minor impact.

Their techniques include planting several different crops in a single field at once to cover the ground more evenly and thereby reduce erosion and increase fertility; planting and maintaining farmland trees and hedgerows to reduce erosion; applying manure to farmland to maintain soil fertility; and, in certain areas such as the Jos Plateau, terracing steep slopes.

Contributed By: Robert Stock (Encyclopedia Britannica 99)

Focus on Ibadan Workshop

Various environmental issues were examined at the Ibadan workshop (as highlighted in *Dr. Akinyeye lectures 2003/2004)* and came up with the formation of Nigerians first research and action-oriented environment. The Nigerian Environmental Action /study Team (NEST). The aims and objectives of NEST are as follows:

1. To collect basic information and comprehensive data on the status of the environment.

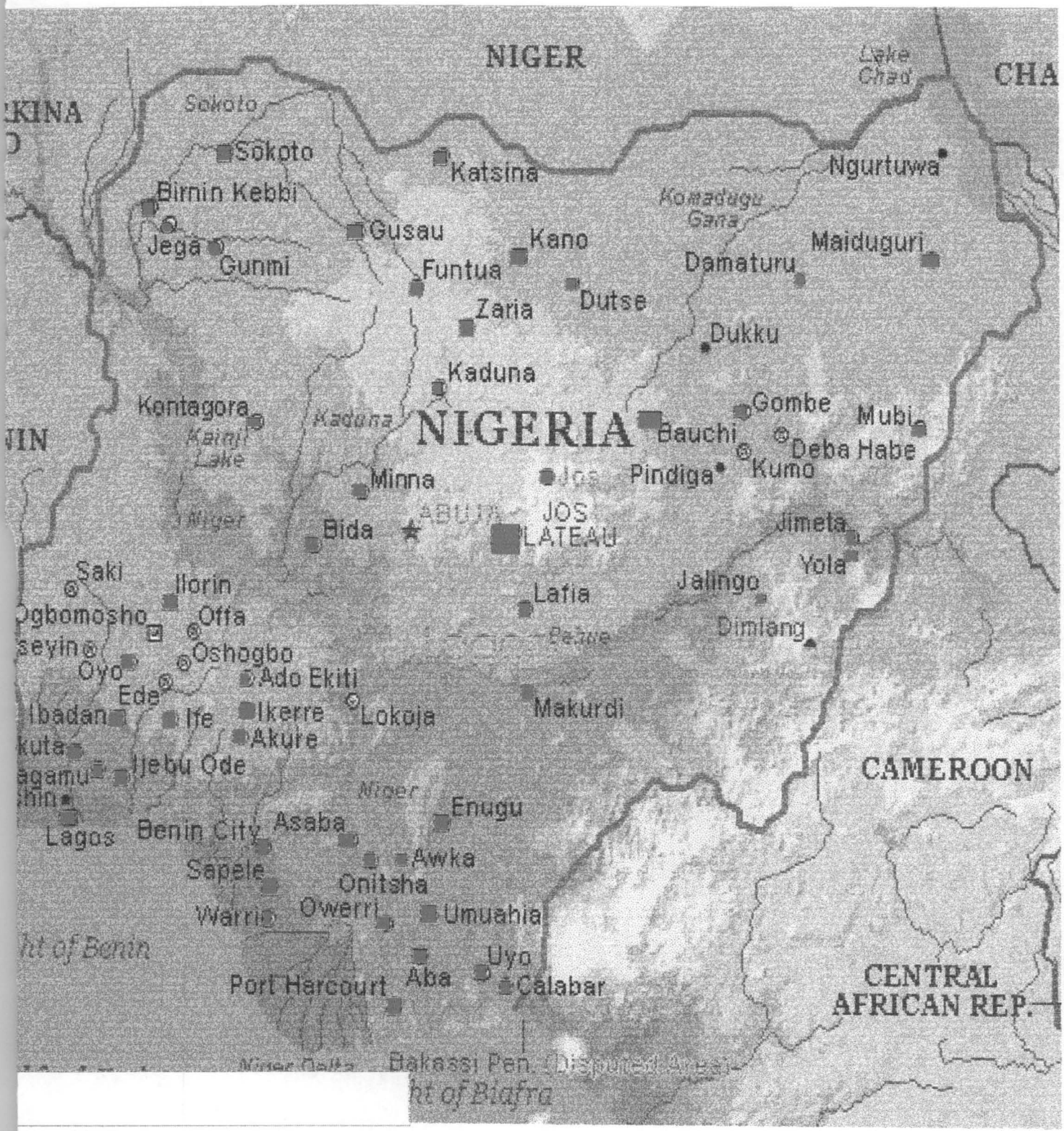
2. To investigate and document areas of potential environmental hazards with a view to identifying gaps in knowledge and promoting specific projects that may arise in the course of study.

3. To analyze pattern of human behavior, social relations and cultural preferences as these affect the environment.

Bush burning from bush fallow practices sweeps through about 260,000 ha per year of forest land and about 100,000 ha per year of savanna land in Nigeria and the dust emitted by it has been estimated at 871,000 tonnes per annum. In addition, about 584,000 tonnes of smoke particles were estimated to be emitted annually into the atmosphere from the burning of an estimated18.25 million tones of dust into the atmosphere annually.

