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The role of water resources in the economic development of a nation cannot be overemphasized. It constitutes the most important necessities to man. This study looks at the consequences/effects of the Maga Dam construction in the Republic of Cameroon on the development of the downstream areas of Kala-Balge and Ngala Local Government Areas of Borno State Nigeria. The negative effects result from drying of one of the richest sources of Nigerian rivers draining into the Lake Chad. It is called River El-beid and locally known as Ebeji which also forms the larger part of the border between Nigeria and Republic of Cameroon (along the two LGAs) for more than 400 km until Lake Chad. To arrive at results showing the magnitude of the effects, a household survey was conducted in the area 0-5 kilometers away from the boundary. A total of 150 households were considered for the interview survey. Field observation and in-depth interviews were also conducted on some stake holders. The results indicate that, economic activities such as farming, fishing, livestock, tourism, trade and transport/navigation, boat carving industries as well as problem of border porosity and security of the area and Nigeria at large have been affected, with resultant effect of poverty, forced out migration and social vices. It is recommended that, in order to restore the river to its normal state some of the waters of Surbewel should be channeled by construction of a navigable canal to River El-beid which could also be dyked through the assistance of Lake Chad Basin Commission and Chad Basin Development Authority (CBDA).

**Keywords:** Water resource, Boundary, Dam, Downstream, Poverty, Lake Chad
ABSTRACT

The central objective of this study was to assess the environmental effects of use of agrochemicals for rice cultivation at JOSAN Rice Farm in Ufuma, Orumba North Local Government Area in Anambra State. The methods used for the study were field observation, measurements and analysis of soil, water and rice samples to identify and quantify agrochemical residues in them. Soil samples were collected randomly at three (3) different locations of the rice field. Water samples were collected from five (5) different points of upstream and downstream of Ozi River at an interval of 20m while rice samples were also collected randomly at five (5) different locations of the rice field. These samples were subjected to laboratory analysis to determine and quantify the concentration of agrochemical residues in them. From the laboratory analysis of fourteen (14) different kinds of agrochemicals used for rice cultivation in the study area, nine (9) of them such as aldrin, alachlor, heptachlor, DDE, lindane, malathion, diazinon, terbufos and carbaryl were within acceptable limit of WHO standards while five (5) of them such as DDT, endosulfan, paraquat, chlorpyrifos and parathion were relatively above the standards in soil, water and rice samples. The Pearson’s Product Moment Correlation Co-efficient Analysis at significance level of 0.05 was employed in testing the research hypothesis. The correlation coefficient (r) showed a strong positive correlation between agrochemicals used for rice cultivation and their residues in soil, water and rice samples. The implication of this, is that there will be serious environmental concern over time as residues of these agrochemicals might cause soil degradation and water pollution while in human beings, it could easily lead to serious health issues. To abate or reduce the risks and problems associated with agrochemicals use for rice cultivation, the study recommends that: (1) cultural method of weed and pest control should be adopted; (2) more researches should be carried out on agricultural biotechnology to introduce new improved breed of rice species; (3) use of agrochemicals should be based on the recommended dosages as directed by the manufacturers; and (4) regular team monitoring by Ministries of Environment and Agriculture to enforce rules and regulations guiding use of agrochemicals.

Keywords: Agrochemicals, Environment, Organochlorine, Organophosphate, Sustainability and Residues
**ABSTRACT**

This study on unsaturated hydraulic conductivity and diffusivity of a soil was conducted at Agricultural engineering experimental plot, Ahmadu Bello University, Zaria. Experimental conductivity was carried out from five profile pits with samples taken from (15, 30, 45 and 60) cm depths. The saturated conductivity ($K_s$) was first determined in the laboratory using the constant head method, the gravimetric moisture was estimated in the laboratory using the pressure plate extractor by applying the required suction of (0, 0.1, 0.3, 1.5, 10 and 15) bars. The bulk densities of the samples collected were estimated. The volumetric moisture contents were determined by multiplying the gravimetric moisture contents with their corresponding bulk densities. Jackson’s model of 1973 was applied to determine the unsaturated hydraulic conductivity at each moisture content using the formula

$$K_i = \frac{K_s}{\sum_{j=1}^{\infty} \frac{\phi_j}{\theta_j}} \left( \sum_{j=1}^{\infty} \frac{1}{(2j+1)^2} \right) \left( \sum_{j=1}^{\infty} \frac{1}{(2j-1)\phi_j} \right).$$

The soil suction and the volumetric moisture contents were related to $K(\phi) = a\phi^m$ and $K(\theta) = b\theta^m$. Where $K$ is the degree of saturation or unsaturation, $\phi$ is the volumetric moisture contents and $\theta$ is the soil suction head, $a, b$ and $m$ are the empirical constants are the measure of the steepness. Mualem Van Genuchten model of 1976 predicted a formula which is used in determining the hydraulic diffusivity by multiplying the conductivity to the differential of this relation $\phi = a\theta^m$. The measure for the unsaturation of flow of water in the soil seems difficult in the laboratory on discrete and small samples removed from the soil when disturbed. Major findings of this study revealed that $m$ value of the diffusivity as a function of volumetric moisture content decreases down the profile pit, this may be as a result of the existence of materials in the soil and also with an increase in the suction. It was observed that the relation between the hydraulic diffusivity as a function of volumetric moisture content, the coefficient of determination ($r^2$) decreases down the profile, it was also observed that the bulk density ($B$) affects the hydraulic conductivity ($K_s$) and diffusivity ($D$). As bulk density increases, $K_s$ and $D$ decreases, and when the bulk density decreases, $K_s$ and $D$ increases. Also a total porosity ($F$) Increased, $K_s$ increase except at (45-60) cm due to its low bulk density in this work. This brought the need to determine the unsaturated hydraulic conductivity and diffusivity to effectively permit aeration and proper design of drainage/waste management facilities and the soil classification was also determined using the USDA Textural triangle and it was found to be sandy Clay loam for the experimental plot. This work should be adopted in the country, especially in erosion and flood prone areas in determining the hydraulic conductivity and diffusivity of soils in order to design safe canals to control flood.
Cities and Air Pollution in Nigeria: The Way forward for Sustainable Development.

ADE, Joshua
Department of Geography, College of Advanced and Professional Studies, Makurdi.
E-mail: adejosh663@gmail.com
Mobile No.: 07036362193

IKAPE, Mercy Ogeyi
Department of Geography, College of Advanced and Professional Studies, Makurdi.
E-mail: ogeyimercy@gmail.com

Peter I. Tyokula
E-mail: pitas4u@gmail.com

Department of Building and Engineering Drawing, College of Advanced and Professional Studies, Makurdi.

Abstract
Air pollution in Nigeria remained one of the most disturbing phenomenon in the Nigerian cities considering the nature of rapid urbanization occasioned by improved technology and rapid population growth. Air quality in Nigeria cities today is completely different from the surrounding suburb areas; this is as a result of the complex interaction between natural and anthropogenic environmental conditions. Air pollution in cities is a serious environmental problem – especially in the developing countries in which Nigeria is inclusive. The air pollution path of the urban atmosphere consists of emission and transmission of air pollutants resulting in the ambient air pollution. Each part of the path is influenced by different factors. Emissions from motor traffic are a very important source group throughout the world. During transmission, air pollutants are dispersed, diluted and subjected to photochemical reactions. Ambient air pollution shows temporal and spatial variability. The study made use of average annual cycle of NO, NO2 and O3 from 1990-2017. Most of the data used for this was accessed through climateportat@worldbank.org for a period of 27 years (1990-2017). The study made use of secondary data from different sources as acknowledged in the text. Trend line and time series were the statistical tools employed to analyze the data. Time series of these air pollutants give information on their trends. Results are discussed with regard to air pollution conditions in other cities. The finding of the study review that the rapidity of the urban growth occasioned by improvement in technology and population increased is responsible for air pollution in the Nigeria cities.

Keywords: Emissions for urban air pollution; Cycles and trends of urban air pollutants; Assessment of airpollution.
ASSESSMENT OF THE INFLUENCE OF CLIMATE CHANGE ON SUSTAINABLE WATER SUPPLY IN OSOGBO, OSUN STATE, NIGERIA.

ADEWOYE, Olugbenga Adewale
Department of Surveying and Geoinformatics
Osun State College of Technology, Esa-Oke, Osun State Nigeria.
waleadewoye@gmail.com 07036916399

Abstract
The need to improve the standard of living necessitates the reasons to provide facilities and increases the land uses. However, there is the need to prepare for the side effect of high technological uses and the sustainability of the environment. Increase in land uses alters the natural cycles which are indirect leads to global warming. The paper takes a critical look at how climate change influences sustainable water supply in Osogbo, Osun State. Arise from the aim; the data source was from the secondary sources i.e. from Nigeria Meteorological Agency and the Erinle water dam. The sources are the official climate data provider in Nigeria and water supply provider in Osogbo, Osun State. Regression analysis was used to determine the relationships between the climatic elements and water supply at the end, it was discovered that there is a very weak relationship between the climatic element and water supply in Osogbo, Osun State. However, the study suggests that there is a need for urgent measures because of the ever-increasing urban population and the pressure on the land uses as a result of socio-economic activities in the area. It is, therefore, become very imperative for the policymaker to include the menace of climate change into the policy formulation to create a synergy for sustainable water supply in the city.

Keywords: Climate Change, Sustainable Development, Water Supply
Environmental Pollution and Crises in Post–Colonial Gombe Metropolis

AgbaTernaPaise, PhD
Department of History and Diplomatic Studies,
Federal University Kashere, Kashere, Gombe, Nigeria
Email: ternagba@yahoo.com
GSM +234 7032 946 879

Abstract

The thesis of this paper is that environmental abuses in Gombe metropolis area paved way for environmental crises which manifests in cholera outbreak, flooding and deforestation among others. These in turn affect socioeconomic wellbeing of the environs. The paper argue that for environmental abuse to be checked in Gombe metropolis to avoid further environmental crisis there is the need for both Gombe State Government and the metropolis local administration to embrace modern urban planning/development and ensure that it is strictly adhered to, the tiers of governments should as well promote environmental education in other to sensitize/educate the environs on the hazards of environmental abuse hence the imperatives of ensuring environmental best practices, among other suggestions. The paper is both theoretical and empirical and therefore adopts the multimethodic approach in sourcing data/information and the analysis.

