SUSTAINABLE DEVELOPMENT, CLEAN TECHNOLOGY
AND
ENVIRONMENTAL SUSTAINABILITY

Edited by
Adedeji Daramola (PhD)

Bells University of Technology, Ota.
Institute for Environment Research and Development
Preface

2012 International Conference on Sustainable Development and Environmental Protection (Clean Technology and Environmental Sustainability) is the second in the series of convention of stakeholders in the inter and multidisciplinary fields of sustainable development and environmental protection convened by the Bells University of Technology, Ota and Institute for Environment Research & Development (IERD). The confab brings together research papers, policy statements, research analysis and research reports from researchers, professionals, academics, administrations and students from five continents. The conference papers in this forum align with the idea behind the sustainable development paradigm with presentations from social sciences, arts, engineering, physical sciences, biological sciences, chemical sciences, built environment etc tailored into achieving local and global environmental sustainability. The themes of the 2012 International Conference on Sustainable Development and Environmental Protection include but not limited to the following:

a. Environmental Management and Policy
b. Sustainable Rural and Urban Development
c. Global Environmental Change
d. Urban Environmental Sustainability
e. Clean Technology
f. Human Security and Environmental Security
g. Sustainable Cities
h. Sustainable Engineering
i. Environmental Assessment / Analysis.
j. Water Security
k. Built Environment and Sustainable Housing
l. Agricultural Environment
m. Natural Environment
n. Socio-economic Environment

Sustainable Development, Clean Technology and Environmental Sustainability is an abridge version of the proceedings of 2012 International Conference on Sustainable Development and Environmental Protection which stands as a feeler for participants and others on the conference presentations.

We will also want to encourage conference participants to get copies of the Journal for Sustainable Development and Environmental Protection where some of the papers in the previous conference (2010 International Conference on Sustainable Development and Environmental Protection) are published after going through painstaking reviews by seasoned academia and professionals.

On behalf of the organizing committee of the 2012 International Conference on Sustainable Development and Environmental Protection and IERD, I wish you excellent and pleasant time in the conference.

Best regards,

S. Adedeji Daramola (PhD)
Bells University of Technology, Ota, Nigeria.
Conference Chair
# Table of Content

**Preface**

**Keynote Address - Sustainable Development And Environmental Protection**  
Prof. Akin Akindoyeni

**Global Natural Disasters and Their Implications on Human Sustainability**  
Prof. Odjugo, P. A. Ovuyovwiroye

**The Need for Environmental Citizenship Education and Awareness In Nigeria**  
Prof. Musibau A. Shofoluwe

**Beyond Cop 17: An Analysis of Eskom Initiatives to Combat Global Warming and Climate Change In South Africa**  
Prof. Kola Odeku

**Ethical Issues in Clean Technology Management**  
Prof. Akande, J.A., David, S. and O.S. Adewuyi

**Feeding the Cities: Town Planning Practices and Urban Food Security Implications in Kaduna Metropolis, Nigeria**  
Dr. B. E. Sambo & A. Ahmed

**Protection of Art Works against Environmental Change:**  
**Governmental Dimension**  
Prof. Dr. Sedat Cereci

**Solar/UV Photocatalytic Degradation of Two commercial Textile Dyes**  
Prof Aoyi Ochieng, Rita.L.L. Pambi, P. Netshitangani, John P Akach and Prof Maurice S. Onyango

**Evaluation Of Chemical And Heavy Metal Concentrations In Maize (Zea Mays) From Industrial Area Of Ogun State Nigeria**  
Dr. Malomo Olu, Prof. Ogunmoyela O.A.B, Oluwajoba S.O (Mrs) and Adekoyeni, O.O

**An overview of Public-Private Partnerships in Shelter and Infrastructure Development**  
Aigbavboa CO, Prof. Thwala WD

**Bioremediation of Hydrocarbon Pollution: A Sustainable Means of Biodiversity Conservation**  
Dr. Yerima, M.B., Umar, A.F., Shinkafi, S.A. & M.L. Ibrahim

**Assessment of the Efficiency of Constructed Wetland in Domestic Wastewater Treatment at the University of Lagos, Nigeria.**  
Adeniran A.E., Aina A.T., Oshunrinade O.O., Oyelowo M.A

**Interpretation of Observed Surface Water Quality Using Principal Components Analysis And Cluster Analysis**  
Dr. Ayeni, A. O., Dr. A. S. O. Soneye and Dr. I. I. Balogun
<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity Conservation and Ecosystem Management: Implication for Sustainable Development in Sub-Saharan Africa</td>
<td>58</td>
</tr>
<tr>
<td>Choice Of Eucalyptus Tree Species For Environmental Management and Protection In Kaduna Metropolis</td>
<td>61</td>
</tr>
<tr>
<td>Cow Dung – Water Hyacinth Sludge: A Veritable Source of Renewable Energy</td>
<td>64</td>
</tr>
<tr>
<td>Distribution and Assessment Of Heavy Metals In Sediments of the River Orle, Southwestern Nigeria</td>
<td>66</td>
</tr>
<tr>
<td>Energy in the Perspective of the Sustainable Development in Nigeria</td>
<td>70</td>
</tr>
<tr>
<td>Energy Sustainability – An Issue for Today</td>
<td>74</td>
</tr>
<tr>
<td>Engineering for Sustainable Development: A way forward to Global Poverty Eradication</td>
<td>78</td>
</tr>
<tr>
<td>Environmental Deterioration in the Niger Delta, Nigeria</td>
<td>82</td>
</tr>
<tr>
<td>Evaluation Of Environmental and Social Impact of Crude Oil Exploitation In Delta State, Nigeria</td>
<td>85</td>
</tr>
<tr>
<td>Historical Heritages and Ancient Ceramic Wares Threatened by Energy Policies: Hasankeyf Case</td>
<td>89</td>
</tr>
<tr>
<td>HOUSING BACKLOG IN SOUTH AFRICA- WHERE DID IT GO WRONG?</td>
<td>92</td>
</tr>
<tr>
<td>Rainfall and Climate Change in Ibadan</td>
<td>95</td>
</tr>
<tr>
<td>Managing the Social And Environmental Impacts Of The Tourism Industry for Sustainable Development and Environmental Protection In Idanre, Nigeria</td>
<td>98</td>
</tr>
<tr>
<td>Sand-digging and Soil Excavation as an Environmental Degradation Factor in Ado-Odo/ota Local Government Area, Ogun State: An Interrogation of the Appropriateness of Construction technology in Nigeria</td>
<td>101</td>
</tr>
<tr>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Micro-Organisms and Physico-Chemical Properties of Floodwaters in Some Major Streets in Benin City, Nigeria</td>
<td>G.O. Atedhor &amp; P.O. Orobor</td>
</tr>
<tr>
<td>Prospects of Carbon (Iv) Oxides Power Plant in Nigeria Contemporary</td>
<td>Aasa S.A. and Dr. Ajayi O.O.</td>
</tr>
<tr>
<td>The Importance of a Holistic Environmental Policy in Sustainable National Development: The Case of Nigeria</td>
<td>Prof Ndiribe A. A. Ndiribe</td>
</tr>
<tr>
<td>Estimation and Econometrics Analysis of Solar Energy Potential of Selected Sites in Lagos, Nigeria</td>
<td>Dr. Oluseyi O. Ajayi</td>
</tr>
<tr>
<td>Nutritive Evaluation of Brewery Spent Grain Supplanted Bread</td>
<td>Dawodu F. A &amp; Dr. Ajanaku K. O.</td>
</tr>
<tr>
<td>Occupational Health and Safety in the oil and Gas industry in Nigeria</td>
<td>Monday Ohi Asikhia (Ph.D) &amp; Mrs. G.C. Emenike (Ph.D)</td>
</tr>
<tr>
<td>Reclaimed Asphalt Pavements-Lime Stabilization of Clay as Highway Pavement Materials</td>
<td>Dr. Edeh, J. E., Eberemu, A. O., Abah, A. B.</td>
</tr>
<tr>
<td>The Impact of Bush Burning on Agricultural Environment in Orhionmwon Local Government Area of Edo State.</td>
<td>J. E. Agheyisi and V. Sido</td>
</tr>
<tr>
<td>Urbanization and Water Supply in Lagos State, Nigeria: The Challenges In A Climate Change Scenario</td>
<td>Dr. Ayeni A. O., Prof. A. S. Omojola and Dr. M. J. Fasona</td>
</tr>
<tr>
<td>Utilization of OMO biosphere reserve for Ecotourism development</td>
<td>SONUBI, Olugbenga Kehinde</td>
</tr>
<tr>
<td>Modeling Air Pollution By Use of Weibull Distribution For Sustainable Management Akintunde, Oyetunde A. &amp; Adelagun, R. O. A.</td>
<td>Akintunde, Oyetunde A. &amp; Adelagun, R. O. A.</td>
</tr>
<tr>
<td>Causes and Effects Of Rural-Urban Migration In Developing Countries</td>
<td>Olubodun, M. E., aluko, O. O &amp; Aremu, S. C.</td>
</tr>
<tr>
<td>Health Impact of Microorganisms Associated with Waste dump Sites in a Private university</td>
<td>Osunwoke J. I. &amp; Dr. Kuforiji O. O.</td>
</tr>
<tr>
<td>Palm Kernel Shell Ash Stabilization of Reclaimed Asphalt Pavements, As Highway Pavement Materials</td>
<td>Dr.Edeh, Joseph Ejelikwu, Manasseh, Joel and Ibanga, Usoro</td>
</tr>
</tbody>
</table>
Rural Urban Transformations in the Developing Countries: A Case Study Of Nigeria
Babalola, Daniel Olatunde..........................................................................................152

An Integrated Approach to Environmental Sanitation in Developing Nations
Marwan Haruna Abdulkarim......................................................................................158

Sustainable Land Use And Development: Perspective On Cosmo City, Johannesburg, South Africa
George Okechukwu Onatu..........................................................................................159

Environmental Impact Assessment (EIA) Approach to Sustainable Environmental Planning, Design and Management In Nigeria
J. A. Oderinde.............................................................................................................165

Urban flooding in South Eastern Nigeria
A case Study of Aba metropolis
R.W.C Nwanguma.....................................................................................................167

Municipal solid waste management as means of Economic development and wealth creation.
Oyedele, Olufemi Adedamola...................................................................................169

The Impact of Sport Tourism in conflict Areas: Case Study of Ife and Modakeke, osun state
Ndasule A.N...............................................................................................................173

Development Of Wind Power System For Reducing Global Warming Emissions
Olusola O.I. & Oluyamo S.S.....................................................................................175

Effect of grazing Intensity on Carbon and Nitrogen Storage in ATRIPLEX CANESCENS Cultivated Areas
A. Sadeghipour, N. Kamali, M. Jafari, H. Azarnivand, A. Haidari, H. Maddah arefi.................................................................177

A Theoretical Appraisal of the Impact of National Housing Policy in Resolving Housing Problems In Nigeria
Dr. Alagbe, O. A., Adewale, B. A. and Alalade, G. M.................................................182

Effects of Grazing Exclusion on Vegetation and Soil Properties in Shahriar Rangelands, Iran
N. Kamali, A. Sadeghipour, H. Azarnivand, H. Joneidi..............................................183

Monetization Policy Effect on Sustainable Buildings In Nigeria

Harnessing the Potentials of Nanotechnology for the Development of Local Economy in Nigeria
Akobire Dennis...........................................................................................................190

Environmental Friendly and Efficient Materials for the Nigerian Construction Industry – proposed materials to Beak the Monopoly of Cement
Alabi O.A. & Alabi S.A..............................................................................................192
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity Measurement of Some Edible Vegetables Consumed In Ozoro, South–South Nigeria</td>
<td>194</td>
</tr>
<tr>
<td>Ojebah, C.K and Akpobire, D.</td>
<td></td>
</tr>
<tr>
<td>Urbanization and Human Security in Developing Economy Mega-city: A Case Study of Lagos, Nigeria</td>
<td>196</td>
</tr>
<tr>
<td>Oluwole Olusegun Akiyode</td>
<td></td>
</tr>
<tr>
<td>Financial Planning Model for Sustainable Building Maintenance</td>
<td>198</td>
</tr>
<tr>
<td>Yusuf BabatundeAdeniyi &amp; Olaniran Hezekiah Farayola</td>
<td></td>
</tr>
<tr>
<td>Sustainability and Theorizing about the Environment: Towards Apost-Modernity of Environmental Discourse</td>
<td>201</td>
</tr>
<tr>
<td>Malachy Igwilo</td>
<td></td>
</tr>
<tr>
<td>Green Architecture and Sustainable Development in Nigeria</td>
<td>203</td>
</tr>
<tr>
<td>S. Adedeji Daramola (PhD) &amp; Toyin Adebayo</td>
<td></td>
</tr>
<tr>
<td>The Cost of Clean Technology, Community Welfare and the Imperatives of Environmentalism In Nigeria: A Case of Wapco Cement Factory, Ewekoro, Ogun State, Nigeria</td>
<td>206</td>
</tr>
<tr>
<td>Samson R. AKINOLA (Ph.D) &amp; Adedapo K. ADEGOKE</td>
<td></td>
</tr>
<tr>
<td>Management and Conservation of Indigenous Medicinal plants in Nigeria Using Phenological Information</td>
<td>210</td>
</tr>
<tr>
<td>Oni, P.I., Jimoh, S.O &amp; Adebisi, L.A</td>
<td></td>
</tr>
<tr>
<td>Built Environment and Engineering (Bee) Skills Crisis: An Exploratory Examination of the Exacerbating ‘Role’ of Clean Technology</td>
<td>213</td>
</tr>
<tr>
<td>Obuks A. Ejohwomu</td>
<td></td>
</tr>
<tr>
<td>Air Pollution in A Sawmill Industry: The Okobaba Experience</td>
<td>214</td>
</tr>
<tr>
<td>Adelagun, R.O.A, Berezi, E. P, Akintunde O. A</td>
<td></td>
</tr>
<tr>
<td>Collection and Characterization of Some Underutilized Cowpea (Vigna unguiculata L.) Cultivars of Southwestern Nigeria</td>
<td>216</td>
</tr>
<tr>
<td>Akinwale, R.O. and Obisesan I.O</td>
<td></td>
</tr>
<tr>
<td>Application of Geographical Information Systems to Management of Municipal Solid Waste Depots in Lagos Island Local Government Area of Lagos State</td>
<td>219</td>
</tr>
<tr>
<td>Dr. Bolanle Wahab and Ojolowo Saeed</td>
<td></td>
</tr>
</tbody>
</table>
Keynote Address

SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL PROTECTION

Prof. Akin. Akindoyeni
Pioneer President of the Green Building Council Nigeria (GBCN)
Chairman of the Council of Registered Builders of Nigeria (CORBON) and the

1.0 PRELIMINARY STATEMENTS

I feel privileged to have been invited to present the keynote address for this highly important international gathering of intellectuals and practitioners in the field of environmental research and development. I have no idea what accreditation criteria were adopted by the organisers for choosing me, but I have a sneaky suspicion that it might have had something to do with my current campaign for Green Building practice in Nigeria.

This is an international conference; hence all the discussions should be of international standard, tendered at internationally accepted need to expand the frontiers of knowledge on the various sub-themes, so as to:

- stimulate avant-garde discussions and further research;
- identify measures of performance indicators for human action effects on the environment;
- create signposts for improved state of the arts practice;
- establish acceptable parameters for future characteristics of environmental development;
- Seek to identify how to establish a comfortable synergy between human actions and the natural environment.

In the context of these objectives, I confess to a prejudice for which I do not pretend contrition. This is to the effect that my country – Nigeria – should be the first beneficiary of the harvest of fruitful results of this conference. Other benefits that could accrue will include:

- the opportunity for other developing countries here represented to take away ideas for research and development which would assist them in developing acceptable, sustainable, and comfortable clean environment in their countries;
- the resultant enlightenment for participants from developed countries to acknowledge where mistakes had been made in their countries and to explore ways and means of correcting them, in order to get back on track for improved and sustainable development, without further injury to their and other people's environment.

One is persuaded to observe that although we live on the same planet, our individual development environments tend to place different shades of definition on what might seemingly be identical concepts. It would therefore be beneficial for us to establish a canvas on which we paint explicit pictures of a number of concepts likely to be intrinsic to our discussions.

ENVIRONMENT - The natural environment encompasses all living and non-living things occurring naturally on Earth or some region thereof. It is an environment that encompasses the interaction of all living species. The concept of the natural environment can be distinguished by components:
Complete ecological units that function as natural systems without massive human intervention, including all vegetation, microorganisms, soil, rocks, atmosphere and natural phenomena that occur within their boundaries.

Universal natural resources and physical phenomena that lack clear-cut boundaries, such as air, water, and climate, as well as energy, radiation, electric charge, and magnetism, not originating from human activity.

Consequently, Built Environment comprises the areas and components that are strongly influenced by human activities.

Again, I am taking the liberty to assume that this conference is concerned with both the total ecological environment of this planet earth as well as the tributary environments in national rural and urban locations. It is expected, therefore, that we do not allow limitations born of our professional prejudices to adversely constrict our discussions and hence the optimality of our results.

DEVELOPMENT - Longman Contemporary English Dictionary defines Development as:

―..The process of gradually becoming bigger, better, stronger or more advanced‖

I dare to point out that in the environmental design and management field, it has been discovered that the term may be regarded as a variable with positive or negative values. Hence one may come across different aspects of development relating to various human activities and aspects of nature. I am, again invoking the prejudicial liberty of my discipline to understand development, wherever the term permits, in the following perspectives:

- Green development - a concept that includes consideration of community-wide or regional environmental implications
- Land development - altering the landscape in any number of ways
- Mixed-use development - the practice of allowing more than one type of use in a building or set of buildings, or any other type of structure
- Real estate development - a business encompassing activities from renovation to the purchase of raw land
- Urban planning or development – a concept that integrates land use planning and transportation planning to improve communities
- Energy development - the effort to provide sufficient primary energy sources
- Renewable energy development - improvement in the provision of energy sources which does not involve the depletion of any natural resource.
- Economic development - the economic aspect of social change

SUSTAINABILITY may be defined as the capacity to endure. In ecology, the word describes how biological systems remain diverse and productive over time. Long-lived and healthy wetlands and forests are examples of sustainable biological systems. For humans, sustainability is the potential for long-term maintenance of well being, which has environmental, economic, and social dimensions. As early as the 1970s "sustainability" was employed to describe an economy "in equilibrium with basic ecological support systems. Ecologists have pointed to The Limits to Growth, and presented the alternative of a steady state economy in order to address environmental concerns".

SUSTAINABLE DEVELOPMENT, in a positive concept, is therefore a pattern of consistent resource use that aims to meet human needs while preserving the environment to the extent that these needs can be met not only in the present, but also for generations to

---
1 Longman Contemporary English – The Living Dictionary
2 Wikipedia
come. It contextualises development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development ties together concern for the carrying capacity of natural systems with the social challenges facing humanity.

Sustainable Development can therefore be defined as the process of consistently combating the increasing stress that people, businesses and organisations put on resources and environmental systems like water, land, gifts of nature and air, which cannot be replaced or go on forever. To tackle this challenge therefore, it becomes essential to make sure that we live within the equilibrium of environmental limits.

2. SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL PROTECTION

2.1 Global Concern and the Developing Nations

“Sustainable Development and Environmental Protection” - the theme of this conference, is aptly chosen. At a period in mankind’s occupation of this planet, when we are gradually being made aware of the discrete quantum of all the gifts of nature through the grace of Almighty God, the whole world is being made sensitive to the fact that if we continue to mismanage the resources God has given us, we may not have the grace to exist, at best with comfort; at worst, at all. The industrialised countries control virtually all the economies of the planet. They also contribute the largest proportion of the pollutants of the planet through their economic activities, resulting in the depletion of the ozone layer as well as the climate change factors of the planet. However, the developing nations are also the dubious beneficiaries of the results of these acts of environmental mismanagement. It is an accreditation of a Nigerian adage that says, “...If the heavens are falling down, it will not be on a single person's head”3. We are therefore as involved as those who have started causing the problem.

Unfortunately, the remnant of our colonial heritage has set us on the same path of industrial development which created the environmental problem that the world has to redress. While the industrialised world is attempting to confront the problem on two fronts of mitigation and adaptation, we in the developing world must be painfully aware that the resources left to us may very well be the last hope of humanity. Our environment might therefore be the last haven for sustainable clean, comfortable and affordable destination for the dwellers of this planet - never mind the on-going space exploration for another location for human habitation. In any case, the two earthlike planets recently discovered to be hovering around a sun similar to ours, has been discovered to be so hot that humans may not survive life on them. The particular target for discussion at this conference is therefore aimed at identifying the executable strategies to achieve the goal of making our planet sustainably habitable without too much resort to artificial means of survival, not only for the present generation but also for future generations of the genre homo-sapiens.

2.2 Environmental Development VS Climate Change

As a continuation of the United Nations' Millennium Development Goals (MDG) initiative on the environment, the UN-Habitat Cities & Climate Change Initiative disclosed4, through several research projects, that:

a) Human activities are releasing greenhouse gasses (GHG) into the atmosphere;

b) These gasses are trapping radiation from the sun;

c) This causes global warming and climate change.

Most of the release of greenhouse gasses is done in cities as a result of indiscriminate energy utilisation. Therefore, the act of confronting climate change in cities means addressing:

- The population vulnerability to climate change impacts;

3 An adage of the Yorubas of Nigeria
4 Kehew, Robert – Green Building Ratings for Africa, Nairobi 2010
Reducing GHG emissions

Because buildings use 30-40% of worldwide energy, comparable levels of GHG emissions can be reduced as a result of a more detailed attention to design, production and operation of buildings in all built human environments. Developing Nations are not exempt from the development of cities, indeed they are fast competing with the developed nations in the growing of mega-cities. While the developed nations are assiduously seeking ways and means of reducing their urban sprawls, developing nations are growing them with uncaring rapidity. This is the time, therefore, for us to heed the wise saying; “A stitch in time saves nine”.

Clean Technology Development and Environmental Sustainability for Developing Nations is not an unattainable goal.

It has been confirmed that a substantial proportion of climate change effects can be attributed to green house gas (GHG) emissions and that about 40% of this has been proved to be from urban settlements, especially in industrialised countries. It has also been globally accepted that the solution to this multidimensional problem can be addressed through mitigation and adaptation strategies for environmental development.

2.3 The Afro-Asian Challenge

Although the African Region and most of the Asian countries (with the exception of China and Japan), presently account for a small proportion of GHG emissions, one is painfully aware that these countries have the highest population growth rates on the planet, perhaps the highest uncontrolled urbanization growth rates in the world and one of the highest human induced as well as climatic deforestation rates. Africa, in particular, also is almost completely dependent on fossil fuel means of energy generation, carbon fuel utilisation for rural energy requirements and one of the most active building industries extant. In the meantime, every African nation, south of the Sahara, aspires to be a vibrant industrial nation as soon as possible.

It is wise, therefore, for Africa to build better and more prudently in order to avoid the mistakes already made by the industrialised nations of the world. Consequently, building to reduce GHG emissions from buildings for all future developments in Africa means that all buildings would be energy efficient. Research has also proved that resulting long term savings would outweigh the initial costs. These same costs are bound to reduce as Research and Development (R&D) efforts increase over time. The answer therefore lies in environmental development based on Green Building principles.

2.3.1 United Nation's Initiative

The May 2010 Nairobi conference, organised by UN-Habitat, defined Green Building Ratings as “evaluation factors for building design, construction and operation, not only aimed at reducing GHG emissions in buildings, but also at the conservation of other essential exhaustible resources such as water and building materials. It is also aimed at an increasing use of renewable energy sources, thereby reducing the use of fossil fuel generated energy in buildings.”

Therefore a group has been mobilised to address the issue of Green Buildings. There are now in existence Green Building Councils (GBCs) in more than 80 countries of the world. Nigeria, as well as a number of African and Asian countries, has joined this movement.

To press home this concept, it is necessary to focus our attention on a particular nation example. As I have previously stated, I will be parochial and use Nigeria as an example.

3.0 THE NIGERIAN CHALLENGE

3.1 The Urban Growth and Development Parameters

The Challenge for Nigeria is the most intimate concern for Green Building Council Nigeria. Our human environment development efforts have nine (9) critical parameters that are similar to those of most African countries south of the Sahara, but different from those of industrialised nations:

---

5 UN-Habitat, 2010
Our urban centers are mostly unplanned and the efforts to create Master Plans and Development Schemes have consistently been thwarted by political interest groups as well as the natural propensity of the populace to avoid disciplined development of any kind.

We generate the major proportion of our electricity using thermal plants. What is generated is usually insufficient and when power is shed, the environment is suffused with portable as well as heavy domestic generators burning fossil fuel.

The equipment used in our homes and offices are largely uneconomical in their energy consumption.

Our energy consumption is still largely from either fossil fuel for cooking and vehicular locomotion or direct deforestation for firewood.

There is a gradual desertification process resulting from the ignorant deforestation habit of our people in the rural areas as well as natural desert encroachment exacerbated by global climate change conditions.

Planning regulations are still tenderfoot in perception and therefore takes little or no cognizance of environmentally friendly design of buildings and their surroundings.

There appears to be a preference for concrete paving and an aversion to the creation of grassed and planted gardens and domestic landscapes in the urban areas.

Urban waste management remains an apparent problem for virtually all urban centers; hence it has become convenient for city administrators to simply set fire to solid waste dumps.

Urban storm water is allowed to run to waste and domestic waste water is poorly managed.

3.2 The Impact of Population Growth
One of the most critical factors determining the quality of the urban environment in Nigeria is the increasing concentration of population in the cities and their pervasive poverty. The Nigerian population jumped from just over 30 million in 1952 to 140 million in 2006 and an estimated 147 million by 2011. The urban population is about 48 percent of the total current population and is expected to be over 50 percent by the year 2015. This five-fold increase of the population within a period of over 50 years has led to increased demand for resources with adverse impact on our urban environment. The impact of Government response to all of these environmental problems has been minimal. We are however convinced that “the goal of an effective urban policy in the context of the environment is to make our cities safe, clean, healthy and aesthetically pleasing.”

3.3 Rational Urban Development Possibilities
Although our urban centers are still small in size compared to a number of those in Europe, North America and Asia, their rate of growth is noticeably faster. This is partly due to the fact that urban development in Nigeria is still largely unplanned, and where there had been plans, they get conveniently abandoned due to manpower shortage in control. A typical example is our demonstrated planned city of Abuja which is gradually being allowed to grow wild without control in the last three years. Being able to commence development control using Green Building practices will present us with the opportunity of not making the same mistakes as the industrialised countries and also provide us with an agenda for development which enhances renewability of construction materials and energy sources, prolong longevity of the citizenry as a result of clean, green and healthy environmental development and maintenance. I dare say that the story is not much different in most developing nations.

4.0 THE GREEN BUILDING COUNCILS

4.1 Nature and Purpose of Green Building Councils

---

6 Federal Ministry of Lands, Housing and Urban Development, Nigeria; Draft Urban Development Policy 2011
Consequent to the realisation that Green Building principles and practices would resolve a major part of the climate change problems, a number of built environment professionals all over the world commenced to form groups known as Green Building Councils. Green Building Councils (GBCs) are not based on isolated professional Institutions. They are industrial and community based responses to sustainability challenges resulting from climate change. GBCs are a worthy instrument for the cooperation of all professional stakeholders, from the core professions to the marginal ones, in the development of a desirable built human environment. For us in Nigeria, we are about to enter a period when professional rivalry and bickering will be a concept of the past, when the perfect development of our environment will be the desire of everyone involved in it. This means that every member of the community from the entrepreneur developer to the youngest child occupier of any building is a stakeholder in the Green Building intervention project. Some are proactive participants while others are passive beneficiaries.

4.2 The Global Network:
The World Green Building Council (WGBC) is a union of national Councils, whose mission is to accelerate the transformation of the built environment towards sustainability. As at August 2010, there are 20 Established GBCs and 62 further countries at different stages of Council development. Green Building Councils lead the shift towards building in a sustainable and responsible manner by educating industry leaders, consulting with policy makers, and sharing knowledge and best practices within the global GBC Network. The rapidly growing GBC Network currently represents over 50 percent of the global construction activity and touches more than 15,000 companies and organizations worldwide. The global GBC Network is leading the movement that is globalising environmentally and socially responsible building practices.

Fig. 1 shows the spread of GBCs worldwide by the end of 2010. It would be observed that only the Republic of South Africa has an established GBC in Africa. The rest of Africa and most of Asia are completely blank, although countries such as Nigeria, Morocco, Ghana, Kenya, Burundi, Mauritius and Egypt are now also making efforts to establish GBCs domestically.

GBCs are categorized as shown hereunder:

![Spread of GBCs - Worldwide](source: WGBC 2010 Report)

*Fig. 1* Spread of GBCs - Worldwide

Source – WGBC 2010 Report

<table>
<thead>
<tr>
<th>ESTABLISHED GBCs (20 No.)</th>
<th>Brazil (2007)</th>
</tr>
</thead>
</table>
4.3 The Nigerian GBC Initiative

Five Nigerians attended the Conference which took place in Nairobi – 5-6 May, 2010. The conference was an eye opener for the Nigerian contingent. Three of the contingent had been participants at the 5th World Urban Forum in Rio de Janeiro, where the idea of the Nairobi conference was being floated. It is here being placed on record that the credit for the mobilization of support for the Nairobi conference must be given to Robert Kehew of the Urban Environment Planning Branch of UN-Habitat. He ignited the interest of most of the African participants at Rio – especially those of us whose intimate knowledge of Green Building practices was extremely scanty. The Nairobi conference saw twenty (20) African nations participating. Of that 20, eight have established green Building Councils.
5.0 THE TEMPLATE FOR THIS CONFERENCE

5.1 Proposed Performance Parameters
In the light of the foregoing, I make bold to recommend a severe template for the
discussions at this conference, which I regard as critical to the environmental future of
the developing nations. Our discussions must address the following parameters:

- Policy and Regulations;
- Models, Performance and Evaluation;
- Communities, People and Behaviours;
- Technology and Materials;
- Production, Processes and Supply Chain;
- Jobs, Skills and Economic Development.

5.2 Policy and Regulations
In the area of Policy and Regulations, this conference should endeavour to produce
unequivocal recommendations addressed to the various arms of government in the
developing nations for cognitive and coordinated policy statements which will address
sustainable environmental development as well as indicative regulations for executive
performance.

5.3 Models, Performance and Evaluation
In the area of Models, Performance and Evaluation, we ought to point at the appropriate
criteria for modeling sustainable environmental development as well as the evaluative
indicators for acceptable performance.

5.4 Technology and Materials
In the area of Technology and Materials, we already have sufficient data about what
materials are acceptable, which are not injurious to human health and longevity. The
horizons of technological knowledge which would render the use of materials and
machinery efficient in use should be identified for the benefit of our professionals. We are
also aware of the various areas where research and development is lagging behind the
times. The critical factor here is not to accentuate expediency at the expense of
sustainability, comfort and safety. The technologies which are acceptable to developing
nations ought to be appropriate to such an extent that they are servants of the people
rather than the people being enslaved and vulnerable to them. To this end, technology
should lend itself to the development of the national economy and social welfare of the
people.

5.5 Production, Processes and Supply Chain
In the area of Production, Processes and the Supply Chain, one is painfully aware of the
extent of wastage in our industrial processes. The interphases between the various
industrial processes have been so ignored that what is regarded as waste product in one
has not been identified as possible input in another. In our industry, it was fashionable at
one time to indulge in research in this area, but it soon became unfashionable when ICT
applications gained ascendency. I believe that the doctrine of sustainability commands
us to review our stands in this area, so as to enhance the principles of renewability,
recycling, replacement with renovation, which lie in the core of Green Building
principles.

5.6 Jobs, Skills and Economic Development
In all these considerations, we must never forget that we are actually working for the
comfort, health and longevity of the human race within this environment. The economic
and social welfare of the genre homo-sapiens is our ultimate goal. Development is
therefore worthless without a core thought for the beneficiary.
6.0 GETTING IT RIGHT, EVERY TIME
If we can optimise these parameters in the research and development solutions evolved out of these conference discussions, we would have gone a long way to attain the objectives of this conference as well as lay down the acceptable options for the achievement of Clean Technology Development and Environmental Sustainability for Developing Nations.

Thank you for listening and I wish you a fruitful and rewarding three days of discussion.

Akin. Akindoyeni
20-03-2012
GLOBAL NATURAL DISASTERS AND THEIR IMPLICATIONS ON HUMAN SUSTAINABILITY

Prof. Odjugo, P. A. Ovuyovwiroye
Department of Geography and Regional Planning
University of Benin, Benin City, Edo State, Nigeria.
E-mail: paoodjugo@yahoo.com
Phone: +2348023718654

Abstract
There are lots of natural disasters that plague mankind in different parts of the world. These range from natural wild fire, drought, desertification, climate change, flood, earthquake, volcano, erosion, landslide, tsunami, hailstorm and heat wave among others. These natural disasters are caused by nature and despite man’s technological advancement and prodigious efforts to put a stop to them, they still ravage his habitants killing him and destroying his property. It is on this basis that this study investigates global natural disasters and their implications for man. Secondary data on the distribution of global natural disasters, their magnitude of damage, cost of such damage and lives lost were collected and analysed using percentages and times series among others. The results show that between 1950 and 2010, there were 19,370 great natural disasters causing the world $2.1trillion with over 2,300,000 fatalities. The magnitude of destruction of these natural disasters was more in the continent of Asia, followed by North America and least in Africa. Within this period, the costliest and most fatal events are earthquake, hurricane, floods and heat wave. The 1980s and the 1990s saw the highest number of events of great natural disasters. Of all the disasters, Nigeria is currently being afflicted more by flood, wind storm, and erosion while the threat of desertification and coastal inundation are being strengthened due to climate change. It is recommended among others that for sustainable development, disaster prevention and risk management, environmental monitoring, early warning and preparedness are key factors never to be ignored by the Nigerian government in particular and global environmental management agencies in general.

Key words: Natural disaster, damage, property, risk management, deaths, subperils activities

INTRODUCTION
Disasters are multifaceted phenomena and they are open to a range of different interpretations. Disaster synonyms used by practitioners and experts have included “calamity” and “catastrophe”. The definition that is provided by the UNISDR (United Nations International Strategy for Disaster Reduction) is one of the most appropriate definition: “A disaster is a sudden, calamitous event that causes serious disruption of the functioning of a community or a society causing widespread human, material, economic and/or environmental losses which exceed the ability of the affected community or society to cope using its own level of resources” (UN/ISDR 2004). Disaster therefore is a situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance. It could also be seen as an unforeseen and often sudden event that causes great damage, destruction and human suffering which are often caused by nature or and anthropogenic forces. Even though there is not a commonly acceptable worldwide definition of “disaster”, there are some characteristics common to most definitions, which include; (1) Sudden, abrupt or unpredictable (2) Causing human, material, economic or environmental losses (3) Exceeding the ability of the affected community to cope with them.

The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster. Not all disasters that occur are recorded in the United Nation's International Strategy for Disaster Reduction (ISDR). For a disaster to be entered into the database of the UN's International Strategy for Disaster
Reduction (ISDR), at least one of the following criteria must be met: (1) a report of 10 or more people killed, (2) a report of 100 people affected (3) a declaration of a state of emergency by the relevant government (4) a request by the national government for international assistance.

Natural disasters can be divided into three specific groups, which include; hydrometeorological disasters, geophysical disasters and biological disasters. Hydrometeorological disasters are natural processes or phenomena of atmospheric, hydrological or oceanographic nature that may cause loss of lives or injuries, property damage, social and economic disruption or environmental degradation. These include floods and wave surges, storms, landslides, avalanches, and droughts and related disasters (extreme temperatures and forest/scrub fires). Geophysical disasters are natural earth processes or phenomena that may cause loss of lives or injuries, property damage, social and economic disruption or environmental degradation. These include earthquakes, tsunamis and volcanic eruptions. Biological disasters are processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic microorganisms, toxins and bioactive substances, which may cause loss of lives or injuries, property damage, social and economic disruption or environmental degradation. These include epidemics and insect infestations.

The magnitude of natural disasters can be divided into 6 categories based on the degree of damage to property and loss of lives. Category 1 natural disaster is a Small-scale event that involves loss of lives between 1and 9 and/or minor and small-scale damage. Category 2 is a disaster of moderate magnitude that involves loss of lives ranging between 10 and 19 and/or damage to buildings and other property. Category 3 is a severe catastrophe which claims more than 20 lives and/or overall loss of more than US$ 50m. Category 4 is a major catastrophe that involves the deaths of more than 100 people, major property, infrastructure and structural damage and/or overall loss of more than US$ 200m. Category 5 is a devastating catastrophe within the affected region that is capable of killing more than 500 people and/or overall loss of more than US$ 500m. Category 6 is a great natural catastrophe. In line with United Nations definitions, natural catastrophes are classified as great if the affected region's ability to help itself is clearly overstretched and supra-regional or international assistance is required. As a rule, this is the case when there are thousands of fatalities, when hundreds of thousands of people are left homeless, and/or substantial overall economic losses. In this study emphasis is laid more on great natural disasters based on availability of data.

Conclusion and Recommendations
The study shows that between 1950 and 2010, there were 19,370 great natural disasters globally costing the world $2.1 trillion with over 2,300,000 fatalities. The magnitude of destruction of these natural disasters was more in the continent of Asia, followed by North America and least in Africa. The 1980 and the 1990 decades saw the highest number of events of great natural disasters. While geophysical, meteorological and hydrological events have been major occurrences since the 1950s that of climatological became a major feature in 1971 and since then it has been re-occurring. This confirms the fact that climate change signals became stronger in the 1970s. Within this period (1950-2010), the costliest and most fatal events are earthquakes, hurricanes, floods and heat waves. While the meteorological disasters destroyed more property, the geophysical disasters claimed more lives. Countries with well developed economies (like USA, Japan etc) experienced more disasters and overall financial losses while countries with low and lower middle economies (like India, China, Bangladesh) suffered more of deaths. Of all the disasters, Nigeria is currently being afflicted more by flood, wind storm, and erosion while the threat of desertification and coastal inundation are being strengthened due to climate change.

It is recommended that for sustainable development, disaster prevention and risk management should be features that every country must take
seriously. While it is difficult to prevent the occurrence of some of the natural disasters like earthquakes, volcanoes and windstorms, adequate risk management policies and measures should always be put in place especially countries within the pacific ring of fire of the world that is mostly affected by these disasters. Global disasters management agencies and organizations should have prompt rescue measures while the rich nations should assist the affected poor nations irrespective of bilateral relationships prior to the disaster. Environmental monitoring, early warning and preparedness are other key factors never to be ignored by government of any nation. While the developed nations like USA, Canada, Russia Federation and Japan among others are trying because they have the financial and technological strength to do so, the poor nations like Nigeria, Bangladesh, Pakistan and India have little or no means of effective environmental monitoring and early warning.

Although Nigeria has not in recent times been prone to severe natural disasters like earthquake, volcanoes and hurricanes, there is clear evidence that the country is not even prepared to monitor and send early warning for the minor disasters affecting the nation. Since most disasters hardly send any warning before they strike, calls for all-year-round preparedness both financially and technologically so that warnings are give before they strikes or proper rescue and relief measures put in place if they eventually occur. The major disasters affecting Nigeria currently are floods, epidemic, wind storms, droughts and erosion. Apart from the epidemic, others can easily be monitored and warning signals given before they occur if the governments equip the agencies or institutions responsible for these environmental issues. The erosion and flood prone areas should be identified and the Town Planning Department ensures that such areas be made free of residential and industrial activities so as to limit the loss of lives and property in case of flood or landslide. The medical sector of Nigeria needs to be strengthened so as to tackle any outbreak of epidemic since it is the deadliest natural disaster in Nigeria. Finally, natural disasters cannot be avoided but their dramatic consequences can be greatly reduced through appropriate preparedness and risk reduction measures including education, technology development, land-use planning and environmental protection.

Acknowledgement
This study is sponsored by the Centre for Population and Environmental Protection (CPED), Shopping Complex, Ugbowo, Benin City. The Centre also provides the finance to attend this conference.

References

Kahn, M. 2005. The Death Toll from Natural Disasters: The Role of Income, Geography,

*Journal of Environmental Science and Technology* Vol. 6(1): 17-27
Definitions of “disaster” and “crises” and related policies at Member State level, BG and RO and discussion of these issues for the EU level.
THE NEED FOR ENVIRONMENTAL CITIZENSHIP EDUCATION AND AWARENESS IN NIGERIA

Prof. Musibau A. Shofoluwe

Department of Construction Management and Occupational Safety & Health
School of Technology
North Carolina A&T State University
Greensboro, NC 27411, USA

&

Dr. Peter Sam
Office of Assistant to the Dean
School of Technology
North Carolina A&T State University
Greensboro, NC 27411, USA

Abstract

Environmental degradation continues to be a major issue of great concern to our modern society. Nowhere has this issue been so pronounced than in developing countries. For example, in Nigeria, every community of various sizes is faced with perennial environmental problems that include, but not limited to, air and water pollution, indiscriminate dumping of urban garbage and sewage, deforestation, oil spills, and other systemic and local environmental injustices. This collective action problem stems from years of public insensitivity and lack of genuine consciousness for environmental justice. In this paper, the authors argue that, for Nigeria to truly achieve sustainable environmental quality and protection, a formal environmental citizenship education and awareness program should be established. In addition to poor and/or ineffective environmental regulations, the authors further argue that lack of citizens’ awareness of certain environmental risks could be blamed, in part, for the country’s poor environmental awareness education. An awareness of environmental risk factors could galvanize citizens to capitalize on their social capital as a vehicle to address issues of environmental quality. Any environmental citizenship education and awareness program should be designed with the ultimate goal of promoting responsible environmental behavior.

Introduction

The push for environmental stewardship has been an on-going campaign both at national and international level. No one argues against the fact that environmental stewardship is best achieved when citizens are exposed to environmental issues and how those issues are addressed and subsequently resolved. This exposure is often accomplished through environmental citizenship education and awareness initiatives. While environmental education in developed countries has had significant impact on the quality of their environment and the well-being of their citizens, the developing countries continue to struggle for ways to achieve environmental sustainability. Environmental education is not new to majority of the developing countries. The need to make environmental education a focus of attention was first espoused by the 1977 Tbilisi Conference organized by United Nations Educational, Scientific and Cultural Organization (UNESCO) (Tbilisi Declaration, UNESCO, 1978). At its conference, UNESCO declared environmental education as a critical need for our global future. To that end, the following declarations were made:

- To foster clear awareness of and concern about economic, social, political, and ecological interdependence in urban and rural areas
- To provide every person with opportunities to acquire the knowledge,
values, attitudes, commitment and skills needed to protect and improve the environment.

- To create a new pattern of behavior among individuals and groups towards the environment.

Following this declaration, a new wave of environmental advocates began to shape environmental awareness campaign landscape. With increased attention to climate change and global warming, environmental advocates believe that the time is ripe to intensify efforts to utilize environmental education as a tool to engage the public on environmental consciousness (Potter, 2010). This argument is further supported by the following quotations from the North Carolina (USA) State of the Environment Report (2011):

“More than ever, children and adults need to understand how ecological systems work and why they matter. Some people have become so disconnected from the natural resources that sustain them that they don’t know where their food comes from or where they get their drinking water. The health of the environment is inseparable from humans' well-being and economic prosperity and to successfully address and solve environmental problems, people require knowledge, tools and sensitivity.” (p. 20)

Developing countries were not immune from these campaigns. In 1981, the United Nations Environment Program (UNEP), through its governing council, developed several initiatives to address environmental education and training needs of the developing countries. With the urgent need to increase public awareness of the environmental issues, UNEP’s governing council authorized its Executive Director to collaborate with relevant international organizations and undertake several initiatives aimed at strengthening the knowledge and awareness of environmental issues in Africa. The prescribed means of achieving this goal included promotion, coordinating, and catalyzing environmental education and training activities.

Conclusions and Recommendations

In this paper, we have discussed the importance of environmental citizenship education and the impediments to achieving responsible environmental behavior. Also, we have discussed how pro-environmental behavior could be promoted to achieve optimum environmental stewardship. We do not doubt the existence of environmental awareness initiatives in Nigeria; however, we feel strongly that a poor level of environmental sensitivity exists among the citizens. In spite of the government and non-governmental organizations’ efforts to promote environmental consciousness, many Nigerian citizens are still far-removed from practicing responsible environmental behavior. We feel that more needs to be done to inculcate the citizens towards environmental stewardship. Any environmental citizenship educational program should include quality assessment benchmark with the primary objective that the program itself meets the goals and objectives of environmental stewardship. Through assessment, evaluators should be able to determine the extent and quality of the environmental education curricula, the level of skills and preparedness of environmental outreach educators, the quality of instructional materials, and the degree to which a broader audience is included in the outreach activities.

To be effective, an environmental citizenship education program must include a plan that integrates the efforts and participation of both government, private, and non-profit organizations. The degree to which previous environmental outreach activities increase the citizens’ knowledge and awareness of a particular environmental issue is critical to the success of future educational programs. Thus, feedback from previous training activities should be carefully analyzed and the lessons learned should be used to improve the quality of future training efforts.

Following are additional recommendations to increase the citizens’ knowledge and awareness of the environment and the necessary steps to take to ensure sustainable environmental quality and protection.
• Raise the level of environmental literacy of the Nigerian youths by incorporating environmental education into elementary and secondary school curricula. Environmental knowledge at these levels would enable the students to analyze various environmental issues and make informed decisions.

• Where it is currently available, the quality, accessibility, and dissemination of promotional materials and programs should be improved.

• Government should establish competitive outcome-based research grant programs through its environmental agency to support higher institutions and other environmental-related centers to carry out empirical environmental-related research.

• Government should support professional development programs for environmental educators at primary through secondary school levels. These programs would allow the educators to sharpen their skills in teaching environmental concepts to school children of all ages.

• Environmental education should be promoted as a viable career option among school children.

• Government should conduct a yearly assessment of public environmental knowledge

• Government should enforce existing environmental laws and hold extractive organizations accountable for their role in depleting the country’s environmental resources.

• If currently non-existent, government should develop effective corporate social responsibility (CSR) policy for foreign extractive organizations working in Nigeria. Such policy should require annual reporting of their activities and how they uphold the CSR policy.

• If not already established, a Center for Corporate Social Responsibility should be established through an institution of higher learning to carry out CSR research studies at various levels of establishment, including foreign companies, government and NGOs.

References


BEYOND COP 17: AN ANALYSIS OF ESKOM INITIATIVES TO COMBAT GLOBAL WARMING AND CLIMATE CHANGE IN SOUTH AFRICA

Prof. Kola Odeku,
School of Law, University of Limpopo,
South Africa.
Kolawole.odeku@ul.ac.za

Abstract
Electricity Supply Commission (Eskom) is a South African electricity public utility that generates and supplies electricity. In the process of generating electricity, Eskom is a significant user of South Africa’s natural resources, in particular of coal. Eskom has a considerable CO₂ footprint and is a large emitter of SO₂, NOₓ and particulates causing global warming and climate change. Mindful of the negative impacts of each unit of electricity generated, Eskom has introduced and embarked on various initiatives to combat global warming and climate change. Against this backdrop, Eskom is fostering innovation through a number of external and in-house initiatives, particularly Research and Development (R&D), with a significant investment in the development and demonstration of new and better technologies, promotion of energy efficiency, involvement in saving energy electricity, self-assessment report to reveal challenges and successes made on a yearly basis. This paper highlights that these initiatives compliment government strategy to combat climate change. The paper highlights the importance of these initiatives to the effect that they are promoting economic development and at the same time promoting clean environment and sustainable development.
ETHICAL ISSUES IN CLEAN TECHNOLOGY MANAGEMENT

Akande, J.A., David, S. and O.S. Adewuyi

Professor and Graduating Students
Forestry and Environmental Technology Programme
Faculty of Agriculture, Bowen University
PMB 284, Iwo, Osun State, Nigeria

Abstract
Clean technology is a developmental course of action aimed at improving products quality, services, and production practices in order to reduce or eliminate environmental and unhealthy impacts throughout the commodity lifecycle. The concept calls for efficient use of resources as a means of abating pollution and attenuating waste production. In contemporary Nigeria, waste management or conversion of waste to wealth has not been given the attention desired either due to lack of knowledge, lack of technology or insensitivity to ethical issues in process management. In this paper, some ethical issues, i.e., moral principles, values and codes touching on clean management are discussed to educate industrial technocrats and other stakeholders involved in materials processing and management. The ethical issues are resource use efficiency; waste to wealth stance; pollution abatement; energy use efficiency; safety factors; greenhouse gas (GHG) emission mitigation; stakeholders sensitization; compliance monitoring; also minimum long run marginal cost comparable to existing technologies. These issues are considered germane to environmental progress and their importance underscored.