While average incomes are higher and death rates lower in cities, urban poverty is as pervasive as rural poverty. Secure, well-paying jobs are scarce, even for those with considerable education. Food is typically expensive. Housing, too, is costly despite its rudimentary quality, prompting the poor to build basic houses in shantytowns. Sewage disposal systems in most cities are also basic or primitive, and polluted streams, wells, roadside drains, and other bodies of water increase the risk of infectious disease. Industry, automobiles, and the burning of fuel-wood further pollute air and water.

LOCATIONAL DISTRIBUTION OF SOME PRISONS



LEGEND

Convict prisons

Satelit prisons

CHAPTER THREE

Methodology

3.1 Data Collection

This research work is designed to highlight the environmental issues associated with vegetal removal in the case study area that is the Nigerian prisons and its attendance consequences and offer solutions.

3.2 Location

Currently Nigeria has 300 Prisons formation that are geographically spread the total inmate population as at 2000 is 47,000. The wide spread of this Prisons are contained in the tables also some major ones visually are identified in the Nigerian map according to vegetation zones of the country.(see plate 1).

3.3 Description

The administrative mechanism of all our prison are the same because it has a central operational command, Officers In-charge station could be

assigned to oversee any other formation. The unavailability of gas that forces the continuous usage of fuel-wood is not restricted to a particular area. The uprooting and removal of plants considered, as security threat is not limited to an area too.

If the Prison central administration considers the application of other alternatives to its cooking energy requirements or come up with a friendly mechanism of vegetal enhancement to beautify and protects its structures, a general circular and funding as the case may be, could be passed and adopted into law by all its formations.

On the spot environmental assessment of some selected prisons are thus as follows;

Maximum prison kirkiri

The maximum prison kirikiri was built in 1965 with a design capacity of 1056 and varying inmate population of about 1800.

The topography of the prison is located off Oshodi/express way and bounded by the lagoon in the south. Residential buildings in the North, the mammy market in the east and the barracks in the west.

The land is relatively flat with non-cohesive soil and very high water table thereby causing flooding during rainy season due to the saturation of the soil.

The prison covers an area of about 15 hectares and 50% of the land is covered by the super structures, comprising of various categories of cells, workshops, administrative blocks clinic place of worship and kitchen. The most striking thing is the kitchen which still has its traditional fire wood area with chimney still been in use of.

This Prison lies within the mangrove vegetation of Nigeria.

Source of energy for cooking is officially gas. But the use of this gas is hindered by price fluctuations and irregular supply. This scenario forces the Prison administrators to use fuel wood for emergency cooking.

Planted or natural trees around this prison are scarce but as the name implies the ground is almost covered by the kiri-kiri grass, the long rainy season of this area ensures the survival of the grass, often at times they are trimmed as carpet grass, this invariably prevents surface run-off and erosion menace.

Onitsha prison

The Onitsha prison was built in 1915 with a design capacity of 326 and varying inmate population of about 1100.

The topography of the prison is located west of the riverbank Residential buildings in the North, the mammy market in the east and the barracks in the west.

The land slopes gently towards the river with red laterite soil and very high water table thereby causing flooding during rainy season due to the saturation of the soil.

About 80% of the land is covered by the super structures.

This prison lies within the rain forest vegetation of Nigeria.

Source of energy for cooking is officially gas. However since the banned in 1989 of fuel wood, it is most times made for emergency cooking, that has been necessitated by irregular availability and price increase of domestic cooking gas.

Planted or natural trees around this prison are scarce, but the grasses that commonly grow in all season are treated as weed invariably they are most at times slash and burn this attitude encourages surface run off and erosions sets the implication is that building in this prison have their foundation exposed as the soil is washed away.

Makurdi prison

The Makurdi prison was built and commissioned in 2002 with a design capacity of 240 bed it is proto type model prison facility. The land area of this prison is over 50 hectares.

The topography of the prison is relatively flat and bounded by Makurdi Oturkpo road in the east and residential buildings in the north, south and west.

The land slopes gently towards the north with soil and medium water table with seasonal rains, the temperature reaches 41^0c in dry season. About 20% of the land is covered by the super structures.

This prison lies within the woodland and tall grass savannah forest vegetation of Nigeria.

Source of energy for cooking is officially gas. However since the banned in 1989 of fuel wood, it is most times made for emergency cooking, that has been necessitated by irregular availability and price increase of domestic cooking gas.

Planted trees around this prison provide sheds and thus bind the soil, but due to absence of grass the whole ground is exposed the surface of the ground becomes compacted and albedo set in the surface becomes hot, and erosion menace, causes havoc to the building structures. See plate -2

Funtua prison

The Funtua prison was established in 2001 with a design capacity of 80 inmate bed space it is proto type model prison facility. The land area of this prison is over 20 hectares.

The topography of the prison is relatively flat and it has Zaria-Gusau road to its west and east with farm lands at background and residential buildings in its north and south parts.