Key Words: Environment, Pollution, Environmental Crises, socioeconomic impact, and Gombe Metropolis.
Abstract

This study was conducted in Zaria metropolis with the aim of assessing the socio-economic and health implication of scavenging. The areas sampled were purposively selected while the target population of 85 waste scavengers was randomly sampled and administered with questionnaires. A semi-structured questionnaire was constructed to capture the demographic characteristics of scavengers, their experiences, types of items scavenged, and the health challenges being faced. Percentages, tables and charts were employed in analyzing and discussing the data. The results reveal that majority of the respondents involved in scavenging are no Nigerian youths. It was also discovered that they are aware of the health implications of scavenging, but the need to survive has made them ignore this. This corroborates report that scavengers in developing world do not follow the basic principles of health when carrying out their business. It was concluded that, as waste scavengers scavenge for wealth, they are also exposed to a myriad of health problems.
EVALUATION OF PHYSIOCHEMICAL PROPERTIES OF SOLID WASTE (RESIDUES) FROM PROCESSING OF CASSAVA GARRI AND SWEETPOTATO STARCH

1,2Ohuoba, A.N.*, 1Kukwa, R.E. AND and 1,2U. J. UKPABI
1. Centre for Food Technology and Research(CEFTER), Benue State University P.M.B 102119 Makurdi. Nigeria
2. National Root Crops Research Institute, Umudike P.M.B 7006 Umuahia, Abia State. Nigeria
* aliceohuoba@gmail.com

ABSTRACT
This study evaluates physiochemical properties of the residues obtained from the sieving operation during cassava (Manihot esculenta) and sweet potato (Ipomea batatas) processing. Residue obtained from the sieving of dried fermented cassava pulp during garri production and extraction of sweet potato starch, were dried on a mounted platform in an open space before processing into flour. Commercial wheat flour was used as a standard. Physiochemical properties of each flour samples were investigated using standard methods. Results obtained shows significant differences (p<0.05) in all the parameters investigated. Cassava sample ranked the lowest in moisture (6.38%). Fat in cassava is 0.057%, sweet potato 1.87%, wheat 3.33%. Ash ranges from 1.84%(sweet potato) to 1.3%(Wheat). Crude fibre from 2.7%(wheat) to 6.66% (sweet potato) while dry matter is from 93.62% (cassava) to 81.67% (wheat). Oil absorbing capacity ranges from 7.04% (cassava) to 1.00% (wheat). Water absorption capacity ranges from 8.0% (cassava) to 1.98% (wheat). Swelling index ranges from 8.11% (cassava) to 1.5% (wheat) while their gelation temperatures are 70°C, 67°C, 60.22°C in cassava, sweet potato and wheat. Cassava and sweet potato residues can be utilized for their higher functional properties and nutritional qualities respectively. The flour of these residues can be used in producing several value-added products in cassava and sweet potato value chain. In addition, providing alternative food for people that are gluten intolerance and diabetes since there is little starch, but high fibre content, which is a very good nutritional quality. Thereby increasing food security and sustainability, in addition preventing environmental pollution and reducing the crops post harvest losses.

Keywords: cassava, sweet potato, Solid waste, pollution, physiochemical, food security
THE ROLE OF ENVIRONMENTALLY RESPONSIVE DESIGN IN SECURING SUSTAINABLE CITIES IN THE 21ST CENTURY

Aminu HaliruAhmad¹; D. O. Eze²& P. U. Ntaji³
DesyOsonduEze, Department of Architecture, Cyprus International University, Cyprus.
2.H. A. Aminu, Department of Architecture, Cyprus International University, Cyprus.

osondudesy@yahoo.com

Abstract
Due to the constant change in the atmospheric concentration of carbon dioxide in the past ages, and knowing that about three-quarter of the anthropogenic emission of co2 to the atmosphere is as a result of fossil fuel burning. Also, there are concerns raised about the possible contribution from urban heat islands to global warming. Research on China (Huang & Lu, 2015), which indicates that urban heat island effect contributes to climate warming. How has the Earth remained hospitable for life for billions of years? This question remains one of the most important in 21st-century science because the answer could help scientists understand the longterm consequences of human activities on the environment. The introduction of an environmentally responsive design is a means of eradicating this problem. It is always better to drain the water when it is still at the foot level, that is why the use of design regarded as a better option in minimizing the environmental pollution in our society today. When we use the right design and green technologies, a hospitable environment, as well as a considerable amount of energy and economic savings is then achievable. This paper discusses the roles of environmentally responsive design in securing sustainable cities in the 21st century, taking into considerations the major air pollution that affects our environment. The research will employ the use of existing articles on the subject matter while also, adapting the use of a qualitative research approach with the aid of three case studies. Drawing conclusions from this and presenting based on the findings.

Keywords: Climate change, Global warming, urban heat island, Sustainable cities, environmentally responsive design, air pollution.
Abstract

Climate change – a current global phenomenon has created in its wake serious environmental and health hazards. Incidence of infectious and communicable diseases have become common through pollution. Over the larger part of the last decade, there have been significant changes in weather patterns resulting into climatic conditions that have created favourable conditions for diseases to thrive causing enormous health hazards. It is reported by the World Health Organization that Nigeria ranks second only to India in reported cases of tuberculosis infections in the World. This study through a field survey drawing samples from Nasarawa State using descriptive statistics finds that the incidence of diseases such as tuberculosis, malaria, typhoid fever, Bilharzias and dysentery which are all linked to environmental factors have been on the rise. A significant proportion of these changes in climatic conditions result from harmful human actions and activities that pollutes the environment through improper disposal of both human and industrial wastes. Unfortunately, these actions of man and their impacts on health outcomes and the environment have not been sufficiently documented. If any appreciable progress is to be made in ensuring sustainable development, man’s activities as they impact on the environment must be conducted in a sustainable manner through enforceable laws towards curbing harmful human practices to generate positive outcomes. This will reduce the incidence of the spread of these infectious and communicable diseases in the State. This must be supported by adopting the resolutions of the United Nations on reduction in global harmful emissions.

KEY WORDS: Climate-Change, Infectious-Diseases, Sustainable Development, Safe Environment
Pollution Assessment of Organophosphosphate Pesticide Residues in An Aquatic Ecosystem

B.W. Tukura¹*, O. S. Osuegba¹, S.I. Audu¹, E. B. Yawuck²

¹Department of Chemistry, Faculty of Natural and Applied Sciences, Nasarawa State University, Keffi, Nigeria
²Department of Chemistry, Kaduna State College of Education, Gida Waya, Kaduna State, Nigeria
*Corresponding author email: bitytukura@yahoo.com, GSM No. +2348066499349

ABSTRACT
Organophosphate pesticides (OPPs) accumulated in an aquatic environment may be transferred along the food chain. Concentrations of OPPs residues in water, sediment and fish collected in dry season from River Benue at the Loko axis in Nasarawa State, Nigeria, were evaluated for possible contamination. Levels of OPPs residues in the samples were quantified using Gas Chromatography (GC) coupled with Pulsed Flame Photometric Detector (PFPD) after liquid-liquid extraction. Concentrations of OPPs ranged from 0.09 to 1.84 in sediment, 0.10 to 1.79 in water and 0.01 to 1.81 µg/Kg in fish. Site 2 recorded the highest levels of OPP residues. Dichlorovos was the most accumulated pesticide in all the samples. Accumulation according to samples varied in the order of sediment > fish > water. Analysis of variance (ANOVA) shows that concentrations of OPPs in water and fish were significantly (p ≤ 0.05) different. Correlation coefficients between levels of OPPs in sediment and water were strongly positive (0.919 – 0.999) except for methidathion (-0.331); while that between sediment and fish were weak and negative (-0.381 to -0.500). The levels of OPPs were within the FAO/WHO acceptable limits.
ANALYSES OF WATER QUALITY AROUND SOME SELECTED WASTE DUMPSITES IN BAUCHI METROPOLIS OF BAUCHI STATE

BALASAGIRMADAKI
SCHOOL OF GENERAL STUDIES, FEDERAL POLYTECHNIC BAUCHI, BAUCHI STATE
08039394519, 08024044270
balasagir2@yahoo.com

ABSTRACT
The study examined the dangers that are associated with intake of unclean and unsafe water in relation to water borne diseases. Three (3) samples were collected and analysed. The physical, chemical and biological parameters of water were obtained from laboratory analysis and were compared with National and WHO standards guidelines for drinking water. The analyses revealed that some of the chemical parameters of the water analysed from wells in the study area exceed WHO and National standards. Physical parameters were also above WHO and National standard. In conclusion, it can be said that the Dumpsite has negative effect on Bauchi environs especially those that are located in the immediate surroundings. It recommended that the waste dumpsite be relocated away from settlement areas.

Keywords: Water, Dumpsite, Standards, Unclean, Diseases
Abstract
This paper deals with the integrated approach typically adopted to improve the air quality in a Nigeria urbanized area. A case study is selected and analyzed in order to find out the viable criteria for the correct management of the problem, aimed at a sustainable city and the decrease of human health effects. The role of conventional and unconventional pollutants (e.g. permanganate and ultrafine particles) is discussed. The available measurement strategies are analyzed in order to point out the trend of the sector and the gap to be covered for guaranteeing a homogeneous protection of the territory (every citizen has the right to inhale air of the same quality). The importance of not limiting the analysis to the implementation of emission inventories is demonstrable through simple examples: indeed, data of global balances can mislead decision makers; they must guarantee an acceptable human exposure that depends on the amount of pollutant that effectively reaches each inhabitant. Location criteria for urban planning are proposed to prevent unacceptable human exposure cases (e.g. kindergarten should not be authorized near an urban freeway; construction of street canyons should be avoided). Zoning out the urban area helps to demonstrate that the coordination among cities is compulsory. To this concern, the transport of air pollutants from region to region must be considered. Unconventional emerging solutions for improving the air quality in urban areas are presented and discussed in the paper together with cost-related viability aspects.

Keywords: air quality, human exposure, Nitrogen-oxide, Permanganate, Sulphur- dioxide, transport, urban planning.
Effect of Coal Mining on Water Quality in Owukpa District, OgbadigboLGABenue State, Nigeria

1 S.BUBA, 2 Jennifer H. Hamadu, 3 Niyim.WBedan and 4 A. N. Badeson,
1,2,3 Department of Geography, Federal University Kashere, Gombe State, Nigeria
4 Departments of Social Development, Adamawa State Polytechnic Yola, Numan Campus, Adamawa State.

Correspondence author: bubasmaila24@gmail.com
Mobile Phone: 08023089588

ABSTRACT

The research focused on assessment of the effect of coal mining on water quality in Owukpa District, Ogbadibo Local Government Area of Benue State Nigeria. Its objectives were to assess the quality of surface water in Owukpa coal mining area and to compare the quality of surface water in the area with the FAO standard for irrigation. Water samples were collected during the field work around abandoned Owukpa coal mining site and analysis carried out using standard laboratory procedures. Data analysis was done using mean, range and student t test, and the results were presented in tables and figures. This result indicates that the surface water was acidic as the pH values ranged from 4.1 – 5.9 with an average of 4.82. The mean concentrations of heavy metals in water samples in milligram per litre (Mg/l) were as follow 0.98, 9.89, 44.70, 87.31 and 7.35 for Pb, Cd, Fe, Ni and Cu respectively. Heavy metal concentrations of surface water were in the order of Fe > Ni > Cd > Cu > Pb. The student t test of surface water quality shows that all parameters measured significantly fall short of the FAO regulatory permissible limits for irrigation except temperature, total solid (TS), total dissolved solids (TDS) and total suspended solid (TSS). It was concluded that the abandoned Owukpa coal mining affected the surface water of Owukpa District to a large extent as surface water quality parameters differ significantly with FAO regulatory limit for crop production. It was recommended among other things that erosion control practices such as afforestation, channelization and others should be done to reduce input and spread of mine waste on the surface water through erosion.

Keywords: Water quality, heavy metals, coalmining, and irrigation
ABSTRACT
To change the nature of an object into a new figure is like giving birth to it all over. The study examined the prospects accrued to using found objects as tool for curbing land pollution in Gombe metropolis, Nigeria. Data was collected from existing literature, visit to dump sites, interview with scavengers and the immediate communities. The result shows that, there are several refuse dumpsites (legal and illegal) within the metropolis. Solid wastes like metals, plastics, woods, glasses, ceramics, leather, stones among others are disposed at the sites. These wastes, to the artists are known as found objects. They are burnt, allowed to litter the environment and decay or scavenged for either reuse, recycling or reclamations. This paper therefore, recommends the need for using found object materials at the dump sites to creatively produce works of art known as found object sculptures, using them as a tool for curbing solid waste decomposition and burning which is hazardous to groundwater and climatic condition of Gombe Metropolis and the world at large.

Keywords: Pollution, Curbing, Sculptures, Found objects, Solid waste.
SOCIO-ECONOMIC EFFECTS OF DEFORESTATION IN GWAGWALADA AREA COUNCIL, FCT, ABUJA.