Key words: clean technology, ethics and sustainability.

Introduction
The evolution of clean technology is an attempt to reform the unsustainable social and technological course that threatens the global environment. This opens up a new space for ethical deliberation and new possibilities for practice. Ethics is an everyday affair and a life-cycle analysis can make it possible to evaluate major environmental impacts of a technology in manufacturing, use and disposal. Clean technology invokes a technological paradigm whereby products, services, and production systems greatly reduce or eliminate environmental and health impacts throughout a product's life cycle from mining to manufacturing to product use and disposal while maintaining the same or better levels of quality. These technologies are either manufactured, acquired or imported through Foreign Direct Investment (FDI) without due consideration for ethical management and interventions (Figure 1) required for sustainability.

Ethics in clean technology management would serve as regulatory quality control philosophy, borne out of agreement so as to have a uniform and directed system. A multi-level and multilateral cooperation among stakeholders including government and non-governmental bodies would help to stimulate proper functioning and the determination of success of implementation. There must be continuous innovations where government and other relevant bodies keep adjusting to latest improvements on clean technologies that best suit their environment. Government role in clean technology management goes a long way to determine environmental success or failure in any community in that it could touch various sectors of the economy outside the scope of a non-governmental organization (NGO). An example is government support and enactments which determine the legality of any clean technology, its acceptance and rate of diffusion into the economy.

One must also give room for flexibility, based on arising challenges to keep notorious technology entrenchment in control. Downward flow of communication is very vital and determines how well the clean technology is embraced. Communication effectiveness determines the quantum and
quality of participation in clean technology management. This is because, no matter the effort of government to promote a technology, good communication across stakeholders is necessary to push the idea that the emerging technology is competitive on the basis of private costs. Ethical considerations should also address means by which barriers to development and sustainability of clean technology such as poor technical know-how and poor research could be addressed.

Figure 1: Ethical interventions that facilitate clean technology.
(Source – present work)

In light of these considerations, this paper explored ethical issues considered germane to effective clean technology management with the express goal of challenging contemporary approaches to reduce their ecological footprint and support a more conducive environment. The ethical issues of concern are (1). Resource use efficiency (2). Waste to wealth stance (3). Pollution abatement (4). Energy use efficiency (5). Safety factors (6). GHG emission reduction (7). Stakeholders sensitization (8). Compliance monitoring and (9). Minimum long run marginal cost comparable to existing technologies. Clean mechanisms through avoided conversion or conservation efforts; also improved energy utilization would reduce wastage; promote energy and resource use efficiency and enhance the maximization of social and material trust in our custody. The concept is entirely on how the resources that has hitherto been wasted can be more efficiently utilized.

Clean technology appliances such as photovoltaic and other renewable technologies (e.g. wind energy, biomass conversion, material science, solar energy, geothermal, wave and tide, ocean thermal, mini hydro-power, hydrogen production), energy efficiency and conservation in buildings - 'green buildings', low energy architecture, sustainable materials technology, low carbon emission, recovery and utilization of methane gas from landfills and alternative agriculture achieve environmental advantage either by being relatively low energy intensive and/or
relying to a greater extent on local resource content.

Life cycle analyses of emerging clean technologies would provide comparative quality services; cost competitiveness on a market basis and environmental superiority to existing ways of handling wastes. Ethics demand creative actions to respond to problems while creating new possibilities. The expectation is that commercial development and application of new waste uses would be readily available and be within the reach of stakeholders in a short period of time. All together, there would be better understanding of the benefits of clean technology in terms of environmental impact and resource management.

Conclusions

Intervention by actors, intended to make technology delivery a clean process, but framed within purely conventional instincts and technocratic view of environmental management is unlikely to produce the desired results unless backed by ethical constructs. Stakeholders commitment to ethical interventions, creative solution and collaboration are important ingredients that will, no doubt, affect perceptions, attitudes, interest and intents towards clean technology. They shall, under the clean development mechanism concept, help to de-mystify the dynamics of carbon trading, enable improved climate, improve peoples quality of life without compromising that of future generations.

The ethical approach is fundamental and directs us to look beyond the technical-rational mechanism of planning, to investigate how such mechanisms actually support and function to bring about a cleaner environment. Slow diffusion of some clean technologies may not only be explained by cost implication but by general resistance to change by the civil society. In other words, compliance to environmental ethics would be promoted through policies encouraging greater importance of the environment. Also by implication, planners must look beyond pro-forma technical solutions to effective environmental planning and management issues that are attentive to universal ethics that drive such issues. The potential of clean development shall be better understood while aligning global environmental objectives with national growth and improvement of living standards.

References


NAHB, 1201 15th St., NW, Washington, D.C. 20005-2800. (800) 368-5242; (202) 822-0200 ext. 463

IPCC WGIII Ch. 8. 2007. Agriculture. IPCC Fourth Assessment Report.

FEEDING THE CITIES: TOWN PLANNING PRACTICES AND URBAN FOOD SECURITY IMPLICATIONS IN KADUNA METROPOLIS, NIGERIA

1B. E. SAMBO AND 2A. AHMED
1Department of Horticulture, Federal College of Forestry mechanization, PMB 2377, Afaka, Kaduna, Nigeria.
2Department of Urban and Regional Planning, Ahmadu Bello University, PMB 1044, Zaria, Nigeria.
*Corresponding author: banelisam@yahoo.com; +2348023308577

Abstract
Historically, settlements have provided within their precincts some proportion of their food needs through household gardening and fadama farming. Such activities have previously been supported by robust urban planning regulations based on generous land allocations and flexible guidelines and tenure rights. In recent times, such planning logic has been jettisoned through infill development in response to increasing rural-urban migration, rapid urbanization, and a growing demand for housing; as well as the speculation of land by the urban elites. It has been argued that such “developmental phenomena” have negative implications on urban food security. But reliable statistics on the implications are not adequately documented and brought to the fore. This paper therefore examines how recent urban planning practices based on infill have reduced the opportunities available for small-scale food production using the Government Reserved Areas (GRA) (previously European Reserved Areas) of Kaduna-Nigeria as case study. The methodology of the study relied on field surveys and the review of government layouts and documents. The use of Satellite imageries and the GIS was helpful in determining changes and trends in open space use for home gardening. The specific findings showed that more than 50% of land hitherto utilized for home gardening has been lost to infill development; which recent urban planning practices have permitted. By this process, urban planners have indirectly denied households the opportunity to supplement their food supplies and intake through home gardening; with all the attendant health repercussions. Conclusively, the paper affirms that the existing practices have negative implications on urban Agriculture and there is the need for changes. Therefore, the recommendation was made for new policies and flexible interpretation of tenure rights to expand the opportunities available to households of cities to meet some of their food needs in a world challenged by growing food insecurity.

Key Words: Urban planning, legislation, tenure rights, regulations, food security, insecurity, sustainable

INTRODUCTION

It is an established fact that historically, settlements have within their precincts provided some proportion of their food needs through household gardening and fadama farming. Such activities have been supported traditionally by robust urban planning regulations based on generous land allocations and flexible guidelines and tenure rights. But, in recent times, such planning logic has been jettisoned in response to increasing rural-urban migrations; viz. rapid urbanization and the demand for housing; as well as the speculation of land by the urban elites. It must be underscored here that robust urban land allocations allowed for the city dwellers, the opportunity to productively engage in backyard vegetable gardening and subsistence food production. This form of continual food production practices within the vicinity of the city walls helped to reduce household food expenditure and over dependence on food imports from the surrounding rural communities; to meet nutritional requirements. Health advantages have also been associated with the practice, as past time farming ensures physical fitness, hence reducing stress, high blood pressure, diabetes, obesity amongst others. This has the beneficial effect of enhancing the lifestyle and improvement on the general quality of life of the city inhabitants.
Sadly, today such activities which were supported and protected by robust sustainable physical planning rules and regulations based on generous land allocations to facilitate for such small scale food production activities have been jettisoned. Consequent on the gradual reduction in plot size allocations, backyard farming activity has been rendered unattractive and unfashionable. This situation has further been compounded by the “maximization of profit syndrome” of the largely urban/city elite land speculators; who have no regard for the principles of sustainable designs and construction. The sole aim of these land investors is to maximize profit - at all cost - in return for their investment; through over utilization of the already reduced plot poverty reduction through increased food security for the inhabitants of these cities. The recent global food and economic crises have made city and national sizes; with no due consideration to the other needs – especially food requirements – of the urban/city households.

Conversely, the prudent and/or wise use of space in urban planning and development can significantly contribute to urban governments realize that urban food security is a major issue that requires policy intervention (Dubbeling et al., 2010). At the moment, prices of food commodities are rising, thus aggravating the already existing food insecurity situation in Nigeria; amidst the global food crisis. Though there is no food protests on Nigeria’s streets today, but in over 30 major cities, sharp increases in food prices and the deteriorating access to food for the urban poor has occurred (Dubbeling et al., 2010). In many parts of the world, soaring food crisis in the past has triggered off riots in Mexico, Indonesia, Yemen, the Philippines, Cambodia, Morocco, Senegal, Uzbekistan, Guinea, Mauritania, Egypt, Cameroon, Burkina Faso, Ivory Coast, Peru, Bolivia, and even Haiti that was once nearly food self sufficient but now relies on imports for most of its supplies (Fanawopo et al., 2008). Nigeria today, according to the Food and Agricultural Organization (FAO) is among the group of 36 countries in Sub-Saharan Africa in food security crisis that cannot feed itself and therefore, relies on imports of staple foods, particularly rice. According to the World Bank’s current report, poor families in most of Africa and Asia spend up to 80% of their budget on food and that high food prices are a matter of daily struggle for more than two billion people; with an estimated 100million people fallen into poverty in the last two years. Nigeria is reportedly ranked 20th on the 2006 Global Hunger Index which also indicates that about 65% of Nigerians are food insecure. That is for every 100 Nigerians, 65 have insufficient access to the amount and variety of food for a healthy and productive life; resulting in widespread malnutrition (Gabriel and Binniyat, 2008).

The World Bank reported food prices are up by 83% since 2005 in Nigeria and are expected to remain high through 2015 (Sambo, 2008).

Today, cities are becoming the principal territories for innovative physical planning strategies that aim to enhance urban living conditions. Compact development is one of such strategies, which in the older areas of cities is promoted through infill. Infill otherwise called land excision is a contemporary strategy that is distinct from old and traditional British styled practice where compact rather than expansive developments are promoted. The arguments advanced for such strategy have been based on economic advantages, but there is a growing voice suggesting that health and social (crime) implications exist from overcrowding, land speculation, subdivision inefficiencies and gentrification etc., are all associated with compact development. Yet there are other challenges, including the urban food security implications of infill that are not being envisioned, debated nor interrogated. In attempting to answer the question: How has infill development undermined the capacity of cities to supplement their food needs? This paper explores the way infill development in the old European and Non European (Native) reserved areas (ERA and NRA’s) of Malali and Barnawa in metropolitan Kaduna, Nigeria have reduced the opportunities available for small scale food production.

CONCLUSION AND RECOMMENDATIONS

Urban planners have bought into the debate for compact development without adequately exploring the potential
implications. Compact development no doubt has its economic arguments not all of which makes sense. The advantages of cost effective supply of infrastructure when compact development is promoted at the town level, does not always add up in the equation, which it is considered that there are economic costs to health and livelihood challenges resulting from congested living environments (pollution, noise, etc) and household food expenditure when opportunities are diminished for home gardening unlike for cities lacking sufficient expansion areas, Kaduna has within its territory attractive opportunities to expand based on sustainable development planning principles that balance up economic social and environmental objectives. Not only have planners been slow in creating new urban districts the few created after independence have been based on land subdivision guidelines in which small lots and high density developments are promoted. Now that infill has gone the full circle (as possibilities are exhausted) and the implications of small subdivisions are known regarding food security challenges for cities, new strategy would be required in improving urban planning and development outcomes.

Consequently, it is conclusively affirmed that the existing subdivision regulations be reviewed in line with current realities. More generous plot sizes should be permitted and FAR’s revised and strictly enforced to ensure that social and environmental objectives of livelihood are adequately protected. In this context high density plots of 15 x 25m should be revised upwards to 25 x 30m as minimum and FAR strictly enforced at not more than 60%. By this, sufficient open spaces will available to permit home gardening, recreation and associated activities. Such action will enhance livelihood in the cities by expanding their capacities to meet some of their food needs in a world challenged by increasing food insecurity and unsustainable planning practices, agricultural policies and programmes.

References
Karen Anderson – Bittenbender (2001): The scoop on infill development. Intracorp Real Estate, LLC, Seattle, USA.


PROTECTION OF ART WORKS AGAINST ENVIRONMENTAL CHANGE:
GOVERNMENTAL DIMENSION

Prof. Dr. Sedat Cereci
Batman University Fine Arts Faculty
72080 TURKEY
sedat.cereci@batman.edu.tr

Abstract
Technological improvements convey lives of people, world changes and environment has damage recently. People and also governments try to ballast between their sources and their need for their lives especially in contemporary conditions of the world. Beside balance, governments try to provide adequate facilities for social life and try to solve social problems and also try to supply all expectations of people. Governments use local sources to supply social need and if local sources are inadequate, import needs. In providing process and in development process, governments can harm environmental nature and also historical and artistic values unconsciously or intentionally. Art works are the most valuable and available instruments to tell people value of past and value of life. They are the first preferential values to protect against environmental and intentional dangers. This problem involves true governmental policy and applicable decisions. People are usually not responsive about historical remains and art works in underdeveloped countries but governments have to. There are a great number of historical remains and art works from different civilizations in Turkey in where was lived many civilisations. Though there are numerous historical remains and art works, Turkish government has not a completely protection policy and Turkish Parliment does not have correct decisions for historical heritage.

Key Words: Art, environment, protection, policy, art works.

Introduction
There are many historical remains and art works which are common heritage of mankind on the earth and they have to be protected for future of mankind. Life on the earth changes rapidly because of technological improvements and consumption approaches and enviroment dirtsies everyday because of consumption and technology and because of industrial complications (Calef and Goble, 2007, 33). Meanwhile all historical accumulation and art works of past are in danger because of pollution.

In some countries, governments enact laws to protect environmental values and also historical and artistic accumulations. To plan environment policy is mission of a government to convey environmental and historical heritage to future (Gabriel and Terich, 2005, 431). Developed countries are more susceptible to protect environment, and historical and artistic works but underdeveloped countries are generally not.

Underdeveloped countries have more vital requirements than art works, so it is a little possibility to be interested in art works and to wait for governmental decisions and policies about environment and about historical remains about and about art works from government in underdeveloped countries.

International aggrements about environmental danger on the earth are being signed by many governments recently and parliaments have many decisions to protect environment against contemporary dangers but beside this governments have wrong decisions about their development (Kadılar, 2010, 187). Any government naturally has policies to adapt their country to contemporary conjuncture and in this process governments can have wrong decisions against environmental existence. Ecological balance is unique value for human life and it began to be destroyed especially since Industrial Revolution and people are concerned with echology and dangers about future of natural balance. Industry increases degradation in environment and technology accelerates change in environment. Some governments have policies for development and also have
correct decisions to protect environment but some others not.

Agriculture is a natural sector for every country to maintain social life, to feed and to produce. Contemporary agricultural technics can sometimes harm environmental naturalness and ecological balance can change towards harmful movements like flood, or like extreme temperature (Carvell and others, 2007, 38). People naturally have anxiety to survive and to live in comfort but people can harm environment unconsciously or intentionally. They usually have consumption more then they need and they have much waste which disposals many natural assets on the earth.

There are especially many historical and artistic remains in the countries in where agriculture is the most common and available occupation in the world, like in Egypt and like in India, and like in Turkey etc. People firstly settled in abundant lands to make agriculture and constituted enormous civilisations in these lands with their glorious buildings and artistic works. Art works are priceless values of countries but they are valuable when they are protected against different dangers.

Natural structure can survive itself in its natural loop and can improve its natural deficiencies and its natural hitches but it can be inadequate for harm of people. When people harm natural structure by destroying it or by living wrong, nature can not find adequate solutions to resolve problems (Turner, 2006, 715). In this case, governments have to start-up to protect environmental value and to provide next generations a livable nature. Some international organisations force governments to have correct decisions to protect nature and to appreciate ecological balance but some governments do not consider warnings.

Government in Turkey mostly intensifies its interest on development and economical matters and meanwhile the Government can not realize environmental problems and historical and artistic works. Turkish Government had a decision and allow to built hydroelectric power plant everywhere on 28 December 2010 and never regarded historical heritages and art works in historical places.

The Government and people began to be interested in more economical and materialist topics in Turkey recently and accumulation of past and art works effacemented because of interest lack. Everybody tries to earn more in turky but people are not aware of a reality that they need more moral energy than physical energy. Art is th most available area in where they can find moral energy.

Conclusion

Earth is the unique place in where man can live and environment is the unique atmosphere which an indispeasurable component of vital totality. Environment is so important for man that a little unsufficient of environment can cause end of mankind. Because of importance of environment, governments have environment policy plan and try to protect environment for their publics. Beside enviroment, historical remains and cultural values and art works important components of man’s vital totality and are components of agenda of governments. Human population increase on the earth recently and technology change form of the earth and change reveal danger for environment and also for historical remains and art works. Art is the most valuable production of mankind which guides people to an illuminated future and tells people acumulaition of mankind so art works have to be protected for future of human. Protection of art works is directly concerned with protection of environment and protection policy of government. Obligation of protection for environment and for historical remains and for art works belongs to governments for future of people and for future of the earth. Turkey is a very lucky country that there are a great number of historical and artistic works and remains and unique environmental values. Turkish Government has a great responsibility to protect environment and art works against contemporary dangers.

References


SOLAR/UV PHOTOCATALYTIC DEGRADATION OF TWO COMMERCIAL TEXTILE DYES

Prof Aoyi Ochieng¹, Rita L.L. Pambi¹, P. Netshitangani¹, John P Akach¹ and Prof Maurice S. Onyango²
¹Department of Chemical Engineering, Vaal Univ. of Technology, South Africa
²Department of Chemical & Metallurgical Engineering, Tshwane Univ. of Technology, South Africa.

Abstract
Textile wastewater typically contains compounds such as dyes, which are biorecalcitrant, and as such need advanced treatment methods such as advanced oxidation process (AOP). In this work, photocatalytic degradation of two commercial textile dyes with different structures has been investigated using TiO₂ immobilized on South African natural zeolite (clinoptilolite). Synthetic textile wastewater made from Mexican reactive red (MRD) and burgundy direct Red (BDD) was degraded under ultraviolet (UV) lamp and solar irradiation. Experiments were conducted to optimise various parameters such as the catalyst (TiO₂-zeolite) loading, initial concentration of the dye, pH and retention time. The results showed that the degradation efficiency of MRD was higher than that of BDD. Also, the degradation efficiency was higher under solar irradiation than that under UV. The optimum catalyst loading was found to be 15% (w/w), which gave up to 92% and 96% degradation of MRD with UV and solar irradiation, respectively after six hours of retention time. There was a decrease in degradation efficiency with increasing catalyst loading, which could be attributed to the attenuation of the irradiations by the catalyst particles.

Key words: Zeolite; TiO₂; Dye; photodegradation; clinoptilolite.

1. Introduction
Various methods have been developed for the treatment of textile wastewater. These methods include membrane technology, activated carbon adsorption, chemical precipitation and biological treatment. However, these methods have been ineffective because of the high salt contents resulting from reactive dying. (Barclay and Buckley, 2002). A method that is attracting the attention of many scholars is photocatalytic degradation. Photocatalytic degradation of textile water effluent is a purification process in which dye, mainly, is removed from the water by action of semiconductors under a source of light. There are several designs of photocatalytic reactors that have been investigated for their efficiency in carrying out both UV and solar TiO₂ photocatalytic reactions. The different reactor configurations studied are parabolic trough, compound parabolic, inclined plate, double skin sheet, rotating disk, water bell, fibre optic, fixed bed and fluidized bed photocatalytic reactors (Braham and Harris, 2009). For photocatalytic degradation, two modes of application of TiO₂ have been studied: suspended TiO₂ and supported TiO₂ systems. The suspended TiO₂ systems have the advantage of high efficiency due to their high surface areas available for mass transfer but suffer the drawback of difficult separation of the TiO₂ particles from treated water after the photocatalysis (Qiu and Zheng, 2007). The problem of separation is as a result of the small TiO₂ particle size (< 0.5 µm) due to which the TiO₂ takes very long to settle in water. This necessitates the use of more costly membrane separation processes (Robert and Malato, 2002). To address the problem of separation from solution, TiO₂ has been supported on various materials such as quartz sands, glass, ceramic particles, stainless steel, activated carbon, zeolite, nanofibres, photocatalytic membranes and mesoporous clays (Qiu and Zheng, 2007; Chong et al., 2010). Supporting the catalyst is considered more practical even though it reduces the photocatalysis reaction efficiency due to the reduced surface area.
available for mass transfer (Chong et al., 2010). The reduction in photocatalyst reaction efficiency can be minimized by applying the most efficient support and attachment method. A suitable support should have a strong attachment to catalyst, maintain the reactivity of the catalyst, provide a high specific surface area and possess high adsorption capacity for the pollutants. Adsorbents such as activated carbon, silica and zeolites adsorb and concentrate the reactants near the TiO$_2$. Also, these adsorbents offer a large surface area for TiO$_2$ attachment thus improving the contact between pollutant and photocatalyst (Shan et al., 2010). The activity of the supported TiO$_2$ photocatalyst and the adherence stability of the TiO$_2$ on its support depend chiefly upon the method of attachment (Qiu and Zheng, 2007).

The aim of this study was to attach TiO$_2$ to clinoptilolite and apply it with solar and UV to photocatalytically degrade dyes and to investigate the effect of different parameters such as pH, dye concentration, catalyst loading, solar irradiation and reaction time.

1. Conclusion
Solar and UV photocatalytic degradation of textile dyes (MRD and BDD) has been investigated using TiO$_2$ immobilized on zeolite. The results show that the photocatalytic degradation for both RMR and DBR depends on the pH, dye concentration and catalyst loading. The degradation was more effective at 1:9 TiO$_2$ to zeolite ratio and with 361 g/l of the initial concentration of the dyes. Solar irradiation provided better results than UV, and since sunlight is abundantly available, it is economically preferable to UV light. The reaction time can be minimize by increasing the mass of catalyst loaded into the reactor; however, it is important to load the correct amount of catalyst to avoid wastages and keep the mineralisation at it optimum since an excessive load will decrease the percentage degradation. Supplying irradiation from all angles to the reactor was found to be more efficient than that from only one direction. In the case of solar degradation, the addition of an aluminium foil provided irradiation from many different angles, thus increasing the percentage degradation.

Acknowledgement
The support by the Water Research Commission (WRC) of South Africa, through research grant no. K5/2105, is gratefully acknowledged.

REFERENCES
EVALUATION OF CHEMICAL AND HEAVY METAL CONCENTRATIONS IN MAIZE (Zea mays) FROM INDUSTRIAL AREA OF OGUN STATE NIGERIA

Dr. Malomo Olu, Prof. Ogunmoyela O.A.B, Oluwajoba S.O (Mrs) and Adekoyeni, O.O.
College of Food Science, Bells University of Technology, Ota
P.M.B. 1015, OTA, Ogun State, Nigeria.
234-0803-404-2331
oludaremalomo1951@yahoo.com

Abstract
Consumption of maize is significant and cut across all economic class in Nigeria especially at its season. The chemical and heavy metal concentrations of maize cultivated in industrial area of Ogun State Nigeria were evaluated for two seasons 2010 and 2011. The metal concentrations Fe, Cu, Mg, Zn, Pb, and As were determined using Atomic Absorption Spectrophotometer (AAS). The results of the chemical analysis and minerals Fe, Cu, Zn, and Mg for the two seasons were comparable and related. The Fe, Cu, and Zn concentrations for the two seasons were above the recommended safe limit for consumption by WHO. The level of Pb and As detected in 2010 rainy season were low and should result in no acute toxicities of the metal while the levels detected for 2011 season were high and raised public concern and warning in order to reduce adverse toxic effect of these metals. The study was carried out to sound a note of warning of the extent of industrial heavy metals pollution and its effect on plants especially maize harvest from the industrial estates in Ogun State Nigeria.

INTRODUCTION
Maize is the third most important crop in the World after wheat and rice. In Nigeria, it also takes third place behind sorghum and millet (Adeyemi, 2010). Worldwide production of maize is 785 million tones with the Africa producing 6.5% and the largest African producer is Nigeria with nearly 8 million tonnes (IITA, 2009). Most maize production in Nigeria is rain fed and 95% of total maize production is consumed locally compared to the World regions that use most of its maize as animal feed. This is evident in Nigerian meal as consumption of maize cut across all economy class especially at its seasons as either boiled or roasted. Nutritional, it has high content of carbohydrates, fats, proteins, and some of the important vitamins and minerals, the product has acquired a well deserved reputation as a poor man’s nutricereal (Punita, 2006).

However, with the current emphasis on eating more healthy diets and public concerns on presence of metals in foods/agricultural produce, it is very essential to assess to the chemical composition and heavy metal concentration in maize that is popularly consumed by people. The presence of essential metals like iron, copper, zinc, magnesium are associated with enzyme systems particularly those involved in oxidation process and other important biochemical process (Akaninwor et al.,2006). They are very useful for the healthy growth of the body though very high levels are intolerable. Metals like mercury, lead, cadmium and arsenic are toxic at very low concentrations (Nkansah and Amoako, 2010). They have the potential hazardous effect, not only on compounds but human health. This is due to their cumulative behaviour and toxicity although they are generally present in agricultural soils at low levels. Increasing industrialisation has been accompanied throughout the world by the extraction and distribution of mineral substances from their natural deposits. Following concentration, many of these have undergone chemical changes through technological processes and finally pass, finely dispersed and in solutions by way of effluent, sewage, dumps and dust, into the water, the earth and the air and thus into the food chain. These include metals and thus also the heavy metals relevant for this document (IOCCC, 1996). There are large scale industries in Ogun State Nigeria, both privately and publicly owned. These include cement,
pharmaceuticals, paint, ceramics, roofing sheets, agro allied, beverages and so on. These are partly as a result of raw material availability or nearness to market (Lagos). The auditing and monitoring of metals in the environment (soil, water and foods) is fast becoming an essential aspect of pollution studies, particularly in industrialised area. The main objective of this study was to determine nutrient composition and content of some heavy metals (Cu, Fe, Zn, Pb, and As) in maize cultivated in industrial area of Ogun State Nigeria.

CONCLUSION
Maize maintained its position as an important nutricereal with is nutrient profile. It revealed considerable protein content, high carbohydrate and metabolizable energy for sustainability and stability. The proximate compositions for the two seasons considered are related. Consumption of maize with elevated levels of essential and non essential metals can lead to the accumulation of the metals in the body and result to health disorder. Most of the concentration levels documented are beyond Recommended Daily Allowance (RDA) Fe (8-15 mg/D), Zn (11 mg/D), Cu (0.9-2.0 mg/D), Pb (20 µg/D). Provisional Tolerable Weekly Intake for As is 0.015 ppm (WHO, 2003). Heavy metal concentration (Pb, As) varied between the seasons investigated, which reflect the differences in their mineral uptake and or effect of environmental/ soil pollution. Industrialisation and their pollution effects might have been responsible for high heavy metals recorded in some areas such as Ota Industrial Estate. High levels of metals above safe limit in staple food like maize called for public concern and this revealed the importance of regular monitoring of heavy metals in staple foods grown in industrial areas to avert health risks related to excessive mineral ingestion. Appropriate regulatory body should ensure proper filtration or treatment of industrial emission to avoid hazards which characterise environmental pollution.

REFERENCE
Najat K. Mohammed (2008). Nuclear techniques applied to biological samples from Tanzania to monitor the nutritional status of children. A PhD thesis. Faculty of Engineering and Physical sciences, University of Surrey.
AN OVERVIEW OF PUBLIC-PRIVATE PARTNERSHIPS IN SHELTER AND INFRASTRUCTURE DEVELOPMENT

*Aigbavboa CO\(^1\), Thwala WD\(^2\)

\(^1\)PhD Candidate, \(^2\)Professor, Department of Construction Management & Quantity Surveying, University of Johannesburg, Johannesburg, South Africa

aigclinton@gmail.com, didibhukut@uj.ac.za, Tel No. +27 -11- 559-6398

Abstract

It has been estimated that more than half of the world’s six billion people now live in cities, towns and other urban spaces. Current trends envisage that this number will continue to rise with the world cities population growth being significantly more pervasive and rapid in the developing world than that of the developed. This trend is expected to be more prevalent in the South Asia and Sub-Saharan Africa, the two poorest regions in the world, where the urban population is expected to double by 2030. As a result of this expected and already existing trend, there is a severe shortage of adequate housing and much of the basic infrastructure so desperately needed to sustain urban growth is either deteriorating, or non-existent. This study aims to provide insight into how the public-private partnership (PPP) model can help promote sustainable housing and city development for countries at all levels of economic development. The goal of this study is to investigate the role that public-private partnerships can play as a possible financing tool for facilitating cities infrastructure and service delivery for countries at all levels of economic development. The study explores a variety of key PPP ideas and principles that can be used to offer direction for governments on the application of the PPP model to wider city development. The study is conducted with reference to existing theoretical literature, published and unpublished research. It is mainly a literature review on the role of PPP in shelter and city development to raise consciousness of the partnership approach and show how it can be used to try and meet the housing and infrastructure needs of governments around the world. Findings from the study show that the level of PPP success can vary depending on a range of factors, also revealed is that with careful application of the partnerships process, housing and cities infrastructure can be effectively delivered and managed.

Keywords: Public-private partnership, Housing, City Development, Infrastructure

INTRODUCTION

It has been estimated that more than half of the world’s six billion people now live in cities, towns and other urban spaces (World Bank, 2009; UN-Habitat, 2011). Current trends envisage that this number will continue to rise with the world cities population growth being significantly more pervasive and rapid in the developing world than that of the developed. This trend is expected to be more prevalent in the South Asia and Sub-Saharan Africa, the two poorest regions in the world, where the urban population is expected to double by 2030 (World Bank, 2009). As a result of this expected and already existing trend, there is a severe shortage of adequate housing and much of the basic infrastructure so desperately needed to sustain urban growth is either deteriorating, or non-existent.

Whereas the urban and metropolitan cities across the world are regarded as having their own set of multifaceted issues; the current financial challenges facing the globe are conspicuously the same. Throughout the world, at all levels of economic expansion, there is an extreme financing need for city development projects most especially for housing provision than can now be provided for by the traditional public sector purse alone. With the full knowledge of this, governments around the world are turning to Private-Public Partnerships (PPPs) as one possible financing option for large scale investments in the provision of affordable housing and other basic infrastructure assets such as, schools and hospital facilities as well as infrastructure development for basic utilities including water, waste management,
sanitation and transport systems which brings about an inclusive and foresighted city development.

In the 1990s a specific form of privatisation was developed to deal with limitations on public borrowing. These involved using private companies to borrow money, build new hospitals, school, road, develop new housing projects amongst others, and then operate it over many years, recovering the investment and profit from payments over the whole period of operation as would have been agreed (Hall, 2008). This model of project financing was thus referred to as PPPs in the European Union member state who had practiced it. There is no clear definition of PPPs (Organization for Economic Cooperation and Development – OECD, 2008), but the term covers a range of different structures where the private sector delivers a public project or service. PPP is used as a general term to cover a wide range of agreements or partnerships made between public agencies and private sector entities, in relation to the delivery of services such as housing, water, sanitation, or power (OECD, 2000; Ramaema, 1997). It is a finance model exclusively run by collaboration between the public, private, and at times by non-profit sectors such as NGOs. The partnership provides competitive and transparent mechanisms to pursue opportunities that bring together the ideas, experiences and skills of both sectors, to develop innovative solutions to meet the community’s needs, expectations and aspirations. PPPs take many forms but generally represent a more dynamic, long-term agreement between the various parties in which each sector contributes and shares some level of risk (UN-Habitat, 2011). It also describes a range of possible relationships among public and private entities in the context of infrastructure and other services. Over time the concept has also been described by other names such as: private sector participation (PSP) and privatization. While the three terms (PPP, PSP and privatization) have often been used interchangeably, there are differences. For instance, a typical PPP model allocates the tasks, obligations, and risks among the public and private partners in an optimal way which is not considered in the PSP and privatization (Asian Development Bank, 2008; Hall, 2008). PSP contracts transfer obligations to the private sector rather than emphasizing the opportunity for partnership. Also, the public partners in a PPP are usually government entities, including ministries, departments, municipalities, or state-owned enterprises. The private partners can be local or international and may include businesses or investors with technical or financial expertise relevant to the project. Increasingly, PPPs may also include nongovernment organizations (NGOs) and/or community-based organizations (CBOs) who represent stakeholders directly affected by the project (Asian Development Bank, 2008). On the contrary, privatization involves the sale of shares or ownership in a company or the sale of operating assets or services owned by the public sector. Privatization is most common and more widely accepted in sectors that are not traditionally considered public services, such as manufacturing, construction, amongst others. Usually, when privatization occurs in the infrastructure or utilities sectors, it is usually accompanied by sector-specific regulatory arrangements to take account of social and policy concerns related to the sale, and continuing operation of assets used for public services (Asian Development Bank, 2008). Also, in privatization the responsibility over the delivery of the public service is fully transferred to the private partner with little or no government oversight (UN-Habitat, 2011). Thus, the continual critical analysis of PSP and privatization experience led to the design of a new generation of transactions, which is now known as PPPs (Asian Development Bank, 2008; Hall, 2008). However, it should be noted that the PPP approach provides an alternative and does not mean privatisation of public services (Savas, 2000). The government continues to deliver core services while contracting out the development and management of infrastructure and non-core services to the private sector. As a result, there is value addition in efficiency and cost effectiveness (Robbins, 2003).
Categorically, a typical PPP allows a private consortium to assume the financing risk and two or more phases of the project’s life-cycle. This may include the design and construction phases of the project and the subsequent maintenance and operation of the government facility under a carefully contrived long-term lease (UN-Habitat, 2011). This is in contrast to the private sector’s traditional role in urban infrastructure development where its involvement is limited to providing skilled labour under short-term contracts, with the delivery of the services being solely provided by the public authority. Rintala and Root (2004) posit that PPP is an umbrella term for a wide range of procurement methods that are alternatives to traditional procurement. Hence, Hall (2008) states that there are two main forms of PPPs available: firstly, concession contracts, where the company gets paid by user charges. For instance in water services provision or toll roads construction. Secondly, contracts typical of the private finance initiative (PFI) where the company gets payments from a public authority. Outside this two main forms, there is also a third form of PPP, which the European Commission has called an ‘institutional PPP’ (Hall, 2008). This is where a joint venture company, providing a public service, that is partly owned by a public authority and partly owned by a private company or private investors to deliver public infrastructure to the society. Generally, PPPs are about combining the pool of expertise and resources available in the private sector and managing it in such a way that it accelerates service delivery and allows Government to focus on its core mandates and responsibilities. Through PPP ventures, the public gets better, more cost-effective services; the private sector get new business opportunities which are both are in the interest of any national development. PPPs are a critical aspect of a nation’s innovation and strategy system. Hence the objective of this paper is to provide insight into how the PPP model can help promote sustainable housing and city development for countries at all levels of economic development. The study explores a variety of key PPP ideas and principles that can be used to offer direction for governments on the application of the PPP model to wider city development.

CONCLUSIONS
The infrastructure challenges facing governments around the world today are enormous. Similarly, a momentous increase in the urban population, combined with slow economic growth across many regions has resulted in major gaps in housing and other infrastructure and urban service delivery. The aim of this study was to provide insight into how the public-private partnership (PPP) model can help promote sustainable housing and city development for countries at all levels of economic development. The study also explores a variety of key PPP ideas and principles that can be used to offer direction for governments on the application of the PPP model to wider city development. Also highlighted were the challenges facing PPP in in the current times. Findings emanating from the literature show that PPPs represent an arrangement outline for global partnership between the public and private sector, which is used as a general term to cover a wide range of agreements or partnerships made between public agencies and private sector entities, in relation to the delivery of services such as housing, water, sanitation, or power. However, it should be noted that the PPP approach provides an alternative means of project funding and does not mean privatisation of public services. Also, it was found that PPP have been applied in many countries around the world and that it is more conducive in the delivery of some infrastructure than others. For instance the power and transport sector have received most PPP attention. The reasons have been that it offers better potential for cost recovery, higher political commitment due to the sector’s importance for country economic growth amongst others. However, this does not mean that PPP cannot be applied in other sectors or that they are without prospects. With appropriate
modalities, support for capacity development and political commitment to the housing sector in particular, PPP is feasible and will thus generate benefit as it has proved in the power and transport sectors. Also, because city development plays an important role in national development in many forms; the possible good of PPPs can solve many problems such as housing, environment, infrastructure systems amongst others. Furthermore, PPPs are often considered a ‘solution for all problems’ by some government institutions; which is a mistaken belief. However, in order for PPP to be a solution for all development problems, there must be a sound balance between project finance, risk-taking, and additional cost recovery strategy. Also, revealed was that PPPs arrangement are not for free and somebody has to pay - either governments or end-users. But a typical PPP allows a private conglomerate to assume the financing risk and two or more phases of the project’s life-cycle. Lastly, it was found that the primary reason for adopting a PPP model for the provision of housing and urban development is based on the objective that, where project appropriateness is correctly stately and implemented; it has the capacity to offer greater value for money when compared with other traditional procurement. Whilst the reviewed literature showed that the level of PPP success can vary depending on a range of factors, but with careful application of the partnerships process, housing and city infrastructure can be effectively delivered and managed. It is thus recommended that when starting a PPP, the most important factor is to have clear objectives, a detailed project definition and the will for long-term cooperation as this can mired the entire long-term relationship between the public and private sector as they both have different goals. Also, it is also recommended that during a PPP, though the relations between all partners are bound in legal contracts, which are difficult and expensive to break up (the ‘lock-in’ effect), there should be a clause for flexibility in case the public sector needs to make adjustment or seek alternative usage to the infrastructure later in the future. Also, the type of PPPs, that is service delivery or regeneration must be adapted to the objectives of the project. Likewise, project should be well evaluated if the best form of delivery process should be PPP. Lastly, the public sector needs to set high sustainability standards which will enhance implementation of high environmental goals.

REFERENCE


Robbins, G. A. (2003). Water Sector Public-
BIOREMEDIATION OF HYDROCARBON POLLUTION: A SUSTAINABLE MEANS OF BIODIVERSITY CONSERVATION

1Yerima, M.B.; 2Umar, A.F. 1Shinkafi, S.A. and and 1M.L. Ibrahim
1. Department of Microbiology, Faculty of Sciences, Usmanu Danfodiyo University Sokoto. P.M.B. 2346, Sokoto State, Nigeria.
2. Department of Microbiology, Bioremediation Research Group, queens University, Belfast, UK

Abstract
Hydrocarbon pollution of the natural environments poses enormous danger to wide variety of species of living organisms. This disrupts interrelationships that exist between them and eventually serves as immediate cause of death. For example, Crude oil can impair egg formation, egg laying, incubation and well being of birds and fish. In addition oil can cause mortality and reduced hatching of eggs. Also when insects are smothered with crude oil, they lose their flying ability and eventually die of suffocation and elevated temperatures. These profound effects made it a source of concern considering the dispersal and pollination role the organisms play. Another consequence is also that of species extinction and gene reduction. Bioremediation experiment was carried out to assess the biodegradative capacity of bacteria on Bonny light crude oil. This was with a view to reducing the level of toxic components of Bonny light crude oil. Selective enrichment technique was used to isolate bacteria that have a chemical appetite for crude oil and the same bacteria were used in degradation experiment. When the bacterial consortia was inoculated into mineral salt medium overlaid with Bonny light crude oil as the only carbon source, transformation of some oil components took place. This was evident by the results of chromatographic analyses generated using GC-MS. The Polycyclic aromatic hydrocarbons were significantly (P<0.05) reduced suggesting a reduced impact on biodiversity.

Keywords: Bioremediation, Biodiversity, hydrocarbon, sustainability

INTRODUCTION
All ecosystems and human societies depend on healthy and productive natural environments that contain diverse plants and animal species. The rapidly growing world population and increased human activity threaten many of these species. Incidentally some of these species of living organisms contribute a number of economic benefits to man and the environment. For example, Crude oil formation, soil formation, waste disposal, nitrogen fixation, biological pest control, pollination, dispersal of fruits and production of pharmaceuticals can all be accomplished through the exploitation of enormous biodiversity (Thorpe et al. 1995; Farnsworth and Soejarto, 1997). Pollinators such as insects, birds and bats provide substantial benefits to the maintainance, diversity and productivity of both agricultural and natural ecosystems (Buchman and Nabhan, 1996). As much as one third of the world’s food production relies either directly or indirectly on insect pollination (Fujita and Tuttle, 1991; Richards, 1993). Pollinator diversity depends on ecosystems that are rich in diverse vegetation. Unfortunately hydrocarbon contamination of agricultural lands that results from oil spillage kills vegetation and hence the biodiversity associated with it. Hydrocarbon substances particularly the polycyclic aromatic types have a deleterious effect on biota. Poly aromatic Hydrocarbons can build up in living tissues and so the PAH contents of plants, invertebrates and fish can be many times higher than the content of PAHs in soil and water. Bioconcentration factors (BCF) which express the concentration in the tissues compared to the concentration in water for fish and crustaceans are frequently in the 10-10,000 range, although a BCF of 134,000 has been reported for BaP in water flea (Daphnia pulex). In water PAHs do not generally dissolve easily but tend to stick to a particulate matter. PAHs stuck to small particles may be found in surface micro layer, but those stuck to larger particles will settle out to sediments. In soil and water, breakdown generally takes weeks to months and the action of microorganisms is usually primarily responsible. In the air, PAHs can
be carried long distances stuck to the surfaces of small solid particles and even remote ecosystems have been contaminated. Poly aromatic Hydrocarbons return to earth in rainfall or particulate settling, or alternatively they can breakdown to longer lasting products by reacting with sunlight and other chemicals in the air over a period of days to weeks. Unfortunately, many PAHs transformation products such as nitro-PAH and hydroxyl-PAH are more carcinogenic than the parent compounds. The effects of PAHs are mostly known from animal experiments, but because of the similarity of Biological systems in different species, it is likely that all mammals, including humans will be affected in a similar way unless if they metabolize these substances differently. It is the metabolic products of PAHs that give rise to their toxicity. PAHs cause cancer (Chaloupka et al., 1993). Several PAHs including benzo (a) anthracene, benzo (a) pyrene (BaP), benzo (b) fluoranthene, chrysene, dibenzo (ah) anthracene, indeno (1,2,3-ed pyrene) have caused tumours in laboratory animals by inhalation and skin contact. Furthermore an increase in mammary tumours in rats has been caused by both a single dose of BaP (100mg/kg) and from eight weekly doses of 12.5mg/kg. Experiments with BaP, which is representative of other cancer causing PAHs show that fish seems to be most susceptible to peak exposures of BaP, particularly after earlier exposure to lower levels. This may have possibly caused induction of metabolizing enzymes required to activate the molecule (Potter et al., 1994). Coke oven workers run an increased risk of developing respiratory cancers as do other workers exposed to PAHs where those substances may also contribute to skin and bladder cancers. PAHs disrupt the sex hormones and possess reproductive and developmental toxicity. There is currently a lack of data on the reproductive and developmental effects of many individual PAHs and even for BaP the data are conflicting. Annual studies suggest effects on sperm quality, but females may be at increased risk of reproductive dysfunction because oocyte and follicular destruction can occur as a result of exposure. Since the testes and ovaries contain rapidly proliferating cells, they are probably particularly susceptible to damage by PAHs. BaP can certainly affect gg production in fish. Exposure has been found to decrease primary oocytes number and reduce plasma testosterone and oestrogen levels (Thomas, 1990). Also experiments show that certain PAHs can be transferred to the egg from female fish, and can cause a decrease in the number of eggs laid, as well as decreased fry survival. Exposure of egg to the sun may increase the toxicity of PAHs as in addition to a decrease in the number of eggs laid and decreased fry survival. Teratogenic effects and decreased percentage hatch were also observed in the fry and eggs of the fish exposed to solar ultraviolet radiation (Hall and Oris 1991). PAHs are considered to be developmental toxicants. Limited animal data, mostly relating to the effects of BaP indicate that PAHs have a potential to induce adverse developmental effects such as pregnancy terminations, malformations, sterility in offsprings, testicular changes including wasting with lack of sperm, immunosuppression and tumours. In adult birds exposure to crude oil can cause stress which shuts down reproduction via feedback to the brain. Crude oil can also impair egg formation, egg laying, incubation and stability of the pair bond. In addition oil can cause mortality and reduced hatching of eggs with the PAHs components being the most toxic (Ronald, 1987). When the feathers of birds are soaked in crude oil, they get smothered and hence loses their ability to fly. On the other hand, when insects are affected they get incapacitated and experience a rise in physiological temperature leading to death. In this research, bioremediation option was considered to test the effect of bacterial consortium on biodegradation of polycyclic aromatic hydrocarbons contained in Bonny light crude oil.

**DISCUSSION**

Comparison between Table 1 and 2 shows a significant reduction (P<0.05) of Polycyclic Aromatic Hydrocarbons. The reduction of Polycyclic Aromatic Hydrocarbons (PAHs) using different wastes achieved in this research work is of significant importance in view of the numerous toxicity and health problems they
cause. The PAHs are ubiquitous environmental contaminants. The health implications of PAHs had been reported by Thomas (1990); Hall and Oris (1991); Chaloupka (1993) and Potter (1994).

A major observation can be made from the reduction of those PAHs that are of serious health hazards. They include Benzo (a) pyrene, Benzo (a) anthracene, Chrysene, Dibenzo (a,h) anthracene, Benzo (b) fluoranthene, Indeno (1,2,3 –d) pyrene and Benzo (g,h,i) perylene. It is interesting to note that in this study, all these compounds were significantly (P<0.05) degraded using the combination of bacteria and wastes used as seed. In the case of Benzo (a) anthracene, the reduction of Polycyclic Aromatic Hydrocarbons (PAHs) using different concentrations of cowdung used as biostimulants achieved in this research work is of significant importance in view of the numerous toxicity and health problems they cause.

REFERENCES
ASSESSMENT OF THE EFFICIENCY OF CONSTRUCTED WETLAND IN DOMESTIC WASTEWATER TREATMENT AT THE UNIVERSITY OF LAGOS, NIGERIA.

1Adeniran A.E., 1Aina A.T., 1Oshunrinade O.O., Oyelowo M.A.1
1Department of Works and Physical Planning, University of Lagos, Akoka, Lagos, Nigeria.

ABSTRACT
The present study was undertaken to assess the reduction of physical, chemical and biological parameters in the domestic sewage generated within the University of Lagos community using constructed wetland. Influent (raw wastewater) and effluent (treated wastewater from the constructed wetland) samples were collected and analysed for various parameters. Average removal efficiencies of measured parameters from treated effluents are 75.27% for Total Dissolved Solids (TDS), 98.18% for Turbidity, 89.72% for Colour, 74% for Conductivity, 58.08% for Dissolved Oxygen (DO), 75.22% for Iron, 67.14% for Sulphate, 92.73% for Nitrate, 89.92% for Manganese, 76.53% for Biochemical Oxygen Demand (BOD) and 92.86% for Total Coliform. All the parameters are within the Federal Environmental Protection Agency (FEPA) Effluent Limitation Guidelines in Nigeria stipulated values for effluent discharge into receiving water bodies. The study concludes that constructed wetland is efficient in the treatment of the domestic sewage. The wastewater discharged into the neighbouring lagoon by the University of Lagos is not polluting the water body.