The land slopes gently towards the north with loose laterite soil and low water table with seasonal rains, shorter than the wet season. The temperature here is high.

About 50% of the land is covered by the super structures.

This prison farm lies within the short grass savannah vegetation of Nigeria. Draught is a common occasional environmental hazard here dust winds with great strength is noticed and capable of chucking human body.

Source of energy for cooking is officially gas. However since the banned in 1989 of fuel wood, it is most times utilize for emergency cooking, that has been necessitated by irregular availability and price increase of domestic cooking gas.

Planted trees around this prison provide sheds and thus bind the soil , but due to absence of grass the whole ground is exposed the surface of the ground becomes compacted and albedo set in the surface becomes hot, and erosion menace, causes havoc to the building structures. See plate 3.

3.4 Sources of data

Due to dynamic time constraints and coupled with, the intricate nature of the case study area, the following methods was used as regards the vegetal cover removal associated with and some aspect of security the source of data used was a personal compilation of past and present field records, which I was opportune together due to my schedule as a technical

supervisor covering all prison formations since 1992.the equipment use are camera (see plates 4-8), sketches, personal interview with office colleagues and public comments made.

The service library also assisted me as I made extensive use of the library in order to obtain pattern of annual inmates population increases, establishments and location of prisons etc. In the library too I was able to make extracts of relevant information as it relates to my project from previous publications.

3.5 Analysis Of Data

CHART 1:

This is the compilation of prisons distribution and inmates' population within the vegetational zones of Nigeria.

Lagos state, which is in the mangrove zone, has the highest inmates population 6307, invariably the demand for fuel wood would be higher, in times of energy required for emergency purpose, fuel wood are often at times sourced from neighboring states.

River state has inmates population of 2368 and its also in the mangrove vegetational zone of the country, it has similar case with what is obtained in lagos.

Kaduna state has an inmate population of 2164 and it is in wood land and tall grass vegetation, in this region vegetal depletion is severe as the rate of growth of vegetation is slow due to lesser rain than the montane and the rain forest zones. The sizes of trees cut down for fuel wood are increasingly becoming smaller day by day.

Kwara state has the lowest inmates population of 320 inmates and it is also within the wood land and tall grass vegetation, the demand for fuel wood in times of emergency need is thus less as compared to Lagos or Rivers state.

Chart 2

This chart provides data on gas consumption limits adopted presently in prisons, indicating a minimum of 25 numbers of 50 kg gas cylinders used in prisons of less than 100 inmates, and a maximum of 90 numbers of 50 kg gas used in prisons above 1300 inmates. In this category we have Lagos and Rivers states toping the rank.

Though the official contract cost of N7,500/50kg of gas is superseded by market events, We are now able to deduce that an average of 12.5kg of gas per month is used to feed an inmate. At an official cost of N7, 500/50Kg the cost per inmate for gas would be N1, 875 per month.

Chart 3

PRISON POPULATION DISTRIBUTION ACCORDING TO VEGETATIONAL ZONES

S/n	Prison state command	Number of prisons/satellites prison	Inmates population	vegetation zones
1	Lagos	5	6307	mangrove
2	Ogun	5	862	montane
3	Oyo	2	832	Rain forest
4	Osun	2	395	Marginal savannah
5	Ondo	4	851	Rain forest
6	Ekiti	1	328	Rain forest
7	Edo	6	1951	Rain forest
8	Delta	5	185	Rain forest
9	Imo	3	1681	Rain forest
10	Enugu	4	1594	Rain forest
11	Anambra	2	1564	Rain forest
12	Ebonyi	2	725	Rain forest
13	Akwa ibom	5	1348	Rain forest
14	Cross rivers	6	753	Fresh water swamp
15	Rivers	4	2368	mangroove
16	Benue	3	616	Woodland and tall grass
17	Nasarawa	4	669	Woodland and tall grass
18	Plateau	6	1068	Woodland and tall grass
19	Niger	7	999	Woodland and tall grass
20	Kogi	6	476	Woodland and tall grass
21	Kwara	2	320	Woodland and tall grass
22	Sokoto	2 – 3sp	901	Short grass savannah
23	Kebbi	5 – 5sp	812	Short grass savannah
24	zamfara	2 – 4sp	505	Short grass savannah
25	Katsina	4 – 6sp	744	Short grass savannah
26	Kano	3 – 7sp	1696	Short grass savannah
27	Kaduna	8 – 8sp	2164	Woodland and tall grass
28	Jigawa	5 – 5sp	506	Short grass savannah
29	Yobe	4 – 5sp	691	Short grass savannah
30	Borno	7 – 9sp	1331	Short grass/marginal sav.
31	Adamawa	6 – 11sp	2148	Short grass savannah
32	Taraba	4 – 8sp	1020	Woodland and tall grass
33	Fct Abuja, suleja	2	504	Short grass savannah
34	Bauchi	5 – 8sp	986	Short grass savannah
35	Gombe	2 – 3sp	627	Short grass savannah
36	Abia	3	880	Rain forest