Alkali Mohammed 1*, A.T. Ogah2, B. Liman Nasir3, Ekor Fidelis Francis3

Department of Environmental Management, Nasarawa State University, Keffi, Nigeria
Department of Geography, Nasarawa State University, Keffi, Nigeria

Abstract: The study evaluated the socioeconomic effects of deforestation in Gwagwalada Area Council, FCT, Abuja. It has also identified the factors responsible for deforestation. The study further examined the nature and extent of deforestation in the study area. Both probability and non-probability sampling techniques were used for the study. The selected villages of Dobi, Gwako, Kutunku, Ibwa-Sarki and Paiko village were purposively selected due to the fact that most of the activities related to deforestation such as farming, lumbering, rearing of animals (grazing), settlement construction, fuel wood trade and so on are being practiced there. Simple random sampling technique was used to select 50 respondents from each of the five selected villages in the study area. Primary and secondary data generated were analyzed using descriptive statistic. The major finding of the study shows that fuel wood was the highest cause of deforestation in Gwagwalada followed by agricultural activities and bushfire respectively. The study also revealed that deforestation has resulted in the loss of income/employment, loss of biodiversity, migration, reduction in tree density, declined in crop yield, cultural heritage and tourism as well as poverty. Based on the findings, the study recommends policies that will drastically reduce indiscriminate deforestation activities and encourage afforestation, reforestation, tree husbandry and tree planting in the study area; this will help to checkmate the recent frequent conversion of forestland to arable cropping and other uses in Gwagwalada Area Council. The study further recommends that forest extension services to the rural households that engage in forestry activities should be strengthened through frequent training. This will help them have adequate and recent information about government policies on the environment and communicate the same to the rural stakeholders. Also, there is need for constant use of both electronic and print media in strengthening anti-deforestation awareness and in communicating recent forestry policies of the government to all the stakeholders in the study area.

Keywords: Socio-economics, Deforestation, Gwagwalada, Fuelwood, Bushfire, Agricultural activities
ABSTRACT
In an effort to provide a cheap and available alternative to firewood in rural household, and to reduce agricultural residues, this study was carried out to produce bio-briquettes from sheanut shell and millet stalk using a simple extruder briquetting machine. Different samples of briquettes were produced by blending varying ratios of the wastes in the ratio of 100:0; 80:20; 70:30; 60:40; 50:50 using cassava starch as binder. The result of the proximate analyses showed that sheanut shell briquettes had a moisture content of 2.50% and millet stalk 3.50%; ash content of 2.50% and 4.50%; volatile matter of 16.0% and 11.0% while fixed carbon content of 79.0% and 81.50% respectively. The viability test results showed that sheanut shell briquettes had a higher density 0.60g/cm$^3$ and compressive strength of 2600Mpa than the millet stalk briquette with 0.31g/cm$^3$ and 880MPa respectively. It took the sheanut shell briquettes 20mins to boil 2 litres of water with calorific value of 7.50ms/kg while it took the millet stalk briquettes 22mins to boil same quantity of water with calorific value of 6.88mj/kg. An efficient fuel has been produced and land pollution nuisance minimized.

Keywords: Briquettes, Biomass, Sheanut Shell, Millet Stalk, Firewood.
ABSTRACT
The paper set out to examine the issue of environmental pollution and its attendant consequences on the Nigerian society. Findings reviewed that environmental issues in Nigeria generally are many, diverse in nature, and are caused by man's interaction with nature (environment) for exploits in a number of ways—both in the cities, where industrial activities predominate, and rural areas, where agriculture thrives. The paper posits that man utilizes air for survival, harnesses land and water resources for domestic, commercial, industrial, agricultural and other purposes. Through these activities; Man, directly and/or indirectly creates problems which are detrimental to his health/survival, well being, natural existence and stability. The researcher noticed that these environmental problems are a consequence of environmental pollution which also degenerates into environmental degradation and several other hazards such as widespread epidemics, depletion of natural habitats, and thus; impede the socio-economic development of Nigeria. The paper recommends awareness creation and change in attitudes for effective environmental and resources management strategies as a way forward.
Assessment of the Risks and Health Hazard Involved in the Use of Agrochemical Among Vegetable Farmers in Jama’are River Basin of Jama’are Local Government Area of Bauchi State

Gizaki, L. J., M. Sa’adu and A. H. Paul

Department of Agricultural Economics and Extension, Federal University Wukari, Taraba State, Nigeria

Abstract
Purposive sampling technique was employed for the selection of the study villages while simple random sampling technique was used in selecting thirty households. Poor education background could partly contribute to the major health effects recorded in the area since 26.7% of the farmers were primary school leavers and up to 40% of them had no formal education who might not be able to read or understand agrochemicals labeling and instructions on use since are written in English. The study also revealed poor awareness (77%) regarding the harmful effects of agrochemicals among the farmers. The practice of mixing agrochemicals with bare hand (73.3%), throwing away of containers (63.3%), using containers for household purposes (56.7%) and the assumption that agrochemicals won’t do anything (50%) appears to be widely prevalent in the study villages. The implication is that there will be serious side effects of agrochemicals in the area since they have direct contact with the chemicals. Despite adequate awareness of safe agrochemicals management by agrochemicals vendor and extension agents, most of the spray-workers were observed to be reluctant to put this knowledge into practice. Only spraying chemicals which should not be directed towards the direction of air (M = 4.07) and bath immediately after spraying of chemicals (M = 4.00) were considered as important precautionary measures against the use agrochemicals. Most of the farmers experienced loss of appetite (90%), dizziness (70%), body itching (66.7%), headache (56.7%) and difficulty in breathing (53.3%) more often following the use of agrochemicals on their farms. Improvement on educating farmers on the use of agrochemicals in appropriate, less risk-related methods, side effects associated with the use of agrochemicals, dangerous habits associated with health risks and the importance of protective measures of agrochemicals especially personal protection equipment and strict laws on the purchase and use of agrochemicals in farming communities should be put in place so as to reduce exposure of farmers and passive individuals to agrochemicals.

Key words: Agrochemicals, Jama’are, vegetables, health effects
Gas Flaring in Nigeria: Decades of Failed Policy Implementation

1MAIWADA, A. S. and 2HASSAN, M.
Corresponding Author: MAIWADA A S
Email: abdulmaiwada24@gmail.com +234 (0) 8032256041

1&2Department of Geography, Umaru Musa Yar’adua University Katsina, Nigeria.

ABSTRACT
Globally, Gas flaring is considered as waste of potentially valuable resources and distinguished to be one of the world’s sources of black carbon released into the environment. In Nigeria, the Africa’s largest oil producing country, unsustainable and careless gas flaring occurs every day in areas of oil production for many decades. This article aimed to review the Nigeria’s environmental management acts and the laws related to natural gas and its unsustainable flare in order to find the reasons behind the failure of natural gas flare phase out. Acts and decrees from the petroleum act of 1969 to the procurement of the petroleum bill of 2012 all failed to implement the unsustainable gas flaring phase out despite the country’s commitment to the current global climate change regime. Trends of unsustainable flare of gas from 1970-2011 shows great fluctuations in the country. Some of the reasons found to be behind the flare phase out failure are the presence of corruption in the oil and gas sector, lack infrastructure from the country’s part to harness the oil and its associated products (Natural gas), lack of will from the oil companies to find other alternatives to market or utilise the Natural gas and the conscious fear of losing considerable amount of revenues from the oil companies. It is recommended that government needs a concrete mechanism to guarantee the coordination and implementation of laws regarding the environment and oil sector and make sure that all projects and plans work to their best possible capacity for this will surely enhance people's lives and confirm the country’s position and role in economic and political leadership in the African Union and the ECOWAS.

Key words: Failure; Gas flaring; Implementation; Nigeria; Policy.
WATER QUALITY AND CONTROLLING MEASURES FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

Imrana Hari¹, Salahudeen Hajarat¹ and Bello Samira¹

¹Department of Geography, Federal College of Education, Zaria

Correspondence email: hariimrana@yahoo.com 07030169665

Abstract

Water is the essential element that makes life on earth possible, adequate supply of clean water is one of the most basic human needs. Of all environmental resources, water is probably the one that is most abused through human activity. For example, the emission of organic pollutants as a result of industrial activities is responsible for rapid deterioration of water quality, with definite health consequence for the human population. In rural communities without access to safe water, and where drinking water is sourced from polluted streams and stagnant water bodies, there has been marked incidence of water-related diseases such as cholera, river blindness, guinea worm infestation, all of which impose substantial welfare loss on society. The aim of this paper is to review the ways to control water pollution for sustainable development in Nigeria, which can be achieved by identifying the importance of clean water for sustainable development and examining the causes of water pollution in Nigeria. This paper recommends that, the society should collectively strive to eliminate open defecation and ensure proper disposal of all forms of human waste through building of appropriate latrines, toilets at homes, markets, schools and other public places, farmers should also control indiscriminate application of inorganic fertilizer and other forms of chemicals to plants and water, through use of compost and organic manure, proper regulation and disposals of industrial wastes, by using incinerators and other modern techniques of refuse disposal. Law formulation against abuse and management of water and water resources by the government and other relevant agencies and establishment of water treatment plants to purify water, supply to rural and urban areas by the government at all levels, private sector and philanthropists.
Abstract

Some air pollutants namely Particulate Matter (PM), Carbon monoxide (CO), Sulphur dioxide (SO₂), Hydrogen Sulphide (H₂S) and Nitrogen dioxide (NO₂) in the lower atmosphere in three major towns of Benue State, Nigeria were sampled using a hand held Haz-dust monitor, gasman and smeared microscope slides. The data for each gas was collected separately for a period of one week in each of the study towns in the state at traffic, industrial and residential sites. The result obtained indicates that the PM daily average concentration range is 0.05±0.01 - 0.12±0.03mg/m³ for residential, 0.16±0.02 - 0.24±0.01mg/m³ for traffic and 0.21±0.03 - 0.37±0.05mg/m³ for industrial sites with Gboko recording the highest concentration per site. The daily mean PM size in all the study towns are predominantly less than 10 µm in size. The CO concentrations ranges are 0.91±0.04 – 24.30±1.6ppm, in Makurdi, 0.055±0.1 – 11.91±0.08ppm in Otukpo. At Gboko, it ranges from 1.89±0.08 – 26.44±1.8 ppm. Sulphur dioxide (SO₂), Hydrogen Sulphide (H₂S) and Nitrogen dioxide (NO₂) concentrations as compared to FEPA National Ambient Air Quality Standard, (NAAQS) indicates that their concentration was within the 24hour safe limits.
Pollution and Health Issues: A Study of Kaine Agary’s *Yellow-Yellow* and Helon Habila’s *Oil on Water*

Iorwuese GOGO 08134596611  
gogoiorwuese8@gmail.com  
Department of English  
Benue State University, Makurdi  
Benue State – Nigeria

Afodiya JEREMIAH  
08024073130  
jefodiya@gmail.com  
Department of English  
Benue State University, Makurdi  
Benue State – Nigeria

Abstract

This paper is a study of pollution and health issues in Kaine Agary's *Yellow-Yellow* and Helon Habila's *Oil on Water*. It is carried out for the reason that pollution of whatever kind: air, water or land, is rife in the contemporary society as a result of man’s expensive activities on earth thereby posing serious varying challenges to both humans and ecology which require critical attention. The theoretical framework adopted by the paper is ecocriticism. It is a literary critical theory which mediates between literature and ecology. Therefore, the paper looks at what pollution is, its impact on humans and ecology and its devastative instances to humanity in Nigeria and the world over. The paper further evaluates how pollution is represented in the selected literary texts and the health challenges it causes to the human communities that are portrayed therein. The paper concludes that pollution is a malady to the existence of humans and ecology therefore, every individual should make conscious efforts in minimising the high rate of pollution in the contemporary society for a healthy life. It thus recommend that, the government and multinational companies that are generating huge revenue from the mining of crude oil in the Niger Delta should collaborate and intensify the clean-up of oil spillage in the region in order to make life sustainable for the indigenous population, also, the multinational companies mining oil in the Niger Delta should endeavour to use high quality equipment that are up-to-date in carrying out their operations in order to minimize the occurrence of crude oil spillage.
WORKPLACE POLLUTION IN NIGERIA: THE FATAL CONDITION TRIVIALIZED

Iyaji Adejoh Ph.D.
Leke, Jeffrey Orseer.
Department of Sociology
Federal University of Kashere.
And
Adejoh Juliana Eikojonwa
Department of Sociology
Kogi State University, Anyigba.