Key Words: Constructed wetlands, total coliform, biochemical oxygen demand, Federal Environmental Protection Agency.

INTRODUCTION
All over the world, much wastewater is being generated and most of them, especially in developing countries, are not treated before being discharged into water bodies. Aquatic ecosystems are used either directly or indirectly as recipients of potentially toxic liquids from domestic, agricultural and industrial wastes (Demirezen, et al., 2007). Untreated or partially treated wastewater release is harmful to the environment, thus wastewater discharge should be regulated to protect the environment. Abdel-Halim et al., 2008 noted that about two-thirds of the population in developing countries have no hygienic means of disposing excreta and total wastewater which implies that inadequate sanitation are the prime causes of disease in such countries.

Raw sewage contains mostly water (about 95%) which often comes from washing and flushing toilets. They also contain organic particles (such as seaces, food, paper fibres, plant materials etc), inorganic particles (such as sand, metal particles, ceramics etc), pathogens and non-pathogenic organism, animals such as protozoa, insects etc, macro solids such as sanitary napkins, diapers etc; Gases such as hydrogen sulphide, methane etc and toxins amidst others. The rich/wide diversity of raw sewage makes them habitat for various organisms and plants.

The mechanisms of water quality improvement in constructed wetlands are numerous and interrelated. These include settling of suspended particulate matter, filtration and chemical precipitation, chemical transformation, adsorption and ion exchange on the surfaces of plants, substrate, sediment, and litter, breakdown and transformation of pollutants by microorganisms and plants, uptake and transformation of nutrients by microorganisms and plants and predation and natural die-off of pathogens.

For more than two decades, have used constructed wetlands to improve the quality of contaminated water and wastewaters (Maine et al., 2009; Murray-Gulde et al., 2005 Zhang et al., 2010.) Constructed wetlands have successfully being used for environmental pollution control despite the fact that it was initially designed for use in domestic wastewater (Scholz & Lee, 2005). Constructed wetlands are engineered waste water treatment systems that involve lots of treatment processes including biological, chemical and physical processes.
resembling natural treatment wetlands (Adeniran, 2011). They are made of shallow ponds on which aquatic plants are grown. Constructed wetlands are constructed with impervious day and synthetic lines and engineered structures control direction of flow, retention and water level (Ewemoje & Sangodoyin; 2011).

The two major types of constructed wetlands are the Surface flow (SF) wetland which consists of a shallow basin, soil or other medium to support the roots of vegetation, and a water control structure that maintains a shallow depth of water and the Subsurface flow (SSF) wetland consists of a sealed basin with a porous substrate of rock or gravel. The water level is designed to remain below the top of the substrate (EPA 1993). Constructed wetlands are known to have a high buffering capacity. Effluent quality is therefore normally quite stable. On the other hand, adverse effects can be expected from low temperatures (especially inhibition of N-removal), peak flows (wash out of solids) and clogging of subsurface flow systems. Removal percentages are mainly dependent on temperature, hydraulic residence time (HRT) and loading rate (Rousseau et al. 2008).

In this study, the combined Surface Flow and Subsurface flow wetland was employed for the treatment of the domestic waste water produced in the University of Lagos before discharge into the lagoon.

CONCLUSION
The results from the study reveal a good performance of the University of Lagos Constructed wetland. The constructed wetland is found to be highly efficient in the treatment of sewage in terms of physical parameters, however, no appreciable difference was noticed in the pH values of both influent and effluent. The removal efficiency of the facility for most physical, chemical and biological parameters is well above average and the effluent values are within the FEPA’s Effluent Limitation Guidelines in Nigeria (1991).

Further studies will be based on the improvement of the constructed wetland for better performance through the examination of the possibilities of the use of a various species of constructed wetland plants. Pilot studies in this respect are on-going.

REFERENCES


Kempster P.L., Van Vliet H.R. and Kuhn A.1997. The need for guidelines to bridge the gap between drinking – water quality and that which is practically available and acceptable water, South Africa J, 23(2), 163.


INTERPRETATION OF OBSERVED SURFACE WATER QUALITY USING PRINCIPAL COMPONENTS ANALYSIS AND CLUSTER ANALYSIS

Dr. Ayeni, A. O., Dr. A. S. O. Soneye and Dr. I. I. Balogun
Department of Geography, University of Lagos, Lagos – Nigeria
aayeni@unilag.edu.ng, ayeniao2000@yahoo.com
+234 (0) 8035894730

Abstract:
Variety approaches are being used to interpret the concealed variables that determine the variance of observed water quality of various source points. A considerable proportion of these approaches are statistical methods, multivariate statistical techniques in particular. The use of multivariate statistical technique(s) is/are required when the number of variables is large and greater than two for easy and robust evaluation. By means of multivariate statistics of principal components analysis (PCA) and cluster analysis (CA), this study attempted to determine major factors responsible for the variations in the quality of 30 surface ponds used for domestic purposes in six (6) selected communities of Akoko Northeast LGA, Ondo State, Nigeria. The samples' locations were classified into mutually exclusive unknown groups that share similar characteristics/properties. The laboratory results of 20 parameters comprising 6 physicals, 8 chemicals, 4 heavy metals and 2 microbial from the sampled ponds were subjected to PCA and CA for further interpretation. The result shows that 5 components account for 97.52% of total variance of the surface pond quality while 2 cluster groups were identified for the locations. Based on the parameters concentrations and the land uses impacts, it was concluded that domestic and agricultural waste strongly influenced the variation and the quality of ponds in the area.

Key Words: Multivariate statistics, ponds, water quality, variance and interpretation

Introduction
The complexity of water quality as a subject is reflected in various types of measurements. These measurements include simple (in situ), basic and more complex parameters (Laboratory). For instance, pH, temperature and DO could be measured with a portable in-situ pH meter, a mercury thermometer and M90 Mettler Toledo AG DO meter, respectively (USGS 2006). BOD, TSS, Cu, Fe, Total bacterial counts, Total coliforms etc could be analyzed in the laboratory using standard methods for water samples examination (Ayoade, 1988; APHA, 1998, WHO 2006 and USGS 2006).

The surface water quality assessment is a matter of serious concern today due to its role in servicing domestic water needs of water stress areas (Yerel, 2010 and Ayeni et al, 2011). The surface water (ponds) quality is principally influenced by the natural and the anthropogenic processes particularly in the urban areas and agricultural activities around the rural areas (Ayeni, 2010 and Ayeni et al., 2011). The level of water quality is relatively determined by the content of physical, chemical and biological parameters present in it. Relationship between two parameters may also lead to increases or decrease in the concentration of others. This relationship or association is usually achieved using multivariate statistical techniques (Ifabiyi, 1997; Mazlum et al., 1999; Jaji et al., 2007). This is because some analysis is primarily concerned with relationships between samples, while others are largely with relationships between variables. According to Mazlum et al., (1999) and Yerel, (2010), many multivariate statistical techniques have the capacity to summarize large data by means of relatively few parameters. Nonetheless, the choice of using any of the multivariate statistical techniques lies on the nature of the data, problem, and objectives of the study. In view of the fact that the daily drinking and domestic water needs of the majority of residents in the area are met by unsafe surface water, in particular surface ponds (Ayeni, 2010), there is the need to understand the variables that control the variations in their quality. Principal Component Analysis (PCA) and Cluster
Analysis (CA) of multivariate techniques are therefore adopted for the study. According Praus, (2005), PCA is used to search new abstract orthogonal eigenvalues which explain most of the data variations in a new harmonize structure. Each principal component (PC) is a linear combination of the original variables and describes different source of information by eigenvalue based on the decomposition of the covariance/correlation matrix (Geladi and Kowalski, 1986). PCA is designed to modify the observe variables into uncorrelated variables of linear combinations of the original variables called “principal components” (Praus, 2005 and Yerel, 2010) as well as to investigate the factors which caused variations in the observed datasets (Mazlum et al., 1999). The principal component therefore provides information for interpretation and better understanding of the most meaningful parameters, which describes the whole data set through data reduction with a minimum loss of the original information. Cluster analysis (CA) is an exploratory analysis technique for classifying a set of observations into two or more mutually exclusive unknown groups based on combinations of interval variables (Stockburger, 1997; Trochim, 2006; Murali-Krishna et al., 2008 and Yerel, 2010). According to Yerel (2010), CA organizes sampling entities into discrete clusters, such that within-group similarity is maximized and among-group similarity is minimized according to some objectives criteria. Its purpose is to discover a system of organizing observations and sort them into groups so that it is statistically easier to predict behavior of such observations based on group membership that share similar identities/properties. In this study, observation and sampling location classification were done by the use of Hierarchical Cluster Analysis (HCA) procedure. HCA identify relatively homogeneous groups of variables (cases) through dendrogram based on selected characteristics. Dendrogram clearly distinguished locations behaviours and interprets the description of the hierarchical clustering in a graphical format (Hastie et al., 2001 and Ryberg, 2006).

This study presents the usefulness of multivariate statistical techniques of large and complex dataset in order to obtain better information and interpretation concerning surface water quality. Principal component analyses helped in identify the factors responsible for surface water quality variations in 6 selected communities. The result revealed that the percentages of the total variances of the 5 extracted components when added account for 97.52% (i.e. their cumulative variance) of the total variance of the observed variables. The variation in components 1 and 2 loadings indicate that organic matter and organic acids could greatly influence the quality of selected ponds. Components 3 ascribed mainly to domestic and agricultural waste of the ponds environment while component 4 and 5 respectively attributed to dissolved/emulsified poorly treated waste water. On the other hand, the result of cluster analysis revealed 2 major clustering groups resulting from influence of agricultural and urban activities around the samples’ locations. Cluster 1 characterized with low Euclidean distance corresponds to 23 locations and clarifies with sub groups that varies with significance Euclidean distance while cluster 2 coherent to 7 locations and observed high Euclidean distance with sub group of insignificance Euclidean distance. Therefore, it is worthwhile to conclude that PCA and CA are better tools for better understanding of the concealed information about parameters variance and datasets discrete information in water quality assessment studies.

References
Biodiversity Conservation and Ecosystem Management: Implications for Sustainable Development in Sub-Saharan Africa

1Bamigboye, E.O. and 2Bamigboye, R.A.
1Department of Agricultural Extension and Rural Development, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.
2Natural History Museum (Botany unit) Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.
Corresponding e-mail: tayo_bamigboye@yahoo.co.uk

Abstract
This paper has attempted to discuss biodiversity, ecosystem management and indigenous knowledge system (IKS) approaches to sustainable biodiversity and ecosystem management. It specifically identifies various indigenous knowledge and ecosystem management strategies employed in an integrated approach to biodiversity and ecosystem management by all stakeholders (local farmers, governmental and non-governmental organizations) to preserve the biodiversity and ecosystem in order to adapt to a global threat “global warming and warning.” It also reports some factors that are associated with the utilization of IKS for biodiversity conservation by farmers. The article further presents a model on the interrelationship between biodiversity, ecosystem management and IKS. The current global campaign for the conservation of biodiversity with low-external input technologies could help to stem environmental degradation. It has also informed the emphases on the ecosystem management strategies in order to achieve sustainable development and economic growth in Sub-Saharan Africa.

Key words: Sub-Saharan Africa, Local knowledge, Sustainable development, Natural resources, ecosystem and conservation.

INTRODUCTION
Since man learnt to appreciate his environment (to till the soil, build a tent in order to seek for comfort, indirectly there has been a steady decline in the natural resource base (Idoga et. al, 2004). The importance of biodiversity cannot be over emphasized. It plays great roles in the nation’s economy and capacity for food production. **Biodiversity is critical to the maintenance of a healthy environment. Biodiversity is the variability among living organisms from all sources including interalia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part (FEPA, 2005; SEP, 2007).**

This is particularly true in the tropical environment especially in Sub-Saharan Africa. Wilson (1998) outlined some of the factors responsible for the depletion of forest quality and productivity in the tropics to include unfavorable climate especially high temperature and low rainfall intensity which culminated into seasonal wild fire. Also, increased population density and over exploitation of the forest production without necessarily involving in culture of replanting. The rate of biodiversity loss has been accelerating rapidly throughout the industrial era as a result of the tremendous benefits of biodiversity and ecological consequences of its losses, urgent attention is needed more than ever before to biodiversity conservation.

It is estimated that between 25 and 40 percent of the original cover of Nigeria forest was lost by 1980, about 380,000 hectares of both forest and savannah vegetation cover are deforested annually (Ayuba, 2004). The overall effect of biodiversity and ecosystem depletion is that Nigeria for example in 1997 had well over 60 million hectare of forest and woodlands, currently has only about 9.6 million hectares of forest reserves. The extent of vegetation depletion in SSA varies from one place to another. In some areas, the battle to restore depleted land has been lost, while in other areas reversing vegetation depletion will prove slower, costly and difficult to achieve.

There is a serious concern over the consequences of unchecked vegetation depletion to the sustainable national development. An assessment by CBD concluded that without conservation measures, the world’s current forest and cropland as a whole would be reduced and
the attendant impact will be biodiversity loses and probably permanent extinction. That is why this present study attempts to look into biodiversity conservation and ecosystem management and its implication for sustainable development. In order to achieve sustainable development these three approaches must be fully integrated into environmental conservation (biodiversity conservation, ecosystem management and local knowledge approaches).

It has been shown (Chamber, 1991) that local knowledge are expressed in different aspect of human endeavor and they include knowledge about the environment, natural resource conservation, farming practices, ethno veterinary therapy, experiment and biological folk taxonomies or systems of classification. It has been widely acknowledged that local people have their own body of knowledge used in solving various problems that confront them in managing their environment. (Agboola, 2005; Bamigboye and Kuponiyi, 2010) acclaimed that indigenous knowledge people has been very relevant and effective in research and development. The richness of the knowledge must be maximally explored and utilized by all agents of development.

According to Shepherd (1998), one of the technical principles of sustainable development is cherishing and understanding indigenous knowledge about the local people and natural resource management. Local knowledge on genetical resources acquired through technical know-how, experiments, borrowing of ideas and inheritance over the millenniums if harnessed through problem identification and technology generation can contribute immensely to biodiversity conservation which will help in sustainable environmental protection in the sub-Saharan Africa.

**Conclusion and Recommendations**

Local knowledge of Sub-Saharan Africa has a potential for ensuring its biodiversity conservation and ecosystem management for sustainable development. This paper presents local knowledge practices that are in use in the study area. While these systems are treated as having a high sustainability potential in the region, this paper was silenced on the utilization of scientific knowledge in biodiversity conservation because some of the imported knowledge cannot fix in to the cultural believe systems and environmental management system. Reengineering of local authorities, development cooperation policy-makers, natural resources managers, and stakeholders in their epic attempt will help to ensure sustainable environmental protection. Revitalization means social re-engineering to make traditional institutions of governance participatory, revolving on community-based knowledge management schemes with more equitable access to and control over knowledge production, sharing and application. NGOs, which have been effective instruments of people’s participation, facilitators and catalysts in development, must start by learning from what local people already know. It is therefore recommended that developing countries need financial support to institutionalize and operate all identify ecosystem strategies in order to achieve sustainable development in SSA.

**References**


CHOICE OF EUCALYPTUS TREE SPECIES FOR ENVIRONMENTAL MANAGEMENT AND PROTECTION IN KADUNA METROPOLIS

¹OJO, O.S; ¹AKINYEMI, O; ¹SODIMU, A.I; ¹JAYEBOA, W.A; ²SULEIMAN, R.A
¹Forestry Technology Department, Federal College of Forestry Mechanization, P.M.B 2273, Afaka ²FRIN/JICA Aforestation Project, Afaka, Kaduna
Sambio2001@gmail.com

Abstract
The choice of Eucalyptus tree species was examined due to recurrent incidence of tree fall in Kaduna metropolis. It was discovered that a total of 32.86 m³ of trees volume from 16 (n) distributions was found to have been depleted and caused environmental threat. Therefore a critical student T – test was used to analyze data derived from the total volume of trees and the distance from Object (D O). Findings from this study revealed that choice of species has no benefits to environmental protection due to wrong choice of Eucalyptus tree selection for various uses in Kaduna metropolis with the values given to be t0.05, 12, 16 = 1.740. The study revealed that the choice of Eucalyptus tree species in Kaduna metropolis has a great effect on lives and properties. Showing a lot of research done within this project the top soil of upon which these particular Eucalyptus tree species (E. camadulencis and E. globulus) are found vulnerable to erosion which thereby exposes the root base of these trees. Also, the choice of Eucalyptus species is very high and the danger therefore from incessant tree fall is prominent in Kaduna and other neighboring metropolis. The trees are also planted too close to structures of high importance.

Introduction
Study Background
Eucalyptus is one of three similar genera that are commonly referred to as "eucalypts," the others being Corymbia and Angophora. Many, but far from all, are known as gum trees because many species exude copious sap from any break in the bark (e.g. Scribbly Gum). The generic name is derived from the Greek words ευ (eu), meaning "well," and καλυπτος (kalyptos), meaning well "covered," which refers to the operculum on the calyx that initially conceals the flower. Reported to be anesthetic, antiseptic, astringent, the redgum eucalyptus is a folk remedy for colds, colic, coughs, diarrhea, dysentery, hemorrhage, laryngalgia, laryngitis, pharyngitis, sore throat, spasm, trachalgia, and wounds (Duke and Wain, 1981).

Conclusion
The study revealed that the choice of Eucalyptus tree species in Kaduna metropolis has a great effect on lives and properties. Showing a lot of research done within this project the top soil of upon which these particular Eucalyptus tree species (E. camadulencis and E. globulus) are found vulnerable to erosion which thereby exposes the root base of these trees. This is noticed to have caused incessant breaking of tree stand especially of same species which is very common in Kaduna metropolis. The trees close to structure were rendered destroyed and existing ones and lives endangered.

Also, the choice of Eucalyptus species is very high and the danger therefore is prominent in Kaduna and other neighboring metropolis. The trees are also planted too close to structure of high importance.
Recommendation
It can therefore be recommended that the choice of trees species for environmental protection should be critically observed because the number of trees found to be abject are quite higher than tolerant. Also, spacing should not underestimate as future occurrence of tree or fall could avoided. Basically, Forestry and Environmental Management should play a significant role in tree choice and planting to safe-guard lives and properties in Kaduna metropolis.

REFERENCES
Malab S.C. (1992) CURRENT STATUS OF EUCALYPTUS PLANTATIONS IN NORTHWEST PHILIPPINES
Mariano Marcos State University and Director, Institute of Sustainable Dryland Agriculture Batac, Ilocos Norte Philippines


COW DUNG – WATER HYACINTH SLUDGE: A VERITABLE SOURCE OF RENEWABLE ENERGY

Olawale O.E. Ajibola and Eniola O. Suley
Department of Systems Engineering, Faculty of Engineering
University of Lagos, Akoka, Yaba, Lagos, Nigeria.
e-mail: oajibola@unilag.edu.ng, waleisiro@yahoo.com
Tel. Number: +234(0)8023025053, +234(0)8034488877

Abstract
Traditionally, cow’s excreta have been used as manure in the fields for ages. With increasing demands for energy coupled with depletion of existing fossil fuel, the quest for renewable energy has taken the centre stage the world over. Cow excreta have been identified as viable source of energy with additional quality that greenhouse emissions are reduced significantly. Being used in developing countries for over three decades now, cow dung and by extension, biomass has a lot of potential to reduce carbon footprint by capturing and storing CO₂ from biogas into the ground thus turning the biogas carbon negative and scrubbing the past CO₂ emissions out of the atmosphere. In this work, we have done a comparative analysis of energy content of excreta of various kinds of animals, man inclusive, and have chosen cow dung. We have excogitated the chemical content of cow dung with a view to extracting its energy content with the ultimate goal of producing electricity thus providing sustainable energy especially for the rural populace where energy requirement is low due to absence of industries.

Keywords: renewable energy, excreta, fossil fuel, greenhouse emissions, carbon footprint, biomass, sustainable energy, conference and fair.

1. INTRODUCTION

Energy is the ability of a system to do work, Gibbs K. (2004). It is the property of a system that enables the system to function and to change form; shape, position and chemical composition, Halliday et al (2004). Energy is required for every human activity; from talking to running, jumping or even reading. Some important forms and sources of energy include: the solar energy, derived from the sun; chemical energy; electrical energy; mechanical energy which basically manifest as kinetic energy (i.e. energy due to motion) and potential energy (i.e. stored energy) to mention but a few. One of the most important of these forms of energy is the electrical energy due to its higher transmissible power, its ability to readily transform to other forms of energy and the human capability to facilitate its storage. Electricity features everywhere in our lives. It lights up our homes, cooks our meals, powers our computers and other electronic devices and Electricity from battery keeps our cars running. For these reasons Energy Consumptions worldwide depends on the quantum of electrical energy generated. The issues connected with the growth in Energy Consumption, Energy Conservation, and Finding Environmentally benign ways of energy production the world over. This may arguably be the most significant challenge facing mankind in the 21st century, Ibidapo-Obe and Ajibola (2011). Nigeria’s Unreliability of Supply and Decline in Traditional Fossil Fuel Production, combined with very grave Environmental matters and Continued uncharted economic and population growth makes it imperative to search for Alternative Forms of Energy. Whilst we proceed with increasing the generation capacity, transmission and distribution of existing traditional energy sources through the development of energy systems and policies that enhance social, economic and environmental performance; it is appropriate to focus on alternative to the traditional energy sources which among other things is capital intensive, and the technology required becomes obsolete within a short space of time thereby requiring intensive overhauling of the machineries or better still a complete replacement of the existing technology with a newer innovation leading to colossal waste of fund. However, the answer to the present imbroglio may be found in renewable and sustainable energy forms both for rural and urban areas of the country, Ibidapo-Obe and Ajibola (2011).

2. CONCLUSION
With the conclusion of this study, a major socio-economic problem was identified: inadequate energy supply; and a way forward has been proposed in the form of the generation of biogas and its application in electricity generation. It is our sincere belief that if power generation is the only problem the current regime in Nigeria can solve, it will be a giant step towards actualizing vision 20:2020.

REFERENCES


Johansson, T.B. (2006); Renewable energy sources for fuels and electricity. Island Press. Washington D.C.


DISTRIBUTION AND ASSESSMENT OF HEAVY METALS IN SEDIMENTS OF THE RIVER ORLE, SOUTHWESTERN NIGERIA

Adepoju, M. O. and Adekoya, J. A
Department of Applied Geology, Federal University of Technology, P. M. B. 704, Akure, Nigeria
Telephone: +234 803 472 2855
moadejo@futa.edu.ng; mohdpoju@yahoo.com

Abstract
Ten heavy metals, namely, Ag, As, Cd, Co, Cr, Cu, Hg, Ni, Pb and Zn were partially extracted using aqua regia digestion method and analysed by ICP-AES from 56 stream sediment samples collected from River Orle, Igarra area, southwestern Nigeria. The analytical results were used to produce geochemical distribution maps for the elements and were subjected to univariate statistical analysis in order to evaluate the distribution and abundance of the heavy metals in the study area. The degree of pollution of these stream sediments by these heavy metals was evaluated by calculating such parameters as enrichment factors (EF), as well as pollution load and geo-accumulation indices (PLI and Igeo).

Co, Cr, Cu, Ni, Pb and Zn are widely distributed in the drainage system while the distribution of Ag, Cd, As and Hg is restricted to only parts of the drainage system with Ag and Cd being localized to one sample site each near Epkeshi in the southern part of the study area. Cr and Pb display anomalously high concentrations, each from a site, also in the same locality where Ag and Cd were detected, indicating the likelihood that the four elements, Cr, Pb, Ag and Cd are genetically related.

Calculation of the enrichment factor (EF), pollution load index (PLI) and geo-accumulation index (Igeo) yielded results that indicate that all the 56 stream sediment sites, except one (MTP54) located about 4 km southeast of Epkeshi in the southern part of the Orle drainage system, are practically unpolluted by heavy metals. The relatively high metal concentration of MTP54 site having Pb EF of 62.5, PLI of 1.14 and Pb Igeo of 2.44, which signifies possible pollution of this site, is essentially attributable to anomalous concentration of Pb at the site. Both natural and anthropogenic sources of the Pb contamination around Epkeshi locality (MTP54 site) are possible.

In conclusion, the levels of concentrations of heavy metals in the study area, in general, do not constitute any serious environmental risk except for Pb which needs to be monitored at only one site in the study area. Therefore the concentration ranges for the different heavy metals in the study area can serve as baseline environmental data against which the degree of pollution of these heavy metals can be evaluated in future.

Keywords: stream sediment; Pb contamination; baseline environmental data; River Orle, Southwestern Nigeria

1. Introduction
Heavy metals, like other metals, are natural constituents of stream sediments, whose concentrations depend on factors such as lithology of rock types, geomorphology and structural setting of the catchment area, as well as climate which controls the rate of weathering, hydrologic characteristics and vegetation type and density (Salomon and Förstner, 1984). These metals can also be introduced into the river channels anthropogenically, in which case they are products of human activities such as domestic and industrial wastewater discharges, sewage wastewater, fossil fuel combustion and atmospheric deposition (Mantei and Foster, 1991; Benamar et al., 1999). Heavy metals in stream sediments can therefore occur as constituents of primary ore minerals, resistant secondary minerals, leachates from waste dumpsites...
and precipitates of various kinds. If heavy metal abundance is above normal, the metals may have a deleterious effect on the environment owing to their toxicity and accumulation in microorganisms, plants, animals and humans. Metal nutritional requirements differ substantially among animal or plant species and also vary with element types. Severe imbalances of metal proportions caused by exposure to elevated concentrations can induce death of organisms (Agbozu et al., 2007). Heavy metals like Pb, Cd, As etc. exhibit extreme toxicity even at trace levels (Nicolau et al., 2006). Hence, the knowledge of heavy metal concentration and distribution in soils and stream sediments is important in an environmental study of any region (Krishma et al., 2010).

Consequently, researchers all over the world have studied the nature and concentrations of heavy metals in different geochemical media. Some workers in Nigeria, notably, Kakulu and Osibanjo (1988), Okoye et al. (1991), Oguzie (2002), Iodo-Umeh and Oronsaye (2006), Obasohon (2008), Ladigbolu and Balogun (2011) have studied heavy metal occurrence and level of pollution of stream sediments in the river channels within some Nigerian urban centres such as Ibadan, Lagos, Ekpoma and Benin. They all reported intense heavy metal pollution as a result of profound effect of industrialization and domestic wastes in urban centres. The present work focuses on the distribution and pollution status of heavy metals in a part of Orle drainage system in the Igarra district, southwestern Nigeria. Igarra area is increasingly becoming a focus of development as a result of establishment of many small- to medium- and few large-scale marble mining and processing companies in the area. Concentrations of ten heavy metals, namely, Ag, As, Cd, Co, Cr, Cu, Hg, Ni, Pb and Zn, which are selected from a suite of trace elements obtained from the stream sediments of the Orle River catchment area (Adepoju and Adekoya, 2011; Adepoju and Adekoya, 2008) were used for this study. The study provides information on the spatial abundance of these heavy metals in the study area and thus affords an opportunity to examine the area for heavy metal pollution.

Summary and Conclusion

A study of the occurrence, distribution and level of pollution of ten heavy metals, Ag, As, Cd, Co, Cr, Cu, Hg, Ni, Pb and Zn in the stream sediments of the Orle drainage system in Igarra area, southwestern Nigeria, reveals the following:

(1) Co, Cr, Cu, Ni, Pb and Zn are widely distributed in the drainage system while the distribution of Ag, Cd, As and Hg is restricted to only parts of the drainage system. In particular Ag and Cd are localized to one sample site each in the southern part of the study area.

(2) Only Cr and Pb display anomalously high concentrations, each from a site, also in the same locality where Ag and Cd were detected in the southern area of the Orle drainage system. It is therefore not unlikely that the four elements, Cr, Pb, Ag and Cd are genetically related.

(3) Calculation of the enrichment factor (EF), pollution load index (PLI) and geo-accumulation index (Igeo) yielded results that indicate that all the 56 stream sediment sites except one (MTP54) located about 4 km southeast of Epkeshi in the southern part of the Orle drainage system are practically unpolluted by heavy metals.

(4) The relatively high metal concentration of MTP54 site having Pb EF of 62.5, PLI of 1.14 and Pb Igeo of 2.44, which signifies possible pollution of and existence of heavy metal contamination at this site, is essentially attributable to anomalous concentration of Pb at the site.

(5) Both natural and anthropogenic sources of the Pb contamination resulting in the pollution around Epkeshi locality (MTP54 site) are possible. Natural sources may be related to the reported sulphide showings in Igarra area. On the other hand, the concentration of marble mining and processing companies in the Epkeshi area can bring about pollution of the drainage system through industrial waste discharge.

In conclusion, the levels of concentrations of heavy metals in the study area, in general, do not constitute any serious environmental risk except for Pb which needs to be monitored at only one site in the study area. Therefore the concentration ranges for the different heavy metals in the study area can
serve as baseline environmental data against which the degree of pollution of these heavy metals can be evaluated in future.

REFERENCES


ENERGY IN THE PERSPECTIVE OF THE SUSTAINABLE DEVELOPMENT IN NIGERIA

Oyedepo, Sunday Olayinka
Mechanical Engineering Department, Covenant University, Ota
e-mail: Sunday.oyedepo@covenantuniversity.edu.ng

Abstract
As energy plays a central role in the world development, it represents as well a major challenge for sustainable development. A sustainable energy system may be regarded as a cost-efficient, reliable, and environmentally friendly energy system that effectively utilizes local resources and networks. Sustainable energy systems are necessary to save the natural resources avoiding environmental impacts which would compromise the development of future generations. Today, more than 80% of the primary energy consumption is based on fossil fuels and the share is likely to remain high in the future. Even if technology developments will reduce the specific consumption, the world energy demand is likely to increase in line with its population. Delivering sustainable energy will require an increased efficiency of the generation process including the demand side. Energy and material efficiency and the integration of the renewable resources will therefore have to play a major role for sustainable development. The challenge concerns not only the technologies at the conversion and useful energy level, but also the energy management and infrastructures. The opportunities for improving the efficiency of industrial facilities are substantial, even in markets with mature industries that are relatively open to competition. This paper explores the role of industrial energy use in sustainable development in Nigeria and the potential sources to increase energy efficiency.

Key words: Energy, Energy efficiency, Sustainable development, Energy management, Industry

1.0 INTRODUCTION
Energy has a major impact on every aspect of our socio-economic life. It plays a vital role in the economic, social and political development of our nation. Inadequate supply of energy restricts socio-economic activities, limits economic growth and adversely affects the quality of life. Improvements in standards of living are manifested in increased food production, increased industrial output, the provision of efficient transportation, adequate shelter, healthcare and other human services. These will require increased energy consumption. Thus, our future energy requirements will continue to grow with increase in living standards, industrialization and a host of other socio-economic factors (ECN, 2003). As the very basis of development, energy use is closely related to the level of productivity in the industry, commerce, agriculture and even in office activities. Energy consumption per capita is one of the indicators or benchmarks for measuring the standard of living of a people or nation. The unprecedented use of energy which began with the industrial revolution certainly brought about massive increase in productivity and change in lifestyle. Since then energy demand has been in the increase to produce more products, travel further and faster or to be more comfortable. Physically, energy is defined as the capacity for doing work. The capacities of energy to do work are inherent properties of energy carriers. Although energy cannot be created nor destroyed according to classical thermodynamics, its capacity for doing work can be degraded and destroyed due to system irreversibility in line with the logic of the second law of thermodynamics (Nag, 2004).

Some of the common energy carriers or sources are coal, petroleum, natural gas, nuclear fuels, biomass etc. Of all these, the most widely used energy sources are the hydrocarbon compounds or fossil fuels which account for more than 80% of global primary energy consumption (Awwad et al, 2007). For instance, fossil energies provide
about 67% of the energy needed to produce electricity - a veritable and the most terminal form of energy for transmission and distribution for industrial production processes (Jean and Marc, 2007). According to the World Energy Outlook of 2006, published by EIA, oil in particular will continue to dominate the energy market into the foreseeable future. In contrast, renewable resources are expected to contribute about 15% at best to the total primary energy requirements by the end of 2030. The issues at stake however is that fossil energy resources upon which modern development depend have finite life span. Experts argue that if global consumption continues at its current pace, economically exploitable reserves of fossil fuels will amount to no more than 40 years for oil, around 60 years for gas and about 230 years for coal (Jean and Marc, 2007).

Energy usage has become an important concern in the past years and there has been growth awareness and an increase in taking personal responsibilities in preventing environmental pollution by minimizing energy waste. Energy has been the key to economic development worldwide, but in the way it is sourced, produced and used, two major drawbacks have emerged. First, the overall energy system has been very inefficient. And second, major environmental and social problems, both local and global, have been associated with the energy system (Davidson, 2006). Climate change and environmental externalities associated with energy consumption have become a major international issue. It has been observed that among the various sectors contributing to green house gas (GHG) emissions, industrial sector contribution was significant (David et al, 2007); thus mitigating GHG emissions from the sector offers one of the best ways of confronting the climate change problem. Energy efficiency is a major key in this regard. An estimated 10-30% reduction can be achieved at little or no cost by improving efficiency of energy use in the industry 2007.

Although Nigeria is relatively endowed with abundant fossil fuels and other renewable energy sources, the energy situation in the country is yet to be structured and managed in such a way as to ensure sustainable energy development, most especially in the industrial sector. Nigeria as a nation is passing through a serious energy crisis and it has been even more affected not by a lack of energy resources, but largely due to poor resource and financial management, a crippling dependence on imports particularly second-hand goods built with out-dated, inefficient technology etc (Eleri, 1995). As a nation that has limited technological capacity but sees industrialization as constituting a crucial leverage and pre-condition for meaningful development, Nigeria should be wise enough to manage her scarce energy resources judiciously.

As far as the industrial sector is concerned, various studies done in the past indicate that energy supply and end-use efficiency in the developing countries are still only two-thirds to one-half of what would be considered “best practice” in the industrialized world. According to a report by the Economic and Social Commission for Asia and the Pacific published by the United Nations, energy savings of the order of 20 to 25% can be achieved economically with existing capital stock in developing nations and another 30 to 60% may be saved if investments are made in new, more efficient capital equipment.

The increasing role of energy efficiency as a catalyst for sustainable industrial development is realism in the industrialized countries of the world. In Nigeria the story is different at the moment as the huge benefits derivable from adoption of energy efficiency and conservation measures by industries remain largely untapped due largely to lack of awareness of the economic and social benefits of energy efficiency measures. This, in addition to high incidence of power outages resulting to large scale use of own power generation and lack of investment capital have given rise to high specific energy content of goods produced by industries in Nigeria. The cumulative effect is loss of competitive edge in the global market by these industries and low after-tax returns. This constitutes a major disincentive to investment and sustainable industrial growth. As a matter of utmost importance, industries in Nigeria should take advantage of opportunities in low level,
low risk but high worth energy efficient measures that reduces the bottom line of any business enterprise. In so doing, a lead time will be created to pursue high-tech driven production processes that will find support at maturity in an already established energy efficient culture.

This paper explores the role of industrial energy use in sustainable development in Nigeria and the potential sources to increase energy efficiency.

**Conclusion**

Energy is an important production factor and therefore should be managed in parallel with land, labor and capital. Energy efficient production process should be seen as a quick and cheaper source of new energy supply as the cost of providing energy can be several times the cost of saving it. Increasingly energy efficiency is considered to include not only the physical efficiency of the technical equipment and facilities but also the overall economic efficiency of the energy system. Hence the adoption of energy efficiency measures in the industrial subsector in Nigeria will enhance profitability, reduce greenhouse gas emissions, promote sustainable development, and improve corporate social responsibility. The time to begin aggressive campaigns for energy efficiency measures in the Nigeria industrial sub-sector in particular and the whole economy chain in general is long overdue.

Pertinent outcomes from this study are (i) the general level of information in Nigeria on industrial energy efficiency is low; (ii) very few companies have adequate awareness and knowledge about implementing energy efficiency projects; (iii) most companies have never carried out an external energy audit to determine areas where efficiency can be enhanced; (iv) most companies need active policy on identifying and repairing leakages such as air, heat and steam, through a combination of internal and external energy audit; (v) the relative low price of fuel in Nigeria, combined with the high investment costs for machines result in long payback period for investments in energy efficiency; (vi) despite the major problem of energy supply facing the companies, a number of them have no clear information on energy efficiency options; and (vii) finance for investment in energy efficiency not readily available either from retained earnings or bank loans due mainly to the financial crisis.

Energy demands by industries in Nigeria will continue to grow. Presently most of these industries are financially and environmentally unstable. With increasing pressure on available resources due to large population, very low GDP, loss of competitive edge in the global market of goods produced in Nigeria, and a drive to catch up with the rest of the world in improving the standard of living of her citizens by at least 2020, Nigeria cannot afford to waste her energy resources through inefficient industrial production processes. There is therefore an urgent need to promote energy efficiency and management measures for sustainable industrial development in Nigeria. The key policy challenge is the need to address the subsisting paradox where companies pay fine for polluting the environment with generators but are not rewarded for greening the environment with energy efficient machines/processes. This paper therefore recommends the need for incentives or subsidies on investments in energy efficiency.

**Reference**


ECN (Energy Commission of Nigeria)(2003), National Energy Policy


Ernst, W and Galitsky, C(2005), Energy Efficiency Improvement and cost Savings Opportunities for Petroleum Refineries, Ernest Orlando Lawrence Berkeley National Laboratory EPA report.


Division of IEA, Paris


https://www.unido.org/doc/65592

Nag, P.K (2004), Power Plant Engineering (2nd Ed.); Tata McGraw Hill, India


Tsighe, Z(2001), ‘Opportunities and Constraints for Sustainable Energy in Eritrea’, In: Habtetsion, S; Tsighe, Z and
Anebrhan, A (Eds.) Sustainable Energy in Eritrea, Proceedings of a National Policy Seminar Held on October 30-31, Asmara, Eritrea


World Commission on Environment and Development (WCED) (1987), Our Common
ENERGY SUSTAINABILITY – AN ISSUE FOR TODAY

L.E.N Ekpeni\textsuperscript{1,}\textsuperscript{*}, A.G Olabi\textsuperscript{2}

\textsuperscript{1,2} Biofuel Research Group, School of Mechanical & Manufacturing Engineering, Dublin City University, Collins Avenue, Glasnevin, Dublin 9, Ireland.
\textsuperscript{*}E-mail: leonard.ekpeni3@mail.dcu.ie

Abstract
Energy sustainability has been an area of greater growth in terms of development across the globe in the recent time. This is said to improve further in the future from one country to another. This development through sustainability needs a cleaner energy supply and renewable energy sources [RES] that are affordable which will not in any way interferes with the society negatively. Most suitably among the [RES] are the biomass and waste fuels which are considered to be a sustainable form of energy due to the fact that natural resource materials renew themselves at a frequent rate so that the ability of future generations to utilize bioenergy will not be compromised. Biomass is a concentrated solar energy that are obtained from the solar powered photosynthesis process during the growth and development phases of plant materials and through which their conversion techniques; waste to energy techniques, bioenergy are the resultants produced from the source, like; biogas, bioethanol, bio hydrogen etc.

In this research, biogas production through yeast (baker’s yeast) is being considered as it is used in the High Pressure Homogeniser (HPH) and its significant energy production is also analysed as compared to other biomass materials that are convertible to different form of biogas such as agricultural crops, crop residues, and forest products.

Keywords: Renewable energy, Biogas, Crops, Biomass, Sustainability, RES, HPH, Yeast

1. Introduction
Fossil fuel and its combustion may eventually leads to the enhancement of global warming and greenhouse gas effect as claimed by Svante Arrhenius in 1896, is no longer an issue. Energy sustainability in general, has now been considered as the major key in terms of natural resources management, and this involves operational efficiency, environmental impact minimisation as well as socio-economical issues [1]. This has become a necessary issue for discussion for every individuals across the globe because, the global energy demand has been growing rapidly, and it is assumed that about 88% of this demand is being met by fossil fuel presently wherein these fossil fuels are being considered as oil and their products, natural gas and coal [2]. In meeting the increasing demand of bioenergy, several raw materials will need to be considered in the production of biogas and bioethanol [3] and several factors has accounted for this renewed development.

The world population has been on the increase, it has doubled since 1960 and will be expected to have more than trebled to almost 9 billion by 2050 as it currently stands at above 7 billion mark [4], hence in the same vein, the energy demand will increase by a factor of two to three during this century [2]. Also, [RES] only supply 14% of the world energy demand [5] and since [RES] is otherwise known as the alternative energy sources, increasing the consumption of fossil fuel to meet out current energy demands alarm over the current energy crisis has generated a resurgence of interest in promoting renewable alternatives that will meet the development of world's growing energy needs [6, 7]. It is anticipated in the scenarios of the future development as highlighted by [8] that the usage of biomass for energy purposes will be insufficient in providing the world's energy demand outside the fossil fuel, hence sustainable development now requires methods and and tools in measuring and
comparing the environmental impacts on human activities for various products [9]. It is now thought that continuous usage of fossil fuel which has been on the increase, will not only lead to diminishing rate of its reserve but also, lead to adverse environmental impact, which has now be showing in most recent times across the globe, especially in the areas of health risk and changes to the climate currently being experienced.

In compliance to the Kyoto protocol agreement which came into force in 2005, minimising the emission rate of greenhouse gas (GHG) emission has been the primary focus and then shifting to renewable energy source that will be sustainable is another. In other to minimize related global warming and climate change impacts, this GHG emission must be reduced to less than half of global emission levels of 1990 and that the energy supply must be secured since these oil and gas reserve concentration are in regions in the world that are politically unstable [10].

In this research, biogas production through yeast (baker’s yeast) is being considered as it is used in the High Pressure Homogeniser (HPH) and its significant energy production as bioenergy from renewable sources is already today a viable alternative to fossil fuels. In a period like this or in the near future when fossil fuel (hydrocarbons) are likely to become scare and costly, methods to convert biomass to competitive liquid biofuels are now increasingly attractive [11], as in the use of the HPH wherein bakers’ yeast are applied.

2. Conclusion
Energy sustainability is the mainstay of the economy now and in the future across the globe, as no meaningful development can take place without this energy sustainability being addressed. Biogas technology has taken a new turn as it offers a unique set of benefits. It should be understood here that the future starts now when it is being prepared that energy sustainability and technological development be targeted. Biogas has in overall contributed immensely to this energy sustainability and its technological development via biomass. The reason being that it provides a way to treat and reuse various wastes – human, animal, agricultural, industrial and municipal [22]. In this study, it has been showcased that bakers’ yeast is not only useful in the pharmaceutical and drink industries, but has also now proven a point of its usefulness in the renewable energy sector in that it is having a higher protein content which are released during the homogenization process in the (HPH) this in turn aid the production of biogas.

High pressure homogeniser is thought to be the best for yeast and other unicellular organisms in the cell disruption for biogas production but has not been evident or proven that this process of cell disruption do not damage or destroy protein contain in them totally as the more the slurry the suspension is during homogenization, the more the protein content released. In another development, it has been proven to be useful biocatalyst in the investigation of mediatorless microbial fuel cell (MFC) as an active glucose oxidation in a mediatorless biofuel cell. MFC is an electrochemical device that can directly convert the chemical energy of organic compounds into electricity using the catalytic activity of living microorganisms for oxidation of the organic compound [44].

Acknowledgements
The author wishes to acknowledge the biofuel group of the School of mechanical and manufacturing engineering and biotechnology department both of Dublin City University (DCU) as well as the supervisor to this research student (Dr Abdul-Ghani Olabi) for the entire work carried out on this study.

References
results and perspectives. WSEAS Transaction on Environment and Development 6(8): (591 – 603)


ENGINEERING FOR SUSTAINABLE DEVELOPMENT: A WAY FORWARD TO GLOBAL POVERTY ERADICATION

Agboola, Lawrence O.
Instrumentation & Control Engineer
National Engineering and Technical Company Ltd (NETCO) {A Subsidiary of NNPC}

Abstract
The application of knowledge in engineering and technology promotes sustainable social and economic development. Engineering is very important in addressing basic human needs, poverty eradication and promotion of secure and sustainable development in developing and developed countries, to bridge the gap between science and society and promote inter-cultural dialogue and cooperation. Engineering for Sustainable Development is an integrated systems approach which focuses on acquiring a balance between the requirements of the current generation and the future generations without compromising the ability of the future generations to meet their needs. Certain difficulties are encountered when applying Engineering for Sustainable Development such as unavailability of information, ill-defined criteria, lack of data and the need to satisfy multiple key decision makers.

To eradicate poverty through sustainable development, the utilization of clean technology should be highly prioritized. Clean technology emphasizes on higher percentage of energy efficiency and sustainability of the environment and it encompasses recycling, renewable energy, green transportation, lighting among other appliances that are energy efficient. It is a means to create electricity and fuels, with a smaller environmental impact and minimize pollution. If clean technology is adopted, man would acquire a qualitative life, life expectancy would increase globally, nations would generate internal and external revenues, there would be jobs and business activities would thrive well which would yield maximum returns, there would be food security, poverty would be eradicated and the best of all, attainment of national peace.

Keywords: Engineering for Sustainable Development, Poverty Eradication, Clean Technology, Renewable Energy, Energy Efficiency, Food security, Climate Change, National Peace.

1.0 INTRODUCTION:

1.1 CAUSES OF GLOBAL POVERTY

Poverty is the principal cause of hunger. The causes of poverty include poor people’s lack of resources, an extremely unequal income distribution in the world and within specific countries, conflict, and hunger itself. As of 2008 (2005 statistics), the World Bank has estimated that there were an estimated 1,345 million poor people in developing countries who live on $1.25 a day or less. This compares to the later FAO estimate of 1.02 billion undernourished people. Extreme poverty remains an alarming problem in the world’s developing regions, despite some progress that reduced poverty from (an estimated) 1900 million people in 1981, a reduction of 29 percent over the period. Progress in poverty reduction has been concentrated in Asia, and especially, East Asia, with the major improvement occurring in China. In Sub-Saharan Africa, the number of people in extreme poverty has increased. The statement that 'poverty is the principal cause of hunger' is, though correct, unsatisfying.

CONCLUSIONS

3.1 THE OPPORTUNITY OF CLEAN TECHNOLOGY

The growth and expansion of clean technology offers an opportunity that is seldom found in economic or workforce development, the chance to support dynamic economic growth, while improving the environment and re-invigorating employment opportunities for individuals that have struggled in the knowledge-based economy.
Economic Growth: Clean technology employers exist in an innovative, profit-driven environment. Venture capitalists have invested billions in this industry, and employers have indicated they expect to increase employment substantially both important indicators of dynamic economic growth.

Environmental Sustainability: The cluster as a whole is focused on developing effective solutions to the environmental challenges of the day using the latest innovative technologies. The underlying objective of most firms in this industry is to attain greater sustainability in how we produce and provide goods and services.

Equitable Opportunities: The growth of other high-technology clusters has not necessarily created new jobs for all facets of the workplace, often times those individuals that do not have a bachelor’s degree or higher are left out of the economic dividends generated from emerging clusters. Clean technology and its promise of advanced manufacturing and assembly occupations can provide economic opportunity for a broad array of educational backgrounds.

Given the potential benefits of a growing clean technology industry, it is not hard to understand why regional policy makers and economists have been strongly advocating for the support and development of the clean technology industry in and around their communities. Community colleges can play a critical role in supporting this industry by training and educating the workforce that will support the clean technology cluster as employers transition from research and development to producing and manufacturing clean technology products and services.

If these points are put into consideration, man would acquire a qualitative life, life expectancy would increase globally, Nations would generate internal and external revenues, there would be jobs and business activities would thrive on ‘fertile grounds’ which would yield maximum returns, there would be food security, poverty would be eradicated and the best of all, attainment of national peace.