Chart 1

TABLE OF ESTIMATED AVERAGE
FUEL WOOD CONSUMPTION IN NIGERIAN PRISONS

S/N	Categories of prison inmates populations	Number of tipper trip of fuel wood consumption per month	Average price per tipper trip
	Less than 100 capacity	1	N15,000.00
	100 – 199	2	Ditto above
	200 – 299	3	Ditto above
	300 – 399	4	Ditto above
	400 – 499	5	Ditto above
	500 –599	6	Ditto above
	600 – 699	7	Ditto above
	700 – 799	8	Ditto above
	800 – 899	9	Ditto above
	900 – 999	10	Ditto above
	1000 – 1099	11	Ditto above
	1100 – 1199	12	Ditto above
	1200 – 1299	13	Ditto above
	1300 and above	14	Ditto above

Source: Available market price 2004

Chart 3

cooking. It is then estimated that N150 worth of fuel wood will be used for an inmate per month.

In comparism it is cheaper to use fuel wood than gas for inmates cooking as over 1000 percent profit will be realized in terms of the economic gains. But for the environmental effects, it is very difficult to estimate the actual cost of the environmental destruction, as this affects not only the present but also the future generation in terms of accumulated environmental hazards.

Diagram 1

This diagram is a Bar-chart that shows the inmates growth rate recorded at every 10 years interval. The period between Year 1990 – 2000 has more increase rate of 10,887 inmates, this probably might be due to the rapid population increase in the countrys population, that brought about more social and economic pressure on the citizens. Year 1960 – 1970 has increase rate of 8,388 inmates this attributed to the aftermath of the civil war, year 1980 – 1990 has minimum increase rate of 3,389 inmates.

the above scenario it can be seen that impact of vegetal cover is less in 1960 – 1970 period even though the inmates growth rate is high but the corresponding forest resource was adequate to provide for the needed fuel wood and it was not envisaged to be limited. Between 1990 – 2000 period there is increase in inmate growth rate as such continous pressure exarted