Email: adejohiyaji03@gmail.com
Phone: 08039670090, 08024474404

Abstract

The problem of pollution in the human society has assumed the status of a hydra-headed monster. Its ravaging effects have been a source of concern to every society the world over. This paper, is an attempt at bringing to light the varieties of pollution found in the work place especially in Nigeria for which little or no attention has been given to over time. Specifically, the paper x-rays the varieties of pollutants found in the work place in Nigeria and its accompanying health hazards. The paper being a theoretical review, relied mainly on secondary data. Findings showed that the work place in Nigeria is bedeviled not only by the famous air pollution but by noise and light pollution. These pollutants result in varying health hazards that impacts negatively on the health of workers. The paper therefore recommends among others, a consciously created environmentally friendly workplace characterized by zero level tolerance for pollution of any kind.

Keywords: pollution, air pollution, noise pollution, light pollution, workplace.
ASSESSMENT OF WASH – BOREHOLE WATER QUALITY AND IDENTIFICATION OF POLLUTION RISK LOCATIONS IN BAJOGA, FUNAKAYEL.G.A. OF GOMBE STATE NIGERIA.

*1James Theophilus, 2Deborah Ishaku

1Department of Science Laboratory Technology, Gombe State Polytechnic, P.M.B. 0190, Bajoga, Gombe State
2Department of General Studies, Gombe State Polytechnic, P.M.B. 0190, Bajoga, Gombe State
*Correspondence author: theophilusjames5@gmail.com, 09032360822

Abstract
Groundwater from wash – boreholes in Bajoga town North – Eastern Nigeria was investigated to ascertain its quality status and suitability for drinking and domestic uses. Water samples were collected in the five wards of the town, namely Anguwan Railway (ward A), Bamalam (ward B), AnguwanYobe (ward C), Sangaru (ward D) and General Hospital (ward E). The bacteriological and physico – chemical analyses conducted were in accordance with the standard procedures. Membrane Filter Technique (MFT) was used for the enumeration of Total and Faecal coliforms, cultured on m – Endo Agar LES (Difco) incubated at 37°C and on Membrane Fecal Coliform (MFC) agar at 44°C for 24 hours, respectively. The total coliforms enumerated ranged from 8CFU/100ml – 20CFU/100ml and no faecal coliforms bacteria were detected in all the five wards. The physico – chemical parameters analysed were pH of the water samples ranged from 6.49 – 6.80, Electrical conductivity recorded for the samples ranged from 380 uS/cm – 620 uS/cm, Total Dissolved Solids ranged from 190 mg/L – 309 mg/L, Nitrate recorded ranged from 0.94 mg/L – 1.40 mg/L, Fluoride ranged from 7.0 mg/L – 15.0 mg/L, Sulphate recorded ranged from 22.0 mg/L – 102 mg/L, Nitrite ranged from 0.00 mg/L – 0.27 mg/L, Copper ranged from 0.27 mg/L – 0.62 mg/L, Manganese recorded ranged from 0.00 mg/L – 0.08 mg/L and Total hardness recorded ranged from 56.0 mg/L – 170 mg/L.

From the results obtained, most of the water samples analyzed met Nigeria Standard for Drinking Water Quality (NSDWQ) and World Health Organisation (WHO) standard. However, the few samples observed to harbour contaminations calls for treatment before consumption. The study also stresses that people should be provided with alternative water source for drinking and cooking purposes.

Keywords: Wash – borehole, water quality, Coliform bacteria, Bajoga town.
LOW EMISSIONS DEVELOPMENT STRATEGY IN NIGERIA: BUILDING RESILIENCE TO CLIMATE CHANGE.

Mailumo, Daniel Andofa
Department of Political Science, Benue State University, Makurdi.

Ahile, Stephen Iorlumun
Email: steveahile@gmail.com
Department of Geography, College of Advanced and Professional Studies, Makurdi.

Abstract

This paper examines low emissions development strategies as forward-looking national economic development plans or strategies that countries use to advance national climate change and development policies in a co-ordinated, coherent and strategic manner. The fact that every nation faces climate change challenges which threaten social, economic and environmental systems globally, most governments are seeking to increase resilience and also lower vulnerability to the impacts of climate change in order to reduce greenhouse gas (GHG) emissions. This paper therefore finds the relevance of low emissions development strategies and also stresses the urgent need for Nigeria to join other nations in developing strategies of building resilience to climate change in the 21st century, also providing structural change that is inevitable and where economies at all levels of development is stronger, more equitable, more sustainable and more resilient. This is more so as low emissions development has become an integral process for most countries in building a green economy framework. The paper outlines gaps that low emissions development strategies could fill and how they can be prepared to ensure that they are effective and efficient in delivering their intended goals in Nigeria. Finally, it recommends some steps in preparing and adopting the best strategies to be integrated for inclusive green growth which are multi-faceted covering interlinked dimensions of economic, social and environmental.

Keywords: Low emissions, Climate change, Resilience, Greenhouse Gases
Analysis of Physicochemical Parameters and Spatial Variation of Groundwater Quality in Gombe, Gombe State Nigeria

Maina Benjamin  
benmaina82@gsu.edu.ng  
Department of Geography, Faculty of Science, Gombe State University, Gombe State, Nigeria  
Aliyu Kachalla  
k.aliyuda@abd.ac.uk  
Department of Geology, Faculty of Science, Gombe State University, Gombe State, Nigeria  
Sule Samuel  
ssule@gsu.edu.ng  
Department of Geography, Faculty of Science, Gombe State University, Gombe State, Nigeria  
Chindang Donatus Dayil  
davilchindang@gmail.com  
Department of Geography, Faculty of Environmental Science, University of Jos, Nigeria

Abstract
Physicochemical parameters such as temperature, pH, Total Dissolved Solids(TDS), turbidity, conductivity, Nitrate, Phosphate, Sodium, hardness and Fluoride of groundwater were investigated in six selected areas of Gombe Metropolis with the core aim of examining effects of sewage on groundwater quality. One way analysis of variance was employed to test the spatial variation in the concentration of the aforementioned water parameters between low, medium and high density residential areas within the study area. T-test was also used to compare the result obtained with WHO water quality acceptable standards. A total of 12 samples were collected from borehole water in high, medium and low density areas of the study area, afterward the water samples were analysed in the laboratory. Physical parameters indicated that there is no significant variation in the concentration of all the selected analysed physical parameters between low, medium and high density residential areas of the study area. Temperature and turbidity fall within WHO permissible standard. Total Dissolved Solid(TDS) exceeded WHO permissible standard limit, on the other hand chemical parameters analysed revealed that there is no significant spatial variation in the concentration of pH, conductivity, Fluorite, Nitrate, Phosphate between low, medium and high density residential areas of the study area. However, the analysis of hardness and sodium revealed that their spatially variation is significant. In relation WHO permissible standard, only pH and Fluorite fall within permissible limit, while Conductivity, Hardness, Nitrite, Phosphate and Sodium exceeded WHO water quality standard permissible limit. It is therefore, essential to treat water from this kind of ground water sources to make it fit for both drinking and domestic use. It is of paramount importance for government to embark on regular environmental sanitation exercises within the study area and also provide refuse disposal vehicles to the populace in the study area to lessen indiscriminate sewage.
This will improve the general health care and well being of the public in the study area.

Keywords: Water quality, Groundwater, Physical water parameters, Chemical water parameters
AIR POLLUTION IN NIGERIA: SOURCES, HEALTH IMPLICATION AND MANAGEMENT OPTIONS

Mansur Mohammed Bello

Department of Community Development, College of Business and Administrative Studies, Potiskum. Email: mansurbello0@gmail.com Mobile Phone no. 08030638064

Abstract

With the expansion of industries and automobiles, and lack of access to clean fuels and efficient technologies for cooking the quality of air we breathe decreased with increased in civilization. This paper describes air pollutants and air pollution, sources and health implication of exposure to air pollution. The objective of this paper is to give a general overview of air pollution management with emphasis on practices that minimize the creation of air pollutants from the source. The paper concluded that because of the ignorance on the part of our citizenry air pollution is thought to arise from automobiles and industries alone. Unless there is adequate control, the multiplication of pollution sources may lead to irreparable damage to the environment and humankind. The paper recommended that to improve air quality the management options require a multidisciplinary approach as well as a joint effort by individuals, private, government and international organizations.

Key Terms: Pollution indoor and outdoor, pollutant, anthropogenic, management
ABSTRACT

Urbanization, transport and economic development are agents of noise-pollution, affecting the environment and air quality in metropolitan areas. The study investigated the sources and perceived effects of noise pollution on human health and property value in Jos metropolis. Stratified random sampling and purposive techniques were employed to select 10 areas and 198 participants for the study respectively. A semi-structured questionnaire was constructed and used to collect data. Simple descriptive statistics, with the aid of SPSS version 16.0 was used to analyze the data while Pearson Product Moment Coefficient (r) was used to test the hypothesis. Results indicated that 49% of noise pollution were from traffic, power generating plants and construction; nearly 81% of the respondents were aware of the concept of noise pollution; 71% admitted being victims of the menace; while 54.5% were aware of the adverse effects of noise on property value. The peak period for exposure to noise pollution is 3pm – 6pm (34%). Over 80% of the respondents rated the intensity of noise as moderate-high but 59.1% rated the frequency as continuous. About 50% of the interviewees attributed sleeplessness and hearing loss to the effects of noise. Over 62% advocated for massive awareness campaigns and legislative action to control the menace, while majority (44%) preferred government to enforce compliance. The correlation analysis (r) value 0.97 shows a strong relationship between noise intensity and decline in the value of property while the R² value of 94.28% obtained implies that noise is responsible for decline in the value of property in Jos. The paper recommended the need for environmental education, creation of green belts along route-ways, improved silencers in motor vehicles, the use of noise protective devices and compliance with pollution abatement measures in order to safeguard the environment from nuisance.

KEY WORDS: Noise, Pollution, Control, Traffic, Health, Environment
Mining and Water Pollution in Azara Barytes Mines of Nasarawa State: The Status and Socio-Economic Implications.

Mohammed Kabiru DAHIRU1dahirumk@gmail.com Mohammed, ALKALI 1; Sunday E. ITIMINI2, Salihu H. Muhammed-Gani1, and Jonathan A OGWUCH3.

1Nasarawa State University, Keffi 2Nasarawa State Polytechnic, Lafia, and 3Benue State University, Makurdi.

Abstract

Worldwide, expansion within the mining sector has led to the growth and development of many countries, including Nigeria, albeit with far reaching implications, and disproportionate benefits on the people. Also mining, (especially the small scale and artesinal type) is regarded as a major source of environmental deradation, with water resources as the most adversely affected by the operation. This informed this study, which assessed the water quality status of Azara Barytes Mines through laboratory analyses of 25 water samples each, within and outside the mines in order to determine how mining impacts the area in terms of its water quality and suitability for some usages. The results of the study showed anormalous concentration of some deleterious elements in these samples (when compared with WHO, FAO, EU, and SON standards, respectively), which may be injurious to health and well being of the people on the long run. The study recommends that the State should ensure environmental awareness and best practice in mining; sound developmental policies, and the transformation of small-scale mining activities in order to make its benefits available to all, and stem down its growing adverse impacts in this and similar other areas in Nigeria.