3.2 REFERENCES


Union of Concerned Scientists (2009), Smart Climate Choices: The Energy and National Security Benefits of Climate Action


Los Angeles Trade Technical College (February, 2008): Clean Technology Workforce Challenges and Opportunities, Presented to the Los Angeles/Orange County Regional Consortium & Los Angeles Trade-Technical College.

M. Mercedes Maroto-Valer (2010): Developments and innovation in carbon dioxide (CO2) capture and storage technology Volume 1: Carbon dioxide (CO2) capture, transport and industrial applications, Cambridge University Press, UK.


Green Chemistry, online at http://en.wikipedia.org/wiki/Green_Chemistry

Green Chemistry, online at http://www.epa.gov/greenchemistry/

Massachusetts Institute of Technology (MIT) Professional Education: Clean Energy Technology: Understanding Materials Limitations and Opportunities [PI.71s], online at http://web.mit.edu/professional/short-programs/courses/clean_energy_technology.html


Materials Science: Online at http://en.wikipedia.org/wiki/Materials_science


And the Netherlands Energy Research Foundation (ECN), report prepared for NOVEM (EWAB 9840)

Abstract
Environmental deterioration explains the degree of damage done to the environment, which is air, water and land through the introduction of materials that alters its safe quality to an extent that is deleterious to life. The causes are classified into two; the natural and the anthropogenic factors. Man’s quest for development has resulted into large scale degradation of the environment, which scientist globally have attributed to human population explosion, urbanization, poor farm management, industrial waste discharge into waterways, burning of fossil fuel and gas flaring. The Niger Delta by strategic location is home of a huge diversity of plants and animals. Some natural resources in the region such as wetland and woodland are highly valued heritage which are going into extinction as a result of increasing oil exploration and exploitation activities characterized by oil spillage, pipeline vandalism, gas flaring and other human factors. Revenue from oil has prospered the country economically but the degree of damage done to the environment is unquantifiable. The solution requires a proactive and all embracing approach and not the current recourse to the use of arms. Our government should implement standards and regulations as practiced internationally. Government should put in place checks and balances on the regulatory bodies to enforce standards. They should also increase environmental education in schools. Lastly, the current amnesty programme by the Federal government should be left apolitical and focused.

Key Words: deterioration, vandalism, amnesty, Niger Delta and biodiversity.

INTRODUCTION
Prior to the conference on the Human Environment held in Stockholm Sweden in 1972 with declarations reaffirm in 1992 Earth Conference (also known as Rio de Janeiro conference), the good health of the environment have long being handled with levity globally. The quality of the environment and the degree of deterioration necessitated a call for a cut down on the production and use of chlorofluorocarbon’s (CFC’s) gases. The protection and improvement of the human environment was advocated at this conference, which recorded an attendance of 113 countries including Nigeria, 19 NGO’s, 400 inter governmental agencies (USEPA, 2008).

Environmental disasters have of recent become a common coin in the world from China to Mexico, Indonesia, United States of America, and Nigeria, there is no doubt that the world is under a serious threat from the environment but ecologists have argued that the environment was only responding to the abuses heaped on it by man’s activities. This has created a great burden for world leaders, that was why the issue of environment ran neck to neck with matters of economy and poverty at the just concluded meeting of the eight worlds most developed economies, otherwise known as the G8 summit, in Japan (Idris, 2008).

Wagner (1975) subdivided the environment of man into four interlocking systems; the atmosphere, the hydrosphere, the lithosphere and the biosphere. According to him the hydrosphere is a thin layer that covers the crust, the atmosphere are the world oceans, lakes and rivers. The lithosphere is the earth itself while the biosphere is a veneer of life that has resulted from the interaction of other spheres. Unuraye et al. (2005) classified the human environment into the physical, which comprises of the non-living things such as air, soil, water, mineral, temperature, humidity, the biological environment made up of man, plants, animal, microorganisms and the social environment made up of family groups, village or urban communities, their culture, beliefs and attitude. According to this author, man has demonstrated his interaction with the environment through his
quest for industrial development, increase in agricultural products, construction of roads, houses and social amenities, fishing for food, mining, and excavation and so on, which have all led to serious environmental impacts. On a daily basis, environmental degradation, resulting from environmental abuse is constantly experienced. Osuntokun (1998) asserted that abuse of the environment has global implications e.g. the uncollected urban and rural wastes, indiscriminate and unplanned construction of houses, refuse and bush burning, industrial pollution in the air, land and water, among others, all affect not only the physical environment but also have deleterious effects on socio-political life. In Nigeria, other major hazards experienced “includes land degradation, flooding, erosion, deforestation, desertification and drought,” (Willem van Cotthem, 2008).

RECOMMENDATION/CONCLUSION
Firstly, Nigeria government and Africa at large should adopt an inclusive definition of the environment in order to move from a tradition prudence and precaution to sustainable development. Secondly, any development must commence with cost-benefit analysis and mobilization of the natural endowments within environmental context, the strategy must be to promote sustainable development and to avoid wastes. This requires a new paradigm and set of principles. Thirdly, such principles should be entrenched in the highest legal order of the land. Fourthly, the government should ensure the actualization of the propose post amnesty plan (environmental restoration, remediation and re-engineering) and stop lavishing our fund on few individuals in the disguise of accepting amnesty deal. Fifthly, the country should adopt standards, regulations, laws that are measurable internationally and have industries that cannot comply forced out of business. Lastly, the government should overhaul the various environmental regulatory bodies that are already compromised.
REFERENCES


EVALUATION OF ENVIRONMENTAL AND SOCIAL IMPACT OF CRUDE OIL EXPLOITATION IN DELTA STATE, NIGERIA

Edokpa, D.A. and Agheyisi, J.E.
Department of Geography and Regional Planning,
University of Benin, Benin City
Email: donald.edokpa@gmail.com; agheyisijustin@yahoo.com
Telephone: 08032695679; 07036744527

Abstract
This study evaluates the environmental and social impact of oil exploitation in Delta State Nigeria. Soil, river and hand-dug well water samples were collected and analyzed in the laboratory. Ambient air quality was measured using real-time monitors. The socio-economic aspect of the study was executed using structured questionnaire administration and focus discussion group meetings. The findings reveal that the ambient concentration of air pollutant CO, SO₂, NO₂, NH₃, TSP and H₂S generally conformed to the FMEnv and DPR limit though the prevailing meteorological condition could accelerate photochemical combination and washout of these toxic gaseous pollutants from the atmosphere into soil and water bodies. The overall soil texture of the study sites were sandy-loam and were acidic with a pH range of 4.5 – 5.4. The mean CEC for the soils was below critical value 5meq/100g. Total nitrogen was deficient in the soil samples with mean value of 0.15%. Exchangeable potassium was relatively high and above the critical limit for crop production. Phosphorus content of the soils was low to moderate with a mean range of 4.6 -12.8mg/kg. Water samples were slightly acidic and outside the WHO and FMEnv limits. Mean value for the metals Fe, Cu, Mn, V, Ni, Zn and Pb were above the FMEnv limits. Although crude oil exploration and exploitation is the main industrial activity in the area, the oil sector offers limited opportunity for the inhabitants of the host communities who are predominantly engaged in subsistence agriculture. The ensuing environmental degradation from oil related activities have far reaching effects on their livelihoods. A steady decline in farm and fish yield in the last five years was reported by the respondents. Sustainability in resource utilisation that guarantees development and minimizes negative impact on the environment is advocated.

Key Words: Sustainable development, Pollution, Resource exploitation, Human activities, Niger Delta

Introduction
Nigeria’s proven oil reserves are estimated at over 120 trillion cubic feet which makes it the 9th largest petroleum-rich nation in the world producing approximately 2.4 million barrels of oil per day from a network of over 800 oil wells (Odjugo, 2007; Atevure, 2004). These oil reserves are found in the Niger-delta region of the country consisting of nine states – Delta, Bayelsa, Rivers, Cross River, Akwa-Ibom, Edo, Abia, Imo and Ondo – extending over 70,000 square kilometres. The Niger-delta is mainly a wetland with six ecological zones (mangrove swamp, freshwater swamp, salt water marshes, evergreen lowland forest, derived savannah and barrier island vegetation) occupying approximately 11,120 square kilometres of Nigeria and home to a wide-range of endangered flora and fauna species. Its mangrove swamp forest is the third largest in the world and the largest in Africa. These ecosystems have come under severe threat of degradation from oil exploration and exploitation activities in the region. Although the Nigerian economy is largely dependent on the oil industry, the associated pollution has raised serious concern about the environmental sustainability of current natural resource exploitation in the country. Consequently, environmental impact assessment has emerged as a major policy issue in oil-related development in Nigeria though emphasis is often placed on the biophysical environment to the detriment of the socio-economic and cultural conditions prevailing in the communities. United Nations asserts that the interdependent and mutually reinforcing pillars of sustainable development are economic development,
social development and environmental protection (WHO, 2005). Within this context sustainability is viewed as a process which connotes a development of all aspects of human life affecting sustenance including economic prosperity, social equity, ecological and environmental quality (Hens and Nath, 2010; Nwafor, 2006). Sustainable development implies economic growth together with the protection of environmental quality, each reinforcing the other. The guiding rules are that people must care for the environment and take no more from nature than it can replenish. This in turn means adopting development paths and practices that respect and work within nature's limits. It is therefore important to reconcile the impact of the oil industry on the economic, social and environmental aspects of host communities within an integrated research framework of sustainable development. This would help to better understand the broad and far reaching effects of our energy choice that underpin current sustainable development strategies in Nigeria.

Conclusion and Recommendations

Undue emphasis has often been placed on the study of biophysical environment of oil producing areas to the detriment of the socio-economic conditions prevailing in the communities. This has been found to limit the responsiveness of oil multinational companies and government to adequately meet the needs of communities whose environment has been negatively impacted by oil exploitation. This study therefore adopted a holistic approach to the impact of oil exploitation in selected communities in Delta State. The findings revealed that oil exploitation has not positively impacted the area of study. The social indicators of the population in the study area show that the people are generally poor peasant farmers. Their major occupations are arable farming and fishing. With low level of education, the number of people that engaged in non-farm sector is very low and the people are generally excluded in all sectors of the oil industry. That means that there is much dependence on land for sustenance and sustainable development. But access to land is still very difficult with 42% of the people depending on land less than 1 ha often in family land. The ensuing environmental degradation from oil related activities have far reaching effects on the livelihoods of the local residents of the study area. A steady decline in farm and fish yields in the last five years was reported by the respondents. This condition is made worse by the environmental degrading activities of oil exploration and exploitation in the region. The state government is often urban-bias in infrastructural development while the rural areas are neglected. According to Okafor (1985), rural areas in Nigeria are characterized by the chronic and fundamental problem of poverty which manifests itself in the severe difficulties experienced by rural dwellers in satisfying their basic needs for food, health and shelter. In spite of the huge oil revenue generation capacity of the region, the people’s poor quality of life is revealed in the poverty threshold of their incomes, level of unemployment, low savings, poor housing structure and degrading environment.

Therefore, we recommend that intervention strategies for environmental assessment, sustainable development and environmental protection should embrace the local peoples’ right to participate in decision-making and implementation in matters that affect their communities and socio-economic well-being. In the notion of Ikhuoria (2005), specific interventions and policy reforms are necessary to resolve social conflicts, improve agricultural and economic activities, quality of life and strengthen proactive environmental planning, social and environmental impact assessments for sustainable development in the region.

Reference


Abstract
With the developments in technology, energy requirement became indispensable for all countries in the world. Nowadays, energy resources decreased and people began to look for alternative ways for producing energy and using it efficiently. For that purpose, communities identify policies to supply their energy need. But within the scope of some energy policies, historical heritages face with danger of being destroyed by the effects arising from production of energy. In this sense, hydroelectric power plants sometimes threaten historical and archaeological regions and may create a danger of extinction for historical structures and goods which transfer informations about social, economic, cultural and political life of mankind. One of these hydroelectric power plants is Ilısu Dam which is under construction in Batman, Turkey. This dam is a huge threat for Hasankeyf which is a village of Batman and which has witnessed the most crucial developments and inventions in the history of huminity such as wheel, money, farming tools, astronomy and written language. As soon as the dam project is completed, Hasankeyf will be obliterated forever. In this study, it is aimed to demonstrate the importance of historical heritages especially ceramic wares (materials which are mostly used by archaeologists) threatened by energy policies and Hasankeyf case was evaluated for this purpose.

Keywords: Historical Heritage, Ceramics, Energy, Hasankeyf.

Introduction
Water, being the main material generating the earth, has been the source of life since ancient times. It was used by societies in almost every field of daily life such as agriculture, transportation, industry and energy. Oceans, lakes, rivers and seas have also served people with their fertile contents so that many civilizations who did not have facility of feeding animals or farming have lived by only fishing. Today, there are still countries trying to overcome water scarcity while some countries are using water in producing electrical energy even knowing that lifetime of dam is approximately fifty years. It seems as an ordinary situation for countries that have various and numerous water resources to use water in energy production. But, reduction in amount of water in the world is becoming a critical question in our century because of dramatic changes in climatic, ecological and geological conditions, especially in last three decades. As a consequence of this, people began to try different ways in order to achieve water. They have improved incredible methods to harvest, transport and store different kinds of water such as groundwater, spring water, rainwater, and even air moisture, but the cost of procuring water will show itself as a function of combined costs of extraction/harvesting, transportation, treatment, storage and delivery (Fekri, 2003). People have to maintain looking for different water sources because water is sneakingly becoming a significant material in all around the world and this situation is preparing a basic for wars and unfair economic interests.

Conclusions
Hasankeyf case is usually discussed by both authorities and scientists. Archaeologists and art history experts sometimes remained in the center of this debate inevitably. The most important question waiting for an answer is about if it is really necessary to destroy cultural heritages within the energy policies. While the government defends itself by showing the less amount of energy sources as an excuse, people who want to save Hasankeyf have no tolerate about destruction of the heritages, because they do not want to lose their culture, history,
lands and homes. Although a new urbanization project including convenient and pleasing architectural houses for the town was represented to the public, some ambiguities about new residential areas intensified concerns. While some people definitely want to live in their own old houses, some of them want to move out as soon as possible, because most houses they live in look so old. On the other hand, all of them agree that there would be health problems arising from the river. First of all, people are aware that serious illnesses would appear, because the dam reservoir will critically reduce autopurification of Tigris, so the raw sewage flowing into the river from nearby cities will have much more intensity with time, and secondly they know that this pollution and disruption caused by the construction works of dam will eradicate the fish life in the river (Ronayne, 2005).

Historical structures, telling all about the history of humanity, are one of the most essential parts of cultural heritage and they represent the overlooked details related with workmanship&art, production technology, architectural features, material characteristics and spiritual value of their periods (Aydin, 2009). Needless to say, ceramics are the common materials in cultural heritages with their unique designs, forms, bright colors and ornamentations. In history, they were used in both interior and exterior fronts of architectural structures, especially in Anatolia. For example; a famous Turkish art tile called “Çini” (in Turkish) has a special use in the time of Ottoman Empire. These art tiles were used in many various architectural structures such as Turkish baths, palaces, mansions and fountains. All these structures have gained impressive views thanks to the “çini” wares which have tulip, carnation, rose, hyacinth, daisy, crescent, passion flower and pomegranate motifs, also Rumi (ornamentation formed with composition of bud, leaf and animal), Çintemani (a decorative motif) and geometric patterns with a bright glaze (Ozaltın and Olmez, 2011, Anonymous, 1983). There were also miniatures on Ottoman art tiles depicting historical events and they were important documents in sense of transferring lifestyles, customs and traditions of that period. There is no doubt that almost all communities had a type of ceramic art including many different styles and figures which give messages about their history. When all of these come together, it is so clear that ceramic residues have an unique ability in reflecting social, economic, cultural, religious and political features of civilizations lived in both recent and ancient times.

Potteries are accepted as the first ceramic materials in history, because they have been used since very old times in which people have just began to discover functional and artistic features of these ceramics. Therefore, potteries have a significant place in both (art) history and archaeology. All forms, colors, patterns and even the simplest figures on a pottery act like a fingerprint in understanding special features (religious, artistic etc.) of the ware and especially in dating process. Except those visual datas, there is now a branch of science called “archaeometry” which is related with all historical residues including ancient goods (made of clays, metals etc.), human bones and skulls. This science uses many different methods which basically contains chemical&phase analysis, amount of impurity, elemental distribution, surface/interfacial chemistry and thermal analysis (Loehman, 1993). Mostly used analysis methods are Atomic Absorption Spectroscopy (AAS), X-Ray Diffraction (XRD), X-Ray Fluorescence (XRF), Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS) or Wavelength Dispersive X-ray Spectroscopy (WDS), Transmission Electron Microscopy (TEM), Raman Spectroscopy, Fourier Transform Infrared Spectroscopy, ThermoGravimetric Analysis (TGA) and Differential Thermal Analysis (DTA) (Striøva et al., 2006, Mangone et al., 2009, Issi et al., 2011). Additionally, there are some methods used for directly determining the ages of historical findings such as Radiocarbon (for materials consisting carbon), Dendrochronology (especially for trees), Thermoluminescence and Optically Stimulated Luminescence (for ceramics, fired earthenwares, brick&tile), Electron Spin Resonance (for limestone, coral, animal shells, teeth). Most of these methods have high technology and this proves that age determination of ancient relics is so important that people always tried to improve their existing technology fort hat
purpose. This shows that since potteries are the first ceramic materials in history of mankind, it will not be wrong to accept them as the most valuable archaeological materials reflecting cultural, social, religious and politic informations. So, there should be effective precautions to save ancient ceramics, otherwise many traces witnessed to numerous historical events would disappear.

References
HOUSING BACKLOG IN SOUTH AFRICA- WHERE DID IT GO WRONG?

*Aigbavboa CO1, Thwala WD2
1PhD Candidate, 2Professor, Department of Construction Management & Quantity Surveying, University of Johannesburg, Johannesburg, South Africa
aigclinton@gmail.com, didibhukut@uj.ac.za, Tel No. +27-11-559-6398

Abstract
A superficial overview of the present South Africa housing problem and backlog crisis points straight at the inefficiency and lack of capacity of the present and other post-apartheid government to adequately address the bugging housing problem in the country. But a sincere historic overview will reveal that the present housing crisis has its origin in the 1913 Natives’ Land Act that severely limited the land that black South Africans could own to a very small percentage (eventually 13%) of the land in South Africa. It also worked to entrench a land tenure system and limited the alienability of land. Today, millions of South Africa’s poor black households live in shacks, hostels and crowded houses in marginalised townships and informal settlements awaiting access to government-availed land and houses. Though the South African government and other stakeholders, since the attainment of democratic governance in 1994, have been creating, embracing and implementing various approaches to housing delivery to speedily meet demand. This study is conducted with reference to existing theoretical literature, published and unpublished research. It is mainly a literature review on the role of the colonial edicts that fostered a culture of housing under-development and eventually an enormous housing shortage that the present government is battling to eradicate. Findings from the study show that since 1910 to the end of the segregation rule, various approaches were used to advance the inhumane idea to restrict blacks from owning properties and with a particular emphasis to the Native Land Act 27 of 1913; this Act concerned with land issues, and since land and housing issues are inextricably linked, this affected the provision of housing for the blacks and other disadvantaged ethnic groups. Further findings revealed that the enactment of the Native Land Act 27 of 1913, cemented housing policy issues in the apartheid era, which created the divide in housing issues till date. However, apartheid policies alone cannot be held responsible for the housing backlog in South Africa but equally no account of housing backlog and conditions can be credible if it does not take into account the history of South Africa and its colonial policies.

Keywords: South Africa, Housing backlog, Policies, Housing

INTRODUCTION
The housing environment in South Africa (SA) is complex, in large part due to the deliberate policy and legislative framework of socio-economic and spatial exclusion and marginalisation created during apartheid. Also, the complexity of the housing process in SA is due to failures and lack of a full understanding of the problems created by the apartheid government and the inability of the post-apartheid state government to satisfactorily redress these problems since 1994 (Tissington, 2010). A superficial overview of the present South Africa housing problem and backlog crisis points straight at the inefficiency and lack of capacity of the present and other post-apartheid government to adequately address the bugging housing problem in the country. But a sincere historic overview will reveal that the present housing crisis has its origin in the 1913 Natives’ Land Act that severely limited the land that black South Africans could own to a very small percentage (eventually 13%) of the land in South Africa. Currently, South Africa experiences major shortages of low-income houses to accommodate millions of its poor citizens. This social problem has its roots in the country’s pre-1994 apartheid regime and is exacerbated by population growth, migration and slow housing delivery. The pre-1994 apartheid regime worked to entrench a land tenure system and limited the alienability of land. Today, millions of South Africa’s poor black households live in shacks, hostels and crowded houses in marginalised townships and informal settlements awaiting access to government-availed land and houses (Mafukidze and
Hoosen, 2009). Though the South African government and other stakeholders, since the attainment of democratic governance in 1994, have been creating, embracing and implementing various approaches to housing delivery to speedily meet demand. However, it must be genuinely acknowledged that the post-apartheid state governance has been actively involved trying to create a level playground for the previously disadvantaged and also to repair the disadvantage condition created by the almost 42 years of the apartheid government. Simply put, it is easy to destroy than to create- so much so that the post-apartheid government has been faced with a situation that is not irreparable and manageable, but a situation that needs patience and a little firmness to address. Hence, as with other socio-economic rights, the legislative and policy framework created by the national government around housing is in fact quite progressive in addressing the situation on ground. However, implementation to date has been skewed and unable to address the land, housing and basic services needs of millions of poor South Africans who still lack adequate housing and access to water, sanitation and electricity (Tissington, 2011).

Generally, the housing issue in South Africa has posed a great challenge to the post-apartheid government. Due to apartheid policies, South African human settlements are characterised by spatial separation of residential areas according to class and race; urban sprawl; disparate levels of service provision; low levels of suburban population density; and the concentration of the poor in relatively high-density areas in the urban peripheries and the wealthy in core and intermediate areas (Khan, 2003). The post-apartheid government inherited an urban housing backlog of approximately 1.5 million units when it was formally inaugurated in 1994 (Goebel 2007). The massive backlog was created by apartheid discriminatory administrations and laws (such as the Black (Native) Laws Amendment Act, No 46 of 1937 and the Black Communities Development Act, No 4 of 1984) along with rapid urbanisation during the post-apartheid period (Mafukidze and Hoosen, 2009). Hence in a bid to address past discriminating laws, the post-apartheid government enacted policies that supported the institutionalisation of housing provision. Amongst these include the Housing Act of 1997, Rental Housing Act of 1999, Housing Consumer Protection Measure of 1998 and Home Loan and Mortgage Disclosure Act of 2000, all drawing from the South African Constitution of 1996 and enacted to redress the policy of the past. While the urban and rural spatial divide still remains pronounced in respect of access to socio-economic goods and services, the phenomenon of the inadequately housed urban poor is increasing. Redressing the inherited inequalities of the apartheid state has established a complex and challenging context for meeting basic needs in contemporary South Africa. Given the physical and political segregation of apartheid, meeting the demand for housing has been a central development challenge since 1994 (Pottie, 2004). However, apartheid alone cannot be held responsible for the housing conditions in South Africa but equally no account of housing policy and conditions can be credible if it does not take into account the history of South Africa and the colonial legacy of the African continent (Goodlad, 1996). Therefore the objective of this study is to present a historic overview of the housing backlog in South Africa and the role of the colonial edicts that fostered a culture of housing under-development and eventually an enormous housing shortage that the present government is battling to eradicate. The paper starts out by presenting an overview of the natives land Act 27 of 1913, followed by a conceptual review of housing backlog history in South Africa before findings are presented and conclusions are drawn.

CONCLUSION
In conclusion, the sincere historic overview of the present South Africa housing problem and backlog crisis in South Africa reveal that the present housing crisis has its origin in the 1913 Natives’ Land Act and other Acts that severely limited the land that black South Africans could own to a very small percentage (eventually 13%) of the land in South Africa. Despite the housing problem has its roots in the country’s pre-1994 apartheid regime, but it is currently being exacerbated by population growth, migration and slow housing delivery. Hence, apartheid alone cannot be held responsible
for the housing conditions in South Africa but equally no account of housing policy and conditions can be credible if it does not take into account the history of South Africa and its colonial legacy of the past. Apartheid legacies and persistent inequalities are major impediments to housing backlog eradication, as the legacy of segregated communities is still alive in South African cities.

REFERENCES


Phago, K. G. (2010) Effects of the development and implementation of the National Public Housing Policy in South Africa with specific reference to The Gauteng province. Pretoria, University of South Africa, Submitted in accordance with the requirements for the degree of Doctor of administration.


RAINFALL AND CLIMATE CHANGE IN IBADAN

1*Olayungbo, A. A., 2Oyedele, A. O. and 3Oke, I. A.
1Natural History Museum, Obafemi Awolowo University, Ile-Ife, Nigeria
2Land and Water Resources Management Programmes, Institute of Agriculture and Research Training, Obafemi Awolowo University, Ile-Ife, Nigeria
3Department of Civil Engineering, Obafemi Awolowo University, Ile-Ife, Nigeria
*Corresponding Author email; anikuje3@yahoo.co.uk

Abstract
Climate Change is one of the major environmental challenges facing the world today. It is well known information that rainfalls are affected by climate change. Crops and animals are known to depend on rainfall for many activities. The consequences of climatic variability include floods in some regions, droughts in some regions, land erosion with excess temperature. This article presents statistical analysis of rainfall data of a particular city (Ibadan, Oyo State) in Nigeria from 1905-2006 and evidence of climate change. Rainfall data of the city were collected (1905 to 2006) and evidence of climate change using other climatic parameters were sourced from literature. The data were grouped and analyzed statistically using analysis of variance (ANOVA). The study revealed that there is a significant change in the monthly rainfall and monthly maximum rainfall of the city. Monthly mean rainfalls increase from 4.06 mm/month in January 1905-1910 to 37.90 mm/month in January 2001-2006. In the month September 1905-1910, monthly maximum rainfalls increased from 245.78 mm/month to 327.60 mm/month in 2001-2006. The F-values for monthly mean and monthly maximum rainfalls were 114.28 and 34.89 respectively indicating significant changes at \( \alpha = 0.005 \). The result showed that there is a change in rainfall pattern, which resulted in regular occurrence of flood. Literature provides evidence of temperature change (increase from 26°C to 27.5°C) and changes in other climatic parameters. It was concluded that there is a change in the rainfall of the city, which can be attributed to climate change.

Keywords: Rainfall, Climate change, flood, rainfall pattern.

INTRODUCTION
Industrial revolution in the early 19th century coupled with the human social and economic development has changed people's lifestyle significantly. The need for energy and consumption of fossil fuels like coal, oil and natural gas have resulted in increased emission of carbon dioxide and other greenhouse gases into the atmosphere (Amiri and Esalamian, 2010). These emissions have changed the energy balance and ecology system of the earth and its atmosphere. Global population growth has caused land use change, deforestation, increased agricultural and livestock activities. Increased solid and liquid waste productions have resulted in many environmental problems including climate change (Amiri and Esalamian, 2010). Atmospheric models predict that the earth temperature will increase from 1 to 3.5°C by the year 2100, which is more than temperature changes during the past 10,000 years. Emission of greenhouse gases production of aerosols in the atmosphere, changes in the earth's reflection index and thermal pollution are the factors affecting climate change. Among these factors, the effect of greenhouse gases is well known and is the most important one. The earth absorbs most of solar radiations that reach the earth through its atmosphere and after getting warm, reflects the thermal waves back to space. Portion of this infrared radiation passes through the atmosphere and a fraction of it is absorbed by greenhouse gases and reflected back to the earth surface which results in an energy balance between the earth and space. This so called greenhouse effect is a natural phenomenon, which has created the normal temperatures ranges in the atmosphere. However, the concentration of greenhouse gases in the atmosphere have exceeded the normal level by as much as 30% resulting in global warming, which can be attributed to
flood in some region and drought in another region. Table 1 and 2 present some major disasters in Nigeria associated with climate change, while table 3 shows flood disasters and associated hazards. Nigeria is situated in West Africa, bordered by Benin in the west, Cameroon in the east and the Gulf of Guinea in the south. It has a large land area of some 923,770 square kilometres (Figure 1) and a mean population density of 89 persons/km². It extends between the latitudes 4°16'N (at the tip of the Niger Delta) and 13°52'N, and between longitudes 2°49'E (on the Okpara River) and 14°37'E (on the El Beid River). It has maximum dimensions of 1200 km from east to west and 1000 km from north to south and is bounded by Cameroon and Chad in the east, Niger in the north and Benin in the west. The coastline is 780 km long, excluding the indentations of Lagos Lagoon, the Niger Delta and the Cross River Estuary, which add at least 1300 km to this. The terrain is very variable, with mountains in the southeast, hills and plateaux including the Jos Plateau in the centre, lowlands in the south and plains in the north. The highest point is Chappal Waddi (2419 m) in eastern Nigeria and the lowest is sea level. Nigeria’s climate varies from equatorial in the south to tropical in the centre and arid in the north.

Mean annual rainfall decreases progressively in passing inland, but it is generally wetter in the east than the west. On the coast at the border with Benin, mean annual rainfall is close to 1750 mm, but this rises to 1836 mm at Lagos (6°27'N and 3°34'E) and to 3800 mm at Forcados (5°21'N and 5°25'E) on the Niger Delta but it falls to 2483 mm at Port Harcourt in the eastern delta. Forcados averages 180 rainy days each year and Port Harcourt 170. There is less disparity in rainfall from west to east inland. Mean annual rainfall is 1378 mm at Makurdi (7°45'N and 8°32'E) on the Benue River, and 1257 mm at Ilorin (8°30'N and 4°32'E). In the centre it rises slightly to 1431 mm at Jos (9°55'N and 8°53'E), which is situated in a wet pocket, and is 1000 m higher than Makurdi. From here rainfall declines to 865 mm at Kano (12°00'N and 8°30'E) and 600 mm at Maiduguri (11°53'N and 13°16'E) in the northeast. The wet season is 10-11 months long on the delta, with a short dry period in December or December-January, depending upon station. On the western coast, near Lagos (6°27'N and 3°24'E), the three months December-February are dry, and there is often a second dry period in August. In passing inland the August dry period is lost, but the major dry season increases in length and severity. It is 6 months long at Jos and 7 months (October-April) at Kano and 8-9 months long at Lake Chad (September-May). Annual rainfall varies from over 4000 mm in the south to less than 250 mm in the north, the national average being 1180 mm. Rainfall is seasonal with a wet season occurring between July to September in the north, extending to between April and November in the delta area. Recent years have seen decreasing rainfall totals in northern Nigeria and drought is a frequent problem in the region.

Temperature ranges are lower at the coast than inland. At Lagos the mean monthly temperature of the warmest month is 27°C and that of the coolest month is 24°C, while at Port Harcourt the corresponding figures are 26°C and 24°C. The figures for Jos are 24°C and 20°C, while those for both for Kano and Maiduguri are 31°C and 22°C. The prevailing winds at the coast are from the south west (SW), and these bring the rains to the interior as the intertropical convergence moves north and south. The mean annual temperature in northern Nigeria is around 25°C. Vegetation largely follows the climatic variation, with densely vegetated mangrove swamps in the south, tropical rainforest in the centre, through to savannah in the north and Sahel savannah in the extreme north-east. With a population of around 130 million people, Nigeria is the most populous country in Africa. It is composed of 36 states and the capital city is Abuja.

Oil production began in the 1950s and today amounts to some 20% of GDP. Coal is also an important natural resource which has been exploited since the early twentieth century. Tin is mined locally. Much of the rest of the economy is based on subsistence farming, although this has in recent years failed to keep up with population growth. Agriculture employs some 70% of the workforce. Around 30% of the land is arable, and around 4% of the cultivated land is irrigated. Principal crops include cocoa, palm oil, peanuts, corn, rice, sorghum and millet. Principal livestock are sheep, goats
and pigs. This shows that adequate rainfall at an appropriate time is an important ingredient in the development of Nigeria with 70% of the workforce as farmers, but information on rainfall pattern are rare. The main objective of this study is to investigate pattern of rainfall in a city (Ibadan, Oyo state) in the south west of Nigeria and provide evidence of climate change in the city.

CONCLUSION

It can be concluded based on the study that:
- the rainfall pattern has changed in the region; and
- change in the rainfall (increment in the rainfall) can be attributed to climate change.

REFERENCES


Etuonovbe, Angela Kesiena (2011), The Devastating Effect of Flooding in Nigeria. FIG Working Week 2011 Bridging the Gap between Cultures Marrakech, Morocco, 18-22 May 2011


Odjugo, Peter Akpodiogaga Ovuyovwiroye (2010a)Adaptation to Climate Change in the Agricultural Sector in the Semi-arid Region of Nigeria 2nd International Conference: Climate, Sustainability and Development in Semi-arid Regions August 16 - 20, 2010a, Fortaleza - Ceará, Brazil.


MANAGING THE SOCIAL AND ENVIRONMENTAL IMPACTS OF THE TOURISM INDUSTRY FOR SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL PROTECTION IN IDANRE, NIGERIA

IKUSEMIJU TOLUWALASE. M ; MHATMAN
Department of Hospitality, Leisure and Tourism Management
The Federal Polytechnic, Ede, Osun State
E-mail: toluwalase20002000@yahoo.com

Abstract
Tourism Industry consists of all those firms, organizations and facilities which are intended to serve the specific needs of the tourists or visitors at their various Tourism destinations. Thus, managing the Social and Environmental Implications of the Tourism Industry cannot be overemphasized. The study examined the concept of Tourism and Tourism Industry, Social and Environment impact of the Tourism Industry, how these impacts can be managed effectively and efficiently in realization for Sustainable Development in Nigeria and relevance of carrying capacity and sustainability. The methods adopted by the researcher include administration of questionnaire to stakeholders in the Tourism industry, oral interview and personal observation. Meanwhile, the data collected were analyzed and interpreted using simple percentage method with results revealed that 73 respondents representing 97.33% agreed that there are social and environmental impacts of the Tourism Industry and that 70 respondents representing 93.33% were of the opinion that Social and Environmental Impacts of the Tourism Destinations in Nigeria should be managed effectively and efficiently in achieving Sustainable Development. However, the study recommended that Tourism Industry should be planned and managed in a sustainable manner with due regard for the protection and appropriate uses of natural and human resource in the host areas. Nevertheless, tourists and residents should be educated on the importance of Social and Environmental Impacts.

Keywords: Environmental, Social, Protection and Development.

Introduction
Tourism is the totality of the relationship and phenomenon arising from the travel and stay of an individual which does not connect with any remunerated activity. Thus, the industry is the collection of productive, business and government organizations that serve the traveler away from home (Okoli, 2001).

Tourism holds great benefits such as that of the rest of the societal economy because it is an important source of both growth and stability in local, state, regional and the national economy and also in terms of social, environmental and business receipt. Tourism is well documented as the world largest industry contributing significantly in terms of employment, multiplier effects, increase in standard of living, Increase in market size to many local, state, regional and national economics (Walker, 1999).

Thus, government of all countries at all stages of development are increasingly dependent on tourism as a veritable source of income, employer of labour, stimulus of abundant endowed natural resources of high tourists appeal ploughed persistently with balance of payment and stimulus for developmental goals (Getz, 1997). Nevertheless, the state of affairs of the industry for realization developmental goals in Nigeria has been blamed on the inability of the management to establish ways of managing their visitors in the tourism destination, inability of the stakeholders to establish that tourism industry is not only a vital stimulant to the national development but also an essential component of social and environmental sustainability and lack of unity and co-existence among the people due to lack of interaction (Bhatia, 1999).

However, Tourism is an important phenomenon in contemporary society which its social and environmental implications must be well managed.

Recommendation
In view of this study, the researcher recommends as follow:

☐ Public and Private sectors of the Tourism Industry should fully recognize that Tourism, when developed and managed in a
sustainable manner is an effective tool for Sustainable development.

- Government should encourage good governance, ensuring that all stakeholders at the local level are duly consulted and responsibilities are clearly defined.
- Government should mobilize further domestic resources in cooperation with financial institutions, micro credit entities, business service providers. Thus, encourage the further development of the local private sector to facilitate community driven programmes and small medium size tourism enterprise programmes.
- Large national and multinational companies operating in developing and least developed countries to act in the most sustainable manner, in the context of the tourism sector, adopting strong social responsibility measures toward local communities, and taking specific measures to increase the level of employment of poor people and the supply of goods and service by the poor.
- Encourage cooperation between the public and private sectors to ensure that the necessary infrastructure to facilitate tourism development is in place, as well as to ensure that the necessary conditions of political stability, peace and governance of public affairs are conducive to tourism development.
- The management and stakeholders of various tourism organizations should provide means of creating awareness about social and environmental implications of the tourism industry.
- Tourism planning, development and operations should be part of conservation or sustainable development strategies of managing impacts of the tourism industry.
- Tourism should be planned and managed in a sustainable manner with due regard for the protection and appropriate uses of natural and human resources in the host areas.
- Good information, research and communication on the nature of tourism destination and its effect on human, culture, social and environment should be available prior to and during visit.
- Necessary facilities should be put in place for tourists use during visit to any tourist destination.
- Tourist/visitors should be provided with alternative experience which can act as substitutes for visiting sensitive areas.

**Reference**

SAND-DIGGING AND SOIL EXCAVATION AS AN ENVIRONMENTAL DEGRADATION FACTOR IN ADO-ODO/Ota LOCAL GOVERNMENT AREA, OGUN STATE: AN INTERROGATION OF THE APPROPRIATENESS OF CONSTRUCTION TECHNOLOGY IN NIGERIA

Samson R. AKINOLA (Ph.D)
Policy Analyst, Governance Expert, Development Planner & Environmentalist
Covenant University, 10 Idiroko Road, Canaan Land, Ota, Ogun State, Nigeria
e-mail: srakinola@yahoo.com; srakinola@hotmail.com
Mobile: +234-803-407-5110

&
Mr. Simon, R. Funsho
Department of Estate management, Covenant University, Canaan Land, Ota.
e-mail: funshosimon@yahoo.com
Mobile: +234-803-600-1704

Abstract
This paper uses Polycentric Planning, an offshoot of the Institutional Analysis and Development (IAD) framework to interrogate the appropriateness of construction technology in sand-digging and soil excavation in Ado-Odo/Ota Local Government Area, Ogun State. The paper found that the technology adopted in sand-digging and soil excavation for the purpose of road and housing constructions is inappropriate for clean technology. Thus, the processes of degradation of the communities studied have intensified in recent times due to uncontrolled urbanization. It was also found that the average depth of digging in three sites is 6 meters; the average distance of sites distance to nearest building is 9 meters; the average distance to the nearest stream is 750 meters; the average distance to the nearest road is 18 meters; and the average area covered by the dug sites is 4.6 hectares. The crude method of soil excavation is causing untold damages to private property and infrastructures such as roads, electricity poles, drainage, etc. Similarly, it was found that excavation activities have induced damages on the existing drainage pattern due to sediments discharge to adjacent water bodies with the implication of inducing flooding.

Using Polycentric Planning and Poverty Reduction Strategy, this paper adopts an African Polycentric Sustainable Environment Model (APSEM) for restructuring decision making on environment to conserve and protect environmental resources. The model and the proposed new institutional mechanism would enable local people and professionals/practitioners in the built environment to have a robust dialogue with the local government officials in order to reposition urban councils to effectively manage urban environment and conserve natural resources.

INTRODUCTION
Environment is the totality of nature and natural resources, including the cultural heritage and the infrastructure essential for socio-economic activities (IUCN, 1991; Okidi, 1993). The school of environmental determinism and environmental possibilism mediate between environmental conditions and circumstances of the community concerned. One of the three important factors in understanding how a society functions is “the peculiar and accidental situation, which providence places people in fashioning their lives. The second is the “laws” or institutions, while the third factor for is the “manners and customs of the people” (Tocqueville, 1966).

The laws/institutions and the manners and customs of the peoples of Africa and Nigeria have not been made responsive to changing environmental conditions and circumstances in spite of the Millennium Development Goals (MDGs). The MDGs, designed in 2000 by all the 192 United Nations member states and 23 international organizations, aim to spur development by improving social and economic conditions among the world’s poor people. This could refer to the environmental and material conditions that are available to the people in fashioning their lives.
economic conditions in the world’s poor countries. They derive from earlier international development targets (OECD-DCD Development Goals (MDGs) by 2015. Website, June 2009) and were officially established at the Millennium Summit in 2000. By 2008, the half way review of the MDGs, no tangible achievement had been recorded.” According to him, “it was worrisome that even the United Nations Millennium Declaration, which the eight goals were promoted, MDGs are the most broadly supported comprehensive and specific development goals the world has ever agreed upon to be achieved by the year 2015. These eight bound goals provide concrete, numerical benchmarks for tackling extreme poverty in many dimensions. They include goals on income poverty, hunger, maternal and child mortality, disease, inadequate environmental safety, and lack of access to drinking water and basic sanitation in urban and rural areas; and (d) achieve a significant improvement in the lives of at least 100 million people at local level (Akinola 2008q). Though environmental degradation and the Global Partnership for Development (UNMDGs Website, June 2009). Environmental Impact Assessment (EIA) policy was put in place since 1992, this policy has not been effectively implemented. Since EIA is a means to an end, the opportunity to benefit from the global that environmental abuse and poverty in the global partnership for Development (UNDP) Nigeria invariably indicate a defective of EIA process.

The MDGs are both global and local, resources within the environment where tailoring by each country to suit specific local conditions are placed by providence. Where EIA planning input into decision-making on development needs by ensuring that environmental reports were prepared, the welfare of development reaches everyone, everywhere. Community residents was not considered a priority in project design and implementation. However, after eight years, while progress has been achieved in other regions, the results are The impact of these projects on the local community residents was not considered a priority in project design and implementation. Nigeria and in Nigeria (Adekunle 2008). People can be summed up as deprivation and Goal No. 7 of the MDGs (i.e. MDG-7) is set to reduce poverty. Oil drilling, gold mining and blasting in Nigeria invariably indicate a defective of EIA process.

An assessment of the MDGs in Nigeria shows that the eight goals are achieved, world poverty will be cut by half, tens of millions of lives will be saved, and billions more people will have the opportunity to benefit from the economic resources within the environment where tailoring by each country to suit specific local conditions are placed by providence. Where EIA development needs by ensuring that environmental reports were prepared, the welfare of development reaches everyone, everywhere. Community residents was not considered a priority in project design and implementation. However, after eight years, while progress has been achieved in other regions, the results are The impact of these projects on the local community residents was not considered a priority in project design and implementation. Nigeria and in Nigeria (Adekunle 2008). People can be summed up as deprivation and Goal No. 7 of the MDGs (i.e. MDG-7) is set to reduce poverty. Oil drilling, gold mining and blasting in Nigeria invariably indicate a defective of EIA process.

The MDGs are both global and local, resources within the environment where tailoring by each country to suit specific local conditions are placed by providence. Where EIA planning input into decision-making on development needs by ensuring that environmental reports were prepared, the welfare of development reaches everyone, everywhere. Community residents was not considered a priority in project design and implementation. However, after eight years, while progress has been achieved in other regions, the results are The impact of these projects on the local community residents was not considered a priority in project design and implementation. Nigeria and in Nigeria (Adekunle 2008). People can be summed up as deprivation and Goal No. 7 of the MDGs (i.e. MDG-7) is set to reduce poverty. Oil drilling, gold mining and blasting in Nigeria invariably indicate a defective of EIA process.
Ilesha, led to a reduction of 54.5% in the yield of farm products (both food and cash crops) and 4.5% in the yield of farm products (both food and cash crops) (Akinola 1997a,b, 2008q). It varies among the development projects: steel plant, 10.0%; road construction, 33.0% for rural areas and 57.6% for urban areas (Akinola and Awotona 1997:200).

This paper uses Polycentric Planning, an offshoot of the Institutional Analysis and Development (IAD) framework to interrogate the appropriateness of construction technology in sand digging and soil excavation in Ado-Odo/Ota Local Government Area, Ogun State. While both sand-digging and soil excavation are used interchangeably, terminologically, sand-digging differs slightly from soil excavation in the sense that the former refers to removal of soil to sandfill wetlands or for embankment in road construction, while soil excavation defines removal of soil in order to lay foundations of buildings and install other structures such as pipelines, cables, etc.

The paper found that the crude method of soil excavation is causing untold damage to natural resources. Similarly, it was found that excavation activities have induced damages on the existing drainage pattern due to sediments discharge to adjacent water bodies with the implication of inducing flooding. Furthermore, excavation activities have induced damages on the existing drainage pattern due to sediments discharge to adjacent water bodies with the implication of inducing flooding. Consequently, the paper analyses the consequences of sand-digging and soil excavation in construction industry in the selected communities within the study area. The paper found that the crude method of soil excavation is causing untold damage as projects in Ado-Odo/Ota LGA engender environmental degradation. In order to protect the environment against abuse and degradation, polycentric environmental planning that is capable of synergising the efforts of stakeholders should be adopted.

Apart from the fact that natural resources should be utilized ecosystemically, environment government, industrialists and host communities should be made to benefit from development projects. Environment related non-governmental organizations and representatives of local communities have not been adequately consulted in the decision making process. The paper argues to deliberate and take decisions jointly and regularly, the hitherto gaps between the stakeholders will be reduced. Consequently, implementation of EIA and enforcement of environmental standards will become easier.

Environmental governance can be described as the way the society as a whole manages its environment by shaping the incentives available to individuals and local communities. It can also refer to the type of relationship between the stakeholders. The paper argues that environmental governance that balances the equation of environmental resources utilization among the stakeholders in the environment should be adopted. Environmental governance can be described as the way the society as a whole manages its environment by shaping the incentives available to individuals and local communities. It can also refer to the type of relationship between the stakeholders. The paper argues that environmental governance that balances the equation of environmental resources utilization among the stakeholders in the environment should be adopted.

Using Polycentric Planning and Poverty Reduction Strategy (PPPRS), African Polycentric Sustainable Environment Model (APSEM) for restructuring decision making on environment to conserve and protect environmental resources (Akinola 2008q, 2011e:68; Akinola and Adesopo 2011d:259). The model and the proposed institutional mechanism would enable local people and professionals/practitioners in the built environment to have a robust dialogue with local government officials in order to reposition urban councils to effectively manage urban environment and conserve natural resources. This, invariably, would produce a new urban governmentality that is polycentric, citizens driven and inclusive; entrenching good urban environmental governance and citizens-centred planning.

CONCLUSION

This paper concludes that sand-digging and soil excavation for development projects in Ado-Odo/Ota LGA engender environmental degradation. In order to protect the environment against abuse and degradation, polycentric environmental planning that is capable of synergising the efforts of stakeholders should be adopted. By implication of inducing flooding. Bringing all the stakeholders in the building/construction industry and environmental governance can be described as the way the society as a whole manages its environment by shaping the incentives available to individuals and local communities. It can also refer to the type of relationship between the stakeholders. The paper argues that environmental governance that balances regularly, the hitherto gaps between the stakeholders will be reduced. Consequently, utilization among the stakeholders in the implementation of EIA and enforcement of environmental standards will become easier.
Polycentric Sustainable Environment Model (APSEM) is adopted for restructuring decision making on environment to conserve and protect environmental resources, especially by reducing vulnerability in sand-digging. The model derives inspirations and working mechanisms from four models: (i) African Public Sphere Restructuring Model (APSRM), (ii) African Polycentric Information Networking (APIN), (iii) African Community-Initiatives and Development Model (ACID) and (iv) African Polycentric Forest Management Model (APFMM). The restructuring process will commence with the design of polycentric sustainable environmental mechanism (PSEM) by scholars and public officials, and the setting up of self-governing community environmental assembly (SGCEA) where stakeholders through their institutions can operate in synergy.

Two major tools of SGCEA are Public Complaints Commission for Environment (PCCE) and Environmental Cost Internalization (ECI). These tools will ensure stakeholders to jointly take decisions, monitor industrial activities and ensure that all industries comply with Environmental Impact Assessment (EIA) standards. If we are to avoid self-destruction, we must think ecologically, develop ethical relationship between man and his environment, and act with the consciousness of earth's finite resources. In this respect, Environmental Impact Assessment serves as a check on human activities in manipulating the environment. With the introduction of the proposed PCCE, the Local Planning Authority (LPA) should be rebranded and funded to embark on effective development control on sand-digging and soil excavation as well as other building, construction and industrial activities in Ado-Odo/Ota LGA and in Nigeria.