Histograph of Inmates population growth

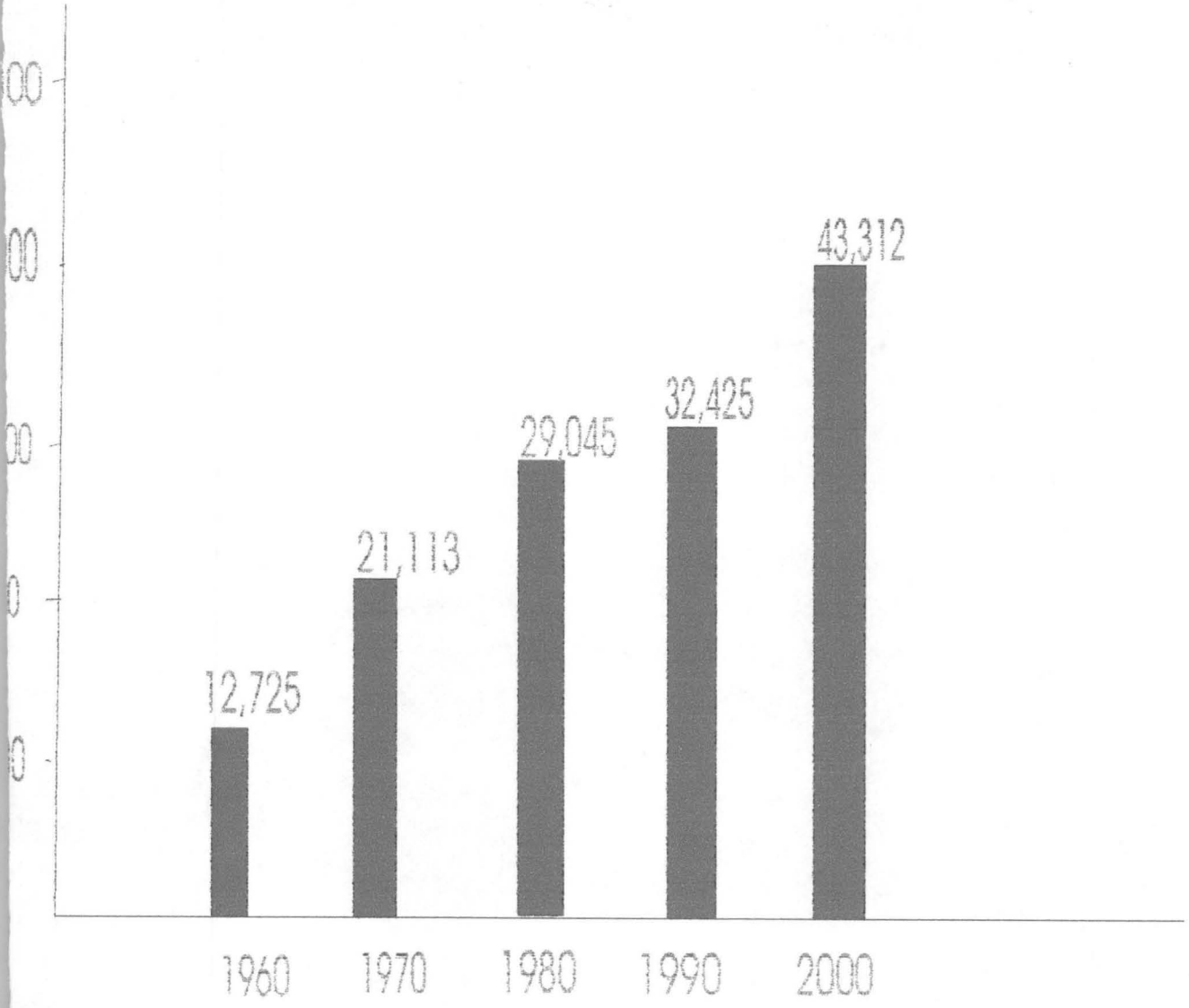


Diagram 1

corresponding forest resource was adequate to provide for the needed fuel wood and it was not envisaged to be limited. Between 1990 – 2000 period there is increase in inmate growth rate as such continous pressure exarted on the forest resource without corresponding afforestation programe and has drastically reduce the size of the forest.

DIAGRAM 2

Diagram 2 is a pie chart that shows percentage distribution of inmates according to vegetational zone of Nigeria. The rain forest has the highest population of 27.4%, followed closely by the rain forest with 27.3%, mangrove zone has 21.4%, the wood land has 18%, montane 2.1%, fresh water swamp has 1.9% and the marginal savannah has 1.8%.

From this data it can be seen that the short grass zone is worst affected, couple with the fact there are few trees in this area and the rate of vegetation is slow due seasonality of rain. The wood land savannah is also not left out vegetation in this area will gradually continue to diminish if measures are not taken. Fresh water swamp does not provide the kind of fuel wood that could generate the kind of energy the study area require as such fuel wood is most often source from the rain forest zones.