Key Words: Barytes, Mining, Environmental degradation, Health, Well being.
GLOBAL CLIMATE CHANGE: A VIEW ON OUR ENVIRONMENT

Okeke Gerald Ndubuisi
HND, B.Sc., PGD, MSc, PhD (Industrial Safety & Environmental Management), MISPON, WSO, ASSE
Chevron Nigeria Limited

ABSTRACT
Global warming is an increase in the average temperature of the earth. Scientific theory suggests that when the level of greenhouse gases in the atmosphere increases, more of the heat rays are trapped in the atmosphere, and redirected back to planet earth, thereby warming the earth. The effects of global warming are already showing; the polar ice caps are melting and if this continues, we are set for a significant rise in sea level, flooding many places. Places which are now full of life could become deserts if rainfall patterns change with the temperature increases. The apparent symbiotic relationship between man and plants has been bastardized by man and invariably, man is paying dearly, the huge price of messing up the environment. The decimation of vegetation and mangroves which absorbs the carbon dioxide from planet earth is one of the reasons for temperature rise. The plants and vegetation need the carbon dioxide from man, while man needs the oxygen from plants for survival. Man has apparently betrayed this marriage of alliance. The emissions of greenhouse gasses and burning of fossil fuels add to this climate change. Other greenhouse gases include, but are not limited to Sulphur hexafluoride, hydrofluorocarbons and chlorofluorocarbons which when released on planet earth, migrates to the upper stratosphere to cause severe damage on the Ozone layer which apparently acts as shield against ultra violet rays from the upper stratosphere. Some greenhouse gases occur naturally in the atmosphere, while others result from human activities such as burning of fossil fuels such as coal, woods, etc. Blocking drainages, gutters and canals with waste materials contributes significantly to this climate change which is usually occasioned by excessive flooding, which we witnessed in 2012 and 2018 along all the riparian areas of the Niger Delta Region and beyond. Sequel to this flood, a lot of homes and arable farm lands were sacked by the rampaging floods; thereby encouraging desertification. As a way out of this climate change, government should come up with the required legislations and laws backed up with the political will power to check gas flaring, decimation of mangroves and hewing down of trees and burning of fossil fuels and other acts capable of increasing the earth temperature. Multinational oil companies and industries that flouts the laws should be fined heavily for gas flaring and pollution of the environment, which will serve as a deterrent to other Multinational corporations and Industries operating in our environment. Government Regulatory Agencies should up their game and desist from issuing building licenses to individuals to build along the drainages on normal water routes or course. We should stop distorting mother nature, reduce reclamation activities, dredging of the Rivers and canals and other unhealthy habits that encourages climate change or flooding. We should encourage people to plant trees and desist from deforestation (If you cut down one tree, endeavor to plant two). Strong enlightenment campaigns and awareness should be created amongst the citizens of this nation, especially on how to manage wastes from cradle to grave and desist from using wastes to block our drainages, gutters, canals and water ways. To achieve a
good, clean and healthy environment is a task that must be done. All hands should be on deck and together we can recreate a planet in harmony, devoid of pollution and degradation, so that generations unborn would not pass harsh judgement against us.
GROUNDWATER POLLUTION AROUND NNPC DEPOT AT ATLAS COVE,
LAGOS STATE: POLICY IMPLICATION

Muritala O. Oke
Directorate of Research, National Institute for Policy and Strategic Studies, Kuru, Jos
Email: okkhemurry@gmail.com

ABSTRACT

Nigeria National Petroleum Corporation (NNPC) is saddled with the responsibility of exploring, refining and distributing petroleum products across the country. One of the depots used by NNPC is ATLAS COVE in Lagos State. The environmental department of the NNPC is saddled with the responsibility of ensuring that the activities of the NNPC did not violate the environmental standard set by NESREA. This study assessed the level of pollution of groundwater around NNPC depot at Atlas Cove, Lagos State. Three samples of borehole water were collected and analyzed in order to detect possible contaminations. The study revealed that the pH values recorded were not within the maximum permissible level (pH 6.5 – 9.8 values). Electrical conductivity, total dissolved solids, BOD were significantly found to be high as a result of most inorganic elements existing in abundance in the groundwater of the study area. Also, high chloride value showed that the water was polluted by sea water intrusion. It was concluded that the activities of leading environmental agencies-NESREA and NOSRDA in ensuring sustainable groundwater development around the Petroleum Depot need to be reviewed. Management of NNPC Depot need to adhere to environmental standard through continuous monitoring and impact remediation. NESREA and NOSRDA should ensure strict enforcement and compliance with environmental laws in all the NNPC facilities.
SETTLEMENT AND INTEGRATION PATTERN OF IMMIGRANT COMMUNITIES IN NIGERIA: A REMARK ON SOKOTO CITY IN THE 20TH CENTURY

Murtala Marafa
Department of History
Faculty of Arts and Social Sciences,
Sokoto State University, Sokoto
marafamurtala02@gmail.com
+2348037463620

Nura Bello
Department of History
School of Arts and Social Sciences
Shehu Shagari College of Education, Sokoto
nurabellogwd@gmail.com
+2348067254151

Abstract

The settlement of immigrants was not a new phenomenon in the history of Sokoto city. Since the early 19th century, Sokoto had attracted and sustained immigrants of diverse origin and occupations. Those immigrants wanted to and they did take advantages of the economic opportunities provided by Sokoto. It is important to note that the diverse immigrant groups in Sokoto were attracted by the hospitality of the ruling class who had never regarded immigrants as unwelcome intruders. The caliph in Sokoto established a tradition of welcoming all categories of immigrants particularly those willing to live in, and identify with the cultural environment of their hosts. The leadership in Sokoto starting from Muhammad Bello not only encourage immigrants to settled within the Sokoto City walls but compelled such migrant groups to understand the social system of their hosts, pay homage to local political authorities and to develop techniques of dealing with them. Thus migrant communities during the 19th century Sokoto established wards that in the course of the 19th century became the major components of the Sokoto urban complex. Although the development of Sokoto city started from 1909 during which the original hamlet or camp of Sokoto began to grow into a sizable Settlement of few wards. By the 1915 there was a remarkable increase in the number of settlements developed in to a number of not less than twenty (20) wards scattered around the mosque and the residence of Muhammad Bello. Some of these wards comprises Gidadawa, Galandanci, Alkamhawa, Alkanci, Zoromawa among others. These were said to be the earliest settlers of Sokoto who settled before the coming of Shehu from Sifawa in 1915. They were established by the personalities that were closely associated with Muhammad Bello. These include his Vizier (Waziri) Gidado whom the ward Gidadawa grew after his tittle; the GaladimaDoshiro and his people, hence the emergence of Galadanci ward. Others includes Alkali,MagajinGari, Ubandoma, Muhammad B.Ali. and UmmrunAlkammu who developed Alkanci, Benanci, Torobbe and Alkakamwa wards respectively.
AIR QUALITY CHARACTERISTICS OF AN OIL AND GAS OPERATION AREA OF NIGER DELTA NIGERIA

1Ngwoke, Moses Okafor; 1IgweOgbonnaya

1Department of Geology, University of Nigeria Nsukka
Corresponding author’s email address: mosesngwoke@yahoo.com

Abstract

The Niger Delta area is the hub of oil and gas exploration, dredging and other industrial activities and continues to witness rapid urbanization. The area of study, located in Yenagoa Local Government Area of Bayelsa state typifies an area with multiple industrial operations. Gas flares and vents, oil spills and leaks, Poor waste management, increased traffic movement and other sources of industrial and household emissions to air could compromise air quality in this area. The air quality status of the study area was assessed with focus on three criteria pollutants – SPM, SO\(_2\) and NO\(_2\). Random field samplings involving 18 air quality samples were carried out in the area using Aeroqual portable meters in both wet and dry seasons. The Oak Ridge National Air Quality Index (ORAQI), was applied in this study to assess the overall air quality status of the study area. The AQI values obtained for each station has been ranked in five levels of pollution ranging from clean air to severe air pollution. Geospatial models of the distribution of the criteria pollutants as well as the air quality index in the study area in both the wet and dry season were generated using ArcGIS tool. The range for SPM was 100 - 660 µg/m\(^3\) with a mean of 216.1 µg/m\(^3\) and 37 - 507 µg/m\(^3\) with a mean value of 174.9 µg/m\(^3\) in the dry and wet season respectively. NO\(_2\) ranged from 17- 119 µg/m\(^3\), with a mean of 57.83 µg/m\(^3\) and from 18-104 µg/m\(^3\)with a mean of 65.38 µg/m\(^3\)in the dry and wet season respectively. The range for SO\(_2\) was 0-832 µg/m\(^3\)with a mean value of 247 and 13-607 µg/m\(^3\)with a mean of 182.05 µg/m\(^3\)for the dry and wet seasons respectively.

The Oakridge air quality index values in the study area indicates that air quality in the 18 sampling stations of the study area, in both dry and wet seasons were not clean. During the dry season, one location was moderately polluted, three locations were heavily polluted while remaining fourteen locations were severely polluted. Furthermore, in the wet season, one location had a light air pollution classification, ten locations were moderately polluted, while seven locations were severely polluted. It can be adduced that air quality was relatively better in the wet season when compared to the dry season.

Keywords: Air Quality, Niger Delta, Oakridge National Air Quality index, Criteria Pollutants.
ASSESSMENT OF SURFACE WATER AND SEDIMENT CHARACTERISTICS OF A PRODUCED WATER DISCHARGE AREA IN OFFSHORE NIGER DELTA, NIGERIA

*1Ngwoke, Moses Okafor, 1IgweOgbonnaya
1Department of Geology, University of Nigeria Nsukka
*Corresponding author: mosesngwoke@yahoo.com

Abstract
The Niger Delta region occupies an area of 20,000 km² and is the largest delta in Africa and the world’s third largest. It is equally considered one of the 10 most important wetlands and marine ecosystems in the world. Nigeria is the largest oil producer in Africa, holds the largest natural gas reserves on the continent, and is among the world's top five exporters of liquefied natural gas (LNG). The Niger Delta area is the hub of Nigeria’s oil and Gas exploration and production. Consequently, hydrocarbon related pollution is widespread, placing the Niger Delta region among the five most severely petroleum damaged ecosystems in the world. Produced water discharges are the sources of the greatest amount of hydrocarbon and several other chemicals into the marine environment. Produced water contains several hundreds to perhaps one thousand or more parts per million (ppm) of oil and grease and in addition, may be high in total dissolved solids (TDS), oxygen demanding organic materials, heavy metals, radioactive substances and other key environmental pollutants. This study assessed the characteristics of surface water and sediment in a produced water discharge point in a shallow offshore location near Warri, Nigeria. Twenty-eight (28) surface water and sediment samples each were collected from designated sampling stations, established at distances of 300m, 500m, 1200m, 2000m, 2500m and 3000m from the produced water discharge location in the North, East, West and South directions while four (4) control or reference samples each of surface water and sediments were collected at distances of 5,500m and 6,500m from the discharge point. Samples were analyzed for organics and heavy metals content and compared with established standards and treated produced water values. Geospatial trends in surface water and sediment characteristics were established using statistical and GIS tools.