REFERENCES


(2002). ‘University education, appropriate technologies and poverty reduction in Nigeria: The missing link’, Proceedings of a Regional Workshop on Promotion of Appropriate Agro-Processing Technologies in West Africa, Obafemi Awolowo University,
Ile-Ife, 2002, pp. 69-78.


MICRO-ORGANISMS AND PHYSICO-CHEMICAL PROPERTIES OF FLOODWATERS IN SOME MAJOR STREETS IN BENIN CITY, NIGERIA.

G.O. Atedhor* & P.O. Orobator  
Department of Geography & Regional Planning,  
University of Benin,  
Benin City,  
Edo State.  
*Corresponding author: E-mail obroziehi2000@yahoo.co.uk  
Tel.: +2348136446117

Abstract  
This paper examines microorganisms and physico-chemical properties of floodwaters in some major streets in Benin City. Floodwater samples were collected from the selected streets and taken to the laboratory for analysis using AAS Model-Solar 969 Unicam series with Air Acetylene flame. The increasing trends of annual and October rainfall justified the timing of this study. Samples revealed colour (CTU) value of >550 in Ugbowo-Lagos Road, New Benin-Ugbowo Road and Textile Mill Road while the lowest value was recorded for Siluko Road. The highest PH at room temperature was recorded in Siluko Road (6.90) and lowest in New Benin-Ugbowo Road (8.70) while conductivity (µs/cm) was highest in New Benin-Ugbowo Road (519) and lowest in Siluko Road (203). While the highest Cl– (mg/l) was recorded against Ugbowo-Lagos Road (141.65), Textile Mill Road revealed the lowest value (33.02). The highest and lowest dissolved CO2 (mg/l) were recorded against Ugbowo-Lagos Road (51.64) and Textile Mill Road (8.80) respectively. Similarly, Fe (mg/l) was highest in Ugbowo-Lagos Road (4.39) and lowest in Textile Mill Road (0.15). Aerobic mesophilic count of the samples were highest in Upper Mission Road (5 x 10^4 cfu/ml) and lowest in Ugbowo-Lagos Road (2 x 10^3 cfu/ml) while coliforms were highest and equal in Siluko, Textile Mill and Upper Mission Roads with at (4 x 10^3 cfu/ml). With the exception of Siluko Road with a value of (2 x 10^2 cfu/ml), no trace of e. coli was found in samples collected from other roads. Similarly, no traces of enterococcus and yeast/fungi were detected in all the samples. It is concluded that the physico-chemical conditions of floodwaters may have contributed to vehicular corrodibility while the aerobic mesophilic and coliforms states of floodwaters could pose health risks to pedestrians. It is recommended that the on-going urban renewal should give sub-surface drainage priority.  

Keywords: Rainfall dynamics, floodwater, micro-organisms, physico-chemical properties and Benin City

Introduction  
There is a consensus that global warming and climate change will lead to extreme weather events globally (Odjugo, 2000, O'Hare, 2002). While some of these extreme weather events such as drought, desertification and hurricanes are region specific, the incidence of flood have not only increased but are occurring in different ecological zones globally making it ubiquitous. The increasing incidence of flooding in Nigeria has generated diverse research interests. Among the elicited research interests are flood adaptation (Ogba and Utang, 2008; Atedhhor et al, 2011), spatial variability of flood intensity (Odemerho, 1988). Flood hazards have been seen as a natural phenomena with its associated damages as the consequences of human action (ActionAid, 2006). The disastrous consequences of flood depend on the degree of human activities and occupancy in flood areas (Ogba and Utang, 2008). Unavoidably, the major streets in Benin City attract high degree of vehicular and pedestrian traffic. Most of the flooding in Benin City occurs along the major streets (Atedhor et al, 2011) which adversely affect vehicular traffic (Omiunu, 1988). The environmental threat posed by flood is further aggravated in urban areas due to the poor conditions of drainage facilities. Although channel constriction accentuates flow levels in terms of depth and width (Betts, 1999), the exposed nature of most drainage systems make them susceptible to siltation and blockage arising from
collection of indiscriminately disposed refuse. Apart from the health risks occasioned by contact with contaminated floodwaters, vehicles are subjected to corrosion arising from repeated exposure. This paper therefore examines the microbial and physico-chemical characteristics of flood water in some major streets in Benin City.

Implications and the way forward
The flood-prone major streets in Benin City selected in this study enjoy high vehicular traffic. The PH values of the floodwater samples, especially that of Siluko Road by Teachers House, the high amount of Cl\(^{-}\) mainly in Ugbowo-Lagos Road by Tom Line Construction Company and New Benin-Ugbowo Road by Okhoro Junction, the high level of dissolved CO\(_4\) in Ugbowo-Lagos Road by Tom Line Construction Company could trigger the corrosion of the metallic components of the huge vehicular traffic that ply the busy major streets of Benin City. The dissolution of CO\(_4\) in water leads to the formation of carbonic acid which aids corrosion of vehicles and weaken the cohesiveness of the asphaltic makeup of the roads. Also, the high conductivity and the Fe of the floodwaters, especially in New Benin-Ugbowo Road by Okhoro Junction and Ugbowo-Lagod Road by Tom Line Construction Company are catalysts for vehicular corrodibility. For example, ferrous oxides are known to form when Fe combine with atmospheric oxygen (O\(_2\)). However, it is instructive to note that these physico-chemical parameters and the activities of microorganisms in the floodwaters are not isolated in producing favourable corrosive solutions. Rather, it is the combined reaction of these factors that attack the metallic components of vehicles and also weaken the binding force of roads. The physico-chemical properties of the floodwater samples examined in this paper corroborates the indices of vehicular corrodibility reported in Omiunu (1995) in which Benin City and some other major cities in Nigeria were shown to have high corrosive effects of Peugeot series (table 4). Apart from the corrosive effects of the floodwaters on the metallic components of vehicles, the microorganisms in the contaminated floodwaters could pose health risks to stranded pedestrians who wade through the floodwaters, especially when the degree of flooding render the streets impassable to vehicular traffic which occasion disruption of intra-city transport services. Since water has been identified as principal agent for many tropical diseases (Alm et al, 1993), contact with floodwater could pose health risks to pedestrians, especially dermatological infections. Furthermore, increasing rainfall and flooding provide breeding ponds for mosquitoes (de Sylva, 1993). It is therefore recommended that the on-going urban renewal in Benin City should give subsurface drainage priority.

References


PROSPECTS OF CARBON (IV) OXIDES POWER PLANT IN NIGERIA CONTEMPORARY

Aasa S.A. and Ajayi O.O.
Mechanical Engineering Department,
Covenant University, P.M.B. 1023, Ota, Nigeria
Samson.aasa@covenantuniversity.edu.ng; +234-0703 9697998

The prospect for carbon power plant was studied due to the needs for sustainable energy supply. Using the various potential of CO\(_2\) generations from the industries, domestic and contemporary environment, the data obtained from the department of petroleum resources, Victoria Island, Lagos, Nigeria from 2003-2009 showed that huge potential exist for the generation of MWh of electricity per year. Using this energy source, up to about 10% of national electricity production could be produced through this means per year. Also the tendency for global warming effects is reduced. The level of pollution caused by direct exposure of CO\(_2\) to atmosphere will also be reduced. Hence, given the appropriate environment and tools required the potential for carbon power plant is highly imperative and can contribute to energy need of the country.

Key words: Global warming, climate change, CO\(_2\) emission, sustainable electricity, power plant
THE IMPORTANCE OF A HOLISTIC ENVIRONMENTAL POLICY IN SUSTAINABLE NATIONAL DEVELOPMENT: THE CASE OF NIGERIA

Prof Ndiribe A. A. Ndiribe
Department of Political Science
Anambra State University
Uli, Anambra State

Abstract
Our world is experiencing some turmoil in terms of the ever-increasing rate of environmental degradation and its effects on social, economic and political development. Many regions of the world are experiencing increased environmental challenges which some have attributed to failure on the part of past leaders to articulate an adequate environmental policy that would be both pro-active and practical. Policy analysts have suggested that understanding the environmental implications of some of our past decisions would have saved us from some of our current travails in terms of environmental despoliation.

The questions are: What could have been the policies? How are they to be articulated in order to avail both leaders and practitioners to the benefits of environmental protection? What will be their eventual effects on socioeconomic development?

This paper tries to develop a framework for environmental policy that will lead to sustainable national development in most countries, taking its focal point as Nigeria. Its purpose is to draw attention to some best practices as well as invite the reader to certain aspects of environmental policy analysis.
ESTIMATION AND ECONOMETRICS ANALYSIS OF SOLAR ENERGY POTENTIAL OF SELECTED SITES IN LAGOS, NIGERIA

Oluseyi O. Ajayi
Mechanical Engineering Department,
Covenant University, P.M.B. 1023, Ota, Ogun State, Nigeria
oluseyi.ajayi@covenantuniversity.edu.ng
+234-8036208899

Abstract
The study was used to develop and assessed the potential and viability of employing solar energy resources for power generation at two sites in Lagos State, Nigeria. Data for the analysis were obtained from the Nigeria meteorological agency and the National Aeronautics and Space Administration’s satellite Goddard Earth Observatory System (GEOS-1) Multiyear time series database for Ikeja and Lagos Island respectively. The outcome showed that huge potential exist for solar-electricity generation at the sites and the cost benefit analysis showed that solar-electricity production at the sites is economically viable. Suggestions which could lead to the promotion and utilization of solar energy resources in Lagos state were proposed.

Keywords: Global solar radiation, sunshine hour, renewable energy resources, solar-electricity, Ikeja, Lagos, Nigeria
NUTRITIVE EVALUATION OF BREWERY SPENT GRAIN SUPPLANTED BREAD

Dawodu F. A. * and Ajanaku K. O.

*Department of Chemistry (Industrial), University of Ibadan, Ibadan, Nigeria.
**Industrial Chemistry Department, College of Science & Technology, Covenant University,
P.M.B. 1023, Ota, Ogun State, Nigeria.
Corresponding author email: kola.ajanaku@covenantuniversity.edu.ng

Abstract
The use of brewery spent grains (BSG) as flour supplement in baking bread and its effects on the bread quality have been investigated. The fiber content of the bread supplemented with different percentage of brewery spent grains increased as the addition level increased. Bread prepared with BSG in the range 3 to 6% resulted in better properties in terms of colour, quality and overall sensory score as compared to those made with brewery spent grains of higher percentage. Nutritional evaluation inferred preference for 3 and 6% BSG integration.

Keywords: Brewery spent grains, bread quality, dietary fibre, flour, food supplement
INTRODUCTION

Brewery Spent Grains (BSG) is the main by-product of the brewing industry and also an important source of protein and fiber in developing countries. Brewery spent grains could be used to increase both dietary fiber and protein in human nutrition through its application in some formulated foods. The growing interest in the effect of dietary fiber on health has stressed the need to improve the protein quality of bread by adding different levels of BSG with flour (Finley and Hanamoto 1980; Addo et al., 1991; Bakhshi et al., 1989; Kissel and Prentice (1979).

Most researchers (Cauvain and Chamberlain 1988; Gen et al., 1990; Robert, 1996; Victor Wu 1993; Wen-xue Zhang et al., 2005; Wen-xue Zhang et al., 2007) have put brewery spent grains to several uses such as fish and animal feeds and finds application in human foods such as biscuits in form of cookies.

CONCLUSION

This study has shown that Brewery Spent Grains (BSG) at low concentration has great potential as a source of crude fiber and protein content in food systems. The blending of BSG significantly improved the dietary fiber of the baked bread. Increasing the level of dietary fiber significantly increased crumb firmness but decreased the degree of softening and bread volume. The sensory evaluation showed better preference for 3 and 6% BSG breads as far as taste and overall quality were concerned. The results demonstrated the importance of supplementing BSG in stable foods such as bread. This BSG utilization could be useful in the developing world where large segments of the population are in urgent need to increase their daily protein intake.


REFERENCES


Bread is made from flour, water and yeast and other ingredients and then baked. It is widely consumed in most part of the developing countries of the world. It is a good source of energy due to its carbohydrate content. Many people receive 16 percent of their daily energy requirements from bread (Ballester et al., 1984; Chandalia and Sheth, 1987; Kelsay, 1978; Salama et al., 1995). Bread also contains a small percentage of protein and high Glyceamic Index (G.I) value which is a relative measure of how fast a given food raises blood sugar.

Bread is obviously suited to the addition of nutritive substances vitamins and minerals and it has become necessary to make use of such food supplement as brewery spent grains to meet the demands of the rapidly increasing world population. The present study looks at the use of brewery spent grains as flour supplement in baking bread and its effect on the bread quality.


Victor Wu, Y. 1993. Protein Isolate from an Experimental High Protein Wheat

Abstract

This paper examines occupational health and safety in the oil and gas industry in Nigeria. The objectives of the study are to investigate the various types of hazards that oil workers are exposed to, the effects of these hazards on the health of the workers, the effectiveness of the existing means of mitigating these hazards, and the adequacy of the legislation that impacts on the provision of occupational health and safety in the oil gas industry in the country. In the course of the study, two hundred and seventeen (217) workers in the oil and gas industry were randomly selected for the purpose of questionnaire administration. Analysis of data was carried out using the SPSS. The results showed that workers are exposed to various hazards in their workplaces. The paper therefore, recommends the provision of fire extinguishers in workplaces, health assessment of all workers, the provision of appropriate health facilities and the enforcement and strengthening of existing legislation to mitigate these hazards.

Key words: Occupational Health, Safety, Oil and gas industry.

Introduction

Occupational health and safety is a cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment. The goal of all occupational health and safety programmes is to foster a safe work environment. As a secondary effect, it may also protect co-workers, nearby communities, and other members of the public who are impacted by the workplace environment (http://wikipedia.com). Since 1950, the International Labour Organization (ILO) and the World Health Organization (WHO) have shared a common definition of occupational health. It was adopted by the Joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995. The definition reads: "Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from good health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job" (http://wikipedia.com).

The term safety has been defined and envisioned by many experts and authorities since the industrial revolution. Some authorities regard safety as the deliberate endeavour undertaken by a group or individual to promote specific precautionary measures against damage, injury or accident. To a vast majority of persons, the term safety has to do with precaution from injuries or accidents that could lead to deformities or disabilities on the human body. Generally safety is a condition of being protected from dangers and harms (Rim-Rukeh, 2009). It is also a situation of being free from hazard and all conditions that have the potential of causing damage, harm or injury. As a
matter of fact, the term safety does not imply the total elimination of all risks or danger, but the elimination of unnecessary risks.

Health is a general condition of a person in all aspects. The World Health Organisation (WHO), in 1948, defined health “as a state of complete mental, physical and social wellbeing and not merely the absence of disease or infirmity. (http://en.wikipedia.org/wiki/health).

Over the years the oil industry has made a variety of contributions to the Nigerian economy. These include the creation of employment opportunities, local expenditure on goods and services, contribution to government revenue, contribution to gross domestic product (GDP), contribution to foreign exchange reserves, and the supply of energy to industry and commerce. (http://www.ogbus.ru/eng/)

Logically, the oil and gas industry is one of the riskiest industries when it comes to health and safety of employees. Interruptions in oil production caused by fires and accidents easily lead to significant economic losses, and potential hazards to humans and the environment (Ahlang, 2005 as cited in www.ivythesis.com). Working in oil refineries basically exposes employees to benzene and naturally occurring radioactive material (NORM), substances that are dangerous to health (Markussen, 2003 as cited in www.ivythesis.com).

Why much has been written on the environmental impacts of oil exploration and exploitation in Nigeria, the impact of the oil and gas industry on the health of its workers has not been paid the necessary attention.

Conclusion
This paper examined occupational health and safety in the oil and gas industry in Warri. From the survey, it was found that oil and gas workers are exposed to many hazards despite the existing legislations enacted by government to impact on the provision of occupational health and safety in the industry. Given the place of the oil and gas industry in the Nigerian economy, there is the urgent need to mitigate the adverse effects of oil and gas on the health of workers.

References


http://en.Wikipedia.org/Wiki/Health
http://www.wikipedia.com


RECLAIMED ASPHALT PAVEMENTS-LIME STABILIZATION OF CLAY AS HIGHWAY PAVEMENT MATERIALS

Edeh, J. E.¹, Eberemu, A. O.², Abah, A. B.¹
¹Dept. of Civil Engrg., Ahmadu Bello Univ., Zaria 810001, Nigeria.
²Dept. of Civil Engrg., Univ. of Agriculture, Makurdi, 970001, Nigeria.
¹edehjoe@yahoo.com, ²aeberemu@yahoo.com, ³abahadakole@yahoo.com.

Abstract.
Decreasing supplies of locally available quality aggregate in many regions around the world coupled with the growing concern over waste disposal and the unsuitable nature of clay soil as highway construction material have resulted in greater use of RAP-lime stabilized clay for road construction. This paper present the results of the laboratory evaluation of the characteristics of RAP-lime stabilized clay soil, using 2 – 8% lime, subjected to British Standard Light (BSL) compactive effort to determine their index, compaction and california bearing ratio (CBR) results. The result of the laboratory tests show that the properties of clay improved when stabilized with RAP with 2 – 8% lime. The particle size distributions improved from poorly graded clayey SAND for 100% clay which fall under AASHTO classification A-2-6 to well graded sandy GRAVEL which falls under AASHTO classification of A-1-a, using up to 8% lime. The CBR results obtained from the study show that using the Nigerian General Specifications, 180% CBR value criterion, the maximum CBR values of 36.56% (unsoaked) for 90% RAP + 4% clay + 6% lime and 34.23% (soaked for 24 hours) for 90% RAP + 2% clay + 8% Lime mix proportions can be used as subgrade and subbase materials.

Keywords: California bearing ratio, clay soil, highway pavements, reclaimed asphalt pavements, stabilization.

INTRODUCTION
In developing countries the biggest handicap to provide a complete net work of road system is the limited finances available to build road by the conventional methods. Therefore there is a need to resort to one of the suitable methods of low cost road construction, followed by a process of stage development of the roads, to meet the growing needs of the road traffic. Thus apart from affecting economy in the initial construction cost of lower layers of the pavement such as sub-base course it should be possible to upgrade the low cost roads to higher specification at a later date without involving appreciable wastage, utilizing the principle of pavement construction in stages. The construction cost can be considerably reduced by selecting local materials including soils for the lower layers of the pavement such as the sub-base course. If the stability of the local soil is not adequate for supporting wheel loads, the properties are improved by soil stabilization. (Khanna and Justo, 2001). The stability and serviceability of most engineering project or structure depends largely on their foundation and the bearing capacity of the soil that supports them (Chesworth, 2008). The stability and strength of structures would affect standard as stipulated in the engineering code of practices.

A road pavement may serve its intended purpose if the foundation or subgrade meets the minimum standard in the highway codes. From road note 29, (1970), a sub-grade with a California bearing ratio (CBR) of 2% or less is termed a weak material, while those with CBR values between 3 – 15% are normal and those from 15% and above are said to be very stable. However, Nigerian General Specification for Roads and Bridges in Nigeria (1997) however, recommended a minimum CBR value of over 80% for base materials, 30-80% for subbases and 10-30% for subgrade.

Massive road construction has depleted once plentiful aggregate supplies and continuing to exhaust the valuable resources to rebuild existing roads only propagates and accelerates the problem (Hanks and Magni, 1989). Mostly, aggregates either from distant quarries, at great expense or from local sources offers
only marginal quality and conserving virgin construction materials through recycling with lime make not only smart but economic and strategic sense. Additionally, if old asphalt and road base materials are not recycled, they must be disposed of or stockpiled, increasing transportation cost; and utilizing valuable land space and increasing environmental and health hazards. Recycling with lime makes the reconstruction of old roads a largely self-sustaining process. Due to the excessive cost of new materials, a new method of design had to be sought and new materials introduced. Some researchers (Ola, 1983; Schroeder, 1994; Osinubi, 2000; Osinubi et al., 2009; Osinubi and Edeh, 2011) tried with soils, which are available everywhere (Kolhe, 2008).

Reclaimed asphalt pavement (RAP) is an existing asphalt mixture that has been pulverized, usually by milling, and is used like an aggregate in recycled asphalt pavement (Jeff and Miles, 2006). During pavement rehabilitation and reconstruction, large quantities of this materials are generated especially when asphalt pavement are removed. RAP is the term given to reprocessed and/or removed pavement materials containing asphalt and aggregates. These materials are generated when asphalt pavements are removed for reconstruction, resurfacing, or to obtain access to buried utilities. The binder in the RAP after several years of service, becomes aged and much stiffer than desired. The degree of aging depends on many factors, such as temperature, air void content of the mixture, and chemical composition of the binder. The aged bitumen present in a RAP has physical properties that make it undesirable for reuse without modification (Chen et al., 2007). Experience has indicated that the recycling of asphalt pavements is a beneficial approach from technical, environmental, and economical perspectives (Chen et al., 2007). This has made the recycling of pavement materials to become a very viable alternative to be considered in road maintenance and rehabilitation with the conservation of resources, preservation of the environment, and retention of existing highway geometrics; are some of the other benefits obtained by reusing pavement materials (Taha et al., 2002). As a general rule, Engineering Technical Letter, ETL (1999) considers RAP as a non hazardous material except when the pavement is constructed with a hazardous material as one of the components. Properly crushed and screened RAP consists of high-quality, well-graded aggregates coated by asphalt lime (FHWA, 2008).

Reliable figures for the generation of RAP are not readily available from state highway agencies or local jurisdictions. Based on incomplete data, it is estimated that as much as 45 million metric tons (45 million tons) of RAP may be produced each year in the United States of America, USA. (FHWA, 1995) and the percentage of RAP in hot mix normally varies from 10 – 50% (ETL, 1999; Jeff and Miles, 2006; Udelhofen, 2006). This indicates that majority of the RAP generated may be stockpiled for use at a later time or disposed as a waste material. In Nigeria however, RAP generated during highway reconstructions and rehabilitations are spoiled along road alignments and the statistics of the amount of RAP generated is not documented. The safe disposal of waste is increasingly a major concern around the world, even with the awareness of the importance of recycling, the volume of waste materials including RAP, continues to grow. The use of waste materials, particularly RAP in the construction of pavements has benefits in not only reducing the amount of waste materials requiring disposal but can also provide construction materials with significant savings over new materials (Schroeder, 1994). Because of the large volumes of materials required for construction, pavements have been favorable structures for the recycling of a wide variety of waste materials. Hence, the use of RAP can actually provide value to what was once a costly disposal problem. Initially, this recycling was limited to the re-use of materials removed from previous pavement structures such as: recyclable asphalt pavement, recyclable portland cement concrete and various base course materials but recently various other materials, not originating or associated with pavements, have come into use, either as additives or pozzolan to improve the properties of the RAP for use in pavement surfaces or sub-surface materials.
Pavement rehabilitation and reconstruction generates large quantities of reclaimed asphalt pavement (RAP) aggregate, and recycling into new asphalt paving mixtures is the predominant application. Though RAP acceptance in road bases and subbases has been limited because of the lack of laboratory and field performance data (Taha et al., 2002). In the United States of America, more than 50 million tons (45.36 million Mg) of asphalt paving material are milled annually and recycling into new asphalt paving mixtures is the major use (Galal, 2007).

The properties of RAP are largely dependent on the properties of the constituent materials and asphalt concrete type used in the old pavement. Since RAP may be obtained from any number of old pavement sources, quality can vary. Excess granular material or soils, or even debris, can sometimes be introduced into old pavement stockpiles. The number of times the pavement has been resurfaced, the amount of patching and/or crack sealing, and the possible presence of prior seal coat applications will all have an influence on RAP composition. Quality control is needed to ensure that the processed RAP will be suitable for the prospective application. This is particularly the case with in-place pavement recycling (FHWA, 2008). Stabilizing the old asphalt surface granular base with cement creates a strong foundation for the pavement hence there is little need for material to be removed or added. The old, brittle asphalt when pulverized becomes "black gravel" that will bond to hydrated lime readily (Kallas, 1984). Research has established typical range of particle size distribution, physical, chemical, engineering and mechanical properties of RAP (Hanks and Magni, 1989; FHWA, 2008; Chen et al., 2007; Roberts et al., 1996; Tyrion, 2000; Karlsson and Isaacsson, 2006; FHWA, 1993; Richard and Smith, 1980; Decker and Young, 1996; Nouroldin and Wood, 1989; Senior et al., 1994).

Clay soil is one comprised of soil particles that are extremely fine (0.02mm in diameter). The particles are extremely closely packed, which does not allow much "pore space" within the soil (Craig, 1992; Das, 1998). Expansive soils of clay out-crop in large areas and these clays have caused persistent difficulties in road construction that are common occurrences worldwide. The common problem is volumetric change associated with such clay soils when subjected to water content. In the light of the maintenance cost that will follow the road repairs accentuated by the presence of the expansive clay, methods of treatment must be evolved to eliminate or reduce the effect of soil volume change on the overall formation of the road structure. It has been found by several studies that stabilization with lime reduces soil plasticity, increases strength and durability, decreases water absorption and swelling (Bell, 1996; Nalbantoglu, 2000; National Lime Association, 2001). These chemical processes modify the soil structure whereby larger grain aggregates are formed leading to several advantages in the suitability of the soil for foundations or road construction (Al-Khashab and Al-Hayalee, 2008).

This study considered the characterization of RAP-lime stabilization of clay soil, for use as highway pavement materials.

CONCLUSIONS

Experimental approaches have being used to assess the suitability of RAP-lime stabilized clay soil as highway pavement construction materials.

The Nigerian General Specification’s criterion of 180% CBR value for highway base materials was not satisfied. However, the maximum CBR values of 36.56% (unsoaked) for 90% RAP + 4% clay + 6% lime and 34.23% (soaked for 24 hours) for 90% RAP + 2% clay + 8% Lime mix proportions can be used as subgrade and subbase materials.

The particle size distributions improved from poorly graded clayey SAND for 100% clay which fall under AASHTO classification A-2-6 to well graded sandy GRAVEL which falls under AASHTO classification of A-1-a.

The plasticity of the material improved with increased lime, decreased clay and at a fixed RAP contents in the mix proportions.

The peak specific gravity of 2.5 for the RAP-lime stabilized clay soil was obtained 60% RAP + 38% clay + 2% lime mix proportion.

The MDD for RAP-lime stabilized clay however increased from 1.71 Mg/m$^3$ for 20%
RAP + 76% clay + 4% lime to 2.02 Mg.m$^3$ for 70% RAP + 22% clay + 8% lime mix proportions with corresponding OMC of 18.11 and 12.03% respectively. While the OMC varied from 9.1% for 70% RAP + 26% clay + 4% lime to 18.11% for 20% RAP + 76% clay + 4% lime and 20% RAP + 74% clay + 6% lime mix proportions.

REFERENCES


Development of Design Method.” J. Of Geotechnical and Geoenvironmental Engineering,
Base and Earth. Materials Information Report MI-137, Engineering Materials Office,
Ontario Ministry of Transportation, Downsview, Ontario.
London.
FHWA/RD-84/088.
Vol. 18, No. 1, pp. 81-92.

---

**THE IMPACT OF BUSH BURNING ON AGRICULTURAL ENVIRONMENT IN ORHIONMWON LOCAL GOVERNMENT AREA OF EDO STATE.**
Abstract
This paper attempts to assess the impact of bush burning on the environment, with specific focus on the relationship of bush burning and the emergence of savannah grasses in a tropical rain forest vegetation zone. Although bush burning is widely researched in many areas in Nigeria having forest reserves and extensive arable agricultural practices, yet little is known about its occurrence and impact in Orhionmwon Local Government Area of Edo State. The study seeks a most appropriate approach in tackling the problem of bush burning, with particular reference to cultural practice and environmental conservation. Findings were based on data collected through structured observation and interviews of farmers in the locality. Traditional arguments of the locals for bush burning as a process of land preparation for cultivation are evaluated against environmental implications of bush burning. The findings revealed that the traditional argument in support of bush burning is based on the simple reason of convenience and cultural practice. Despite traditional claims of convenience in the use of fire in land preparation, our findings revealed that the negative impact of bush burning which is the invasion of savannah grasses on farmland far outweigh the farmers’ convenience. The paper recommends better awareness and enforcement of existing legislations on bush burning and concludes that alternative means of land preparation for cultivation should be adopted.

Keywords: Bush clearing, Savannah grasses, Environment, Agricultural practice, Land preparation.

Introduction
The environment is the aggregate of all the external conditions and influences affecting the life and development of organisms, in this case, man. In order words, the environment of man means the surroundings in which he lives. The concept of sustainable development means maintaining a delicate balance between meeting human needs and preserving natural resources and ecosystems on which we and future generations depend. There are over a hundred definitions of sustainable development, but the best known is the one provided by the World Commission on Environment and Development (WCED) which defined sustainable development as the “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” What this means is that, in the long term, responsible use of natural resources now will help ensure that there are resources available for sustained growth far into the future. Sustainable development implies economic growth together with the protection of environmental quality, each reinforcing the other. The guiding rules are that people must care for the environment and take no more from nature than it can replenish. This in turn means adopting development paths and practices that respect and work within nature's limits. The concept of sustainable development can be broken into three constituent parts; one of which is environmental sustainability. Embedded in this is agricultural sustainability. Sustainable agriculture can be simply defined as environmentally friendly methods of farming that allow the production of crops or livestock without damage to the farm as an ecosystem. Apart from this, it also prevents the adverse effects on soil, water supplies, biodiversity, or other surrounding natural resources. The concept of sustainable agriculture is an intergenerational one in which we pass on a conserved or improved natural resource base instead of one which has been depleted or polluted.

Conclusion and Recommendations
Orhionmwon Local Government Area of Edo State has a vast agricultural land. The villages that were selected for the study generally practiced extensive subsistence agriculture particularly land rotation or bush fallowing system of farming. This involves using a portion of land for farming in one year and then left it to fallow for a number of years before returning to farm on that portion of land again. Since the farmers’ population in the
area is increasing, the fallow period is getting shorter. Also, large parcels of farmland are being used for oil palm plantations each year especially by the rich farmers. This tends to shrink the land available for land rotation practice and consequently short fallow period. Bush burning is widely used as a method of land preparation after clearing. But indiscriminate bush burning has exposed the land to the invasion of savannah grasses, particularly Siam weed, Elephant and Guinea grasses. Invasion of these weeds has changed the farming practice of the study area. Farmers are adapting to the new agricultural environment by intensifying weeding exercise and employing the use of chemicals and fire in weeds control. However, these techniques seem not to effectively put the invasion of savannah grasses under control. It is on the basis of these findings that the following recommendations are made.

➢ Vigorous war against bush burning (WABB) should be carried out in the local government area on a sustained basis both in the mass media and public rallies by the state and local governments. Village heads should sensitize their subjects against bush burning particularly during the dry season on a yearly basis by sending out town criers as a way of reminder. Heavy fine should be imposed on anyone caught causing indiscriminate bush burning.

➢ The state government should create a special division in the State’s Fire Service with the mandate of training and equipping staff in fighting bush or wild fire as it is done in the developed world.

➢ Farmed parkland vegetation should be encouraged particularly along motorable farm roads and bush paths since indiscriminate bush burning has been found to occur mostly from roadsides and bush paths.

➢ Both the state and local governments should, as a matter of urgency, legislate against cattle grazing in farmland of Orhionmwon Local Government Area.

➢ The local government authority should utilize the vast wooded grassland in the south eastern part of the local government area as a commercial rangeland for cattle ranching.

➢ The state and local governments should acquire and rent out tractors to the local farmers at subsidized rate for land preparation.

➢ Since cassava has been found to be resistant to savannah grasses, it should be cultivated as hedges to protect other food crops with less resistant to savannah grasses in mixed crops farms.

➢ A 2 – or 3 – year crop rotation in one farm should be practiced instead of the traditional land rotation which involves bush fallowing. Land preparation for crop rotation in old farms will not necessarily involve burning.

➢ The traditional method of bush fire prevention which involves the construction of pathway around the boundary of newly cleared farm before setting the plot on fire should be encouraged and as a rule, cleared farm plots should not be set on fire until late March or early April.

➢ Existing State’s and National legislations on bush burning should be enforced. The government should carry out mechanized land preparation for the local farmers to buy.

If these recommendations are not urgently implemented the secondary (anthropogenic) forest which constitutes the vast agricultural environment of Orhionmwon Local Government Area will very soon become a tropical grassland with severe consequences on the local agricultural practices.

Reference


ABSTRACT
Population and water production data on Lagos State between 1963 and 2006 were collected, and used for trend and projection analyses. Land use/Land cover maps of 1975, 1995 and NigeriaSat-1 imagery of 2007 were used for land use change analysis. Temperature, rainfall and relative humidity (RH) data between 1960 and 2006 (46 years) and evaporation between 1965 and 1999 (34 years) were collected and used to depict the temporal climatic variation and the likely future scenario. Inferential statistics and GIS tools were used to generate the results for the study. The population of Lagos State increased by about 557.1% between 1963 and 2006, and correspondingly, safe water supply increased by 554%. This indicates that water demand has outpaced the supply over the years considering the population growth rate. Currently, 60% of domestic water use in urban areas of Lagos State is from groundwater while 75% of rural water is from unsafe surface water. Between 1975 and 2007, urban land use increased by about 235.9%. The 46 years climatic records revealed that temperature and evaporation respectively increased and decreased slightly while rainfall, and Relatively Humidity (RH) decreased consistently. Nevertheless, the evidence of thermal discomfort in the metropolitan area cannot be disputed. Based on the current trends, the Lagos State population and required water are expected to increase to about 19.8 millions and 2.42 m/m³/d respectively by the year 2026. Rainfall is likely to decrease by -6.68 mm while temperature will increase by 0.95°C by 2026. Urban land use is expected to increase by about 20% with expectation of serious congestion in the suburb areas. With these results, over 50% of the urban inhabitants will be highly water poor in years to come if the present trends continue unabated.

Key Words: Challenges, climate, scenario, urbanization and water supply

Introduction
In spite of Man’s remarkable advances in science and technology, his economic and social well-being still depend on weather and climate. Different time and spatial scales studies on annual distribution and variability of climatic variables, urban land use and population have shown to have had substantial impact on water supply (Adeyemi, 2000, Vorosmarty et al, 2000 and Ayeni et al, 2011). About 75% of commercial energy is consumed in urban and peri-urban areas. In addition, about 80% of all waste is generated from the cities and about 60% of Greenhouse Gas Emissions that causes global climate change emanate from cities (El-Sioufi 2010). Extreme weather patterns such as erratic rainfall, temperature and other climatic factors fluctuations/inconsistencies are inherent characteristics of climate and such fluctuations have had diverse effects such as drought and flood and more importantly on water supply (Olaniran, 1990; Adejuwon, 2004 and Kilsby et al, 2007). For instance, availability of surface water or shallow groundwater depends on the precipitation (EEA 2007 and IPCC 2008). Therefore, increasing severe weather risk and its threats to human settlements has become a great concern especially in coastal areas such as Lagos. Each and every day, climate refugees from rural areas that have been hit by drought or flooding intensify migration to the cities. Essentially, majority of rural population who are characterized with poor health conditions, unemployment or social segregation are more vulnerable to the effects of climate change and therefore, tend to migrate to cities within or outside
their countries e.g. migration from far northern Nigeria states (e.g. Sokoto, Kano, Borno) to Lagos State. The UN predicts that there will be millions of environmental migrants by 2020, and climate change is one of the major drivers. Therefore, there is no doubt that climate change aggravates existing socio-economic and environmental problems especially pressure on water supply and many other new challenges (Arnell, 1999 and 2004; United Nations 2009). Climate change will therefore affect water resource base especially water availability, quantity, quality, timing, and distribution and other watershed services in as much availability of clean drinking water is a critical issue for most people in the world (Ringler, 2008 and USDA 2008). It will affect water utilities of people who rely on water for daily purposes. This is because, higher temperatures and reduced precipitation levels will cause shortages in available supply due to slower recharge rates of groundwater resources and/or reduced availability of surface water. The world’s urban poor are the most affected today and will be in future if the present scenario continued.

The above scenario describes the water situation in most parts of Lagos State. The provision of adequate safe water to the growing population of urban residents, especially the urban poor of Lagos State, remain one of the biggest challenges facing government and local authorities. Lots of efforts will be needed to bridge the gap if water demand in Lagos State should be met. Therefore, it is based on these facts that the impacts of such climatic variables, urbanization and population on water supply in Lagos State Nigeria remain the focus of this research interest. The paper also discusses various future associated risks without addressing the threatening climate change, rapid urban expansion problems and fast growing population issues.

**Conclusion and Suggestions**

The solutions to the climate change threats on water supply sources lies in the hand of governments, corporate organizations and individuals by adopting various options for increasing water supply schemes and capacity as well as reducing greenhouse gasses emissions. More water supply infrastructure should be planned and developed for future generation. This can be achieved by developing highly and efficient water supply scheme, encouragement of community water development and management strategies. Higher efficiency appliances such as **advanced wind turbines, solar photovoltaics and other renewable energy technologies** should be encouraged. Also, strategies to protect and restore threatened natural resources should be established and global laws that protect them should also be enforced.

In conclusion, the nature is a complex system while the future effects are difficult to predict. Conversely, lots of surprises should be expected. Drier may become either wetter or drier depending on their locations and vice versa. With the nature and complexity of global change coupled with rapidly increasing urbanization, the consequences are many and in most cases deleterious to human and its environment. Future impacts on man become more difficult to predict because changes may be self-reinforcing with human being to cope within. While in some, it may be self-canceling or self re-structuring but everything will depend on today’s plans.

**References:**


Arnell, N. W. (2004): Climate change and global water resources: SRES emissions and socio-economic scenarios, Global Environmental Change 14, 31–52
El-Sioufi, M. (2010): Climate Change and Sustainable Cities: Major Challenges Facing Cities and Urban Settlements in the Coming Decades, UN-HABITAT Article of the Month – June 2010
LWC (2009): We will soon deliver 15 new water works, Lagos State Water Corporation Alausa Alert, Dec. 30th, '08 - Jan. 18th, '09
USDA (2008): Climate Change and Water Perspectives from the Forest Service. The U.S. Department of agriculture (USDA), June 2008
Abstract
The Omo Biosphere Reserve situated in the eastern part of Ogun State in the Southwest, Nigeria offers a practical demonstration of places that seek to reconcile conservation of biological and cultural diversity and economic and social development through partnerships between people and nature. The biodiversity resources of Omo Biosphere Reserve includes: forest elephants (Loxodonta africana cyclotis), Red capped Mangabey, Mona Monkey, Red river Hog, Monitor Lizard, Black Cobra, Puff Adder, Tortoise, Snails, Crabs, and so on, many avifauna resources some of which are endemic to Omo, over 250 plant species inclusive of Climbers, Grasses, Herbs, Shrubs, Orchids and palm species. Other ecotourism resources include rivers, caves, hills, a clement weather and serene environment, crafts and occupational activities of the people. Purposive sampling questionnaire survey method was used to collate data from five communities in the biosphere enclave. The sampling population of 250 had a retrieval rate of 90 percent. Result shows 170 of the respondents which represent 75 percent agree that the other forest resources should be used to sustainably develop the biosphere reserve, 195 respondents, which represent 86 percent know that the reserve has other resources beside timber that can be sustainably utilized, while 180 respondents representing 80 percent agree that a lot of effort are needed by all stakeholders to achieve success. The study recommends more committed stakeholders’ activities to conserve biodiversity of the reserve, provide socio economic opportunities to the people and assist in reducing the acceleration of climate change in the area.

Keywords: Biodiversity, Biosphere Reserve, Ecotourism, Sustainability, Stakeholders, Resources.

INTRODUCTION
Biosphere reserves are reported areas of terrestrial and coastal/marine ecosystems or a combination thereof which are internationally recognized within the framework of UNESCO’s Programme on Man and the Biosphere (MAB) (Statutory Framework of the World Network of Biosphere Reserves). Reserves are nominated by national governments; each reserve must meet a minimal set of criteria and adhere to a minimal set of criteria and adhere to a minimal set of conditions before being admitted to the network. Each biosphere reserve is intended to fulfill three complementary functions; a conservation function, to preserve genetic resources, species, ecosystems and landscapes; a developmental function, to foster sustainable economic and human development; and a logistic support function, to support demonstration projects, environmental education and training, and research and monitoring related to local, national, and global issues of conservation and sustainable development (UNESCO, 1996). Ecotourism is also being selectively introduced as an approach for conserving nature and maximizing the sustainable utilization of resources in protected areas. In practice, ecotourism has often attempted to simultaneously satisfy tourists’ desire to experience nature and maintain environmental conservation. Operationally, the success or failure of ecotourism depends on a wide range of factors, including the status of natural and other tourism resources, the demand for nature tourism, the sustainable utilization of and impacts on natural resources, and the distribution of revenue generated by these
resources. Harmonizing and/or balancing these factors in order to preserve and develop natural resources in a sustainable manner is the most important purpose of ecotourism (UNDP, 1999).

**RECOMMENDATION**
The study recommends very articulated approach to issues of conservation and sustainability particularly as it affects socio economic circumstances of the communities. All the stakeholders must be committed to conserve biodiversity.

**REFERENCES**

Concerted efforts must be made to provide socio economic opportunities to the people and assist in reducing the acceleration of climatic change in the area. The non-timber resources should be harnessed in a sustainable manner for the benefit of the people and the reserve. Stricter environmental laws must be enacted to discourage indiscriminate felling of timber and hunting of fauna. The possibilities of economic empowerment of the people through REDD should be harnessed.
MODELING AIR POLLUTION BY USE OF WEIBULL DISTRIBUTION FOR SUSTAINABLE MANAGEMENT

1. AKINTUNDE, Oyetunde A. and 2. ADELAGUN, R. O. A.

Department of Physical Sciences,
College of Natural and Applied Sciences,
Wesley University of Science and Technology, Ondo,
P.M.B. 507, Ondo, Ondo State, Nigeria
evtunde@yahoo.com
+234 803 425 3309

Abstract
It was established that air pollution is caused by excessive concentration of one or more contaminants such as dust, smoke, fumes, gases, etc in the air which adversely affects human health, plants, animals or even damage to properties. These air pollutants are present in the atmosphere as solid, liquid or gaseous substances. The concentration of the air pollutants produces global warming, depletion of ozone layers, acid rain, acidification of soil, surface water and ground water, etc. Because of the adverse effects in the short- and/or long-term, there is need for proper control and monitor of air pollution both locally and globally. Hence, the research paper then examined the problem of identifying the appropriate distributional form for air pollution concentration data of which Weibull distribution is found to be more appropriate. For the distribution a simple empirical model, which yields approximations to the relative root mean square error of the percentile estimates against sample size and parameter values, was developed and demonstrated. Thus for the distributional model, an estimate of the relative error associated with evaluating high pollutant levels may be readily determined.

Keywords: air pollution, global warming, ozone layers, acid rain, Weibull distribution

INTRODUCTION
The atmosphere or air is normally composed of approximately 78% nitrogen, 21% oxygen and 1% mixture of carbon dioxide, water vapour and small quantities of inert gases like argon, neon, helium among others. The atmosphere is known to be a significant component of the natural environment because it provides all the gases necessary for the sustenance of all forms of life in the biosphere. The atmosphere also filters the incoming ultraviolet rays, protect the earth’s surface and prevent the earth from becoming too hot. As well known, the atmosphere may be divided into four distinct layers having varying characteristics of temperatures and combination of gases.

CONCLUSION AND RECOMMENDATION
Due to the adverse effects in the short- and/or long-term, there is need for proper control and monitor of air pollution both locally and globally. As examined the problem of identifying the appropriate distributional form for air pollution concentration data of which Weibull distribution is found to be more appropriate since it makes use of the location, the shape and the scale of environmental air pollution and the pollutants. It is therefore recommended from the studies of Weibull distribution that for proper management of air pollution:

- There should be drastic reduction in terms of scale in the consumption of fossil fuels and other sources of air pollution.
- More advanced and efficient technologies should be developed, so that maximum energy may be derived from the existing fossil fuels and the emission of air pollutants at all locations should be minimized.
- Serious efforts should be made to promote reduction in the production
and consumption of ozone depleting chemicals.

- Serious efforts should be made to produce and propagate the use of alternative chemicals which do not deplete ozone layer in the stratosphere.

REFERENCES


An Introduction to Pollution Science, pages 8–71


CAUSES AND EFFECTS OF RURAL-URBAN MIGRATION IN DEVELOPING COUNTRIES

OLUBODUN, M. E.¹, ALUKO, O. O.²
¹,² Dept of Architecture, Federal Polytechnic, Ilaro
Ogun State, Nigeria

&
AREMU, S. C.³
³Dept of Architecture, Federal Polytechnic, Bida,
Niger State, Nigeria.

Abstract
Urban population rises as more people leave the villages and farmsteads to live in the cities. This is a common phenomenon in developing countries. People move into cities to seek economic opportunities. A major contributing factor is known as "rural flight". In rural areas, often on small family farms, it is difficult to improve one's standard of living beyond basic sustenance. Farm living is dependent on unpredictable environmental conditions, and in times of drought, flood or pestilence, survival becomes extremely problematic. To the knowledge of rural dwellers, cities are places where money, services and wealth are centralized. Cities are where fortunes are made and where social mobility is possible. Businesses, which generate jobs and capital, are usually located in urban areas. Whether the source is trade or tourism, it is also through the cities that foreign money flows into a country. It is easy to see why someone living on a farm might wish to take the chance moving to the city and trying to make enough money for a good living condition. Rural migrants are attracted by these possibilities that cities can generously offer, but often settle in shanty towns and experience extreme poverty. There are better basic services as well as other specialist services that are not found in rural areas. There are more job opportunities and a greater variety of jobs. Health is another major factor. People are often forced to move to cities where there are doctors and hospitals that can cater for their health needs. This paper aims to examine the major causes of these movements, the immediate and remote effects as well as providing recommendations for possible solutions.

Keywords: Urban, Rural, Population, Migration, Economy.

INTRODUCTION
Migration is the movement of people from one geographical area to another, involving permanent or temporary residence or settlement. There must be a reason or reasons of migration—either something are chasing the individuals away from their present location or there is an attraction to where they are going to. Rural-urban migration has long been associated with economic development and growth in the economic literature. Migration occurs as a response to economic development needs as well as social, cultural, environmental and political factors from areas of origin and destination. Also, adverse physical conditions like flood, land slide and the like may contribute to reasons for leaving one location for the other. Okpora (1983) posits that migration from rural to urban centers are always many as compared with urban to rural. The movement from rural to urban areas creates negative impacts on the quality of rural life especially when such migrants carry away their needed consumption to the cities, especially young adults who subject the older farmers to harder works on the farms by virtue of their movement. Though, Ijere (1994) argued that rural-urban migration has a positive impact on urban growth and social development, which paves way for generation of employment opportunities and provision of educational facilities as well as transportation into social structure for the migrants.
Urbanization leads to economic growth and economies of scale, but because of a divergence of social costs and private costs, excess urbanization arises which leads to inefficiency. Many government policies have direct or indirect relationship with rural-urban migration. Due to the negative consequences of excessive rural-urban migration that can occur, it is very important that policymakers realize the incentives or disincentives associated with each policy during the planning stages, i.e., before implementation. The past few decades have witnessed a rapid pace of urban population concentrations in the developing countries of Africa and elsewhere (Bell, 1986; Liebenow, 1986; Hance, 1970; Davis, 1969).