MAP 1

PERCENTAGE DISTRIBUTION OF INMATES

WITHIN VEGETATIONAL ZONES

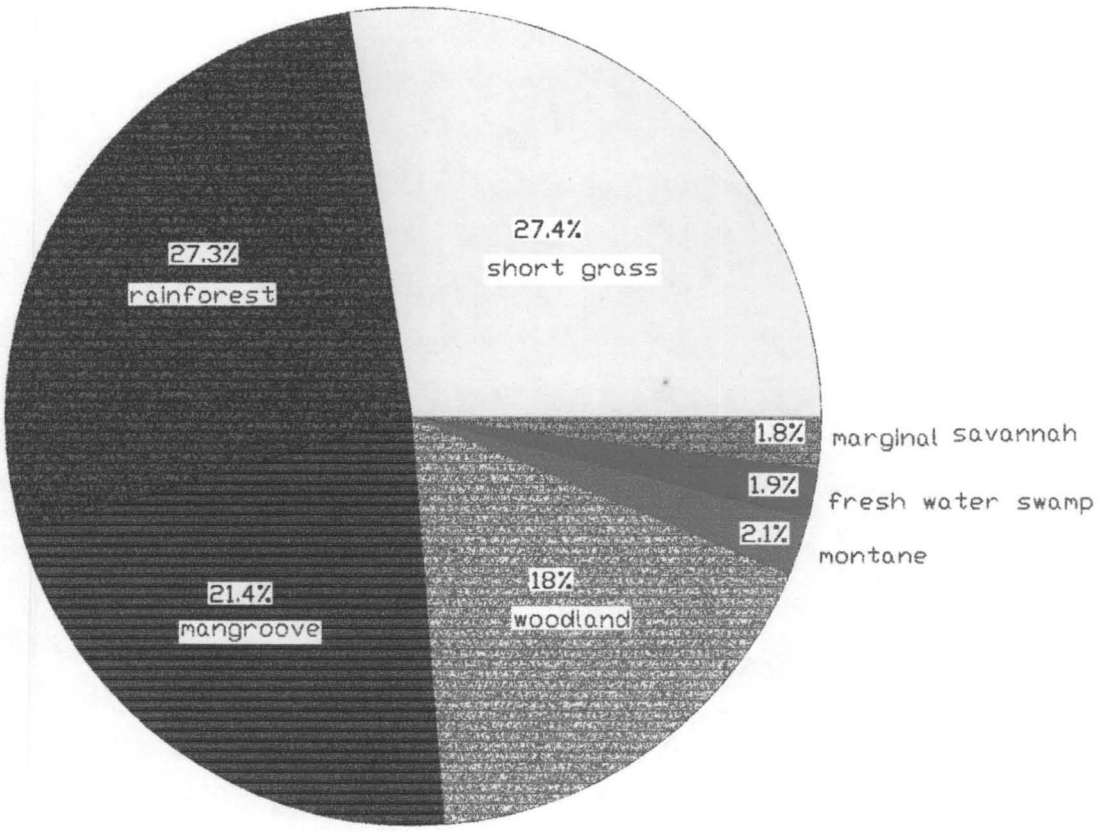
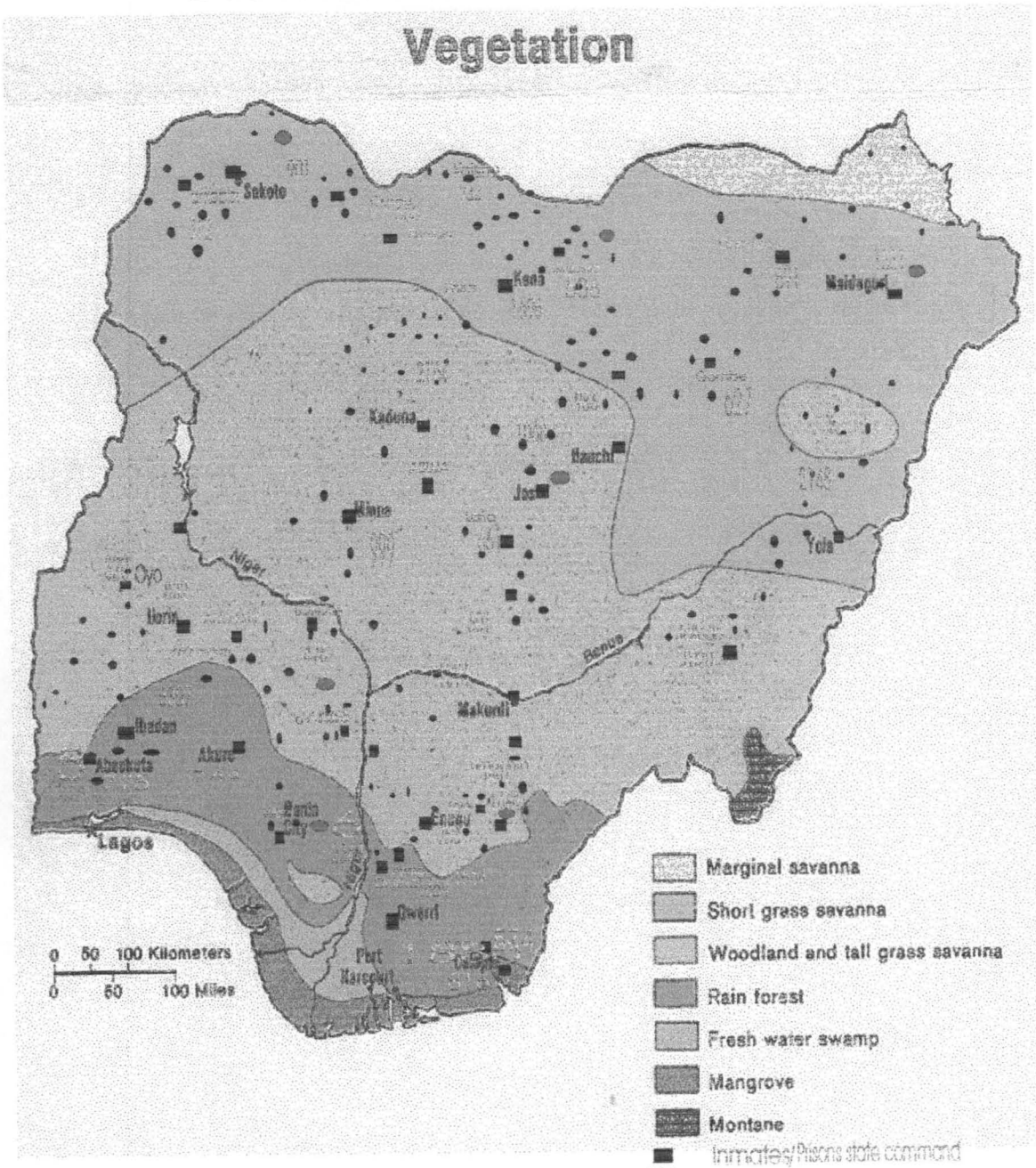


DIAGRAM 2

Distribution of Prisons In The



Map 2

This map shows the location distribution of some prisons in Nigeria though the prisons are not evenly spread but they have common impact on vegetal removals either for fuel wood or for site clearance purpose where ever they exist.

MAP2

This map is an attempt to show the distribution of prisons in the vegetational zones of Nigeria, the woodland and tall grass savannah has more prison distribution than the less mangrove vegetation, in the marginal savannah though has lesser prisons, the effect of vegetal removal is much more felt as vegetation in this area are very few and scanty.

PLATE 1

This image shows large and medium size fuel wood that are extracted from the forest.

PLATE 2

This image indicates extracted fuel transported to site for consumption it can be noted that the size of the fuel wood has further reduced.

PLATE 3 & 4

This image indicates effects of erosion on prison structure that is caused due to excess vegetal removal.