Keywords: Assessment. Produced Water, Surface Water, Sediment, Niger Delta
AN EVALUATION OF SOLID WASTE MANAGEMENT SYSTEM IN
AKANUIBIAH FEDERAL POLYTECHNIC, UNWANA, AFIKPO
NTAJI, P. U. UDOMIAYA, E., UMEMSOFOR, A., and UJAGBOR, J. U.,
Department of Architectural Technology, AkanuIbiam Federal Polytechnic, Unwana.
Ebonyi State.
Email: nntaji-patrick2@gmail.com
Phone No: 08169409121

ABSTRACT
Waste generation is as synonymous and fundamental to man as food and shelter alike. The proper management of waste has always been a bone in the neck especially for developing nations. This paper seeks to do an evaluation of the solid waste management system of AkanuIbiam Federal Polytechnic Unwana, to ascertain the area that generates the most waste on campus, to know the level of awareness and the compliance level of sustainable waste management practices. Using structured questionnaires, field observations and one-on-one interactions with necessary stakeholders, the result shows that the business centre area generates the most waste with 48% responses. The results showed 72.5% responses to units having less than 3 wastes collection containers and 60% of the containers are placed at over 10m apart from each other, with a whooping 70% saying the containers are in a poor state. 80% of the waste management practice is by burning, with only 3.3% recycled. 82.5% indicated their waste being disposed off in arbitrary refuse dump. 90.8% and 97.5% indicated awareness on the refuse and recycling systems of waste management. But only 21.7% showed knowledge on source reduction. In conclusion, it was observed that the management of the institution was not creating any form of awareness on waste management and had no blue print on how to enhance the wealth inherent in waste recycling. Recommendation was for policy makers, to generate modalities on how best waste generated within their localities can be managed.

Keywords: Waste, generation, management, system.
EVALUATION OF GROUND WATER QUALITY OF OKRIKA LOCAL GOVERNMENT AREA OF RIVERS STATE, NIGERIA

NUMBERE, MPAKABOARI THANKS (BSc, MSc, AESM)  
GEORGE, BEKINBOANGA (B.Tech, M.Eng)

ABSTRACT

Water is an indispensable component of the environment without which living things cannot survive. It is challenging to achieve a clean and sanitary environment without water because of the domestic and industrial benefits attached to water. Environmental pollution is a great risk to access to safe drinking water. The Niger Delta is a typical case study. It is imperative to evaluate the ground water source of the area considering the diseases caused by polluted water body. Therefore, this study seeks to evaluate the quality of ground water in Okrika Local Government Area of Rivers states. Experimental design was used to derive data for the study. Experimental design mainly concerned with laboratory analysis of the physio-chemical parameters of the water samples. The field data required were water samples from the selected communities in Okrika Local Government Area. Water samples were collected from major water sources of the communities and transported for laboratory analysis immediately in sample collection bottles and parameters concentrations were determined for the selected communities. The sodium absorption ratio (SAR) was established from the experimental from the studied area which ranges between 0.46 - 1.74, Water Quality Index (WQI) was applied to examine the status of the groundwater quality which was discovered to be poor and unsuitable for drinking. This study thus recommends that groundwater from the communities should be treated before it should be supplied to the people and more water provision facilities should be constructed in the communities to complement existing water facilities.

KEYWORDS: Evaluation, Groundwater, Water Quality, Okrika Local Government Area
ABSTRACT

The central objective of this study was to assess the environmental effects of use of agrochemicals for rice cultivation at JOSAN Rice Farm in Ufuma, Orumba North Local Government Area in Anambra State. The methods used for the study were field observation, measurements and analysis of soil, water and rice samples to identify and quantify agrochemical residues in them. Soil samples were collected randomly at three (3) different locations of the rice field. Water samples were collected from five (5) different points of upstream and downstream of Ozi River at an interval of 20m while rice samples were also collected randomly at five (5) different locations of the rice field. These samples were subjected to laboratory analysis to determine and quantify the concentration of agrochemical residues in them. From the laboratory analysis of fourteen (14) different kinds of agrochemicals used for rice cultivation in the study area, nine (9) of them such as aldrin, alachlor, heptachlor, DDE, lindane, malathion, diazinon, terbufos and carbaryl were within acceptable limit of WHO standards while five (5) of them such as DDT, endosulfan, paraquat, chlorpyrifos and parathion were relatively above the standards in soil, water and rice samples. The Pearson’s Product Moment Correlation Co-efficient Analysis at significance level of 0.05 was employed in testing the research hypothesis. The correlation coefficient ($r$) showed a strong positive correlation between agrochemicals used for rice cultivation and their residues in soil, water and rice samples. The implication of this, is that there will be serious environmental concern over time as residues of these agrochemicals might cause soil degradation and water pollution while in human beings, it could easily lead to serious health issues. To abate or reduce the risks and problems associated with agrochemicals use for rice cultivation, the study recommends that: (1) cultural method of weed and pest control should be adopted; (2) more researches should be carried out on agricultural biotechnology to introduce new improved breed of rice species; (3) use of agrochemicals should be based on the recommended dosages as directed by the manufacturers; and (4) regular team monitoring by Ministries of Environment and Agriculture to enforce rules and regulations guiding use of agrochemicals.
Phytochemical Analysis and Evaluation of Antimicrobial Activity of Tuber-Extracts of *Dioscoreadumetorum* (wild variety).

Ichiko Chic Odeh1*
Chemistry Department, Benue State University (Center for Food Technology and Research), Makurdi, Nigeria+234(0)8133191423igwueichiko@gmail.com

John O.Igoli2
Chemistry Department, Federal University of Agriculture, Makurdi, Nigeria. igolij@gmail.com

Gillian O. Igbum2
Chemistry Department, Benue State University, Makurdi, Nigeria. ogbenebenny@yahoo.com

Abstract
The aim of this study is to screen for bioactive compounds of tuber-extracts of *Dioscoreadumetorum* (wild variety) and investigate its antimicrobial properties against some pathogenic micro-organisms responsible for different diseases in man. Sequential extraction (maceration) was carried out at room temperature (27 ± 2°C) using n-hexane and ethylacetate. Phytochemical analysis revealed the presence of alkaloids 2.4%, tannins 6.5%, flavonoids 8.3%, phenolics 9.7%, saponins 7.0%, steroids 10.3% and terpenoids 1.8%. Antimicrobial activity of the extracts were carried out against 12 micro-organisms using disc and broth diffusion methods. The extracts showed sensitivity to most of the test microbes. The minimum inhibition concentration (MIC) ranged from 10mg/µ - 40 mg/µ, zone of inhibition was between 20mm-27mm. The antimicrobial activity against *MethicillinResiststaphylococcus aureus*, (MRSA) 27mm was the highest, *staphylococcus aureus*26mm, *Streptococcus pyogenes*26mm, *candida krusei*26mm, *pseudomonas aeruginosa*26mm, *Escherchia coli*26mm, *candida albicans*25mm, *candida tropicalis*25mm, *corynebacterium ulcerans*24mm, *proteus mirabilis*24mm, *candida stellatoidea*23mm and *salmonella typhi*20mm. The results of this study showed that the bioactive constituents of this plant inhibited a wide range of pathogens which indicates that the extract of this yam could be a promising source of therapeutic agents for these test-micro-organisms.

Keywords: *Dioscoreadumetorum*, phytochemical, antimicrobial activity
AN OVERVIEW OF METHODS AND METHODOLOGY IN ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Ogbole, J. E.¹ Jumbo, D. and Mangbon L.I.²

¹ Department of Statistics, Federal School of Statistics, Manchok, Kaduna State, Nigeria
² Department of GNS, Federal School of Statistics, Manchok, Kaduna State, Nigeria
*Corresponding Author Email: ogbole446@yahoo.com

ABSTRACT

The paper focused on review of various methods and methodologies in Environmental Impact Assessment (EIA). All information sourced from relevant literatures were adequately acknowledged. The paper came up with the many methods in EIA among which are; Approaches based on expect knowledge and judgment, the Delphi method, Multi-criteria evaluation, benefit-cost analysis, goals-achievement matrix, ecological risk, exposure scenario approach (especially the even-tree analysis), the ranking approaches, weighting-scaling methods, and the ranking scaling checklist methods. It is pertinent to conclude this paper by saying that various steps and methods use in EIA study have been developed. It is not necessary to use a methodology in its entirety in an environmental impact study; rather it may be instructive to use portions of methodologies for certain requisite activities. Additional methodologies are being tested, and there is no ”universal” methodology which can be applied to all project types in all environmental settings. However, the most frequent used approach is that of relying on expert opinion, ”expert” being someone with special knowledge useful in forecasting.

Keywords: EIA, Sustainability, Environmental, and Impact
Analysis of Drought in Kaduna State, Nigeria
Between 2000 and 2014
Ogbole J.E1 Jumbo, D 2 Mangbon L.I1

1Department of Statistics, Federal School of Statistics, Manchok, Kaduna State, Nigeria
2Department of GNS, Federal School of Statistics, Manchok, Kaduna State, Nigeria
*Corresponding Author Email: ogbole446@yahoo.com

Abstract

Kaduna state is located within the Guinea Savannah of the African Continent between latitudes 9° 02’ and 11° 32’ north of the equator and between longitude 6° 15’ and 8° 50’ east of the prime meridian. As a result, it is prone to the risks of drought. This study examined the three most important ways of monitoring drought in any locality; people’s perception, precipitation data and remote sensing data. Kaduna state has a population of 6,066,526 (National Population Commission, 2006) the sample size used for this study is 400 respondents. Simple statistical tables were used to present and analyze the data. Equally, Statistical Package for Social Science (SPSS), and Idrisi software were used to analyze the data. The study revealed that there have been episodes of drought in Kaduna state within the period under review. The study also revealed that there is a positive relationship (0.72) between rainfall and vegetation vigour/biomass in the state. Similarly, vegetation condition index (VCI) revealed a value 10.2% indicating a severe drought in the state. Therefore, the study concluded that both rainfall and vegetation vigour/biomass are generally decreasing; indicating a strong positive correlation value of 0.71 (71%). The study therefore recommends that there should be public enlightenment campaign on drought, tree planting etc as it is a very complex phenomenon and its effects very devastating.

Keyword: Kaduna State, Drought, Risk, perception, Rainfall and Vegetation.
ABSTRACT:
Municipal Solid Waste (MSW) in the Federal Capital Territory has resulted in serious environmental and health problems due to improper management. Air Pollution is from waste dumpsites is one of the major environmental concerns in FCT due to the disposal system and uncontrolled burning of MSW. Effect of Waste Dumpsite pollutant emission on Air Quality in the FCT was investigated. Concentration level of six (6) air quality parameters which include methane (CH$_4$), nitrogen dioxide (NO$_2$), sulphur dioxide (SO$_2$), carbon monoxide (CO), hydrogen sulphide (H$_2$S) and carbon dioxide (CO$_2$) were determined in the wet and dry season period in eleven (11) dumpsites and three (3) randomly selected non-dump (control) sites in the FCT were determined using a series of hand-held air quality monitoring equipment. Results indicate the levels of CH$_4$ ranged between 0.0000 mg/m$^3$ to 0.1699 mg/m$^3$ and 0.0000 mg/m$^3$ to 0.0638 mg/m$^3$ for the wet and dry seasons respectively. The wet season mean concentration range for NO$_2$ was 0.0157 mg/m$^3$ to 2.0218 mg/m$^3$, while it was 0.0000 mg/m$^3$ to 1.0035 mg/m$^3$ for the dry season. The levels of SO$_2$ ranged between 0.1092 mg/m$^3$ to 1.8122 mg/m$^3$ in the wet season and 0.0000 mg/m$^3$ to 0.3639 mg/m$^3$ for the dry season. Concentration level of CO ranged between 0.0862 mg/m$^3$ to 1.9005 mg/m$^3$ and 0.1114 mg/m$^3$ to 14.0638 mg/m$^3$ for the wet and dry seasons respectively. H$_2$S ranged 0.0232 mg/m$^3$ to 0.4404 mg/m$^3$ during the wet season and 0.0232 mg/m$^3$ to 0.4065 mg/m$^3$ for the dry season. While that of CO$_2$ ranged between 1.7669 g/m$^3$ to 2.3802 g/m$^3$ for wet season and 1.6365 g/m$^3$ to 1.9923 g/m$^3$. On the whole, concentration of most measured gases was higher at the dumpsites relative to the control points. Test of Correlation analysis reveal that most of the gas pollutants showed positive significant correlation at 95% and 99% confidence interval. F-value was greater than F-critical at α<0.01, which indicated a significant difference in concentration of air quality parameters between the wet and dry seasons. Open dumping and uncontrolled fires in the study area could threaten the health of human life especially the dumpsite workers and the neighbourhood who are regularly exposed to these pollutants. There is a need to develop better practices with regard to municipal solid waste open dump site operation and emission control.