In Ghana, for example, the urban population in 1960 was 23 percent of the total population. The proportion increased by almost 10 percent to 32 percent in 1984 (Statistical Service of Ghana, 1988). This has engendered both scholarly and policy interests and concerns. The concerns have emanated from the fact that the bulk of the urban population is constituted of migrants from rural areas and other small towns in the countryside. The loss of rural populations to urban centers is often bemoaned for its implied adverse effect on rural development. The empirical data have revealed that migration is generally selective of the young, versatile, and/or better educated members of the community (Ritchey, 1976; Browning & Feindt, 1969). This creates a form of “brain drain” on the rural populations. At the points of destination, the deleterious consequences of rural-urban migration have been noted. With the demand for urban socioeconomic amenities exceeding their supply, the urban areas often become spectacles of multifarious problems such as overcrowding, congestion, inadequate housing, high rates of unemployment and underemployment, crime and other forms of delinquency. The quality of life at both the areas of origin and destination are, therefore, significantly affected.

CONCLUSION AND RECOMMENDATIONS
From the foregoing, therefore, there is an urgent need to get the right key towards solving the problem of excessive rural-urban migration in restoring a proper balance between rural economic and social opportunities:

Provision of basic social amenities:
The governments in the developing countries should implement policies that will enhance the provision of basic social amenities like electricity, portable water, recreational centers, schools, good roads among others in the rural areas. Rural electrification projects are a typical example concerning this point. As these amenities are provided, they enhance healthy living and opportunity to know what is going on in the world. The recreational centers would be a source of entertainment and relaxation for the dear hardworking farmers and their relatives. To walk for miles on a third class road which neither human nor vehicle can access during a heavy rain just to attend a basic school and do the same thing when coming back is more or less a hectic and a propeller of rural urban drift. People in the rural areas should be provided with schools at least from the crèche to the senior high school level. This will limit their movement to the urban areas in search for formal education. Concerning the road, most produce have to lie idle in the farm which sometimes get rotten, therefore providing good roads will ensure fast and effective conveyance of produce from the farm to the market and thus a high value for their produce which in the long run improve their living standard. To summarise this point, the provision of these basic social amenities will enhance active enrolment in the classroom, fast movement to the market, enhanced living condition among others.

Improvement in the quality of education:
In an attempt to reduce congestion in urban schools as well as some fortunate rural areas, there should be a policy that will lead to the improvement in the quality of education in the rural areas. This should not just be the number of school built but also the quality of teachers, the resources in the schools like libraries, playing fields, serene environments and even better structure of the schools as far as building is concerned. Well trained teachers must be posted into
the rural areas and adequately motivated; teachers estates; rural teachers allowances, teachers that will teach what they have to teach and inculcate in their students, the passion to believe in themselves. The schools should be of the same standard as the ones in the urban centers; a building and not just a structure. The resources available should be made ease to the students so that they can increase their innermost endowments. There have to be changes in the curriculum, teaching and learning materials and the teaching strategy, a total revamping of the educational sector and changes in the attitude and the mindset of every member of the community: the learners, the educated, parents and society at large. This policy will affect the learned and later impact on the farmers and the rural community at large.

Creation of credit and loan schemes:
Farmers and women in the rural areas should be provided with credit facilities and loan opportunities. The fact that "rural" is poor means that these loans should not bear high interest rates. Governments of developing countries should made available loans and credit schemes to the rural man to expand his farm, business and buy new crops. Again subsidies should be given on fertilizers and basic farm inputs. The government can purchase farm inputs and sell it to the farmers in the rural areas at subsidised rates on credit to be paid in installment, rural banking services and rural microfinance institution in the rural areas to improve their savings and enhance their endowment and introduce them to the financial sector. The agricultural extension officers should increase their outreach programmes to educate the nation builder in the rural areas new farming methods. Women should be given credits to start or expand their businesses. All these should be done in a carefully studied manner so that those who really need it would be given. The main idea of this policy is to equip the rural folk to be more vibrant and productive in their field of work and prevent them from moving to the urban centers to have access to the financial institutions. Therefore there is a point in granting these loans to people who will effectively use the money to improve their jobs so that when the loans are being taken, there will be a possibility of repayment.

Industrial modernisation:
The governments of these nations should also embark on the establishment of industries, factories and agro businesses in the rural areas. These industries would serve as a means through which the primary produce can be processed into semi or finished goods. Also, the governments should build silos and other storage facilities into which farm produce would be bought directly from the farmer at a more competitive price and be stored in the storage to feed the available industries and even for export. Equally, the government can also help private investors by giving them tax exemption and other incentives to motivate prospective investors to invest in the rural areas. This will go a long way to create employment to the rural people thereby limiting their desire to move to the urban centers for employment opportunities.

Technological Sophistication:
Because simple tools are used for farming, rural farmers cannot produce in large quantities, therefore providing technologically advance input like mower, ploughs, tractors, fertilizers and education in modern farming techniques among others would increase the amount of output and therefore even their wealth. This is because provision of such opportunity can positively impact on the rural men and women because they can embark on large scale plantation or commercial farming to increase yield and output and their income. This will make farming to both adult and youth in the rural area attractive hence limiting their desire to get to the urban centre for other employment opportunities. Also the access to internet and telecommunication can go a long way to curb rural urban migration because the youth's access to these things would make them content in their community and thus they would see no difference in the rural and the urban centers since they can access even in the rural areas as it is in the urban areas.

Entrepreneurship:
Another possible and vibrant policy that can curb rural urban migration and it adverse effect on unemployment and underemployment in developing countries is the training and coaching of new and potential entrepreneurs in the rural areas. Funds and materials should be made available to trainees and those that are ready to initiate their skills as startup capitals for their various jobs. This will be a source or motivation to establish themselves in the rural areas and thus no incentive to move. Again, the youths should be trained and educated to be innovative and their skills should be sharpened to effect positively on their jobs. To this, the "rural" can come out of her shell to produce and thus be well equipped to face the challenges in the rural areas that would compel them to move. Available resources should be utilized in every possible way as this can go a long way to even reduce unemployment and underemployment. This policy should be geared towards the youth because about 80 percent of the migrants to the urban centers are youth. Judging from the above, it can be seen that excessive rural-urban migration is primarily caused by improper balance of economic and social opportunities such as the availability of social amenities like good roads, hospitals, schools, opportunity for advancement, proper health care between the rural and urban areas. This has led to the eruption of many problems on both the urban as well as the rural areas. Especially unemployment and underemployment in the urban areas, other problems are increase in social vices in the urban areas, overcrowding in the urban areas and even slowdown of development of the rural area. The governments of developing countries have to implement policies that will ensure the balancing of both social and economic opportunities available to the urban dweller and his counterpart in the rural area such as provision of basic social amenities, improvement in the quality of education, creation of credit and loan scheme, industrial modernization, technological sophistication and entrepreneurship policies. If these economic and social opportunities are shared equally between the rural and the urban areas, which will lead to proper balance between the two, it will help to curb the problem of urban unemployment and underdevelopment caused by rural-urban migration problems.

REFERENCES
Caldwell, J. C. (1968a); "Determinants of Rural-Urban Migration in Ghana", in Population Studies, 22 (3), pp 361-78.
Frazier, E F (1961); "Urbanisation and Its Effects Upon the Task of Nation-Building in Africa South of the Sahara", in Journal of Negro Education, 30 (3).
Iwayemi, A. (2006). “Nigeria’s Oil Wealth: the Challenge of Sustainable Development in an Economy Dependent on Non-
Renewable Natural Resource". University of Ibadan Postgraduate School 31st Interdisciplinary Research Discourse.
Ibadan: University of Ibadan.
Liebenow, J G. (1986); African Politics: Crises and Challenges, Indiana University Press, Bloomington, IN.
Little, K. (1957); "The Role of Voluntary Associations in West African Urbanisation", in American Anthropologist, UX (4), August
Martines, G. (1975); "Migrant Fertility Adjustment and Urban Growth in Latin America", in International Migration Review, Vol. 9, pp 177-190.
Mayer, P. (1961); Townsmen or Tribesmen, Oxford University Press, Oxford.
HEALTH IMPACT OF MICROORGANISMS ASSOCIATED WITH WASTE DUMP SITES IN A PRIVATE UNIVERSITY

Osunwoke J. I. & Kuforiji O. O.
Bells University of Technology, Ota, Ogun State, Nigeria.
e-mail; bukkolak@yahoo.com

Abstract
A total of 12 soil samples were collected from four different sampling stations; three were waste-dump sites (Stations A, B and C), and one containing no waste at all was used as the reference site (RS). The samples were examined for temperature, pH, viable aerobic heterotrophic bacterial and fungal counts. The mean temperature values of the soils ranged from 27°C to 34°C while the mean pH values ranged from pH 6.18 to 9.26. The mean total viable aerobic heterotrophic bacteria population ranged from 1.0 x 10^5 cfu/g soil to 7.0x10^17 cfu/g soil while the mean total viable fungal population ranged from 2.0 x 10^4 cfu/g soil to 3.0 x 10^10 cfu/g soil. The bacteria isolated from the waste-dump soils were: Bacillus, Klebsiella, Pseudomonas, Serratia, Staphylococcus, Enterobacter, Enterococcus, Aeromonas and Streptococcus, respectively, while the fungi included Aspergillus flavus, Aspergillus niger, Fusarium, Mucor, Penicillium, Rhodotorula, Candida and Saccharomyces. Only Fusarium and Penicillium were isolated from all the sampling sites. Statistical analysis using ANOVA (F-test) at 5% significance level showed that the bacterial counts were significantly different between B and A, and between B and RS, respectively. While, the viable heterotrophic fungal counts was observed to be significantly different between C and A, C and B, and between C and RS. The health implications of the identified microorganisms on man are discussed.

Keywords: waste-dumpsites; microorganisms; health implications.

INTRODUCTION
Waste (also referred to as rubbish, trash, refuse, garbage, or junk) can be described as unwanted or unusable materials (Wikipedia, 2009). Human societies generate large amounts of waste (Taylor et al., 2002). Many things are discarded everyday ranging from ordinary rubbish to old newspapers, packaging, cleaning materials, and many different kinds of junk (Defra, 2005). Large quantities of pesticides and fertilizers are also leached into the environment from farms (Defra, 2005). Microorganisms such as bacteria and fungi rapidly populate waste materials using their components as their sources of nutrition for growth and multiplication, many of these microorganisms have been found to be harmful to man. Indiscriminate waste dumping therefore breeds these microorganisms and causes a health hazard to the human population. With the ever growing numbers in the University community, it is therefore inevitable that the amount of waste produced by the school’s population correspondingly increased as waste is directly linked to human development. Each dump site on the school’s premises composes of different types of waste in different proportions. Therefore there is a need to understand whether the microorganisms found in each dump site pose health threats to the environment and to the population of the school. In most universities, collection, disposal and transport of waste are the only parts of waste management carried out. Processing, recycling and monitoring of waste materials are hardly looked at in the university environment. As a result, waste materials are deposited in certain “open” dump sites in the school and allowed to compile until they are taken away or incinerated. Pathogenic microorganisms
and harmful chemicals in solid waste can be introduced into the environment when the waste is not properly managed (Wai-Ogosu, 2004; Ogbonna et al., 2006). Waste can contaminate surface water, ground water, soil and air which cause more problems for humans, other species, and ecosystems (Obire et al., 2002).

Thus, the objectives of the study are to: i) isolate and identify the bacteria and fungi in different waste dump sites in a Private University with student population of about 2,000; ii) assess the potential health implications of the isolated microorganisms and iii) suggest preventive/control measures in order to make the environment more suitable for human habitation.

Conclusion and Recommendations

It can be seen that the presence of the microorganisms isolated in this research in soil is unavoidable as they play important roles in biodegradation and hence in nutrient cycling; however, their populations in the soil can be minimized so as to avoid high rates of disease occurrence among the University’s population.

From this study, the waste dump site with the least amount of putrescible waste supported the least microbial population of all the waste dump collection sites. It can therefore be advised that the practice of not dumping putrescible waste in the open waste collection sites, but rather taking them away from the University’s premises on a daily basis should be adopted by both cafeterias on the University college grounds. In addition, the University should direct her efforts in ensuring the efficient removal of waste from the premises so as to minimize the health hazards associated with waste dumping.

Furthermore, the University indeed all establishments should endeavour to relocate any existing waste dump sites away from the residential, clinic, and feeding areas, as well as providing them with covers as most of the diseases caused by these microorganisms are opportunistic infections which may cause more harm to immune deficient individuals in the clinic, and in the residences. This recommendation not only applies to a Private Institution, but is also applicable in Public Institutions where the population is higher and most of the environment has been overtaken by unapproved developmental buildings.

REFERENCES
[www.answers.com/topic/microorganisms](http://www.answers.com/topic/microorganisms-1)
[www.defra.gov.uk](http://www.defra.gov.uk)
[www.wikipedia.org/wiki/Microorganism](http://www.wikipedia.org/wiki/Microorganism)
PALM KERNEL SHELL ASH STABILIZATION OF RECLAIMED ASPHALT PAVEMENTS, AS HIGHWAY PAVEMENT MATERIALS

1Edeh, Joseph Ejelikwu, 1Manasseh, Joel and 1Ibanga, Usoro
1Dept. of Civil Engineering, University of Agriculture, Makurdi. 970001, Nigeria.

ABSTRACT
Domestic, agricultural and industrial wastes are generated everyday and in large quantities and the safe disposal of these waste materials are increasingly becoming a major concern around the world. This paper presents results of the laboratory evaluation of the characteristics of palm kernel shell ash (PKSA) stabilized reclaimed asphalt pavement (RAP) with a view to determine its suitability for use as highway material in flexible pavements. The RAP - PKSA mixtures were subjected to British standard light, BSL (standard Proctor) compactive effort to determine the compaction characteristics and California bearing ratio (CBR). Test results show that the properties of RAP improved with PKSA treatment. The particle grading improved from 99.4% coarse aggregate and 0.6% fines, with AASHTO classification of A-1-a for 100% RAP to 95.2 – 99.5% coarse materials and 0.5 – 4.8% fines, with AASHTO classifications of A-1-a and A-1-b (gravely SAND), for the various RAP - PKSA mix proportions to A-3 (fine SAND) for 100% PKSA. Maximum dry density (MDD) decreased as the optimum moisture content (OMC) of the RAP/PKSA mixes increased with higher PKSA content. The CBR values decreased from the maximum values of 17.11% (soaked for 24 hours) with a corresponding unsoaked CBR value of 21.39% recorded for 90%RAP/10%PKSA with higher PKSA content to a minimum value of 4.31 and 4.2% (soaked and unsoaked, respectively) for 10%RAP + 90%PKSA mix proportion. The 90%RAP/10%PKSA mix that recorded a CBR value of 17.11% (soaked for 24 hours) can be used as sub-grade material in flexible pavements. This research provides an initial lead to the evaluation of PKSA stabilized RAP as highway construction material, as it is based on CBR determination.

Keywords: California bearing ratio, Palm kernel shell ash, Reclaimed asphalt pavements, Stabilization.

INTRODUCTION
In recent times, the demand for good flexible pavement materials accentuated by design guidelines that are based on the assumptions that aggregates are important ingredient of pavement structure, has increased due to increased constructional activities in the road sector and paucity of available construction materials along road alignments. To overcome this problem, the different alternative generated waste materials, including reclaimed asphalt pavements (RAP) scarificed from failed highway pavement, deposited in large quantities along reconstructed road alignment, is stabilized with palm kernel shell ash (PKSA). The material is deposited in large quantities, as waste on production sites, which cause not only environmental hazard but disposal problems.

Domestic and industrial wastes are generated everyday and in large quantities and the safe disposal of these waste materials are increasingly becoming a major concern around the world (ETL, 1999; Gardiner, 2011; Gomes et al., 2011; Hossain, et al., 2011; Wen and Wu, 2011; Osinubi and Edeh, 2011). These waste products (Pihl and Milvang-Jensen, 2009), if properly treated, could be modified for use as structural components of the pavement. Among these wastes is the reclaimed asphalt pavement (RAP) that can be stabilized with other waste materials or additives to improve its engineering properties and be used as new construction material.

Reclaimed asphalt pavement (RAP) is the term given to removed and/or reprocessed pavement materials containing asphalt and aggregate. These materials are generated when asphalts are removed for reconstruction, resurfacing, or
to obtain access to buried utilities. When properly crushed and screened, RAP consist of high-quality, well-graded aggregates coated by asphalt cement (FHWA, 2008). In developed countries like United State of America (USA), where the concept of asphalt recycling had been in vogue, it is estimated that the amount of excess asphalt concrete that must be disposed is less than 20% of the annual amount of RAP that is generated but in developing countries like Nigeria, RAP is sometimes disposed in landfills or in the right of way, commingled with other materials, as waste, since facilities are not readily available for collecting and processing the RAP.

Recycled RAP is almost always returned back into the roadway structure in some form, usually incorporated into asphalt paving by means of hot or cold recycling, and sometimes used as an aggregate in base or sub base construction (Terrel et al., 1994; Singh, et al., 2011), although not always in the same year that it is produced. The use of RAP in mixed asphalt is generally an accepted process, with an overall positive impact on the environment (Ahmed, 1991). The percentage of RAP in hot mix normally varies from 10 – 50% (ETL, 1999), 10 – 15% (Jeff and Miles, 2006; Udelhofen, 2006). RAP acceptance in road bases and sub-bases has been limited, because of lack of laboratory and field data (Taha et al., 2002). However, the use of stabilized RAP as sub base and base materials of pavement leads not only to economic solution (Kennedy et al., 1998; Anouksak and Direk, 2006) but also offers a potential use of the RAP treated with cemented materials like sawdust ash, thus reducing the amount of waste materials requiring disposal and providing construction materials with significant savings over new materials (Shroeder, 1994).

The properties of RAP are largely dependent on the properties of the constituent materials and asphalt concrete type used in the old pavement. Since RAP can be obtained from any number of old pavement sources, quality can vary, hence, quality control is needed to ensure that the processed RAP is suitable for the prospective application. This is particularly the case with in-place pavement recycling (Anouksak and Direk, 2006). Research has established typical range of particle size distribution, physical, chemical, engineering and mechanical properties of RAP (Shroeder, 1994; Tyrion, 2000; Karlsson and Isaacsson, 2006; FHWA, 2008).

Palm kernel shell is the crash shells housing the palm kernel seed. Palm kernel shells can be considered as a natural pellet and a high grade solid renewable fuel for burning as received both in co-firing with steam coal or burned at biomass power plants, usually blended with other grades of biomass, like wood chips. The palm kernel shell is also used as a source of fuel for the boilers. Unfortunately, the shell contains silicates that form a scale in the boilers if too much shell is fed to the furnace, thus limiting the amount of shell that can be utilized in the boilers. Residual shell is disposed of as gravel for plantation roads maintenance. Blacksmiths also buy the shells to use as fuel material in their casting and forging operations (AbdulAzeez, 2011).

Palm kernel shells are derived from the oil palm tree (elaeis guineensis), an economically valuable tree, and native to western Africa and widespread throughout the tropics (Ndoke, 2006). Palm kernel shell is an industrial waste and it's available in large quantities especially in palm oil producing area of the southern part of Nigeria. Palm kernel shells have very low ash (about 3% weight - ASTM D3174-02, 2002) and sulphur (about 0,09% weight – ASTM D4239-02, 2002) contents. The specification is 20% max of Moisture, 3% max of fiber and dirt. (AbdulAzeez, 2011).

Palm kernel shells are used mostly as aggregates in concrete (Sulymon, 2005; Olanipekun, et al., 2006; Alengaram et al., 2008; Alengaram et al., 2010; Olutoge, 2010; Sarman and Omidreza, 2011) and asphalt concrete (Ndoke, 2006).

Fly ash is a pozzalana, which when combined with calcium oxide and water forms cementitious materials. Like the coal fly ash, PKSA can be classified as either class F that contains less than 10% lime (CaO) or class C with more than 10% lime (CaO) content. Class F fly ash (with pozzolanic properties, glassy silica and alumina) requires a cementing agent such as Portland cement, quicklime or hydrated lime in the presence of water to react and
produce cementitious compounds. On the other hand, class C fly ash will harden and gain strength over time in the presence of water. While both classes are considered to be pozzalanic, class C fly ash is usually self-hardening (Halstead, 1986). Fly ash is one of the few waste materials that have an American Society of Testing and Materials (ASTM C618-92a, 1994) standard for procedures of sampling and testing. Depending on the use and requirements, fly ash can be used to replace some of the cement in admixture treatment of a deficient material.

Researches undertaken with other ashes show that the Laboratory results of the stabilized materials improved in stiffness and strength. When the materials were stabilized with coal fly ash, California bearing ratio (CBR) and resilient modulus (Mr) values increased from 24% and 51 MPa, respectively, for RSG before stabilization to 48 – 90% and 96 – 195 MPa, respectively, after stabilization (Edil et al., 2007; Hatipoglu et al., 2008). Li et al. (2009) reported CBR value of 154% for coal fly ash stabilized RSG, while the CBR and Mr values of RPM, respectively, increased from the ranges 3 – 17% and 45 - 50 MPa before stabilization to 70 – 94% and 78 – 119 MPa after stabilization, respectively (Li et al., 2008). Misra et al. (2007) also reported an improved recycled asphalt base material with CBR value of 120% when treated with coal fly ash. However, the use of palm kernel shell ash (PKSA) as highway construction material is largely not documented.

The current most appropriate document for general pavement design is TRRL report 1132 (2000). This document relate the current "normal" traffic flows, type of traffic and CBR value of the subgrade "1132" to the design of highway pavement. TRL Report TRL615 - Development of a more versatile approach to flexible pavement design (2000). Flexible composite pavement design also deals with the idea of increasing the versatility of road pavement design to give the engineer a wider choice of materials and design configurations. This increased versatility will lead to more economic designs by allowing new materials, recycled materials and a wider range of secondary aggregates and binders to be used. It also offers the potential to enable stronger foundations to be constructed, incorporating hydraulically bound materials and providing the option of reductions in the more expensive surfacing layers. These materials are however chosen to withstand cyclic loads, water absorption and minimize stress formation in the soil. This study considered the characterization of palm kernel shell ash stabilization of RAP as highway pavement construction materials.

CONCLUSIONS

An experimental approach was used to assess the suitability of RAP stabilized with non-self-cementing PKSA as highway pavement material. The improved particle size distribution of PKSA stabilized RAP contain 95.2–99.5% coarse materials with 0.5 – 4.8% fines content and falls under AASHTO classifications of A-1-a and A-1-b described as very gravelly SAND. The materials are generally non plastic.

The specific gravity of 100%RAP and 100%PKSA are 1.81 and 1.31, respectively, while the values for the various RAP/PKSA mixes are in the range 1.18 - 2.42.

The maximum dry density (MDD) decreased as the optimum moisture content (OMC) of the RAP/PKSA mixes increased with higher PKSA content. The highest MDD of 1.88 Mg/m³ with corresponding OMC of 24.5% is obtained for 90%RAP/10%PKSA mix proportion.

The experiments are based on local waste materials of PKSA and RAP generated and deposited in large quantities resulting in environmental problems. The evaluations of the waste are limited to laboratory experiments whose results can be used as a control to field work. The strength empirical parameter of California bearing ratio is still used as a bases to characterizing road construction materials in developing countries of the world.

The 90%RAP/10%PKSA mix with CBR value of 17.11 and 21.39% (soaked and unsoaked values, respectively) achieved using BSL compaction energy can be used as sub grade materials in road construction.

REFERENCES
http://exportfromnigeria.proboards.com/index.cgi?board=general&action=display&thread=78
(Last accessed 27th December, 2011)


E. Alzamora, Geotechnical Special Publication, GSP 211, pp. 1172 – 1181.


RURAL URBAN TRANSFORMATIONS IN THE DEVELOPING COUNTRIES: A CASE STUDY OF NIGERIA

Babalola, Daniel Olatunde
Department of Architecture, College of Science and Technology
Covenant University, Canaan Land Ota, Ogun State, Nigeria
E-mails: daniel.babalola@covenantuniversity.edu.ng; obablola@yahoo.com

Abstract
This study which was aimed at gaining better understanding of the mutations in morphology of rural urban environment has the objectives to: review the evolution of human/urban agglomerations; assessed the trends of rural urban development; assessed the trends of rural urban development in Nigeria and made regional comparisons of the main issues. The methodology adopted includes the qualitative and quantitative research design methods based on secondary data. Data characterizing the regions/areas objectively were presented and appropriate analytical methods including factorial growth rates, differentials and cube root transformations, were used to determine the trends. The results showed that rate of rural urban transformation in Nigeria is exceedingly high and one of the highest not only regionally but globally. The paper concluded that cities structures are very complicated and brought about by a network of myriad of forces. The cities evolved through evolutionary processes from human settlement which grew in sizes, population, and physical development etc.; the form of such cities also increase in complexities and recommended that for the developing regions particularly African continent (with two global megacities Cairo, Egypt and Lagos, Nigeria) to be able to curb the numerous problems of poverty, hunger, malnutrition, population explosion, high rates of cities growth among others, associated with urbanization, there must be complete economic transformation and attainment of high level technological development as already attained by Europe and North America, which have the capability of bringing about great improvements in the image, forms or outlook of cities, as sustainable architecture/planning, urban design and construction of buildings and infrastructures can be carried out better and faster than they used to be, to aid human habitation with enhanced quality of life.

Keywords: Cities, developing countries, human settlement, rural areas, sustainability, urbanization.

INTRODUCTION
Background to the Study
In most parts of the world rural areas have been declining since the 19th century or earlier, both as a proportion of land area, and in terms of the proportion of the population living in them. Urbanization encroaches on rural land, and the mechanization of agriculture has reduced the number of workers needed to work the land, while alternative employment is typically easier to obtain in cities. In parts of the developed world urban sprawl has greatly reduced the areas that can be called rural, and land use planning measures are used to protect the character of rural areas in various ways. Rural areas or the country or countryside are areas that are not urbanized, though when large areas are described, country towns and smaller cities will be included. They have a low population density, and typically much of the land is devoted to agriculture. The degree to which areas of wilderness are included in the term varies; very large wilderness areas are not likely to be described by the term in most contexts. About 91 percent of the American rural population now earns salaried incomes, often in urban areas. The 10 percent who still produce resources generate 20 percent of the world’s coal, copper, and oil; 10 percent of its wheat, 20 percent of its meat, and 50 percent of its corn. The efficiency of these farms is due in large part to the commercialization of the farming
industry, and not single family operations (Howarth, 2011).

The Census Bureau definitions (new to the 2000 census), which are based on population density, defines rural areas as all territory outside of Census Bureau-defined urbanized areas and urban clusters. An urbanized area consists of a central city and surrounding areas whose population ("urban nucleus") is greater than 50,000. They may or may not contain individual cities with 50,000 or more; rather, they must have a core with a population density generally exceeding 1,000 persons per square mile; and may contain adjoining territory with at least 500 persons per square mile (other towns outside of an urbanized area whose population exceeds 2,500): Thus, rural areas comprise open country and settlements with fewer than 2,500 residents; areas designated as rural can have population densities as high as 999 per square mile or as low as 1 person per square mile (CRS, 2005); USDA, 2011): The USDA's Office of Rural Development may define rural by various population thresholds. The 2002 farm bill (P.L. 107-171, Sec. 6020) defined rural and rural area as any area other than (i) a city or town that has a population of greater than 50,000 inhabitants, and (ii) the urbanized areas contiguous and adjacent to such a city or town: The rural-urban continuum codes, urban influence codes, and rural county typology codes developed by USDA's Economic Research Service (ERS) allow researchers to break out the standard metropolitan and nonmetropolitan areas into smaller residential groups (CRS, 2005). For example, a metropolitan county is one that contains an urbanized area, or one that has a twenty-five percent commuter rate to an urbanized area regardless of population.; OMB, Under the Core Based Statistical Areas used by the OMB: a metropolitan county, or Metropolitan Statistical Area, consists of (i) central counties with one or more urbanized areas (as defined by the Census Bureau) and (ii) outlying counties that are economically tied to the core counties as measured by worker commuting data (i.e. if 25% of workers living there commute to the core counties, or if 25% of the employment in the county consists of workers coming from the central counties): Non-metro counties are outside the boundaries of metro areas and are further subdivided into Micropolitan Statistical Areas centered on urban clusters of 10,000-50,000 residents, and all remaining non-core counties (USDA; CRS, 2005).

The U.S. Census Bureau, the USDA's Economic Research Service, and the Office of Management and Budget (OMB) have come together to help define rural areas.; United States Census Bureau: 84 percent of the United States' inhabitants live in suburban and urban areas (Yen, 2011), but cities occupy only 10 percent of the country. Rural areas occupy the remaining 90 percent (Howarth). The nature of the term 'rural' varies from place to place. It often refers to areas in the country concerned which are less densely populated. There are different types of rural areas, depending on how accessible they are from urban areas. These range from the rural urban fringe, to the extreme (remote) rural areas (GCSEBitesize, 2011). Rural areas change over time. These changes are caused by: economic factors - tourism income, farming profitability, primary sector jobs; environmental factors - land use, pollution, conservation; and social factors - population change and migration, leisure time, retirement population. There are different types of rural areas, which can be classified according to how accessible they are to the urban areas, the core and densely populated, where the number of people per square kilometre is high; rural-urban fringe, the very edge of the city, beyond the suburbs, where countryside and city merge; economic, to do with money and finances; environmental, your relationship with the environment around you; and social, to do with society and social organisations.

Conclusions
From the results of this research, it was concluded that, cities structures are very complicated and brought about by a network of myriad of forces. The cities evolved through evolutionary processes from human settlement which grew in sizes, population, and physical development etc.; the forms of such cities also increase in complexities. Cities in the developing regions that have most of the modern
technological facilities tend to grow faster than those in the developed regions. The differential rates of evolution of cities was observed globally and regionally that, the more highly economically developed and technologically advanced a region is the less the rate of growth of cities (or the lower the rate of cities evolution in terms of number per annum on regional basis), i.e. North America and Europe with high level of technological development succeeded in keeping rate of growth of cities (1950-1995) very low.

REFERENCES


Planner’s Perspective, Lagos, Nigeria: Libro-Gem Books

Godwin, J. 2005. ‘Dependency to Independence to Interdependency: Architecture as a part of the progression and the significance of interdependency within the global picture’, a paper delivered at the Covenant University, Ota Ogun State in May 2005.


PRB. 2000. Number of cities with population of one million or more 1950-1995


UN. 2011. World Percentage Change in Population (2000-2010) with Regional/Continental (Sub) Totals in 2010


UN. 1995. World Urbanization Prospects: Number of cities with population of one million or more in Nigeria 1950-1995


AN INTEGRATED APPROACH TO ENVIRONMENTAL SANITATION IN DEVELOPING NATIONS

Marwan Haruna Abdulkarim
Special Assistant to the Governor on Environmental Sanitation,
Governor’s Office,
Zamfara State

Abstract

Improving access to sustainable Environmental sanitation is a key element for an improved public health and reduction in mortality rate. Some definitions of environmental sanitation have narrowed it to safe disposal of human excrement, but in the most recent times it has been understood to go beyond that. Environmental sanitation denotes the control generally, of those elements in the environment that affect or may affect human health. Hence, environmental sanction is being defined as an adjustment of the environment for the prevention of disease. It include such subjects as pollution control, hygienic quality of food, control of insects, rodents and other vectors as well as waste management. The sustenance of environmental sanitation in the developed world has impacted greatly in lower mortality and morbidity rates. However, this is not so in the developing nations due to the lack of sustainable environmental sanitation. Accordingly, the author of this paper presents herein an integrated approach to obtaining a sustainable environmental sanitation in the developing nations. The approach looked in to the causes and the way forward that include enactment of environmental sanitation laws, organizational structure, social marketing and economic/financial outlines.

Key words: environmental sanitation, sustainability, integrated approach.
SUSTAINABLE LAND USE AND DEVELOPMENT: PERSPECTIVE ON COSMO CITY, JOHANNESBURG, SOUTH AFRICA

George Okechukwu Onatu
FACULTY OF ENGINEERING AND BUILT ENVIRONMENT
DEPARTMENT OF TOWN AND REGIONAL PLANNING
UNIVERSITY OF JOHANNESBURG
DOORNFONTEIN CAMPUS
gonatu@uj.co.za

ABSTRACT
The rapid growth in housing demand since 1994 represents a mammoth task for both the present and future housing policy in South Africa. The new Developmental Local Government in an effort to address this challenge has placed high premium to informal settlement formalization and mixed income housing development. The rationale behind these two approaches is to address urban poverty, segregation and redevelopment. The goal of this paper is to appraise mixed income housing development as it relates to sustainable land use with the objective towards integration along racial and social grounds. The problem associated with South African housing policy in creating separate residential development based on income group has reached a crisis point in addressing housing challenge facing the country. The poor remain located on the peripheries of the cities where the land is cheap and far from their places of work and have to travel long hours to and from work. The City of Johannesburg is characterized by fragmented housing development that lack harmonious integration and this impact on infrastructural provision and access to job opportunities. Hence, this investigation tends to appraise the development of mixed income housing development in addressing these challenges. This investigation will be based on an exploratory research and will reviewing the success and challenges of mixed income housing development. Both published and unpublished literatures were equally use in this study as well as focus group discussion and interview with the beneficiaries as well as the principal developers and City of Johannesburg representatives. Integration of the poor into the urban system is achievable with effective and efficient Public Private Partnership.

Key words: Sustainable land use, Mixed income housing strategy, Public Private Partnership and Poverty alleviation.

INTRODUCTION
The search for the ultimate sustainable urban development and form perhaps now needs to be reoriented to the search for a number of sustainable urban forms which respond to a variety of existing settlement patterns and contexts (Jenks, et al, 19996:345). Studies have shown that the form of a town or city can affect its sustainability. It is widely accepted in the field of urban planning and related built environment that a relationship exists between the shape, size, density and uses of a city and its sustainability. However consensus is lacking about the exact nature of this relationship in urban studies debate (Williams, et al, 2000). The relative sustainability of, for example, high and low urban densities, or centralized and decentralized settlements is still disputed. Certain urban forms appear to be more sustainable in some respects, for example in reducing travel, or enabling fuel efficient technologies, but detrimental in others, perhaps in harming environmental quality or producing social inequality. To help to understand what sustainable land use and urban development means it is imperative to understand the concept of sustainable development and then relate this to specific
urban form. The most widely definition of sustainable development is that of the WCED (1987), which describes it as development which is capable of meeting today’s needs without compromising the ability of future generations to meet their needs. This definition contains inter-generational equity and social justice, as well as environmental awareness (Haughton and Hunter, 1994 cited in Williams, 2000: 3). In view of this definition we now see ourselves being confronted with the question, “How do policy makers achieve the objective of building a sustainable city using a mixed-income housing development”? This is the critical question that lies at the heart of this research. We shall tackle this question not in a straightforward manner; instead we approach it by reviewing a specific land use development strategy the mixed-income housing project. The argument in using this case example is not to justify it as the only ideal model but to serve as one of the pathways towards achieving sustainable city. According to Guy and Marvin (2000 cited in Williams, et al, 2000) the achievement of sustainable cities is a process and not the result of implementing a particular model.

Mixed-income housing development strategy has attracted the attention of many scholars and also feature in many policy documents, namely, (Department of Housing South Africa, 2005; Duda, 2005; Fraser & Nelson, 2008; Hoek-Smit, 2002; Huchzermeyer, 2005; Marshall, 2005; Milligan, et. al, 2004; Smit et.al, 2006). These scholars points out that mixed-income housing development is an innovative approach to housing delivery that provides a mixture of housing products to suit low income earners, middle income earners as well as high income earners. Proponents of mixed-income housing at another angle posit that economic diversity within a neighbourhood would automatically enhance community interaction and improve neighborhood characteristics (Cole & Goodchild, 2001; Joseph, 2006; Klein hans, 2004). Early studies on mixed-income housing initiatives were guided by the general hypothesis that enhanced neighborhood conditions-physical, political, and socioeconomic-translate into public goods that were broadly distributed across all households (Fraser & Nelson, 2008). Studies has shown that mixed-income housing does not automatically produce these hypothesized neighborhood-and household-level outcomes both in the U S (Collins, et al.2005; Kleit, 2001; Popkin et al. 2004; Salama, 1999 and Varady et al. 2005).

DeFilippis and Fraser (2008:2 cited in Onatu, 2010) in reaction to these findings question the premises on which mixed-income housing and neighbourhood (MIHN) policy were always based on the above stated reasons as they found themselves attracted to the ‘ideal”, in theory, but frustrated by its reality in “practice”. According to their research, these policies tend to ‘leave poor people in places without the social networks and informal social support of prior neighbourhood’ (ibid: 10). Poor urban neighbourhood is noted to have dense networks of social support that have been created out of necessities because services that are commodities in wealthy neighbourhood (childcare, for instance) must be negotiated as non-commodified when the participants do not have money. They noted that mixed-income policies have failed to create social mixing, networks, interaction as well as institutional services and capacities. Being in close proximity need not engender interaction, and when it does, that interaction may mean conflict as much as anything else. It is unclear whether or not the physical proximity of the rich and poor will lead to the rich even acknowledging, let alone understanding or trying to understand the poor (De Filip pis & Fraser, 2008:10). Using as example US Department of Housing and Urban Development’s (HUD) HOPE IV program, Fraser & Nelson (2008) noted that mixed-income developments can reduce the incidence of social problems related to concentrated poverty while providing opportunities for low-income households to gain access to better neighborhoods. Placed-based mixed-income housing initiatives they argue can play a role in creating a foundational environment in which other poverty ameliorating strategies can be more successful (e.g. Welfare to Work, Jobs Plus).

Schwartz and Tajbakhsh (1997) found that mixed-income represent the current direction of U.S. Housing policy, but caution
that little is actually known about its social benefits, its costs, and the preconditions for its viability. According to their findings, research on mixed-income housing is necessary to determine the extent to which reducing the concentration of poverty can also reverse the social problems connected to poverty. Mixed-income housing are created through four different context, namely, density bonuses and other land-use regulations, special public housing programs and initiatives, State and Local housing programs, and nonprogrammatic mixed-income housing (private individuals and organizations building and sustaining mixed-income housing outside of any institutional framework that specifically promotes such housing) (Schwartz& Tajbakhsh, 1997:17).

Mahlangu (2007) in describing mixed-income housing strategy in South Africa noted that small rental units to go alongside bigger houses. South Africa’s first mixed-income housing development hits the market. “Jerusalem”, in Fairland, northwestern Joburg, will see lower-income earners living side by side with more affluent homeowners. The plan is to build 187 houses on 9.3ha of council-owned land. Social housing units would take up 30% of the development. The 55m² social housing units will feature two bedrooms, a kitchen, bathroom and living room. They will be rented out for R1, 500 to R2, 000 a month to families earning between R3, 500 and R7, 000 a month. The other units, which will make up 70% of the development, are expected to sell at over R1.5- million. Initially, residents were extremely concerned about the original proposals for an extensive low-cost housing development in their area. Francois Viruly (2007) in commenting on this development stated that “The only issue that we need to watch out for is that we build such units in areas where there is sufficient infrastructure. Mixed income housing development according to some analyst can have important role in getting additional affordable units built, ensuring high quality housing and deconcentrating poverty (http://www.knowledgeplex.org).

Notwithstanding the benefits, they further noted that mixed income housing is not the silver bullet to overcome the difficult challenges faced by families seeking to escape from poverty or realities of housing markets. This is because mixed income housing developments are complex, present unique risks, and often house fewer needy families than other type of development. Contextual factors at local, state and federal levels all impact mixed-income housing development as these projects typically involve complicated multi-level coordination (Fraser & Nelson, 2008 cited in Onatu, 2010).

CONCLUSION AND RECOMMENDATION

Mixed-income housing development as shown in this study incorporating various socio-economic grouping has portrayed an element of the use of settlement to aim at sustainable development. Private sector participation in housing development should be encouraged as most local authorities are struggling in terms of finance to address socio-economic issue and service delivery. Integrated sustainable human settlement can be developed without compromising and infringing on people’s comfort. There is need to strengthen the inclusion of mixed income (inclusionary housing) as a policy to form part of the Housing code chapter in South Africa. Mixed income housing has the ability to deal with South African highly segregated built environment as access to land is a very big issue and to acquire prime land for the location of the RDP houses is very difficult. The success of Cosmo City is the appropriation of land by the City of Johannesburg from private developer and this brought down the development cost. The need for intersectoral collaboration cannot be overemphasized in view of the project. There is need to further research on the extent to which land use regulation policies are monitored and adhered to by residents of this community.
REFERENCES

Christian, M, (2009), Focus group discussion: Project Facilitator CODEVCO


Cowden, B. (2006) Cosmo City Review. Social Housing Focus Trust


Luc-Limacher, J (2009), Focus group interview: Project Town Planner, Cosmo Project


The Sunday Times (2006) , *Housing Policy makes victims beneficiaries September 30th*


[www.knowledgeplex.org](http://www.knowledgeplex.org) cited on 27th of September, 2009


ENVIRONMENTAL IMPACT ASSESSMENT (EIA) APPROACH TO SUSTAINABLE ENVIRONMENTAL PLANNING, DESIGN AND MANAGEMENT IN NIGERIA

J. A. ODERINDE,
Department of Urban and Regional Planning
The Polytechnic, Ibadan.
oderindej@yahoo.com

Abstract
Prior to the advent of the Nigerian Urban and Regional Planning Law Decree 88 of 1992, the development of the built environment in the urban and rural areas was done without recourse to the incidence of development strides on the natural environment. The practice of developing the urban and rural areas in the past have resulted into scores of uncontrolled and uncontrollable environmental disasters and menaces in the urban and rural settlements. The effects of human activities in the development of the built environment have led to the distortion of man-environment equilibrium. This is usually accompanied by adverse environmental hazards and repercussions which threaten the total existence of man. Today, the increasing concern for the quality of the environment justifies the need for and the indispensability of the Environmental Impact Assessment (EIA) policy that provides for effective management of the precious environment. Persistent increase in industrial and urbanization processes, application of sophisticated technology and their concomitant incidences have, over the past decades, heightened the concern, the world over, for the proper management of the environment to improve its quality and make it sustainable for human well-being. This paper discusses the importance of EIA in environmental management policies generally and for national development in Nigeria in particular. It looks at the EIA concept and the need for it. Its principles and procedures are discussed. The paper also provides the basis for the effective design, planning and sustainable management of the built and natural environment.

Keywords: Environment, Environmental Impact Assessment, Sustainability, Development.

INTRODUCTION
Environmental planning, design and management basically aim at ensuring an orderly, healthy, beautiful, convenient, functional and naturally sustaining human environment. A sustainable human environment creates cost effective, life-sustaining development that eventually, if given adequate attention, enables the earth's generative capacity its ability to recuperate and to maintain steady productivity. This leads to the concept of resource conservation, which is a strong component of sustainable development. One of the current means of minimizing the negative effects of large-scale changes in the environment due to imbalances in the ecosystem is the adoption of the Environmental Impact Assessment Policy which must be applied in especially large-scale development projects in order to determine well ahead of time, adverse effects, before, during and after the execution of such projects. The EIA is thus a planning tool for preventing environmental problems due to an action plan, it helps in the avoidance of costly mistakes in project implementation (FRN,1992).

CONCLUSION
With the way and manner that man's activities on earth planet have been degrading the physical environment, the need for an action plan to take into consideration possible effects of pollutants from proposed developments cannot be over-stressed. Environment watchers all around the World wonder how long the earth planet would continue to tolerate this abuse and at the same time sustain man's existence. The introduction of Environmental Impact Assessment (EIA) is a step towards checking the menace. Consequent upon this, many agencies, such as the Petroleum Industry, in the country have made it mandatory for operators to conduct studies and prepare environmental impact and evaluation reports for their proposed physical developments. The environmental impact assessment is a harbinger to a cleaner and sustainable
environment where man and his environment can be in harmony with one another.

**REFERENCES**


Abstract
There is always an accelerated increase in the population of our urban centres, as a result of rural-urban migration. People tend to drift to the urban centres in search of job and employment opportunities, higher economic gains and access to better quality of life. This phenomenon results in uncontrolled urban expansion, which brings in its wake squatter settlement, indiscriminate erection of illegal structures and haphazard housing development. Most of these erections are located on drainage lines and occasionally blocking access to the evacuation of debris and hindering the free flow of surface water thereby contributing to urban flooding. Additional to this are some bad architectural and construction practices where large percentage of building premises are covered with concrete floors and interlocking pavement, indiscriminate cutting of trees and depletion of grass land. These practices deny surface water the opportunity to sink thereby exacerbating urban flooding. This paper tries to identify the variables that are responsible for urban flooding in Aba City and professes solutions for amelioration through the deployment of urban resilience mechanism.

1.0 INTRODUCTION
FEMA (2001) defines flood as a general and temporal condition of partial or complete inundation of normally dry land areas from overflow of inland or tidal waters or from the unusual and rapid accumulation of run off or surface water from any source.
In a natural environment, when it rains, water normally infiltrates into the soil. With the increase in urbanization, (Tobin and Montz, 1997) and the consequent increase in population, which encourages developments, erections of more buildings, increase in paved surfaces and alterations of the built environment, more lands are utilized, leaving little surface area for water infiltration such that with a little amount of water fall, an urban environment experiences rapid flooding.(Adina 2001).
Under rapid and uncontrolled urban development, this scenario becomes a big challenge, because most of the buildings which are haphazardly developed are erected along flood plains, making it difficult for the passage of run-off thereby exacerbating the case of Urban Flooding.
Also, under rapid urbanization, the previously built drainage could be overwhelmed by flooding, and becomes inadequate in the quick and efficient discharge of storm water. Other factors, such as indiscriminate dumping of refuse especially into drainage lines, such as gutter have also severely contributed to excessive flooding of the urban environment. (Ojo, 1991, Isong 1999)
In Urban areas, the impact of flooding is very high because of high population density, housing congestion and the presence of infrastructure.
Urban Flooding has caused the death of many people. Buildings have been submerged, collapsed and washed away, under very heavy flood situation.
Large scale disruption of social services has been experienced as a result of urban flooding. Because of the deleterious nature of urban flooding, there’s the urgent need to focus attention, and carry out thorough investigation into the dynamics of urban flooding, in order to reduce the hazards and if possible to completely eradicate it, so that urban life could be less distressful, and more meaningful to residence.
Aba City in the South-Eastern Nigeria is one city that is constantly besieged and
inundated with Urban flooding. This study examines some of the human and environmental factors that are contributing to urban flooding in Aba; and in evaluating these variables makes practical suggestions on how the menace of urban flooding could be prevented, controlled and eradicated.

CONCLUSION
Aba is located within the Tropical Rain Forest Belt of Nigeria. It is difficult to eradicate Urban flooding. But something can be done to checkmate it’s destructive potential. This can be done by constantly evacuating the obstructed drainage systems which is the main problem and cause of urban flooding in Aba. Government should show proactive response towards the issue of urbanisation. So long as the world is still developing, there would be increase in rural-urban migration which is certainly the chief cause of urbanization and the concentration of population. The need to provide adequate drainage infrastructure in developing communities around Aba would be a vital strategy in combating urban flooding in the city of Aba.

REFERENCES
Seye Ojo, (2011): Abode for humans or a pigsty, Daily Sun, Tues June 28, 2011, PP 16
MUNICIPAL SOLID WASTE MANAGEMENT AS MEANS OF ECONOMIC DEVELOPMENT AND WEALTH CREATION.

Oyedele, Olufemi Adedamola  
MD/CEO, Fame Oyster & Co. Nigeria (Project Managers and Sustainable Development Consultants).

Abstract  
Effective municipal waste management has dual purposes of reducing environmental, social and economic effects of wastes in the built environment, and also serves as a means of wealth creation (with efficient waste to wealth programme). Municipal wastes are refusals from an individual, group of individuals or organization, but the fact that these wastes have been refused by a party does not mean that they are useless. Wastes can be harnessed, harvested and turned into wealth. Municipal wastes are generated daily and when this is combined with the industrial solid wastes produced at the same rate, what we have is stable supply of raw materials for production of wealth. Wastes are limited in categorization. This makes it easier for them to be recycled. The type and volume of wastes generated greatly depends on class. Municipal solid wastes can either be food remnants, glass, wood, wood-shavings, paper, cloth, pet bottles, rubbers, plastics, nylon, tyres, metals, foam, others. This grouping of wastes is the beginning of processing them into usable materials. Some metals are combined to form alloys and derive superior benefits of combined characters. The innovation of modern methods of wastes recycling like pyrolysis, catalytic decomposition and conversion has made total eradication of wastes possible. Waste dumps and refuse grounds are depository and custodians of artifacts, antiques and wealth. The means of derivation of wealth from wastes is a system. If well harnessed, municipal wastes can serve as great income earners and means of economic development for individuals, organisations and states.  
Key Words: Municipal Solid Waste, Private Sector, Recycling, Wealth Creation, Waste to Wealth.