PLATE 5

A. Medium size extracted fuel wood

B. Large size extracted fuel wood

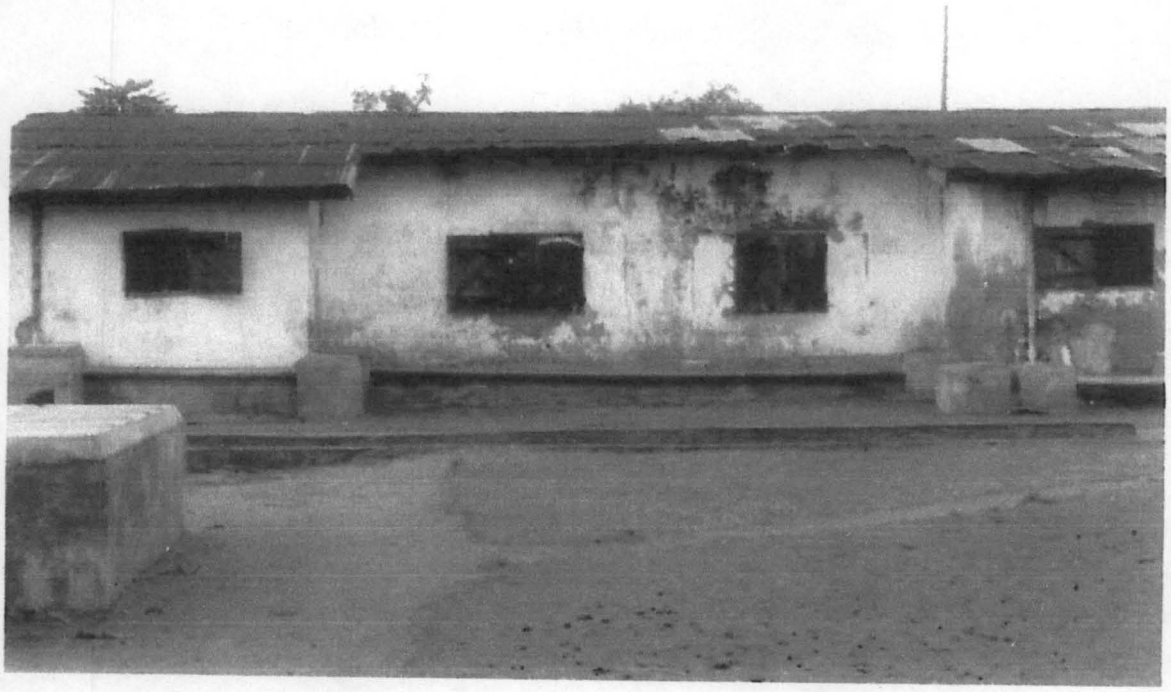
Plate 1

C. Shrinkd size extracted fuel wood

Plate 2

Erosion exposed Prisons structure

Plate 3

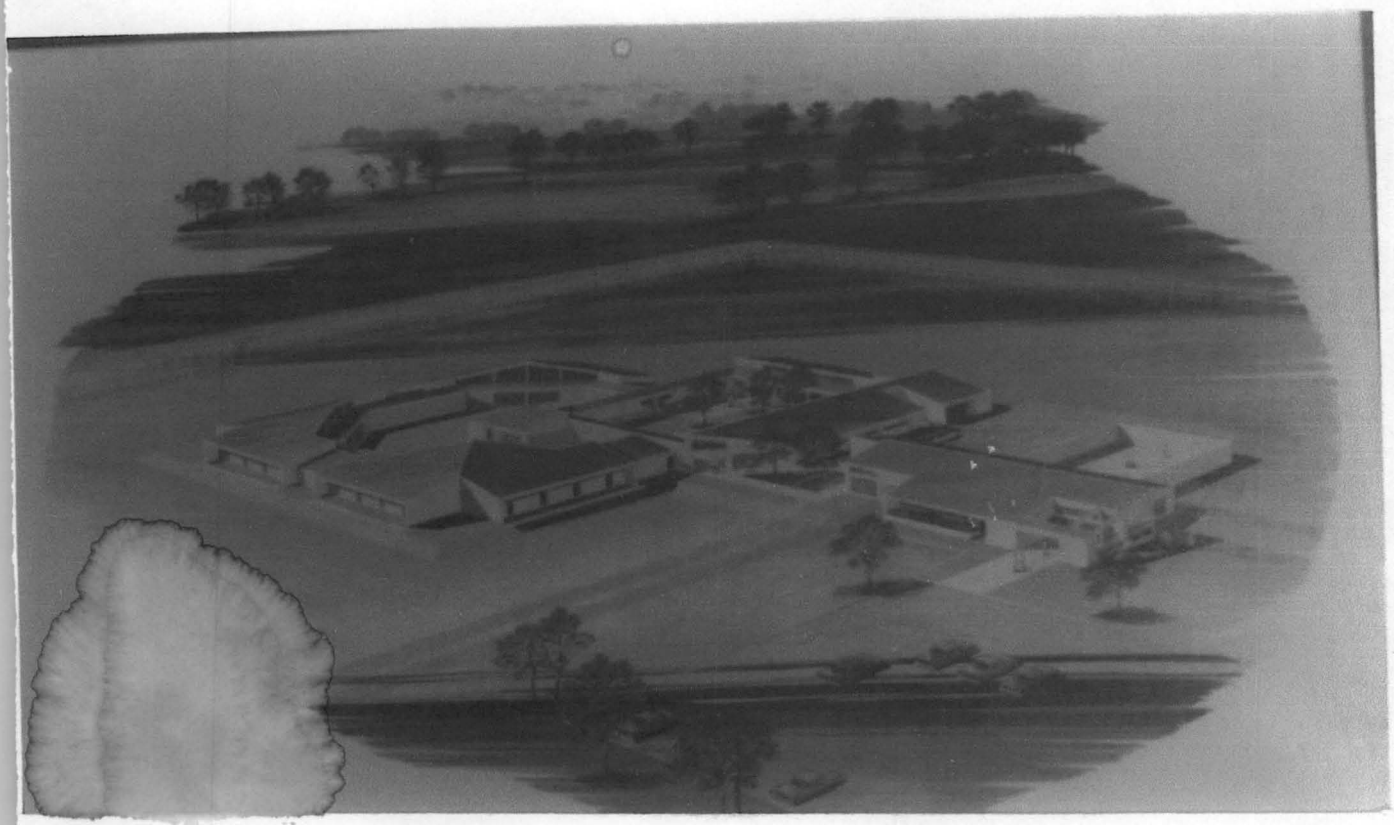


A. Vegetal cover protect foundation of struction

B. Erosion effect the foundation of structure

Vegetal cover controls erosion.

Plate 5



80 bed Medium Security Prisons on 20 hectares on cleared land

Plate 6

240 bed Medium Security Prisons on 50 hectares on cleared land

Plate 7

This image in a prison set up shows that adequate vegetal cover provides effective protection to soil t erosion.

PLATE 6 & 7

This is an 80 and 240 bed medium security prison that is set up in 20 and 50 hectares respectively of clear land, in most instances effective re-a forestation program is not envisaged.

CHAPTER FIVE

5.0 Summary

The demand for fuel wood by Nigerian Prisons as energy for inmates cooking and other foliage removals has contributed largely to deforestation. This activity has diverse effects, apart from leaving the earth surface unprotected and vulnerable to erosion, it also increase surface run-off, causing infiltration by draining soil fertility, which largely contribute to low agricultural productivity.

From the available data of study area it is revealed that vegetal removal from even a small activity of an organization could contribute in depleting the ecological world and thus enhanced comparative loss of the agricultural yields in major crops.

The Prison service could play a vital role in exploiting alternative source of energy for cooking of inmates food, and thereby reducing its dependence on fuel wood.

The rate of depleted vegetations which was due to increase of population and absence for alternative for energy resource is so high that an immediate attention of the Prison authority is needed to save the ecological world, agricultural resource and threat caused to the environment.

4.2 Recommendation:

Based on the result of this case study, it is recommended that;

A. Awareness

Nigerian prisons in particular should set up an enlightment program within all its formation in order to create awareness to all Prison station officers on the importance of vegetal cover towards environment protection and future sustainable growth of which both the present and future generation are held responsible.

This could easily be disseminated with educational schemes through lectures and symposiums. Enlightment schemes would play a great role, since the rate of ignorance of environmental problems and conservation is about 90% of the entire populace of the study area.