Keywords: Air Pollution, Uncontrolled fire, Waste dumpsite, Municipal Solid Waste, Air Quality Monitoring
Refuse Generation and Disposal and its Urban Planning Implications in Wudil, Kano State, Nigeria

OmavuduIkogho¹.³
Mukhtar Muhammed²
Tukur Mahmoud¹

¹Department of Urban and Regional Planning,
Kano University of Science and Technology, Wudil, Kano State, Nigeria.
²Department of Urban and Regional Planning,
HussainiAdamu Federal Polytechnic, Kazaure, Jigawa State, Nigeria.
³Corresponding author: ikogho@gmail.com

ABSTRACT

Waste is defined as substances or objects which are disposed of. This study is centred on solid waste simply known as refuse. This study aims at assessing the characteristics of refuse generation, collection and disposal in Wudil town. The objectives of the study were to identify the components of solid waste generated, locate the sources of solid waste generated, the method of collection and disposal as well as to examine the effectiveness and planning implications of the refuse management process. The population of the study area was 301,104 and 200 households was systematically sampled on an alternate street basis. Descriptive statistics in form of frequency tables and simple percentage was used to present the data. It was discovered that the average amount of refuse generated was one bag of refuse. Also waste generation was much during the beginning of the month and during weekends. The major components of waste generated was household waste, nylon sachets and paper. Based on these findings, it was recommended that planning for waste collection and disposal should be organised after the observed pattern to optimise efficiency. Also due to the composition of the solid waste generated, government, NGOs and communities should initiate waste to wealth programmes to counter rising unemployment and improve livelihoods.

Keywords: Refuse, Disposal, Generation, Collection, Planning
Synthesis and Characterization of Graphene Oxide from Agricultural Waste

ARO-MODIU, O., *OSOBAMIRO, TEMITOPE M., PETER, O., AYANLEYE, A.
Department of Chemical sciences, Olabisi Onabanjo University, Ago-iwoye, Ogun state.

*email: topebamiro@gmail.com, Osobamiro.temitope@oouagoiwoye.edu.ng

Abstract
Agricultural waste products are very rich in carbon and can be used to produce materials which have significant importance both scientifically and commercially. This study is aimed at producing graphene oxide from agricultural waste using groundnut and almond shells as major materials. Hummer’s method was adopted with some modifications which involved carbonizing, conversion of carbonized product to graphite and conversion of graphite to graphene oxide. The produced graphene oxide powder was then subjected to characterization using FTIR and XRD. The FTIR results for the determination of functional group showed peaks at 3407 cm\(^{-1}\) and 1712 cm\(^{-1}\) (from groundnut shell) and peaks at 3457 cm\(^{-1}\) and 1712 cm\(^{-1}\) (almond shell) corresponding to hydroxyl and carbonyl groups respectively which indicates proper oxidation and good structure. The XRD result showed two peaks for both samples at 20. The percentage yield of graphene oxide from groundnut shell (11.5%) is less than the percentage yield of graphene oxide from almond shell (42.5%). The high yield production of graphene oxide, from almond shell is a better raw material than that from groundnut shell. This work therefore provides a cheaper and costeffective means of producing graphene oxide for industrial and environmental remediation purposes.

Key words: Graphene, groundnut shell, carbonization, almond shell, characterization
Proximate and Mineral Composition of Roeselle Leaves Waste

Department of Chemistry, Nasarawa State University, Keffi.
Corresponding Author: bathiyashuaibu@gmail.com

Abstract

The nutrient yield from roselle leaves waste (zobo leaves after juice extraction) in Keffi Local Government of Nasarawa State was investigated. The proximate composition and mineral contents were determined according to the methods described by analytical methods. The result of the proximate analysis showed that the waste had moisture content (14.6 %), ash content (33.7 %), lipid content (2.1 %), protein content (3.54 %), fibre content (1.6 %) and carbohydrate content (44.46 %). From this study, carbohydrate was found to be higher than the other parameters. The mineral contents showed moderate value for Mg (4.67 mg/kg⁻¹), Ca (41.78 mg/kg⁻¹), Mn (0.48 mg/kg⁻¹), Fe (4.38 mg/kg⁻¹), Zn (8.41 mg/kg⁻¹), K (0.30 mg/kg⁻¹) Na (5.7 mg/kg⁻¹) and Cu (ND) was not found. This waste, presently disposed into the environment causing environmental pollution can be used as animal feed.
Assessment of Surface Water Quality in Rivers and Ponds a Viable Option for Improving Irrigation in Nigeria

1SamailaKundenIshaya and 2Kwarfwang Kevin Jack  
1Nasarawa State University Keffi Email ikunden@yahoo.com  
2Plateau State University, Bokkos

Abstract

Nigeria is blessed with abundant surface water in rivers, streams, rivulets and ponds. However, one of the greatest problems faced in the country is management of water quality from the numerous receiving surfaces for irrigation. This has resulted in the use of water likely to be injurious to the soils and plants. This affects the productive capacity of soils and the developmental processes of many crops. It is in this respect that this study undertook a review on assessment of water quality for irrigation and its application to Nigeria. The study used content analysis and reviewed relevant works on water quality for irrigation. The study examined major issues that affect the safety in the use of water for irrigation. These included issues associated to application of water high in salinity that may result in the built-up of salts in the soils, which cause difficulty in plants uptake of water a condition that causes plants to become stunted even when water is sufficient. High sodium ion in the irrigation water may raise exchangeable sodium percent in the soil and may impede the free flow of water and aeration in the soil thus interfering with normal developmental processes of many plants. Low or high pH in water affects the solubility of the soils and plants performance during irrigation. Other specific ion toxicity also have significant effect on water quality at levels that cause ailment to human health, for example the presence of trace elements in irrigation water can bio-amplify in due course within the food chain thus affecting the consumers of crops from such water. To use water wisely the study recommends that there is the need for intensive assessment of water quality for most surface sources and that research institutes be set in each state to monitor the quality of water to ensure standards recommended for a variety of uses are met.

Keywords: Salinity, Sodicity, Toxicity, Assessment and Irrigation
Levels of Organochlorine Pesticides in Serum of Selected Women in Ile-Ife, Nigeria

Yemisi Tosin Awe¹, Adedeji Onayade², Mosudi Babatunde Sosan³, John Adekunle Oyekunle⁴

¹ Institute of Ecology and Environmental Studies, Obafemi Awolowo University, Ile-Ife, Nigeria.
² Institute of Public Health, Obafemi Awolowo University, Ile-Ife, Nigeria.
³ Department of Crop Production and Protection, Obafemi Awolowo University, Ile-Ife, Nigeria.
⁴ Department of Chemistry, Obafemi Awolowo University, Ile-Ife, Nigeria.

Abstract
Organochlorines are persistent organic pollutants and present everywhere in the environment because of their wide range of application and long-term use. They are bioaccumulated in human adipose tissue, blood and breast milk, and cause adverse health effect. Therefore, there is need to monitor these compounds in the environment and human systems, especially in a county like Nigeria where there is still continual use. This study evaluated the concentration of organochlorine pesticides in 100 women in Ile-Ife, Nigeria and related it to some demographic characteristics and factors (parity and lactation) that affect burden of the compounds in women’s systems. A total of 15 organochlorine pesticides were detected, including p,p DDT, aldrin, endosulfan, γ-BHC and δ-BHC. The most dominant is p, p DDT which is present in all samples with mean concentration of 12.61 ppb followed by aldrin which was present in 99% of samples with mean concentration of 80.99%. Although endosulfan II and endosulfan sulphate had dominance below 20%, the concentration when detected were very high. The only chlorinated benzene detected in all of the samples were γ-BHC and δ-BHC having mean levels 8.22 ppb and 4.62 ppb respectively. There is an indication that some of these pesticides are still in use as at the time of this study because there were presence of higher levels of parent compounds than their metabolites in blood samples.
Implications of Environmental Abuse on Health and Socio – Economic wellbeing in Developing Countries: A focus on Pollution and Deforestation

Abanyam, Noah Lumun Ph.D.
Department of Sociology,
Federal University of Kashere, Gombe State Nigeria
E-Mail Address: noahlumun@gmail.com or marknoah4africa@yahoo.com
Contacts: +234(0)70349028489 & +234(0)8052410631

SamailaBuba
Department of Geography
Federal University of Kashere, Gombe State Nigeria
E-mail Address: bubasamaila24@gmail.com or buba.samaila@yahoo.com
Contacts: +234 (0) 802208958

Hamadu, Jennifer Hunleyedi
Department of Geography
Federal University of Kashere, Gombe State Nigeria
E-mail Address: hunleyedihamadu@gmail.com
Contacts: +234 (0)8032562485 & +234 (0)9072719461

Abstract
The earth produces clean air, nourishing food, fresh water and vegetation. However, environmental abuse of these natural processes is increasingly causing serious health risk and socio-economic challenges. This study examines the implications of environmental abuse on health and socio-economic wellbeing in developing countries focusing on pollution and deforestation. Tragedy of the common theory was used in analyzing the study. The study found that environmental abuse causes climate change which continue to increase threats to human health, impacts on thermal stress, death, injury, floods, and storm and indirectly through change in the ranges of disease vectors such as mosquitoes, water-borne pathogens, biodiversity deflection, erosion, water quality, air quality, and food availability and quality. The story also revealed that environmental abuse such as deforestation, wide spread hunting, air pollution and water pollution are the disastrous consequences or commonest effects associated with drought, desertification, frequent cases of floods, starvation as well as ill-health such as respiratory illness, heart disease, long cancer, cholera, typhoid fever, food contamination and high rate of warm infection. The study recommended that there should be a coordinate global approach aimed at cutting down greenhouse gas. More so, there should capacity building to integrate climate change and its impacts into development planning involving local communities, raising public awareness and education on the implications of environmental abuse on the health socio-economic wellbeing. The study concludes that scientific attention, effective implementation of law against environmental abuse, and excessive campaign against environmental abuse should be the corner stone in eradicating all forms of pollutions and deforestation in developing countries.

Keywords: Implications, Environmental Abuse, Health, Socio-economic wellbeing, Developing Countries, Pollution, Deforestation
WATER POLLUTION: THE BANE OF SUSTAINABLE DEVELOPMENT IN THE 21ST CENTURY IN CENTRAL CROSS RIVER STATE- NIGERIA

1 Bernadette N. Ndomah & 2 Edom O. Abeng
1 Master of Urban and Regional Planning (MURP) & 2 M. Sc., PGDPA, B. Sc. (Ed)
1 Department of Geography, School of Secondary Education, Arts and Social Sciences Programs, Federal Collage of Education, Obudu, Cross River State, Nigeria.
2 Department of Political Science, School of Secondary Education, Arts and Social Sciences Programs, Federal Collage of Education, Obudu, Cross River State, Nigeria.
E-mail: 1 bernyndomah@gmail.com & 2 edomabeng7@gmail.com
Phone numbers: 1 08035376848, 08055566114 & 2 08036631946

Abstract

The study examines water pollution and sustainable development in Central Cross River State (CCRS), Nigeria by: determining the impact of water pollution on human life in CCRS, ascertaining whether water pollution damages aquatic life in CCRS and, examining the influence of water pollution on tourism development in CCRS. The following null hypotheses (H0) were drawn from the objectives to guide the study: H01: There is no relationship between water pollution and human life in CCRS, H02: There is no relationship between water pollution and aquatic life in CCRS and H03: There is no relationship between water pollution and tourism development in CCRS. 200 copies of the questionnaire were administered on residents of the study area using the on-the-spot questionnaire administration technique. Data generated from the administration of the instrument were coded and analyzed using the chi square test analytical technique. The results obtained revealed among others that: water pollution is harmful to human life, damages aquatic life and it does not support tourism development in CCRS, thereby working against sustainable development in the 21st century in CCRS. The following recommendations were made: Creating awareness especially among communities that are likely to be affected by the pollution, so that they may be able to defend themselves by law, making sure that the sources such as industries and others dispose of their wastes in a safe manner, scientific research and development of new technologies for better management of sewage and other wastes, safer agricultural practices incorporating organic farming so as to eliminate the use of excess chemicals, judicious use of water in every aspect of living and developing more efficient ways of waste disposal in CCRS, Nigeria.