Introduction  
Sustainable management of municipal solid wastes seems to be the solution for eradicating wastes in the built environment and simultaneously, creating wealth. Municipal solid waste or municipal solid waste (MW or MSW), also known as refuse, trash or garbage, is a type of waste consisting of everyday items that we consume and discard. It is predominantly food wastes, garden wastes, containers and packages of products, and other miscellaneous inorganic wastes from residential, commercial, institutional and industrial sources. Municipal wastes are inevitable in our daily living.

Conceptually, municipal solid waste or refuse is any solid material which is discarded by its owner, user or producer. Solid wastes are left-over arising from human, animal or plant activities that are normally discarded as useless and not having any consumer value to the person abandoning them (Oyedele, 2005). The fact that they are not having either economic or social value to the person discarding them does not mean that they cannot be valuable to any other person. Solid wastes, at times, are like the cornerstones of the builders and are the materials for the production of some goods. “One man’s meat is another man’s poison”.

Wastes are also an extremely heterogeneous mixture of constituents that appears to vary according to season, the social characteristics of the neighbourhood and which has changed in response to evolving situation. Timaru District (New Zealand) Consolidated Bylaw 2007 defined solid waste as “any material that is primarily not a liquid or gas, is unwanted and/or unvalued and is discarded or discharged by its owner”. Solid Waste may include material that may potentially be reused, recycled and composted. Solid waste that has been disposed in the landfill is called rubbish.
Also, solid waste can be defined as human unwanted tangible materials that cannot directly flow into streams or evaporate into the atmosphere. They are the solid products or leftovers of domestic operations in the house, recreation areas, agricultural operations, construction, demolition, maintenance and repair works, packaging and manufacturing activities etc. It consists thereof, of discarded solid materials resulting from domestic and community activities and from industrial, commercial and agricultural operations. The composition of solid wastes in any settlement reflects the nature and composition of its human activities, culture, economic class (wealth level) etc.

This paper will discuss the various types of wastes that are generated daily by individuals, their incidence of generation, and their usefulness as raw materials for production of other goods. It will also show that there is no waste that cannot be reduced, re-used or recycled into another usable product.

Conclusion

With the discovery of waste management technologies like “gasification” and “pyrolysis”, all wastes can now be recycled and converted. Both organic and inorganic wastes can be burnt in a container without oxygen thereby giving out useful gas as bye-products. Apart from ensuring a decent environment, a co-ordinated and sustainable municipal waste management process will result into industrial emancipation of Nigeria and will boost our economic and tourism development. Wastes are capable of spurning the industrial development of Nigeria in the twenty-first century if properly harnessed and recycled.

Richard Pryor, an American and one time president of Solid Waste Management Association, said “nothing became wasteful unless if left unattended to”. The three r’s of waste management are: reduce, reuse and recycle. Wastes could be recycled to generate wealth. A lot of benefits could be derived from wastes if recycled. In places like Nigeria, wastes could be used to generate power, a development that could help the industrial development of the nation. Wastes can also be used as source of raw materials for industrial use. Wastes are used as economic instruments and as a source of raw materials for the industries in America, Britain, Canada, Denmark etc. In Ireland, it is used as political instrument where cities and villages compete for the coveted price of the “most beautiful city and village” every year. In Singapore, it is a custom and waste management is part of their educational curriculum right from the primary schools.

Enormous wealth is kept untapped in waste dumps in Nigeria. Wastes can be properly harvested, recycled and converted into raw materials for industries in Nigeria. Effective waste management is a system, a system that requires investment. Government should plan waste dumps in an inconspicuous locations. Plants (buffers) are used to screen waste recycling centres to make them less hazardous and away from the sights of passers-by. The scavengers hunting for wealth from wastes and the cart-pushers should be properly trained and recognised as part of the waste management system. Wastes transporters and officers working at our waste dumps should work in line with the international standard. Shower rooms and water closet toilets should be provided in our waste dumps for workers use. It is through this concept that all the stakeholders can efficiently contribute meaningfully into harnessing the wealth in waste management.

References


THE IMPACT OF SPORT TOURISM IN CONFLICT AREAS: CASE STUDY OF IFE AND MODAKEKE, OSUN STATE

Ndasule A.N
Department of Hospitality, Leisure, and Tourism Management, Federal Polytechnic Ede, Osun State. noraakerele@yahoo.com

Abstract
This research covers “sport tourism as a tool for sustainable peaceful co-existence in a conflict region” thus it’s focused on both Ife and Modakeke communities in Osun state. Sport foster social integration among different ethnic groups, it is an avenue to create an environment in which people come together to work towards the same goal and show respect for others. The purpose of this study is to pinpoint the role which sport tourism can play in promoting peace in conflict region. both the economic and social impact of sport tourism were also discussed and the effect of conflicts on environment is not left out. Various relevant data were gathered from the primary source by administering structured questionnaire, to randomly selected respondents from both communities. Analysis of data was achieved by means of Simple descriptive statistics, and 86% of the respondents agree that sport tourism can actually be used in promoting peace in troubled areas. In conclusion sporting activities can be used as a reconciliation tool to encourage, understanding and tolerance between communities, ethnic groups, religious groups, etc. It was then recommended that the local government, state government and the federal government should encourage various sport activities in these communities and also sporting facilities should be provided by government.

Keyword: Conflict, Peace, Sport Tourism, Nigeria.

THE STUDY AREA
The study area of Ife/Modakeke are located in Ife west and Ife east of Osun state, which falls with latitude 7.33N and longitude 4.34E of the equator and Greenwich meridian respectively. is Ife an ancient Yoruba town in Nigeria, South west of Nigeria, According to historians, the town’s habitation can be traced as far back as 600 BCE. The meaning of the word “ife” in the Yoruba language is "expansion"; "Ile-Ife" is therefore a reference to the myth of origin "The Land of Expansion". In fact, the city is commonly regarded as the origin of the Yoruba culture.

Modakeke is a town in Osun State, South West Nigeria, with a population of close to three hundred thousand people. The Modakekes are also known as the “Akoraye” and have a history of valor at war and are prosperous farmers. With the fall of the Oyo Empire to the Fulani, the Yoruba kingdom was thrown into confusion and the inhabitants of the Old Oyo were dispersed and started new settlements all around Yoruba land. Fleeing southwards in search of new abodes after the fall of the Oyo Empire, the Oyos started settling among the Ifes in 1834. As the Romans of old, they were soldier-farmers Ooni Akinmoyero gave the displaced Oyo an expanse of land to stay outside the walls of Ife, the place given to the Modakekes was home to a species of bird called Ako (Stork), Hence the origin of the appellation AKORAYE (The stork has a place). It was also customary for the storks at the location to chirp and sing the rhyme “Mo-da-ke-ke-ke” which was most of the time heard by the Ifes and it was decided that the new settlement would be called MODAKEKE.

RECOMMENDATION
Based on the finding and conclusion reached, the following recommendations were made.

The collaboration among international organizations,
governments, NGOs and local communities is essential to operate sport based initiatives that work towards development and peace

- Organizing of inter-communities on different sporting athletes for the youth in the communities in order to determine the best and discharge in productive ones, which could serve as job opportunities for the successful contestant.

- Enlightens programmed should be made for people on the importance of sport tourism in promoting of peace in a conflict regions

REFERENCE
Boyowa (1993): Environment and tourism in Nigeria national library of Nigerian cataloging publication
Business day Editorial (Friday 28 - Sunday 30 May 2010)
SWISS (2005) “Sport for development and peace” swiss agency for development and cooperation (sdc) (c) 2005
www.wikipedia.com: (http://www.sportsevents365.com/)

Categories:
DEVELOPMENT OF WIND POWER SYSTEM FOR REDUCING GLOBAL WARMING EMISSIONS

OLUSOLA O.I. and OLUYAMO S.S.
Department of Physics
Federal University of Technology
P. M. B. 704, Akure
E-mail: olajidelbk@yahoo.com & oluyamos@yahoo.com

Abstracts
Wind energy as one of the active solar technologies involved in energy generation has historically been used to propel sailing ships or converted into mechanical energy for pumping water or grinding grain; the principal application of wind power today is the generation of electricity. Wind energy as power source is favoured by many environmentalist as an alternative to fossil fuels, as it is plentiful, renewable, widely distributed, clean, and does not produce greenhouse gas emissions which is one of the major contributors to global warming. This paper describes the anatomy of a wind power turbine system, a set of statistics from the American Wind Energy Association (AWEA) to quantify the comparative emissions of both air pollutants and greenhouse gases of wind and other fuels.
Keywords: wind power, environment, greenhouse gases, global warming, emissions

Introduction
Energy is vital for all living – beings on earth; modern life-style has further increased its importance. Some of the resources available for generating electrical energy are: thermal, hydroelectric, wind power, fuel cells, photovoltaic cells and so on. Solar radiation, along with secondary solar-powered resources such as wind and wave power, hydroelectricity and biomass, account for most of the available renewable energy on earth. However, all renewable energies, other than geothermal and tidal, derive their energy from the sun (Olson, 2010).

In Nigeria for example, the main sources of electrical energy generation are the thermal power station and the hydroelectric power station. The country generates less than 20% of its daily needs; today, non availability and non reliability of electricity has become a way of life. Nigeria with a population of about 150 million people generates about 4,000 megawatt of power. Thailand with a population of about 70million people generates close to 40,000mW of power (Flowers, 2010). South Africa with a population of 45 million generates 46,000mW of power; Ghana with a population close to 21 million generates 1,900mW. United Kingdom and United States of America generates 77,000mW and 300,000mW of electricity power respectively (Sinclair, 2008).

From research, it was discovered that countries which generate higher megawatt of power make use of different sources such as thermal, hydroelectric, wind power, photovoltaic cells to generate their electrical energy (Lema et al., 2007). For example, as at the end of the year 2007, Germany was able to generate 22,247mW of electricity from wind power, United States was able to generate 16,818 mW of electricity from wind power, Spain was able to generate 15,145 mW of electricity from wind power, India generated 8,000 mW of electricity from wind power, while United Kingdom was able to generate 2,389 mW of power from wind (Wald, 2011). Germany generates a total of 370,783mW of power out of which 22,247mW is attributed to wind energy generation.

Conclusion and Recommendation
The research work on secondary solar-powered resources such as wind energy generation using a turbine system is just a means to an end and since wind energy is plentiful and renewable, a large scale wind farm can be constructed to accommodate 50 to 100 wind generators to boost the
output capacity (Archer et al., 2007). In addition to this, a hybrid system comprising of Photo-Voltaic modules and wind turbine system can also be used together to boost overall generated output power; this generated power can then be connected to the power grid lines. With grid-tied systems, excess electricity can be sent to the transmission grid. Because of the metering of energy received by the local grid, the surplus power produced by domestic hybrid generators can, in some jurisdictions, be fed into the network and sold to the utility company, producing a retail credit for the hybrid generators owners to offset their energy costs and the investor can get a good return through payment from the grid authorities.

References


EFFECT OF GRAZING INTENSITY ON CARBON AND NITROGEN STORAGE IN ATRIPLEX CANESCENS CULTIVATED AREAS

A. Sadeghipour\textsuperscript{1,2}, N. Kamali\textsuperscript{1}, M. Jafari\textsuperscript{1}, H. Azarnivand\textsuperscript{1}, A. Haidari\textsuperscript{1}, H. Maddah arefi\textsuperscript{3}

1. Faculty of Natural Resources, University of Tehran, Iran.
2. Faculty of Desert studies, University of Semnan, Iran.
3. Research institute of forests and rangelands, Tehran, Iran.

Abstract

This research focused on quantifying the influence of grazing with different intensities on carbon and nitrogen storages in Atriplex canescens cultivated areas of Tehran Province, Iran. Differences in grazing intensity were quantified as non-grazing (NG), moderate grazing (MG) and heavy grazing (HG) based on rate of vegetation utilization. To estimate C and N stored in biomass and their relationship in plant compartments, simple biomass equations were established in each treatment. To assess carbon and nitrogen storage and their distribution in the different treatments, main stores where organic carbon accumulates contain biomass (aboveground and belowground), soil depth (0-25, 25-50, 50-75 cm) and litter were sampled in November 2008. The results showed that C and N in aboveground, belowground and litter were decreased significantly by grazing intensities in both heavy and moderate grazing in comparison with non-grazing treatment. Also there was significant difference in soil C in reaction to (HG), but there was no significant difference between (NG) and (MG) treatments in all depths of soil. Soil nitrogen (SN) contents was decreased significantly ($P<0.05$) by grazing intensities in whole 0-75 cm depth (and all separated layers except to except to 50-75 cm depth) in all treatments. Soil allocated the highest amount of ecosystem’s C and N in all treatments and relative allocations of belowground were increased by grazing intensity. It was seen that grazing not only had a potential to change the C and N of the ecosystem, but also could change the allocation of these elements in ecosystem. In this study, although, heavy grazing reduced the amount of C and N storage in both plant biomass and soil, moderate grazing only responded to plant biomass C and N and not to the soil.

Keywords: Grazing intensity, carbon storage, nitrogen storage, biomass, rangeland.
Introduction
Rangelands comprise about half of the world's land area, and contain a third of C stores (Allen-Diaz, 1996). In other hand, Dry lands cover 45% of the global land surface and in spite of their low organic carbon concentration in soil; comprise 16% of the global soil carbon pool (Ojima et al., 1995; Jobbagy and Jackson, 2000). soil in many of Rangelands receive low carbon input but Rangelands may have a high potential to sequester carbon if the input of organic matter into soil and deceleration of soil organic matter decomposition is boosted with best management practices (Batjes, 1999).

Despite this significance, our intuition about effects of management on the carbon and nitrogen storage in rangelands remains limited (Schuman et al., 2002; Reeder and Schuman, 2002).

Grazing is one of the most common land uses of the world's rangelands, and has the fundamental potential to alter C storage in this ecosystem by: Modifying the magnitude and relative allocation of C to above and belowground biomass (Briske et al., 1996); Altering microclimate and the availability of water and nutrients [Shariff et al., 1994; Kielland and Bryant, 1998); and Influencing the quantity and quality of C inputs by modifying the species composition and functional diversity of plant communities (Scurlock and. Hall, 1998).

Although grazing-induced processes collectively appear to accelerate rates of C cycling processes in grazed ecosystems (Ruess and Seagle, 1994; Bardgett et al., 1998), their influence on ecosystem C storage often inconsistent and difficult to predict(Reeder and Schuman, 2002).

Studies of grazed soils worldwide have shown both increases (Schuman et al., 1999 and Reeder et al., 2004) and decreases (Derner et al., 1997; Yong-Zhong et al., 2005 and Andrew, 2006) in soil carbon and nitrogen storage by grazing.

A review of 34 studies involving grazed and ungrazed sites around the world show both decrease (40%) and increase (60%) in soil carbon as result of grazing exclusion (Milchunas and Lauenroth, 1993)

Iran has about 90 Mha (million hectares) of rangelands; it comprises about 54% of the surface Iran. Over 70% of this area located in the Arid & Semi-Arid zone (Abdi, et al., 2008). The general utility of these rangelands often is grazing and stocking density over the carrying capacity has resulted in changes in quality and quantity of vegetation cover and soil, increase of bare soil and eventually desertification.

Because there is not any information about the magnitude and distribution of C storage in these arid lands so, this is very important to know about the rate of carbon and nitrogen budget and Effect of grazing on their storage in soil and vegetation on these areas.

This research focused on quantifies the influence of grazing with different intensity on carbon and nitrogen storage in soil and vegetation on Atriplex canescens cultivated areas of Iran. The null hypothesis (H0) was that grazing exclusion has no effect on the previously mentioned soil parameters, while the alternative hypothesis (H1) was that it applies a significant effect on them.

Conclusion
Although Rangelands locating in arid zone may contain low concentration of organic matter per area unit, but they contain a huge percentage of terrestrial C and N because of their vast land area they occupying.(Luciuk 2003)

Grazing has a proven effect on ecosystem elements such as C and N storages but it seem ecosystems show different response to grazing in different conditions. Response stringency of ecosystem to grazing and its magnitude is depended on some factors that the most is intensity of grazing (Follet, et al, 2001).

In our study although heavy grazing has reduced the amount of C and N storage in both plant biomass and soil, moderate grazing has response only to plant biomass C and N and not to the soil. this result can show two talking point; the first one is that low or moderate grazing intensities not only have minimal impact on C and N storage in ecosystem but also in some situations it can increase soil C and N(Follet, et al, 2001).

It was proven that no change occur in ecosystem's C and N when grazing intensity is equal or less than grazing capacity of rangelands( Milchunas and Lauenroth 1997). Over grazing will decrease C and N of rangelands by reducing both above and below ground biomass and it cause a
decrease in C and N of ecosystems in long term (Rider 1955, Branson 1956). And the second one is that the response of soil to change its C and N storage by grazing is slower than plant's response. (Hill 2003, Johnson 1992, turner and koerp, this matter causes that some times we do not able to see significant changes in C and N in ecosystem by applying grazing managements. It is an important point especially in arid ecosystems that improving C and N in ecosystem will accuser more slowly than other ecosystems because of shortage of precipitation and nutrient elements in soil.

References


Sequester Carbon and Mitigate the Greenhouse Effect. Published by CRC Press LL


Raiesi, F., Asadi, E., 2006. Soil microbial activity and litter turnover in native


A THEORETICAL APPRAISAL OF THE IMPACT OF NATIONAL HOUSING POLICY IN RESOLVING HOUSING PROBLEMS IN NIGERIA

Alagbe, O. A., Adewale, B. A. and Alalade, G. M
Department of Architecture,
Covenant University, Ota, Ogun State, Nigeria.
wole.alagbe@covenantuniversity.edu.ng

Abstract
There is a serious problem of inadequate housing in Nigeria. These housing problems are manifested in overcrowding, inadequate infrastructural facilities, acute shortages of housing units and rapid increase in slum/squatter settlements in major cities across the country. The Nigerian National Housing Policy (NHP) was launched in 1991 with the key objective of providing suitable and adequate shelter for all citizens. This paper used a qualitative research methods approach in appraising the extent at which the NHP has succeeded in meeting its core objective. Reviews of existing theoretical literatures on current housing problems in Nigeria were appraised. Findings showed that despite various attempts by governments to implement the key objective of the NHP, it is evident that housing demand is far greater than housing supply. Factors responsible for these problems were traced to urbanization of poverty, undeveloped housing finance system and high interest rates on mortgage. Other factors include but are not limited to high inflation rate, high cost of building materials due to overdependence on imported building materials and lack of accessibility to land at affordable rates. The paper concluded that the problem is not with the NHP document but with the lack of political will by the government in tackling economic issues which has a great impact on the building construction industry and housing delivery in general.

Key words: National Housing Policy, housing problems, housing delivery, housing demand
EFFECTS OF GRAZING EXCLUSION ON VEGETATION AND SOIL PROPERTIES IN SHAHRIAR RANGELANDS, IRAN

N. Kamali*, A. Sadeghipour1,2, H. Azarnivand1, H. Joneidi3
1. Faculty of Natural Resources, University of Tehran, Iran.
2. Faculty of Desert studies, University of Semnan, Iran.
3. Faculty of Natural Resources, University of Kurdestan, Iran

Abstract
Much of the rangeland of Shahriar in Iran is degraded and will require considerable improvement and reclamation to achieve a desirable state. The aim of this study was to evaluate the effects of grazing exclusion on vegetation and soil properties in Shahriar rangelands. Sampling in both grazing exclosure and control areas was conducted using a systematic randomized method. Six 100 meters long transects were randomly located in each area and along each transect ten 1 × 1 m sampling plots were located. Within each plot, species presence, canopy cover, species yield and plant density were measured. Soil cores were taken in the center of each vegetation sampling plot at 0-30cm and 30-60 cm depths. Organic matter, nitrogen content, the amount of phosphorus, potassium, EC, pH, the percentage of CaCO3, and soil texture were determined for each sample. Results indicate differences in canopy cover percent, species composition percent, yield and plant density in highly palatable and palatable classes between the exclusion and the control site. All growth forms at the exclusion site differed from those at the control site. Perennial grasses, perennial forbs and annual forbs at the exclusion site were higher than in the control site, and annual grasses and shrubs at the control site were greater than at the exclusion site. Soil property parameters at the exclosure site were greater than at the control site for EC, pH, organic matter, nitrogen, phosphorus, and potassium. Exclusion of grazing from rangeland in this region improved the vegetation and soil properties.

Keywords: exclusion, soil properties, vegetation properties, Shahriar rangelands.
Introduction

Rangelands comprised 45% of 165 million hectares in Iran. Rangelands in many areas have been degraded and palatable species have declined over time and been replaced by inferior and unvalued, sometimes toxic species due to excessive exploitation (Azarnivand & Zare Chahoki, 2008). In many areas, these desirable species are lost and soil is exposed to wind and water erosion (Mesdaghi, 2007). When rangeland forage resources are used without managing using scientific information and a plan to sustain resources, forage coverage and soil resources degrade. Reduced canopy cover and plant litter caused direct impact of raindrops to the soil and erosion is exacerbated (Azarnivand & Zare Chahoki, 2008). As a result, water runoff is elevated causing increased soil erosion loss and decreased water infiltration so plant growing conditions are more arid than they need to be given ambient climatic conditions (Moghaddam, 2007).

The vegetation on degraded rangelands in this area is dominated by invasive, thorny or toxic plants (Moghaddam, 2007). Due to reduced forage production capability, these rangelands have low crop production potential. Consequently, with loss of vegetation, soil degradation occurs, continuing and intensifying land degradation resulting in rangeland exploitation that reduces profitability and the provision of ecosystem services that people depend on (Yayneshet et al., 2009). To prevent this continuing degradation and negative consequences, it is essential to conduct restoration operations in these areas to improve the vegetation and stabilize the soil surface from water and wind erosion (Mesdaghi, 2007).

Improvement operations include livestock management, mechanical operations (cultivation, pitting, counter furrow, flooding), biological enhancement (planting of native and alien rangeland seeds, fertilization, fire, grazing exclusion) and livestock facilities (Holechek et al., 1989). Numerous studies have indicated that overgrazing of rangeland causes a decline in soil physical, chemical and biological properties, resulting in dramatic changes in vegetation and modifications in nutrient cycling (González-Megías et al., 2004; Lindsay and Cunningham, 2009; Bauer et al., 1987; Lavado et al., 1996; Chaneton and Lavado, 1996), and indeed permanent degradation of land productivity and destruction of the ecosystem (Su et al., 2004). Results showed that grazing exclusion in overgrazed areas increased biomass, organic carbon, total nitrogen in soil (Pie et al., 2008), vegetation cover, dry matter production and number of palatable species in the region (Jeddi and Chaieb, 2010) and species composition (Arevalo et al., 2011) compared to grazing area. Also Jeddi and Chaieb (2010) showed that calcium and potassium increases with increasing duration of exclusion and the lowest amounts are seen in continuous grazing, while sodium concentration, electrical conductivity and pH shows a decreasing trend and decreased with increasing exclusion duration. Soil pH significantly reduced in exclusion (Pie et al., 2008).

Teague et al., (2011) reported that a higher percentage of tall grass in the grazing exclosures than in grazing treatments. Also there were differences in nitrogen, organic matter, calcium and pH between the exclusion area and different grazing treatments that included light continuous grazing, heavy continuous grazing and multi-paddock grazing that included rest-recovery.

This review of the literature indicates that exclusion has different effects on soil and vegetation properties in different regions. The aim of this study was to evaluate the effects of exclusion on vegetation and soil properties, and its suitability and performance at Shahriar rangelands.
Conclusion

Overall, grazing exclusion in Shahriar rangelands creates the proper environment for sustainable grass species settlement and seeding conditions in renewal plant species life. Succession and vegetation development has beneficial influences on the micro climate and soil function to create optimum conditions for further vegetation improvement in the region. Improving vegetation and litter enhancement caused water infiltration to increase, reduce soil erosion, improve soil porosity and aeration, increasing soil biological activities and organic matter content and improve soil aggregation. In conclusion, soil physical and chemical properties improved with grazing exclusion so in this region it caused improvement in the vegetation and soil properties.

References

18. Girma Tadesse, 1998. Effect of cultivation on chemical and physical properties of a Vertisol, in Middle Awash


properties in a semiarid steppe of Inner Mongolia (P.R. China), Geoderma, 143: 63-72.


MONETIZATION POLICY EFFECT ON SUSTAINABLE BUILDINGS IN NIGERIA

Yahaya Ahmed¹, Yakubu Aminu Dodo², Jibril Danazumi Jibril³, Mohd Zin Kandar⁴ & Abd. Hamid Mar-iman ⁵

¹, ³ & ⁵ Faculty of Geoinformation and Real Estate, ² & ⁴ Faculty of Built Environment
Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia
Corresponding Author *yahmednas1@gmail.com

Abstract
Sustainable construction practice is becoming the main stream in the construction industry as part of the solution to enhance sustainability. Monetization policy of the Federal Government of Nigeria has brought a kind of succor to the issue of housing in Nigeria especially, the civil servants who hitherto were being exploited by shylock landlords and estate agents. A survey was carried out in Abuja to determine the effect of monetization on the civil servants, with a total of 455 questionnaires distributed to the civil servants with a return rate of 86.15%. SPSS 14 was used to analyze the result. Monthly income with a standardized coefficient value of 0.272 contributed more followed by, the type of housing accommodation -0.085 and the number of years spent in service. Monthly income and type of housing accommodation occupied as observed has a significant relationship with rent. The relationship that exists between years of service and the rental value is insignificant (P ≥ 0.05). Monthly income plays a significant role in determining the rental value paid before the monetization policy in Nigeria. The result shows that policy can have effect on the process of building and this requires the Government to propose more policies that would enable effective and sustainable housing delivery for her populace.

Keywords: Buildings, Monetization, Nigeria, Policy & Sustainability,

INTRODUCTION
The state of housing operations in Africa as a whole reflects to a large extent of the state of the economies. Nigeria housing finance is solely dependent on the national economy To resolve the housing problem, the national economy must first be revisited. The national housing policy that is clamoring for the private / public partnership in the housing delivery, anchors solely on the banking sector. The Nigeria National Housing Fund (NHF) was set up with the Federal Mortgage Bank as the agent to the management of the housing loan scheme(Daramola. et al.2010). The Federal Mortgage Bank of Nigeria (FMBN), was established in 1977 with the aim of providing long-term credit facilities to mortgage institutions in the country It was also set up to provide long term loans to individual and real estate property developers for housing construction.

CONCLUSION
The result shows that there is a relationship in rent paid, monthly income and type of housing accommodation occupied by the civil servant. Also the result show that there is a significant change in rental value before and after the monetization policy as shown in the Tables above. There is an increase in rental value of property after the monetization policy; this is due to some factors which monetization policy is one of the factors. Policy is one key factor for attainment of sustainability and with the result above it is clear with good government policies sustainable development can be achieved especially in attainment of sustainable building

RECOMMENDATIONS
There is need for the government to revert or revisit the policy of housing scheme so as to providing low cost housing which are sustainable for the low income earners to own or have a house since majority of civil servant even with the monetization policy still living in rental accommodation.

Policy could be used to achieve sustainable design in Nigeria
There is need for government to play a great role in the achievement of sustainable
buildings in Nigeria because it involve a lot of commitment from the part of not only the populace but as well as the government.

ACKNOWLEDGEMENT
The authors would like to thank the International Doctorial Fellowship (IDF) initiated by Universiti Teknologi Malaysia (UTM) supported by the Ministry of Higher Education, Malaysia (MOHE) and Education Trust Fund (ETF) Nigeria for contributing to this research Work.

REFERENCES
J.A, Onyike, An Assessment of the affordability of housing by public servant in owerri, Nigeria. Journal of land use and development studies,. vol. 3 No.1. 2007
Talba, I (2004) seminar paper on implementation of the monetization policy in the federal civil service of Nigeria,
HARNESSING THE POTENTIALS OF NANOTECHNOLOGY FOR THE DEVELOPMENT OF LOCAL ECONOMY IN NIGERIA

Akpobire Dennis
Delta State Polytechnic Ozoro
Email:siredennis@yahoo.com
Phone: 07031656252

Abstract: In today’s world with depleting natural resources and increasing consumers’ demands, emerging technologies such as Nanotechnology which involves the study and use of materials on a diminutive length scale between 1 to 100 nanometers had proven to have enormous potential in enhancing efficiency in the cost of production of goods in the 21st century (Onah, 2009). Nanotechnology, employs the control of nanostructure of materials for enhanced properties at the macro scale: these include increased hardness, ductility, magnetic coupling, catalytic enhancement, selective absorption, higher efficiency electronic and optical behavior (Froes,1998, Brus,1996). Nanotechnology had widespread applications in the fields of Medicine, Engineering, Environment, Energy, Food, Molecular manufacturing etc. This paper examines current use of nanotechnology in Africa and the need for Nigeria to harness this technology in the pursuit of her economic/scientific revolution and realization of her Vision 2020.

Introduction: The Nigerian Nanotechnology initiative (NNI, 2005) has defined “nanotechnology” as encompassing the science, engineering, and technology related to the understanding and control of matter at the length scale of approximately 1 to 100 nanometers. One nanometer (nm) is one billionth, or $10^{-9}$, of a meter. In order to fully appreciate the magnitude of the measurement in question, approximately eighty thousand particles of nanometer sizes are needed side by side to give an equivalent of the width of a human hair. A typical carbon-carbon bond length, or the spacing between these atoms in a molecule, are in the range 0.12 – 0.15 nm; the smallest cellular life-forms, the bacteria of the genus Mycoplasma are around 200 nm in length. The DNA is approximately 2-12 nm in diameter (Prasad;2008). Thus nanomaterials cannot be seen with the naked eye and also requires specialized microscopes that have adequate lens resolutions to capture nanostructures. The scale of nanomaterials is so small that materials measured in the nano scale($10^{-9}$)m are referred to as nanoworld materials or structures e.g. the DNA, ATP, etc while relatively bigger scale of measurement where materials are measured in the micro scale ($10^{-6}$)m are referred to microworld materials or structures e.g. the red blood cell (RBC), human hair etc.

Conclusion: The clarion call for the diversification of the Nigerian economy in order to reduce dependence on crude oil as the main revenue generating sector can be achieved by investing in Nanotechnology. China and Japan as an Asian economies had already tapped into the vast potentials in the Nanotechnology world. Today their economy is wasted with many nations in demand of the nanomaterials products thereby boosting the Gross National Income and foreign exchange power. Nigeria can harness the vast potential in nanoscience for the development of her local economy.

References:

http://fonai.org/Journal.html
Bush, George W. 2001. Executive Order: President’s Council of Advisors on Science and Technology, October 1, 2011,
Bush George W. 2004, Executive Order: Amending the President’s Council of Advisors on Science and Technology to Serve as the National Nanotechnology Advisory Panel, July 23, 2004,
ENVIRONMENTAL FRIENDLY AND EFFICIENT MATERIALS FOR THE NIGERIAN CONSTRUCTION INDUSTRY – PROPOSED MATERIALS TO BREAK THE MONOPOLY OF CEMENT

Alabi O.A.
Department of Architecture, Bells University of Technology, Ota, Nigeria.

&

Alabi S.A.
InterDeep Concept Ltd., Ilorin, Nigeria

Abstract:
In Nigeria, the construction industry has been dominated by the use of materials that have cement as a key/major ingredient. Slabs, columns, sandcrete blocks and so many other elements for construction have cement as a major ingredient. Over time, the Nigerian construction industry has come to depend greatly on the use of cement based materials to the point that they are grotesquely over used in some structures. As a result, the industry is monopolized by the cement industry therefore controlling a higher percentage of the cost of a building.

This paper takes a look at the monopoly effect of the use of cement. This will lead to the presentation of an alternative building material which can be used in lieu of some cement based materials. Hence this paper will bring about awareness of an alternate material that is readily available, propose a break in the monopoly of the use of cement in the Nigerian construction industry, present a material which will consume less energy to produce and erect. Therefore have a lesser negative effect on the environment. The proposed material that can perform the above is ‘laterite brick’ also known as Compressed Earth Block (CEB). Cement, steel and CEB are made from materials that are mined. Of these three, laterite which is the key ingredient in CEB takes less energy to mine and process and causes the least environmental pollution. When it comes to speed of construction, steel and CEB are materials that are erected much more speedily than cement based elements.

Keywords: Environmental friendly, energy efficiency, cost effectiveness, earth construction, alternative materials

INTRODUCTION:
A typical Nigerian structure has a composition of 80-90% cement based materials/elements. Therefore, over 60% of the cost of erecting a building is determined by the cost of cement. To some, this has become a point of concern as price of cement in recent times has been fluctuating and climbing higher. ‘The price of a 50kg bag of cement rose from N1, 500 early 2010 to N1, 800 early 2011. It rose sharply to N2, 400 in May 2011 and continued to an all time high hovering between N2, 700 and N3, 000’ (Oladunjoye, 2011). By December 2011, cement prices had reduced but oscillated between N1, 800 and N2, 000. According to Jide Mike, Director General - Manufacturers’ Association of Nigeria (MAN), the price of cement would remain high because of the cost of power which accounts for half of the production cost.

Imported cement would also be on the costly side because a 35% levy has been placed recently on imported cement by the Federal Government. (Oladunjoye, 2011).

CONCLUSION
The technology of CEB has constantly been tested over time and is being enjoyed by various countries such as India, Sudan, South Africa etc. climatic conditions in these countries are similar to Nigerian climate. Hence, proving that the survival of CEB constructed structure is sure in Nigeria.

The advent and application of this technology when embraced will greatly reduce the cost of construction of most low-rise buildings and ultimately break the monopoly stronghold of cement on the Nigerian construction industry. Group housing societies making individual houses can benefit from the use of CEB.
Contractors can also take advantage of the mobility of the equipment and save on the transportation cost by producing bricks at site of construction.

**References**


CONDUCTIVITY MEASUREMENT OF SOME EDIBLE VEGETABLES CONSUMED IN OZORO, SOUTH –SOUTH NIGERIA

*Ojebah, C.K AND Akpobire, D
Department of Science Laboratory Technology,
Delta State Polytechnic,
P.M.B 5,
Ozoro.
Corresponding author. ckjebah@yahoo.com

Abstract
Some Nigerian vegetables: spinach (Spinacia oleracea), pumpkin (Telfairia occidentalis), water leaf (Talinum triangulare) and garden egg leaf (Solanum melongena) purchased from Ozoro market, South-South, Nigeria were analysed for their conductivity values. The result of the analysis shows that conductivity values were relatively high indicating high concentration of the electrolytes. The value was highest in water leaf (7515 $\mu$S/cm), followed by garden egg leaf (7125 $\mu$S/cm), spinach (6825 $\mu$S/cm) and lowest in pumpkin leaf (3760 $\mu$S/cm). This high value may be due to the use of inorganic fertilizers during planting.

Keywords: Conductivity measurement, vegetables

Introduction
Vegetables are considered as a natural source of nutrients gifted by the almighty God to human being (Oluwadare, 2008). They are fresh and edible portions of the herbaceous plants which traditional African societies have always exploited to provide adequate nutrition, food security and income generation (Akubugwo, 2007).

Vegetables which are inexpensive, a times wild plant which come in form of edible roots, stems, leaves, fruits or seeds contain valuable food ingredients which can be successfully utilized to build up and repair the body, maintain alkaline reserve of the body because they contribute to carbohydrates, proteins, minerals, vitamins and some certain hormone precursors to the diet (Rumeza et al 2006, Akubugwo et al 2007).

Conductivity is the ability of any substance to conduct electricity (Udoh and Udofia, 2008). Studies of the conductivities of vegetables will give useful information on the electrical properties of the vegetables. Conductivity is a function of the total dissolved ions present in a substance. Conductivity measurement are used routinely in many industrial and environmental applications as a fast, inexpensive and reliable way of measuring the ionic content of a solution. The higher the electrical conductance, the higher the concentration of the soluble salt in the substance (Kpomah, 2011). Little attention has been paid to the conductivity of vegetables consumed within the locality. This study is aimed at assaying the conductivity of spinach (Spinacea oleracea), water leaf (Talinum triangulare), pumpkin (Telfairia occidentalis) and Garden egg (Solanum melongena) commonly consumed in this part of the country.

Conclusion
The conductivity of some commonly consumed vegetables in Ozoro, South-South Nigeria has been analysed and result obtained indicate high concentration of electrolytes. The conductivity of specific ions causing the conductance of these selected vegetables was not determined in the cause of this work. However result obtained is an index of increased ion concentration in vegetables studied.

References
Kpomah, B. (2011) – Analysis of the concentration of electrical conductivity in
solid wastes collected from five cities in the Niger Delta Area during composting. *Proceeds of the 34th Annual International Conference Workshop & Exhibition of the chemical society of Nigeria held from 19th – 24th September, 2011.* P502


URBANIZATION AND HUMAN SECURITY IN DEVELOPING ECONOMY
MEGA-CITY: A CASE STUDY OF LAGOS, NIGERIA

Oluwole Olusegun Akiyode,
Institute for Environment Research and Development (IERD),
Ota, Nigeria

Abstract
Human Security is intertwined with the principles of sustainable development. The urbanization tendency of some developing economy country such like Nigeria has given rise to the growth of mega-city. The development of the megacity has negative implications on its human security. The study traces the growth of Lagos as a twentieth century megacity. This study uses Lagos, Nigeria as a case in examining the urbanization tendency of a developing economy vis-à-vis its human security. It posits that the consequences of urbanization affect its expected human security.

Keywords: Human Security, urbanization, sustainable development, developing economy and Nigeria.

Introduction
The national security is expectedly primary to the human and socio-economy development. Nevertheless, the sustainable development of every nation anchors on its socio-economic development which will requires veritable and practicable human security tenets for its success. This is because, convectional security is expectedly dependent on human security, where the latter complement national security by protecting people from range of menaces (Commission on Human Security, 2003:4, 6). Human security depicts the assurance of life in every society. It is also in the steps towards reducing poverty, achieving economic growth and at the end preventing conflict (Millar, 2006, p. 50)

Human security component is interlaced with the concept of environmental security. This is because the concept of environmental security advocates for the security of man/woman in relation to his/her environment (Akiyode, 2010).

Even though, the human security concept may be regarded as being ambitious by scholars and policy makers but this study believes it is necessary for the assessment of human development attributes in every society because of its promising qualities. Human security has been defined as the “comprehensive view of all threats to human survival, life and dignity and stresses the need to respond to such threats” (Neethling, 2005:37).

security in accordance with 1994 UNDP reports were highlighted as economic security, food security, environmental security, personal security, community security and political security (Svenson, 2007:7). These highlighted forms of securities are essential in every society. Human security is interlaced with sustainable development. The two concepts supposedly co-joined together in an inseparable manner. Therefore, the ongoing process of urban agglomeration and development which brings about mega-city development may need to be analyzed using the human security components. Thus, this paper reviews the human security of Lagos mega-city with the foci eye of environmental security. It identifies the current environmental problems of Lagos which could hinder its environmental security thereby affecting its human security.

Conclusion
The study analyses the human security indicators in Lagos mega-city that has hindered the process of sustainable development and environmental protection. It agrees that the socio-economic development of the city will continue to serve as bait to rural urban dwellers. It suggests that human security components of Lagos mega-city may be affected with the negative consequences of rapid urbanization. Thereby it recommends regular environmental assessments and
remediation of identified ecologically destabilized spots and the development of environmental sustainable infrastructures in the city.

The study further advocates the formulation and implementation of integrated approach in the mega-city environmental management which will enrich its human security.

References

FINANCIAL PLANNING MODEL FOR SUSTAINABLE BUILDING MAINTENANCE

Yusuf Babatunde Adeniyi,
babatunde adeniyi@yahoo.com
Tel No: 08052230498

Olaniran Hezekiah Farayola,
Email: olaezy@yahoo.com
Tel No: 08023539444
Department of Building Technology,
The Polytechnic, Ibadan.

Abstract
Sustainability challenges stem from wanton consumption of natural resources, for which construction industry has been identified to be highly culpable. Service life prolongation through effective maintenance of existing building stock will lead to optimal utilization which is highly desirable as “built and let decay” is inimical to sustainable development. Financial constraint however, is the main inhibition to effective building maintenance, especially where through inheritance there are multiple interests on a single property or where the property is not generating enough income. This paper has therefore set out to develop a model for maintenance financial planning interfaced with the rate of degradation of building components based on service life prediction, for sustainable building maintenance management. While predictable maintenance is identified for maintenance management, other maintenance liabilities are appropriately referred to risk management in project management and facility management. Statutory financial provisions are therefore recommended based on the model’s hyperbolic sine depreciation rate for timely and up to date building maintenance.

Keywords: sustainability, maintenance financial planning, service-life, degradation, maintenance liabilities, hyperbolic sine depreciation.

INTRODUCTION
The importance of building maintenance is seriously ignored among building owners and equally overlooked by governments. Their oversight cannot be denied in the light of the dilapidation and deterioration of building in various parts of the world (Yiu, 2007). The situation which is likened to the pollution situation before the global awakening to sustainable environmental protection. However while environmental pollution is squarely addressed by sustainability, building maintenance is least considered when sustainable development issues are discussed. Building maintenance which is defined as all works both technical and administrative carried out in order to sustain the value of a building. This age long objective of building maintenance is found to be compatible with the global sustainable development goals which aim at preserving our environment. Since built and let decay syndrome resulting from lack of maintenance is inimical to sustainable development in terms of its effect on the environment and economic competitiveness due to wanton consumption of natural resources for which construction industry is found most culpable (Hovde and Moser, 2004). In the opinion of Jones and Clement-Croone, (2004), refurbishment of derelict properties could reduce demolition and construction waste. While Pearce et al., (1996) contended that repairing existing structure would save a lot of material and resources. This will have direct positive effect on sustainability and environmental protection.

RECOMMENDATIONS
Service life estimation should be made mandatory for all manufactured material and components and should be independently conducted. Its optimization should be part of ISO certification criteria
and used for benchmarking. Consultant designer should be responsible for service life attainment to which they should be responsible and accountable. This should be duly stated in their condition of engagement. Financial provision for maintenance should be made mandatory through the statutory building maintenance provision account, to be managed jointly by the facility manager and the property owner for attainment of sustainability and environment protection.

CONCLUSION
This model has put into consideration the expected roles of all stakeholders involved with due regard for all concepts of sustainability through the exponential function for degradation and arrived at the hyperbolic sine relationship for depreciation rate for maintenance. This model has explained the linear and non linear depreciation patterns differently observed in the empirical studies conducted on depreciation rate of building in earlier research works.

REFERENCES
Pearce, A.R., DuBose, J.R and Vanegas, J.A (1996) Rehabilitation as a strategy to increase the sustainability of the built environment, School of Civil Environmental Engineering, Georgia Institute of Technology, U.S.A.
Yiu, C.Y., (2002): The effects of age in housing prices in Hong Kong, Ph.D. Thesis, Department of Real Estate and Construction, The University of Hong Kong, Hong Kong
SUSTAINABILITY AND THEORIZING ABOUT THE ENVIRONMENT: TOWARDS A POST-MODERNITY OF ENVIRONMENTAL DISCOURSE

Malachy Igwilo
Centre for Foundation Education,
Bells University of Technology, Ota
Email: migwilo@gmail.com
Phone: 234-7038611282

Abstract
There is no doubt the environment is subject to the activity of humans which in some cases may indeed lead to outright damage. But the extent and nature of this damage is subject to debate. Some scholars insist that there is an adverse climate change going on while others submit that there is nothing untoward about the current changes in weather pattern or the climate. The science of environmental degradation is not precise and so there is room for political maneuvering geared towards deception with the view for lucrative commerce. There is already a fever level belief that unless we go green, humanity will be obliterated. To this extent, this paper looks at the problem created by the impression of environmental science and the exploitative tendencies of green technologies. It is the submission of this paper that the call to go green remains suspect as long as they are not geared towards ameliorating immediate human problems. The post-modern temper of multilateral discourse is urgently needed in our search for a viable environmental sensitivity. The paper submits that all discourses should centre on protecting humans directly and not pursuing imprecise science. Such policies like banning atmospheric burning of materials, using less toxic detergents that can poison the lakes, using paper bags instead of plastic ones etc, are the way to go in the environmental discourse instead of the current pursuit of fleeting fancies that purport that life will end unless we go green such ideas are no longer sustainable.

Introduction
According to Rachel Carlson’s book, Silent Springs, the use of fertilizers, herbicides and insecticides damages not just farmlands, but the world’s water resources. This is a plain truth that is directly verifiable through the scientific method. Rachel Carlson was one of the earliest progenitors of the environmental movement whose work has redefined how we operate in the environment including the wildcat mining of resources going on around the world. Rachel Carlson’s ideas led to the industrial production of less toxic fertilizers and insecticides, including detergents. The main thesis of her life work is that if we allow non-biodegradable chemicals to enter our soils and sub-soils, these chemical will eventually find their way into both the sea and our fresh water sources. Although there is a great push towards environmental responsibility through the increased study of environmental morality, there are still great dangers out there that eventually we will poison the world and life as we know it may seize. Carlson’s thesis and its consequences are scientifically verifiable. This means that verifiability and predictability, which are hallmarks of science, could indeed be applied to this thesis.

However, in the early 1990s, another movement built, supposedly, on the thesis of Carlson has been generated by other groups of scientists including politicians, most notably Senator Al Gore of USA. These groups of scientists are insisting that far and above the immediate danger of poisoning our seas, oceans and farm lands, there is another imminent danger of our activities changing the entextures of the earth. These textures of the earth here includes: the polar ice, the ozone layer, the atmosphere, sea levels etc. These
scientists, base their thesis on the so-called greenhouse gases. Carbon dioxide in particular is seen here as the chief pollutant we must all run away from and many countries have joined the bandwagon in insisting that this gas should be regulated so that its usage should be minimal so that the ozone layer will not be depleted, so that our sea level will not become catastrophic as polar ice melts, among other things. There are other gases that we should abhor including carbon monoxide and Freon. These new environmental movements are very influential and they invest billions to shape public opinion through the press and moves among other things. Their motto has become going green! It is very surprising how these scientists are the ones deciding what we do in our environmental ethics and responsibility.

The major flaw in this new movement is that it is mostly dependent on shoddy science, public neurosis and propaganda. To make matters worse, they have now become the environmental interpretative community. This has led the present author to look critically at the nature of the science informing this movement and to show how it is not sustainable especially as we continue to get information about the changing nature of our planet.

The best approach to use in the current environmental debate is post modern sensitivity. This means that the idea of an interpretative community of scientists imposing shoddy science as a way to go is not scientific and is not sustainable. In the end, humanity suffers by losing the most important environmental information it desperately needs.

Conclusion

As our immediate environments continue to show signs of environmental irresponsibility, we must focus on those areas that are directly related to the activities of man. The fact that the polar ice is melting cannot be scientifically be proven to be as a result of human activities. For instance, it is has been discovered by some orbiting satellites that the earth behaves in certain mysterious ways that has nothing to do with human activities. However, the poisoning of our oceans with non-biodegradable chemicals has something to do with human activities. If we have to develop a viable environmental consciousness, we will then focus on sustainable environmental knowledge without resorting to an environmental understanding that is both shoddy and unsustainable peddled by profit seeking and influence seeking scientists.

References

Brennan,A and Sze-lo,Y ‘Environmental Ethics’ in Stanford Encyclopedia of Philosophy
www.plato.stanford.edu/entries/ethicsenvironmental/
GREEN ARCHITECTURE AND SUSTAINABLE DEVELOPMENT IN NIGERIA

Adedeji DARAMOLA (PhD) and Toyin ADEBAYO
Department of Architecture,
Bells University of Technology, Ota, Nigeria

Abstract
Green Architecture is a concept developed to encourage sustainable development. It brings transformation to design and construction in both developed and developing economy. The paper analyses the nature of design and construction in Nigeria on the basis of green and sustainable practice. It surmises that the concept of green architecture will affect the nature of architecture and design which depends on the choice of materials, the construction techniques, the calculated cost of construction and the climatic conditions in Nigeria. It posits that the developmental concept of green architecture in Nigeria will encourage sustainable development and environmental protection.