Awareness through institutional training both at local and international levels should be provided to different categories of staff.

The prison service should set up schemes with incentives that would ensure motivation to any Prison facility that excels in the management of its forest

since the rate of ignorance of environmental problems and conservation is about 90% of the entire populace of the study area.

Awareness through institutional training both at local and international levels should be provided to different categories of staff.

The prison service should set up schemes with incentives that would ensure motivation to any Prison facility that excels in the management of its forest reserve. The over 15,000 hectares of its 10nos. existing farm centers that are distributed nation wide could be targeted at the forefront of this exercise.

B. Reforestation

Special Land reserve should be set aside to various Prison locations with the aim of re-afforestation programming in order to plant economic species of trees like gmelina arborea, khaya grandifoliola, entrandophragma anglonse var. macrophyllum, E. candollei, lovoa klaineana, canarium schweinfurthii, terminalia ivorensis, and T. superba trees etc. This if successfully achieved would provide sufficient fuel wood for emergency cooking purposes. All the demands for fuel wood for energy would be confined to these forests reserves only.

C. Exploring Other Energy Source Energy for cooking

(i) Biogas

It is well known that organic materials produce biogas after anaerobic activity. This process is utilized by our septic tank (EMG by Ozeki), and the resultant biogas is used for daily cooking. The biogas consists of 60% methane and 40% carbon dioxide and the energy requirements of cooking for twelve days can be obtained from one month's amount of bodily waste. The tank is filled with water and can be used at any time. The biogas system with septic tank (EMG,Ozeki).though experimental use of biogas is already started in some prison locations such as Zaria and Kirikiri Prisons the benefit of such should be spread to other formations.

ii. Solar energy

The use of solar for cooking and heating has been practice in so many prisons and its efficiency is commendable. This energy resource is very abandoned in Nigeria.

iii. **Improved stove**

Improved stoves increases the heating efficiency of cooking and reduce the quantity of fuel wood use. This kind of cooking stoves are now available in the market.

iv. **Diesel cookers**

Diesel cookers provides durable cooking equipment that can sustain the enormous energy need for prison cooking, it also provides ample storing facility.

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