Keywords: Sustainable development, green architecture, environmental protection, construction and design.

INTRODUCTION
Every building responds according to its composition and of its design. The International Energy Agency released a publication that estimated that existing buildings are responsible for more than 40% of the world’s total primary energy consumption and for 24% of global carbon dioxide emissions (Howe, 2010). Architecture is responsible for about 45% of the carbon dioxide (greenhouse gas) emissions in the UK. The designs of architects are very important in mitigating the problem of climate change. This calls for the concept of sustainable architecture. This invariably form the major concern of the architects in seeking sustainability in design.

The concept of organic architecture which was the fundamental concept of great architects like Frank Lloyd Wright (1867–1959) has now been identified under the current climatic challenges as a most relevant approach amongst the schools of thoughts in architecture.

Today, architects are facing increasingly tougher regulation about how energy efficient buildings must be, have ever-more environmentally aware and demanding clients, and themselves want to play their part through their work. The current focus of major schools of architecture is aimed at providing member-focused guidance on the principles, tools and techniques necessary to design and build low carbon buildings, and adaptive, flood resilient design, and to advise clients on what is possible.

The architects today have come to terms with the fact that rapid and significant reductions in global carbon emissions are necessary to reduce climate change, and supports a minimum of an 80% cut in CO₂ emissions by 2050. The Royal Institute of Architects (RIBA) in its commitment to meeting the challenges of climate change, developed a Climate Change Policy which adopts the philosophy of Contraction and Convergence. The theory points towards significantly tougher international reductions in emissions, and seeks a globally equitable solution. In realizing the set objectives, RIBA was very active in pushing for a fair but strong international agreement in the run-up to the UN’s Copenhagen Summit in December 2009.

To further achieve this, there is a strong need to promote greater public awareness of the climate change threat, stressing the significant roles buildings and design play in creating and reducing climate change. To achieve this, there is a need for a synergy between core professions in the building industry working together in collaboration with other institutions to encourage the government and the construction industry to...
raise their standards and play their part to combat climate change. Another important aspect of green design is the strategic placement of windows around the facing of the building. Ideally, the windows are placed so that the most efficient use of sunlight during the day takes place. In addition to decreasing the demand for artificial light during the daytime, the windows can also serve as a means of allowing the natural sunlight to provide a degree of warmth to the interior of the building. This in turn makes it possible to utilize less of the stored solar or wind energy to keep the space at an equitable temperature.

Green architecture is otherwise known as eco-design, eco-friendly architecture, earth-friendly architecture, environmental architecture, natural architecture. The concept takes into consideration the orientation of the building in relationship to the sun and wind direction in order to take absolute advantages of the movement. Green architecture also entails studying the human activities within the space to allow for spaces with activities at different periods of the day. The building may be recessed partially into the side of a hill, providing natural insulation. Composting toilets may be the ideal solution in areas where water is harder to come by. Finding ways to use whatever elements are native to the area also help to keep the structure in balance with nature, such as creating blocks using local sand rather than shipping in bricks constructed elsewhere.

CONCLUSION
Sprawl is one of the biggest causes of congestion, especially in the mega cities of developing countries. It is evident that sprawl takes the form of slums that reduces the quality of life in the cities. This new neighborhood was beneficial to the environment, human health, and reduced pollution. One of the most sustainable examples of dealing with growth in Mega cities took place in Argentina. A NPO in Northern Buenos Aires built 175 low-income homes on a site that once used to be a brownfield. The developers then sold the homes to poor families with children on very flexible payment plans. The city supplied water to the area, and since the brownfield was already within the city, sprawl was limited.

Creating a low carbon design in architecture, seeking energy efficient ventilation, appropriate design ergonomics as well as good consideration and blending of outdoor environment with the indoor would enhance the attainment of sustainable development in developing economy like Nigeria. The practicable use of courtyard system in planning and design would enhance the quality and efficiency of most tropical architecture. To achieve this, both developing and industrialized world should set a carbon target. Architecture should enhance the quality of life and not reduce the quality of life.

Green architecture ensures that no part or component of the building poses a threat to the surrounding environment. This requires the use of natural building materials with organic compounds like wood, bricks, or other elements rather than synthetics. The concept of green architecture or building throughout society has five varying visions which include the ecological, smart, comfort, aesthetics and community visions with each having competing discourses (Guy 10997 in Boyle, 2004). Therefore, achieving these laudable goals will exhilarate effects on architecture and design of building at different localities and regions.

References

Presidential Task Committee on Sustainability (2003-2004).
THE COST OF CLEAN TECHNOLOGY, COMMUNITY WELFARE AND THE IMPERATIVES OF ENVIRONMENTALISM IN NIGERIA: A CASE OF WAPCO CEMENT FACTORY, EWEKORO, OGUN STATE, NIGERIA

Samson R. AKINOLA (Ph.D)
Policy Analyst, Governance Expert, Development Planner & Environmentalist
Department of Architecture, Covenant University, Ota, Ogun State, Nigeria
e-mail:srakinola@yahoo.com; srakinola@hotmail.com
Mobile: +234-803-407-5110

&

Adedapo K. ADEGOKE
Department of Architecture, Covenant University, Ota, Ogun State, Nigeria
e-mail:dpadegoke@yahoo.co.uk
Mobile: +234-803-380-8990

Abstract
Uncontrolled technology and unfettered business drives of kleptocratic capitalist bourgeoisies in industrial sector maximises profit at the expense of citizens’ welfare in industrial corridor and this is self-suicidal to the society in terms of environmental degradation and climate change. This is because the magnitude and tempo of degradation of the earth’s surface has intensified due to “irrational actions” of our global civilization which were dictated by greed or were the result of ignorance. The fault lies with human society with the way in which society has elected to win, distribute and use the wealth.

Using the Institutional Analysis and Development (IAD) framework, this paper investigates the extent to which West African Portland Cement Company (WAPC) has conformed to clean technology in its activities and operations in the process of producing cement. The paper presents the findings of an empirical study conducted between 2011 and 2012 on the impact of WAPC, Ewekoro, Ogun State, Nigeria. Though WAPC has embarked on clean technology (Cleantech), it still uses the old method (wet and semi-wet clinker line) that emits dust to the environment. The paper discusses and analyzes the interface between WAPC and socio-economic environment of the surrounding communities. Findings confirmed that there was absence of community participation as an important planning input into decision-making on resources utilisation within the environment where citizens are placed by providence. It was also discovered that the welfare of community residents was not considered a priority in project design and implementation.

The impact of the project on the local people can be summed up as deprivation and poverty as blasting of limestone results in displacement, dislocation and other attendant health consequences. In addition, this project led to loss of employment opportunities in farming, air and water pollution, deforestation, decrease in soil fertility and ill-health. Lack of compensation and/or inadequate compensation to the affected people is also a problem in the area.

Using Polycentric Planning and Poverty Reduction Strategy, this paper adopts an African Polycentric Sustainable Environment Model (APSEM) for restructuring decision making on environment to conserve and protect environmental resources. The model and the proposed institutional mechanisms would enable local people, industrialists and public officials to have a robust dialogue in order to reposition WAPC to effectively engage in Corporate Social Accountability (CSA) and conserve natural resources. This, invariably, would produce a new WAPC-community working relations that is polycentric, citizens driven and inclusive; thus, entrenching good environmental governance and citizens-centred planning.

INTRODUCTION
Uncontrolled technology and unfettered business drives of kleptocratic capitalist bourgeoisies in industrial sector maximises profit at the expense of citizens’ welfare in industrial corridor and this is self-suicidal to the society in terms of environmental degradation and climate change.
change (Akinola 2010h). This is because the magnitude and tempo of degradation of the earth’s surface has intensified due to “irrational actions” of our global civilization which were dictated by greed or were the result of ignorance (Calder, 1970). The fault lies with human society with the way in which society has elected to win, distribute and use the wealth (Forester, 1971; Meadows, et. al., 1972; Mesarovic et. al., 1974; Commoner, 1971:178; Blackstones (1974). Akinola (2003, 2008b,q, 2011b,d,e) corroborates these views through various studies in Nigeria by tracing environmental crisis to the problems of disconnect that separate leaders from the people.

Whereas the people that are placed in a particular environment by providence should be the beneficiaries of the natural resources in that environment, politics of exclusion in Nigeria have stripped the local people of the resources within their domain through draconian laws and repressive institutional arrangements that feather the interests of the ruling elites. That is why MDG target income poverty, hunger, maternal and child mortality, disease, inadequate shelter, gender inequality, environmental degradation and the Global Partnership for Development (UNMDGs Website, June 2009).

An assessment of the MDGs in Nigeria by The Director-General of UNIDO (United Nations Industrial Development Organisation) shows that Nigeria is off the track in efforts to achieve the Millennium Development Goals (MDGs) by 2015. According to him, “it was worrisome that even in 2008, the half way review of the MDGs, no tangible achievement had been recorded.” The review showed that Nigeria, like most other countries in Africa, was not on track. There are very strong institutional challenges in the country to meeting the MDGs. Nigeria has the means to achieve the MDGs, but needed to organise them effectively to achieve the desired results (Adekunle 2008).

Environmental degradation is intricately linked with poverty as developmental impacts represent socio-economic sponges that soak the welfare of people at local level as the case of Ewekoro cement production facility (Akinola 2008q). The Ewekoro cement production facility of the West African Portland Cement (WAPC) Plc., situated at Ewekoro in Ifo Local Government Area of Ogun State is the oldest cement factory in Nigeria (WAPC, 2000). The industry was established in the locality in May 1957 because limestone was discovered in large quantity in the area. There are eleven villages within the vicinity of the industry and they are: Ewekoro, Akinbo, Itori, Oke-oko Sekoni, Owode, Egbado-Ajegunle, Olujobi, Lapeleke, Alagutan, Elebute and Papa Lanto. The people in these villages were predominantly farmers, while quite a few of them engage in fishing.

Studies confirm unquantifiable loss of species biodiversity in abutting ecosystems after over 50 years of continuous cement production at the Ewekoro facility. Mining activities at the Ewekoro quarries also caused a breach of the confined aquifer within the shale and limestone belts, leading to continual discharge of ground water into the extant river systems (Olaleye, 2003). Dustfall not only contaminates the soil, it also forms encrustations on plant leaves thereby reducing the chlorophyll content, impairing carbon dioxide exchange and ultimately the plant photosynthetic rate. The toxic elemental composition in the atmospheric deposition from the cement plant operations not only endanger the soil quality but also affect the flora and fauna composition (Olaleye, et. al., 2005). Consequently, human health is indirectly affected through different pathways such as drinking water or groundwater, skin absorption of the chemicals from soils (Nessel et al., 1991; Zemba et al., 1996 cited in Schuhmachera, et. al. 2003).

Akinola (2000, 2008q) also shows that the impact of WAPC on the local people, land, farming and fishing activities is enormous. Air pollution from the industry forms soot and smog on plants, retarded growth of plants and that led to low agricultural yield. Limestone dust from cement industries killed farm crops and rendered agricultural land infertile. Food crops in the vicinity of cement factory were badly affected too as industrial dust settled on crops. There were cases of stomach aches when people ate the affected fruits in the area. The pollutant affected man’s skin
physically thereby causing skin diseases. As a result, a lot of people were “forced” to abandon their farm land.

The agitation for the safety of environmental health, nature and natural resources has attracted the attention of Environmental Impact Assessment (EIA) agency and scholars on the need for clean technology and remediation measures in cement production by the Government (Akeredolu, 1989; Asubiojo, et al, 1991; Olaleye, et al, 2005; Subir, 2006). Consequently, it was decided to phase-out completely the wet and semi-wet clinker line and replace it with an environmentally benign clinker line which was installed in 2010 at a cost of Three Hundred and Fifty Million Euros (E350,000,000), an equivalent of Seventy Five Billion Naira (N75,000,000,000). The gigantic clean tech factory is named Lakatabu, meaning ‘an extra large elephant’ in Yoruba language.

Uncontrolled technology is one major factor driving climate change with its attendant consequent disaster, low standard of living and poverty. This has been occasioned by orthodox neo-classical market driven development policy adopted by all countries since 1980s. Neo-liberal policy has treated environmental effects of economic growth as externalities and ignored them (Rudrappan, 2011:10). The impact of climate change is deep on the poor generally. Negative impact of multinational companies (MNCs) on local community is disastrous – poor wages to the locals, people loose their land and other resources with low or no compensation. Where properties of local people were negatively affected in the course of mining and industrial development, the real values of property were hardly determined, not to talk of appropriate compensation to the victims (Akinola 2008q).

While benefits from cement industry are skewed against the people, the impact of cement production on air, forests and water bodies is fast eroding economic base of farmers and fishermen respectively. What a double tragedy for these groups in the commons! This exclusionary tendency in the area and its consequences could lead to violent reactions of youth and insecurity in Ewekoro as we have in the Niger Delta region.

Uncontrolled technology has done tremendous damages to the mother earth and humans to the extent that the essence of development is defeated. The essence of development is to increase the welfare of citizens but if the process of growth and development is endangering welfare, the development is self-defeating. It is for this reason that this paper is calling attention to environmentalism – action and movements towards conservation of natural resources.

This paper uses Polycentric Planning, an off-shoot of the Institutional Analysis and Development (IAD) framework to interrogate the extent to which WAPC has conformed to clean technology in its activities and operations in the process of producing cement in Ewekoro, Ifo Local Government Area, Ogun State. The paper found that WAPC adopts two methods of cement production – the wet and semi-wet clinker line that externalizes industrial fumes and clean technology (Cleantech). The paper queries WAPC on the reasons why it still uses the old method (wet and semi-wet clinker line) that emits dust to the environment, when it has installed a new plant that is designed for clean technology. Consequently, the paper analyses the consequences of using the old method that externalizes industrial fumes and cement.

Using Polycentric Planning and Poverty Reduction Strategy, this paper adopts an African Polycentric Sustainable Environment Model (APSEM) for restructuring decision making on environment to conserve and protect environmental resources (Akinola 2008q, 2011e:68; Akinola and Adesopo 2011d:259). The model and the proposed institutional mechanism would enable local people and industrialists and public officials to have a robust dialogue in order to reposition WAPC to effectively engage in Corporate Social Accountability (CSA) and conserve natural resources. This, invariably, would produce a new WAPC-community working relations that is polycentric, citizens driven and inclusive; thus, entrenching good environmental governance and citizens-centred planning.

CONCLUSION

This paper concludes that limestone mining and cement production by WAPC in
Ewekoro, Ifo LGA, Ogun State, Nigeria engender environmental degradation and poverty. Though WAPC has embarked on clean technology, it still uses the old method (wet and semi-wet clinker line) in its cement production. In order to protect the environment against abuse and degradation, polycentric environmental planning that is capable of synergising the efforts of stakeholders should be adopted. By bringing all the stakeholders in cement production and environment (governments, scholars, industrialists, environment related non-governmental organizations and representatives of local communities) together to deliberate and take decisions jointly and regularly, the hitherto gaps between the stakeholders will be reduced. Consequently, implementation of EIA and enforcement of environmental standards will become easier.

Using Polycentric Planning and Poverty Reduction Strategy (PPPRS), African Polycentric Sustainable Environment Model (APSEM) is adopted for restructuring decision making on environment to conserve and protect environmental resources, especially by reducing vulnerability associated with cement production. The model derives inspirations and working mechanisms from four models: (i) African Public Sphere Restructuring Model (APSRM), (ii) African Polycentric Information Networking (APIN), (iii) African Community-Initiatives and Development Model (ACID) and (iv) African Polycentric Forest Management Model (APFMM). The restructuring process will commence with the design of polycentric sustainable environmental mechanism (PSEM) by scholars and public officials, and the setting up of self-governing community environmental assembly (SGCEA) where stakeholders through their institutions can operate in synergy.

Two major tools of SGCEA are Public Complaints Commission for Environment (PCCE) and Environmental Cost Internalization (ECI). These tools will ensure stakeholders to jointly take decisions, monitor industrial activities and ensure that all industries comply with Environmental Impact Assessment (EIA) standards. If we are to avoid self-destruction, we must think ecologically, develop ethical relationship between man and his environment, and act with the consciousness of earth’s finite resources. In this respect, Environmental Impact Assessment serves as a check on WAPC in manipulating the environment. With the introduction of the proposed PCCE, the Local Planning Authority (LPA) should be rebranded and funded to embark on effective development control on WAPC in Ewekoro, Ifo LGA, Ogun State, and other cement factories across Nigeria.
MANAGEMENT AND CONSERVATION OF INDIGENOUS
MEDICINAL PLANTS IN NIGERIA
USING PHENOLOGICAL INFORMATION

1Oni, P.I., 2Jimoh, S.O and Adebisi, L.A
1Department of Biological Sciences, Bells University of Technology, P.M.B 1015, Ota. Nigeria
2Department of Forest Resources Management, University of Ibadan, Nigeria
Corresponding author: petidowu2000@yahoo.co.uk.

ABSTRACT

Africa's wealth of biological resources and plant genetic resources in particular is critical in alleviating poverty, ensuring food security and developing new medicines apart from their socio-cultural values. However many of them are becoming threatened, endangered and sometimes facing extinction majorly due to unsustainable management and extractive pattern. Management and conservation of any economic tree species requires scientific information on their flowering and fruiting behaviours (phenology). Ten most frequently used medicinal plants in traditional medicine across three West African countries; Nigeria, Ghana and Republic of Benin were investigated for their reproductive biology (flowering and fruiting behaviours). The study was carried over a two year period with data collected during the dry and raining seasons respectively. Nigeria was sub-divided into four main agro-ecological zones and sampling sites selection were sufficient representative of each zone. Onset of flowering, mean duration and duration of flowering to fruition were monitored. Findings indicated that flowering behaviors varied greatly among the ten different medicinal plants with many of them flowering during the early dry season. Mean flowering period ranged between (8.35±0.58) days in Securidaca longipendunculata to (45.68 ±0.79) days in Vitellaria. paradoxa while fruits development and maturation often coincided with early rains. Onset of flowering increased with altitude in south-north direction with slight differences in west-east direction of the species range. Mean fruit set duration also ranged between (15.22 ±0.15) days in Alstonea bonnie to (145.87 ±0.86) days in V. paradoxa. Land use types irrespective of ecological zones had no significant effect on flowering and fruiting behaviors. Generally number of different medicinal plants observed on site basis was very low. In view of the increasing threats to the selected medicinal plants investigated, there is the need to put in place a holistic management and conservation programme (in-situ and ex-situ) to ensure sustainability. Findings from the present study provide additional information for targeting effective germplasm collection fruits (seeds) for the domestication and ex-situ conservation of these medicinal plants.

Key words: Medicinal plants, Nigeria, ecological zones, Phenology, Conservation

INTRODUCTION

Natural resources management lies at the nexus of human and environment interactions. Consequently there is the considerable attention by the public, practitioners and the academics on the establishing of management processes that minimize conflict while recognizing sustainability goals (Mitchell, 2002; Gibson, 2006). Africa's wealth of biological resources and plant genetic resources in particular is a critical element in alleviating poverty, ensuring food security and developing new medicines. They also possess immeasurable social and cultural values and significance (Gillespie et al; 2004). However the rate of genetic erosion through loss of species and varieties has heightened the need to adopt more proactive steps in the conservation and use of these valuable resources. Currently there is a global attention on the conservation and sustainability of the-rich biodiversity of the
tropical rain forest (FAO, 2009). The potential of the Nigerian flora as a veritable source for pharmaceutical and other therapeutic materials have been greatly emphasized (Gbile and Adesina, 1986; Adodo, 2001, Oni, 2010).

Within the natural forests in Nigeria abound several valuable non-timber resources of edible and highly nutritive plants whose fruits, leaves, stems, twigs, barks and roots are of high medicinal values (Owonubi and Otegbeye, 2004; Ugbohu and Odewo, 2004). Mgeni (1991) opined that with the unique diversity of plant and animal life, tropical rain forest represents biological renewable resources of food, medicine and fuel if well managed. However many of these valuable plant species are fast disappearing as a result of rapid rate of natural forest conversion to mono species plantation, commercial agriculture and other economic activities (Roby, 1991). A major challenge in natural forest resources in Nigeria is the continuous decline in stock over the years (Ajakaiye, 2001). Jimoh et al. (2005) indicated that many of the old folks who posses knowledge and information on the use and conservation of most of these medicinal plants are gradually dying without adequate documentation of their knowledge.

Medicinal plants no doubt, will continue to play significant roles in both rural and peri-urban health care services as evident in the number of herbal practitioners in Nigeria toady. According to World Health Organization, (2004) despite all advances made in orthodox medicine, traditional medicine will continue to gain renewed interest in health care services of Nigerians. This may be attributable to increased awareness in their potential and curative ability and limited short comings compared with synthetic drugs (Osuntokun, 2001, Ugbohu and Odewo, 2004). According to Gbile and Adesina (1986) herbs usually serve as the repository materials and have been acknowledged to be generally safe without or with minimum side effects. The dwindling economic fortunes and high cost of orthodox medicines have also forced many people to exploit various plant species for their health service (Odebiyi & Ogunjobi, 2003). Sound decisions in sustainable in-situ and ex-situ conservation and management of medicinal plant genetic resources in various agro-ecological zones of Nigeria requires detailed knowledge of not only their taxonomy, population structure, natural regeneration pattern but also their reproductive biology (Oni, 2010). Unlike several tropical timber species and domesticated food crops which had received substantial research attention including their phenology over the years such information is limited for several medicinal plants (Bowen, 1997, Oni and Fagbenro,2003) Current field observations indicated that not only is the gene-pool for several medicinal plants threatened many are facing extinction. A major challenge is inadequate silvicultural information due limited information on their flowering and fruiting behaviours. Understanding this component of the plant biology is not only critical for their ex-situ domestication and conservation but vital for their future genetic improvement (Oni, 2003). Most tropical tree species are characterized by precious flowering (Ladipo, 1998) while flowering had been observed to vary with altitudes (Oni, 2001). Therefore developing sustainable management protocol for any flowering plant species requires therefore requires adequate knowledge on their phonological behaviours. The present study therefore attempts to provide additional information for the selected medicinal plants in Nigeria so as to bridge the gap in the development of best practices for domestication, management and conservation

CONCLUSION
Phenological study of this nature is germane in the development of appropriate fruit (seeds) collection programme for medicinal plant genetic resources improvement and conservation. This becomes relevant since substantial collections still come from the wild, while domestication activities still remains very low. A realistic starting point is the availability of information in this direction which the current study attempted to provide. From the present study it was observed that the different medicinal plants showed great variations in the onset of flowering and fruiting as well as varying durations for these processes. Some of the medicinal plants especially A. bonnie, P.
*angolensis* and *S. longienduculata* had very short flowering duration period hence close monitoring is opined if viable seeds are to be obtained. Also duration of time of fruiting in *P. angolensis* was very hence fruit collection must be timely if viable seeds are to be obtained. Flowering and fruiting events were observed to sometimes overlap in some of the species especially in *P. angolensis* and *R. vomitoria M. lucida* which are typical rainforest ecosystem species hence close monitoring is recommended for fruit collection. In most instances flowering was majorly a dry season and tends to increase with altitude in a south-north direction hence proper calendar and arrangement must be put in place as to when is the best time for fruits collection on ecozone basis. The presence of some typical savannah medicinal plant species (*Z. xanthozyloides* and *V. paradoxa*) is an indication of savannah encroachment southwards due to human activities. Various forms of threats were also observed on the medicinal plants species including; debarking, pollarding, roots excavation as well as seasonal fires. The present study provides useful guide for future germplasm collections, propagation and their genetic improvement as strategies for their domestication and *ex-situ* conservation range-wide in Nigeria.

References
BUILT ENVIRONMENT AND ENGINEERING (BEE) SKILLS CRISIS: AN EXPLORATORY EXAMINATION OF THE EXACERBATING ‘ROLE’ OF CLEAN TECHNOLOGY

Obuks A. Ejohwomu
WD Consults, UK
obuksejohwomu@wdconsults.com

Abstract
The need to harness the benefits of clean technology without compromising existing manpower and natural ecosystems cannot be overemphasised. Emerging evidence currently suggests the quest for clean technology is currently exacerbating BEE skills crisis in the developing world. That is, it would be naive for built environment and engineering stakeholders to remain adamant that the peculiar “brain drain syndrome” in Nigeria for example, remains the primary cause of Built Environment and Engineering (BEE) skills crisis. A systems dynamics approach is used to unpack the impact of current government policies on BEE skills crisis and the sustainability of clean technology. A practical and realistic redress strategy - the concept of multi-skilling - is prescribed to better enhance societal dependence – the built environment in particular - on clean technology amid a viable natural ecosystems. The implication of which is a tilt towards equilibrium in the supply and demand for ‘new’ BEE skills in Nigeria and beyond.

Keywords: skills crisis; clean technology; multi-skilling; systems dynamics
AIR POLLUTION IN A SAWMILL INDUSTRY: THE OKOBABA EXPERIENCE

1Adelagun, R.O.A, 2Berezi, E. P, 3Akintunde O. A.
1. Chemistry department, Wesley University of Science and Technology, Ondo, Ondo – State.
2. Chemistry department, Bayelsa Sate College of Education, Brass Island, Bayelsa State.
3. Mathematics department, Wesley University of Science and Technology Ondo, Ondo – State.
Corresponding author: jemiruth2009@yahoo.com.

Abstract
Burning as a means of disposing sawdust, a by – product of wood in the sawmill industry has raised a lot of environmental concern. The level of air pollution in Okobaba sawmill industry was investigated using standard and approved methods. Results from this study showed that CO levels ranged from 30 – 720ppm, NO\textsubscript{2} was 0.73 – 0. 84ppm and SO\textsubscript{2} were 0.23 – 0.60ppm. These values far exceed approved limits by the Federal Ministry of Environment. This is an indication that the inhabitants both living and working in the area as well as the ecosystem must have being adversely affected.

Key word: Air pollution, Air pollutants, Air analyzer, Air quality index, Ecosystem, Sawmill Industry, Toxicity.

INTRODUCTION
The atmosphere consists of mixture of gases that completely surround the earth. Air is said to be polluted when chemicals, gases, particulate matter and biological materials that can cause harm or discomfort to humans or other living organisms or cause damage to the environment are released into the atmosphere (Aghedo et al., 2009). Air pollution is the most insidious of all forms of pollution because we can partially avoid the direct contact of other forms of pollution; we must breathe the air (Dix, 1981; Speeding, 1997). The sources of these pollutants can be natural (volcanic eruptions, swamps, sea spray or forest fires) or anthropogenic (emission from industries, power generation facilities, vehicle emission, quarry sites emission, gas flaring or burning of woods and carbonaceous materials (Speeding, 1997). Air pollutants arising from human activities can emanate from stationary sources or from mobile source such as mobile vehicles, ship and airplanes. Air pollution of the urban centers is one of the world’s worst pollution problems. The ambient air quality of an area affects the chemistry of its atmosphere and the general wellness of the environment including humans. Air quality reports in most industrialized countries have air quality standards and guidelines to regulate emission into the environment (USEPA, 1993; FGN 1988). The pollution constituents that are emitted into the atmosphere are either gases or particulate matter such as smoke, aerosol, dust, fumes, grit, mist, fly ash, soot, etc. Chemical substances discharged into the atmosphere are called pollutants when these undergo chemical change they are referred to as secondary pollutants. The effect of air pollution is upon the soil, vegetation, crop, animal life, people, buildings and structures. Air pollutants include CO, NO\textsubscript{x}, CO\textsubscript{2}, SO\textsubscript{2}, H\textsubscript{2}S, and VOCs. CO is one of the criteria pollutants because of its potential effects; it is produced during the incomplete combustion of fuels such as natural gas, coal or wood. CO combines with the red blood pigment called haemoglobin displacing oxygen and carboxyhaemoglobin is formed (Raaschou-Nelson, 1995).

\[
\text{Hb} + \text{O}_2 \rightarrow \text{HbO}_2 \\
\text{HbO}_2 + \text{CO} \rightarrow \text{HbCO} + \text{O}_2
\]

The affinity of CO for haemoglobin is about 220 times greater than that of oxygen (Horsfal, 1998). People exposed to 80ppm of CO have their blood carrying capacity reduced by 15% which is roughly equivalent to losing a pint of blood and an acute concentration of 100ppm or more is invariably fatal. CO is an asphyxiate;
prolonged exposure results in tissue damage. At extremely high level, CO can cause death (Raaschou-Nelson; 1995; Speeding 1997).

NOx: This implies the oxides of nitrogen; Nitrogen (IV) oxide, one of the NOx is produced from vehicle exhaust systems, power generating systems and some chemical manufacturing processes. Like ozone, it can be formed by photochemical action and so is present in photochemical smog. The gas when inhaled forms HNO₂ and HNO₃ which attack the mucus inner lining of the lung, causing irritation of the throat, (Howel, 1997; Speeding 1997), fibrosis (scarring) and emphysema (distension). Acid rain by NOx gases leads to deterioration of buildings and structures. SO₂ gas is an acidic gas which combines with water vapour and is implicated in the damage and destruction of vegetation, degradation of soils, building materials and water courses. People exposed to it have suffered respiratory symptoms such as nasal – pharyngities, coughing, shortness of breath (Akeredolu, 1989).

Several research works on air pollution and their related health hazard had been published (Ede et al., 2010, Ukpebor E.E and Ahonkhai, 2002, Ayodele J.T and Emmanuel 2007, Ayodele et al., 2007, Ugwu K.E and Ofohata A.H, 2011, Uzeukwe et al., 2008).

The sawmill industry remains the backbone of furniture factories which has sustained many Nigerian families and has provided investment opportunities because of its high profitability due to the abundance of its raw materials. This has led to the improvement of the socio-economic development and empowerment of its workers (Lawrence Okigbo, 1964).

The Okobaba Sawmill Industry is located at Ebute Meta, in the Mainland of Lagos State of Nigeria, close to the Third Mainland Bridge that connects the Mainland to the Lagos Island. The sawmill sources its wood from the various forests in and around Lagos and are transported by rafting through the Lagos lagoon to the sawmill for processing to sawn wood, plywood etc. Massive amount of sawdust are generated as a result of the sawmill activities and to reduce the mountain of this sawdust, the millers resort to continual burning which causes great environments impact on the inhabitants within its vicinity. These include pollution by particulate matter from sawdust, thick heavy smoke from burning of the sawdust, the foul smell from logs of wood submerged in the lagoon awaiting processing etc.

The aim of this study, therefore, is to assess the index of air pollution around the Okobaba sawmill and to correlate this index with the burning of the sawdust and its consequent impact on the ecosystem of the area.

**Conclusion**

The result of the analysis of the gaseous pollutants, CO, NOx, and SO₂ which were released into the atmosphere from the massive burning of heaps of sawdust revealed that the environment has been greatly polluted and the fact that the values obtained are much higher than the limits stipulated by the FEPA, implies that the lives of people living and working in this environment are seriously threatened. Moreover, the smoke emanating from the burning of the sawdust causes impairment of respiratory organs, reduction in visibility for both pedestrians and motorists on the Lagos 3rd Mainland Bridge, which could lead to accident. Burning of the sawdust also causes discoloration and weakening of the pillars of the bridge due to acid rain. It is therefore recommended that the burning of the sawdust should be discontinued while alternative disposal method should be enacted. We hereby suggest the usage of the sawdust for land filling, poultry dropping, sinks and wood filling in Furniture Company. All activities that produce air pollutants should be liable to an Environmental Tax Law. Moreover, the Federal Government and all stakeholders as well as other relevant bodies should as a matter of urgency curtail the activities of the sawmill industries to abate the magnitude of environmental pollution in the area.
COLLECTION AND CHARACTERIZATION OF SOME UNDERUTILIZED COWPEA (Vigna unguiculata L.) CULTIVARS OF SOUTHWESTERN NIGERIA

Akinwale, R.O. and Obisesan I.O.
Department of Crop Production & Protection, Obafemi Awolowo University, Ile-Ife, Nigeria
*Corresponding Author (Email:akinrichie2002@yahoo.com)

Abstract
Genetic erosion of most tropical crops, especially legumes, has become a matter of global concern. The primary objectives of this study were to collect the underutilized cowpea cultivars indigenous to southwestern Nigeria and characterize their accessions. Four States were purposively selected for collection exercise. Seed samples of the legumes were collected from farmers’ fields, seed stores, orchard gardens, and market places. The accessions were planted out in three-row plots using a spacing of 0.75 cm x 0.25 cm at the Teaching and Research Farm, Obafemi Awolowo University, Ile-Ife in 2002. Morphological and phenological traits were recorded and the data generated were summarized using means and standard error of mean. Proximate analysis was carried out on the accessions in two replicates and analysis of variance was used to ascertain variability among accessions for their nutrient composition. A total of eight accessions belonging to two distinct types (solojo and ereguru) were collected. Results showed wider variability among the ereguru accessions for most agronomic traits. Flowering traits were of primary importance in characterizing the accessions and cluster analysis grouped the accession according to their origin. Within each type, statistical analysis of the proximate composition revealed that seed coat colour was a good indicator of the crude protein content. Accessions with lighter coat colour had significantly higher crude protein than the darker accessions. In conclusion, there exist wide diversity among neglected cowpea variants in this region which is an indication of their great potential for preserving variability for future utilization and legume crop improvement.

Keywords: legumes, accessions, cowpea, characterization, diversity

INTRODUCTION
Conservation has been described as the rational use of earth’s resources to achieve highest quality of living for mankind (Dasmann et al., 1973). The milestone international Convention on Biological Diversity (CBD) signed at the United Nations Conference on the Environment and Development in 1992 emphasized in Article 8 that conservation of agricultural biodiversity is important in farmers’ field as well as in protected areas and genebanks (UNEP, 1994).
Cowpea (Vigna unguiculata L. Walp) is a very important, widely adapted, and versatile grain legume. It is mainly produced and consumed in Africa where it provides a major low-cost dietary protein for millions of smallholder farmers and consumers who cannot afford high protein foods, such as fish and meat. On the average, cowpea contains 24% protein, 62% soluble carbohydrates, and small amounts of other nutrients (IITA, 2010). It is a very low-input crop, traditionally grown in intercropping systems. Cowpea contributes to soil fertility through nitrogen fixation and is also cultivated to prevent soil erosion. Cowpea can be found approximately between 15°N and 20°S, and over a large range of climates but most likely found in subtropical to tropical conditions characterized by warm temperatures (annual average >20°C) and relatively high annual precipitation (>250 mm) (IITA, 2010). The worldwide cultivation of cowpea in 2008 was estimated to be 11.8 million ha of land with an annual production of 5.4 million tons of dried grains (FAOSTAT 2010). Although the intensity of cultivation of cowpea cultivation in the southwestern region of Nigeria is ranked low (Agboola, 1979), the extent of biodiversity of cowpea in this region is expected to be very high because the region falls within the humid tropics where there is highest degree of biodiversity of most crops in the world (National Academy of Science, 1979). From field observation, cultivation of cowpea in this region has dwindled considerably and farmers go for the improved cowpea cultivars which has very narrow genetic base as the expense of the local indigenous
cultivars which over decades evolved as a result of cultivation and selection by farmers in this region. Only cowpea transported from the northern regions are found in most market places in this region. The objectives of this study were therefore to collect indigenous neglected cowpea cultivars in this region and characterize them with a view to assess their genetic diversity for agronomic traits and nutritional composition.

RESULTS AND DISCUSSION
It is not surprising that most of the world cowpea production comes from Africa (about 91%). Most interestingly, West Africa, with 10.7 million ha, accounts for most of Africa’s production, with Nigeria and Niger being the leading cowpea growing countries (FAOSTAT 2008). This region is noted as the center of origin of this crop. In this study, a total of eight accessions belonging to two discrete cowpea cultivar types were collected; two accessions of *Solojo* and six accessions of *Ereguru*. *Solojo* accessions were collected in relatively larger quantities from farmers’ field and market places in the northern part of Oyo State while small quantities of *ereguru* accessions were available during the collection exercise. This indicates that *solojo* may not be under serious threat of extinction even though its cultivation is only limited to the northern part of Oyo State, which shares more of savanna climate than the rest of the State in the rainforest zone. *Ereguru’s* accessions were collected from Osun, Ondo, and Ekiti State, signifying that it has a wide adaptability in this region. However, it is evident that the relatively small quantity of these accessions available for collection showed that *ereguru* cultivar is under serious threat of going into extinction. Therefore, efforts towards collection and conservation of *ereguru* germplasm should be intensified. Results from characterizing the germplasm revealed wide genetic variation among the 8 accessions. Assessment of the qualitative traits showed wide variability in seed coat colour, pod and seed colour and shape, type of peduncle, nature of flower (determinate or indeterminate), life cycle, growth habit etc.

Characterization based on morphological and phenological traits also revealed wide genetic variability. Subjecting the traits into principal component analysis revealed the level of importance of these traits in characterizing the germplasm (Table 3). From the analysis, the first six principal component (PC) axis accounted for 99% of the total variations among the accessions. Following a statistical restriction that only eigenvectors equal to or greater than 0.3 made a significant contribution to variation at a particular PC axis (Badu-Apraku and Lum, 2007), five traits namely; emergence, days to flower, days to ripe pod, days to harvest maturity, and seed crowding index had high loadings on PC1, indicating that they are of primary importance in characterizing the germplasm (Table 3). The high eigenvectors of traits at a PC axis implies high correlation among the traits with similar sign. Thus, the days to flower, days to ripe pod, and days to harvest maturity are expected to show high correlations while emergence and seed crowding index with negative signs are also significantly correlated. Similarly, vigour index, number of seeds per pod, plant height and seed crowding index are highly important at the secondary principal axis while pod development period, pods per plant, peduncle length and 100 seed weight had high loadings on the PC3 implying that they are tertiary importance in characterizing these accessions (Table 3). These results were similar to the findings of Oladejo (2010), when he evaluated 30 cowpea cultivars for their physiological, phenological, and morphological traits. Constructing a dendrogram based on the 12 traits which were identified by principal component analysis as important at either primary, secondary, or tertiary levels revealed an interesting pattern in the genetic diversity of the accessions (Fig 1). The *solojo* accessions were clustered separately, in the first cluster, from the *ereguru* accessions. This indicate that even though, they belong to the same family, they might not be of the same sub-species and/or cultivar. The second cluster consists of the two *ereguru* accessions collected from Osun State. The third cluster was the *ereguru* accession collected from Akure in Ondo State. The fourth cluster includes the white- and black-seeded *ereguru* accessions while the light-brown accession of *ereguru* falls into a different group. From this diversity assessment, it is interesting to note that the light-brown seeded *ereguru* accessions, despite the same seed coat colour were clustered according to their origin. This implies that they might not have co-evolved from the same ancestry or might
have undergone genetic reconstitution or recombination through continuous cultivation by farmers. From these results, it evident that *ereguru* germplasm had inherent genetic variability and breeding efforts at improving its performance will be a worthwhile venture in this region. Diversity among *Solojo* accessions was not adequately assessed owing to their few numbers. Seeds harvested from the dark grey seeded type segregated to give a white-seeded type which indicates that there may be wider genetic variability than this study could explain. Proximate analysis revealed that the *solojo* accessions were not significantly different from one another but *ereguru* accessions exhibited wider genetic variability especially for crude protein content (Table 4). It was also observed from the results that crude protein content is greatly determined by the seed coat colour. White-seeded accessions of cowpea had highest protein content, followed by light-brown accessions and lastly, the black-seeded accession. However, the crude protein percentage recorded in this study is not significantly different from the elite cowpea reported in literatures (IITA, 2010).

One major weakness of this paper is lack of well defined experimental laid-out (in a replicated trial) in the assessment of the performance of these accessions. However, information sufficient for characterizing the accession was obtained. Therefore, the accessions should be planted for about two more seasons to allow for possible segregation within accession and subsequently, a well-conducted field evaluation of the resulting entries is necessary to confirm the results reported in this study.

In conclusion, there is wide variability among the cowpea cultivars accessions characterized and this calls for more intensive efforts at collecting and conserving more accession of these cultivars to preserve them for future use in crop improvement programmes.

**Acknowledgements**

The authors of this paper acknowledge the technical assistance of the Teaching and Research Farm, Obafemi Awolowo University, Ile-Ife.

**REFERENCES**


Badu-Apraku, B., and A. F. Lum. 2007. Agronomic performance of Striga resistant early-maturing maize varieties and inbred lines in the savannas of west and central Africa. Crop Science 47: 737-750


APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEMS TO MANAGEMENT OF MUNICIPAL SOLID WASTE DEPOTS IN LAGOS ISLAND LOCAL GOVERNMENT AREA OF LAGOS STATE

Dr. Bolanle Wahab and Ojolowo Saeed
bolanle_wahab@yahoo.com and kamaldeenojolowo@yahoo.com
Department of Urban and Regional Planning, Faculty of the Social Sciences, University of Ibadan

Abstract
The nature of socio-economic transactions taking place in Lagos Island every day make solid waste management challenges more acute. These transactions generate large volume of waste which has become an environmental challenge because of poor refuse management strategies which do not matched the rate of refuse generation. This study examines the underlying factors militating against efficient control of solid waste collection in Lagos Island by applying geographic information systems and conventional qualitative and quantitative research techniques to proffer possible solutions.

Questionnaires were administered on 240 households in six wards in Lagos Island to collect information on solid waste mode of storage, transportation to communal waste depots and methods of disposal in the area, but 215 (89% of 240) were retrieved for analysis. Digital analyses such as nearest neighbour, buffering, overlay and distance measurement were carried out with the aid of ArcMap 9.3 to reveal the geographical locations of solid waste depots, the spatial pattern of distribution, and distances covered by residents and traders alike to dispose solid waste.

The existing 13 designated refuse depots were found to be crossly inadequate to facilitate effective evacuation of solid waste in Wards A, B, and C, while D, E, and F and G did not have waste bins. In Wards where waste bins were provided, the distances of more than 200m between respondents’ residences and waste depots, as well as, the complete absence of waste depots in others encouraged patronage of illegal refuse collectors who disposed refuse indiscriminately.

It is recommended that public awareness campaign be heightened and sustained and additional communal solid waste depots provided in Lagos Island to facilitate accessibility and reduce the distance usually covered by residents and traders to dispose refuse. This will promote prompt and healthy disposal of solid waste in Lagos Island and prevent possible incidence of enteric ailments.

INTRODUCTION
Waste generation as an activity is not problematic per se, but subsequent phenomenal collection, storage and disposal in the face of rapid and uncontrollable urbanisation pose challenges in many cities in Nigeria. In spite of the obvious solid waste management revolution in Lagos State, municipal solid wastes of all descriptions are on daily basis deposited unauthorised in public places. It is amazing that public drain, undeveloped land, verges of major roads and streets; canals, lagoon and air spaces of residential and commercial buildings are receptacles of municipal solid wastes in Lagos City, particularly in Lagos Island.

Municipal or urban solid waste is refuse that includes predominantly household wastes with sometimes the addition of commercial waste collected by a municipality within a given area. They are in solid or semisolid form and generally exclude industrial hazardous wastes. Municipal Solid Waste is useless or unwanted material discharge that resulted from human or animal activities. It comprises of garbage or food wastes: rubbish, including glass, tin cans, and paper, and fresh / garden wastes (which include larger items like tree limbs), old appliances among others. Most commonly, it is solids, semi solids or liquids in containers thrown out of houses, commercial or industrial premises (Morgan, 1979).
Waste, either solid or liquid is an integral part of man (Ojolowo, 2007). Its generation, regardless of the quantity involved does not automatically breed environmental nuisance. However, sanitary storage, regular and efficient evacuation and disposal of waste that is abreast of rate of generation may help eliminate any known form of environmental harm. Environmental nuisance ensues when evacuation and disposal of waste perpetually lag behind the rate of generation.

Waste management is a coordinated and systemic control of waste through sequence of actions to mitigate public health and environmental risks associated with insanitary waste management. Functional municipal waste management cannot be achieved without deciphering the socio-economic and environmental influence underpinning waste generation, storage, collection and disposal.

Lagos Island, though one of the smallest in terms of Land area, is one the major and oldest commercial centers in Lagos State. There is a marked difference between the day population of Lagos Municipality and that of the night. The anthropogenic activities generate waste of all descriptions (both solid and liquid wastes) Out of these, solid wastes is posing an evergreen problem, because of the quantity involved. This estimation excludes waste likely to be generated by commercial fragments. The addition of solid waste generated from commercial activities to that of the households in Lagos Island is no doubt a serious environmental problem, particularly concerning effective storage and disposal. One major cause of this challenge, particularly, in Lagos Island, is the rapid rate of per capital generation of waste, which is increasing geometrically, because of the rapid rate of urbanization and subsequent population growth. The problem is aggravated by lack of adequate communal solid waste depots in Lagos Island. Communal Solid Waste Depot (CSWD) is the first point where waste of all types are deposited by residents and traders alike (after storage in either paper, plastic, rubber or nylon containers) prior to removal and subsequent transportation to landfill sites by agents of the Lagos State Waste Management Authority. In the absence of enough CSWD, waste of all descriptions are deposited indiscriminately anywhere. Consequently, nuisances that are detrimental to public health are engendered.

The state of Municipal Solid Waste Management in Lagos Island is a serious concern. Wastes of all descriptions find their ways into public places such as open space, drainage channels, lagoon and road verges. Many households and business outfits do not use waste bins or bags to store and dispose wastes at designated communal waste depots; rather they throw it in the drains, canals, roadside, or in any available open spaces by themselves. Also, on many occasions, residents contracted cart-pushers and waste porters to discard loose wastes. The cart-pushers and waste porters themselves also, either dump the unkempt waste in illegal dumpsites or in public drains, lagoon etc. Besides the health hazards associated with waste, solid wastes clog the drainage systems and hydraulic structures, thereby facilitating urban flooding which sometime can ignite outbreak of diseases.

In Lagos Island, over 307.15 tons of trash, garbage, scraps and other debris were estimated to be generated in 2008 by 122,862 households alone (LAWMA, 2010). The rate of municipal solid waste generation in Lagos Island is geometric. The inadequacy of waste collection sites and the skewed location of the available ones encourage indiscriminate deposition of waste of all types onto every available space, including the rooftops in the study area. The analog methodologies in use by Lagos State Waste Management Authority (LAWMA) in capturing waste generation, deposition, removal and disposal is far loosing efficacy. This paper argues that the employment of the digital techniques of Geographic Information Systems to locate municipal solid waste depots is capable of revealing the adequacy or otherwise of refuse deposition sites with bird’s-eye view. The provision of sufficient refuse depots is a healthy and sustainable strategy to avert indiscriminate deposition of waste in public places.

The main thrust of this paper is to apply GIS techniques to evaluate communal solid waste depots in Lagos Island Local
Government Area of Lagos State. It also assesses the present waste management strategies in Lagos Island, and analyses the urban land use of the Local Government Area using remote sensing and GIS technology. The paper finally generates the pattern of location of existing communal waste depots, proposes the location of new depots, and suggests possible reallocation of existing ones using GIS technology.

Conclusion
The yardsticks employed by Lagos State Waste Management Authority in selecting locations for communal solid waste depots in Lagos Island are not scientific. Adequate communal solid waste depots are supposed to be located in all parts of Lagos Island to accommodate the volume of waste generated by mixed land use activities going on therein. There is no exclusive landuse pattern that can be accorded to a particular part of the Island because trading and residential activities are taking place concurrently everywhere. Both landuses are known to rapidly generate solid waste of all descriptions that causes environmental pollution and which improper disposal aids flooding.

The manner which solid wastes are deposited in Lagos Island appears to pose a high risk to public health and the environment in general. There is urgent need for the Lagos State Waste Management Authority to respond by adopting acceptable scientific methodology in siting communal solid waste depots at appropriate places in Lagos City, and Lagos Island in particular to avert indiscriminate solid waste deposition and its attendant environmental health consequences.