KEY WORDS: Pollution, Sustainable, Development, Water, Human, Tourism.
TOURISM AND PLASTIC WASTE GENERATION IN THE 21ST CENTURY IN CROSS RIVER STATE- NIGERIA

1 Bernadette N. Ndomah & 2 MpantorObenNeji
1 Master of Urban and Regional Planning (MURP) & 2 M. Sc. (Ed)
1 Department of Geography, School of Secondary Education, Arts and Social Sciences Programs, Federal Collage of Education, Obudu, Cross River State, Nigeria,
2 Department of Adult and non-formal Education, School of Adult, Non-Formal and Special Education, Federal Collage of Education, Obudu, Cross River State, Nigeria.

E-mail: 1 bernyndomah@gmail.com & 2 mpantoroben@gmail.com
Phone numbers: 1 08035376848, 08055566114 & 2 08073203249

Abstract

The study examines tourism and plastic waste generation in the 21st century in Cross River State (CRS), Nigeria by: examining the make of shopping packing bags for tourists, ascertaining the product of take-away food/drink packs bought by tourists and, determining the make of hair/body care product packs as served to tourists in their respective lodges in CRS. The following null hypotheses (H₀) were drawn from the objectives to guide the study: H₀₁: There is no relationship between the make of shopping packing bags for tourists and plastic waste generation, H₀₂: There is no relationship between the product of take-away food/drink packs bought by tourists and plastic waste generation and H₀₃: There is no relationship between the make of hair/body care product packs as served to tourists in their respective lodges and plastic waste generation in CRS. 200 copies of the questionnaire were administered on residents of the study area using the on-the-spot questionnaire administration technique. Data generated from the administration of the instrument were analyzed using the chi square test analytical technique. The results obtained revealed among others that: the make of shopping packing bags for tourists, the product of take-away food/drink packs bought by tourists and, the make of hair/body care product packs as served to tourists in their respective lodges in CRS are all made of disposable plastics thereby, generating commendable plastic waste in CRS- a tourism destination. By this, plastic pollution is enhanced while hampering sustainable development in the 21st century in CRS.

Key Words: Pollution, Sustainable Development, Tourism, Plastic, Waste Generation.
THE RATIONALE FOR RURAL ENVIRONMENTAL RESOURCE CONSERVATION TOWARD SUSTAINABLE DEVELOPMENT

DR. JONATHAN ABAWUA
Department of Geography
Faculty of Environmental Science
Benue State University, Makurdi

Abstract

The present state of reckless exploitation of the earth’s resources in the rural environment, without recourse to conservation principles, is becoming increasingly worrisome to the international community. Since the 1970s the UNO has been awakening the international system of the serious dangers of environmental degradation and resource depletion, and the urgent need to protect our natural resources, such as the ores, water, soil natural vegetation, and even climate. The initiative of the UNO has received positive response globally, as many countries, including Nigeria have formulated Environmental policies along with a series of specific environmental laws and regulations. The paper uses the Nigerian examples to illustrate, that inspite of the laudable legislative and institutional frameworks in place, there is still low level of awareness and general apathy about environmental protection in most communities. Materials gathered from documentary sources, interviews and observations show, that trees are freely cut-down recklessly for fuel wood, without any thought about replanting. Much of the semi-arid North-East region has been deprived of climax vegetation due to overgrazing and overcropping. Inefficient damming and irrigation methods accelerate the vanishing of water and vegetal resources of the Lake Chad region. The Middle Belt has problems of sheet erosion, soil leaching, depletion of forest reserves and reckless small-scale mining of solid minerals. In the Niger-Delta region farmlands, water and vegetal resources are lost daily to oil pollution and gas flaring. Other coastal areas of the south-west are affected by soil leading, floods and swamps. Given the infinite nature of most of these earth’s resources, the paper reaffirms that their conservation for sustainable development is non-negotiable to allow humans derive the greatest long-term benefits from them. Measures suggested here for conserving our earth’s resources include: recycling, reclamation, afforestation, reforestation, hybridization and establishment of well protected conservation areas and forest reserves.

KeyWords: Resource Conservation; Sustainable Development.
THE GREAT PACIFIC GARBAGE AND THE PARADOX OF ‘PLASTICIZATION’ OF AQUA-TERRESTIAL HABITAT OF KWA-IBOE RIVER ESTUARY

Ebong Mbuotidem Sampson  
Department of Geography and Natural Resources Management,  
University of Uyo, Uyo.  
mbuotisampson@gmail.com

Iniobong E. Ansa  
Department of Geography and Natural Resources Management,  
University of Uyo, Uyo.  
iniobongansa@uniuyo.edu.ng.org

Nsidibe Mbuotidem Sampson  
amayaknsidibe@gmail.com

Abstract
The plastic waste generation on coastal environment is a global threat to man and his aquatic environment. This is clearly seen in the events marking two critical world celebration; The world Environment Day and the world Ocean Day. This paper takes a close look at the situation within the Kwa Iboe estuary. The activities within the coastal environment built from two critical factors of the physical environment characteristics of the activities of tidal waves as a carrier of plastic wastes as well as anthropogenic induced activities as reflection in the social activities within, like duping of plastics through pleasure treat and picnics Riverine transportation, along navigation paths. In addition, poor waste management and little or no enlightenment on waste management was observed to be a snag in the proper management of the coastal environment. The paper recommends a holistic reconsideration of waste management strategy through the commencement of sensitization to visitors and tourist on waste disposal, waste reused as well as the provision of mobile toilet within this area. It also encourages researches on the use of Nypa palm so as to allow proper navigation within the coastal area.
IMPLEMENTING STRATEGIC POLICIES AGAINST ENVIRONMENTAL POLLUTION IN NIGERIA: IMPLICATIONS FOR AGRICULTURAL DEVELOPMENT AND SUSTENANCE IN THE NIGER- DELTA REGION

Amina Bala Saleh and Erunke Canice EsidenePh.D
Department of Political Science
Nasarawa State University, Keffi
Tel: 08065595472
Email: erunke72@gmail.com

Abstract
The thrust of this paper is to examine the nexus between the implementation of effective environmental policies in Nigeria and how it can impact on agricultural production and food security in the Niger-Delta region. One of the challenges of realizing adequate food security as well as increased agricultural production in the Niger-Delta in particular, and Nigeria in general, is the problem of environmental degradation occasioned by oil spillage. The implication of this state of affairs is that arable agricultural lands meant for crop production have been destroyed by pollution. The multiplier effect of this is that the region in question and its teeming populace have been basically ravaged by all manner of social crises such as poverty, disease, food shortages and malnutrition, and an unending agitation for resource control. The study is a theoretical analysis of existing works of scholars and experts in the broader field of environmental pollution studies. The research relies on secondary sources of data as method of investigation. The study discovers that inadequate strategic environmental policies enunciated by government at all levels in the past and present, have continued to be the bane in the increasing challenge in terms of environmental disaster in Nigeria. To be able to reverse this unfortunate situation, the study sums up with critical policy recommendations to the effect that realizing sustainable agricultural development requires new thinking and change of attitude over and above political rhetoric. This way, the quest for the achievement of vision 2030 of the global sustainable goals can be greatly realized.

Keywords: Strategic Policies, Environmental Pollution, Agricultural Development, Sustainability.
NIGERIA AND THE MENACE OF ENVIRONMENTAL POLLUTION IN HISTORICAL PERSPECTIVE: A CASE STUDY OF SOKOTO STATE

FARUKU MUHAMMAD
Department of History, Shehu Shagari College of Education Sokoto
Phone: 07062086205  email: nrabelogwd@gmail.com

Abstract
Environmental pollution has generated and continues to pose serious menace to the socio-economic development in Nigeria and Sokoto state in particular. However, in spite of the tremendous attention paid by both the government and non-governmental agencies through various policies, the menace in Sokoto and even in Nigeria at large still demand further attention as the situation continue degenerating. Sokoto starting from the beginning of the colonial conquest in 1903, the colonial authority made little effort in ensuring effective conservation of economic resources to limit pollution in the area. What prevailed most was the colonial policy designed to ensure effective exploitation of the resource as a means of incorporating the area in to the world-wide capitalist system. With the demise of the colonial rule and the attainment of independent, there were still no clear formulated policies in the area designed to ensure effective management of environmental pollution in the area. Although there are now in existence, the Ministry of Environment designed to eradicate the menace in the area, most of the policy makers lack the understanding and expertise of the process involved in curtailing the menace. The paper therefore will examine some of the devastating effects of the environmental pollution in Sokoto. Emphasis will be given on the historical evolution and perspectives on the environmental factors influencing the development of the area.

Key words: environment, pollution, menace, conservation, resources, policy.
Evaluation of heavy Metals from Roadside Soils of major Highways in Lokoja, Kogi State-Nigeria

*M.A. Funtua¹, and Onimisi², F.O.

¹Department of Pure & Applied Chemistry, Federal University Birnin Kebbi, Kebbi State-Nigeria
²Department of Chemistry, Federal University Lokoja, Kogi State-Nigeria

*Corresponding author: adomustapha@yahoo.com, +234-8039738584

Abstract

The level of heavy metals from the major roadsides of Lokoja town was evaluated using Atomic Absorption Spectrophotometer (AAS). Soil samples were taken from five different sites along the major highways Nataco, Ganaja, Adankolo, Kpata and Zenith respectively. Soil samples at each sampling sites was taken at the depth of 2cm, 4cm and 7cm beneath the soil. These were then mixed to give a representative sample per site. Samples were digested using aqua regia in the ratio 3:1, HCl:HNO₃, followed by addition of 10cmH₂O₂. The volume of the digest was made up to 100cm³ using distilled water. Portion of this solution was used for the determination of Cd, Fe, Pb and Zn. Mean levels of the analysed metals ranged between 3.31±0.01mg/kg Pb at Ganaja, to 1.56±0.01mg/kg at Kpata. Cadmium was observed to be highest (0.06±0.02mg/kg) at Kpata, with a least value (0.01±0.00mg/kg) at Ganaja. Zinc was highest (3.21±1.23mg/kg) at Nataco, and least (0.94±0.05mg/kg) at Kpata. Iron was highest (627.11±10.38mg/kg) at Nataco, with a least value (339.78±6.23mg/kg) at Kpata. Mean pH of the soil ranged from 8.39±0.47 Adankolo, to 7.11±0.20 at Kpata. Mean Organic carbon (OC) was observed to be highest (0.76±0.32) at Ganaja, and least at Nataco (0.34±0.02). Mean moisture content was observed to be highest (1.82±0.09%) at Nataco, with the least (0.86±0.02%) at site Zenith.

Key words: Heavy metals, Lokoja, Road sites, Soil and Highways.
GAS FLARING IN NIGERIA: DECADES OF FAILED POLICY IMPLEMENTATION

1MAIWADA A S & 2HASSAN M.
Corresponding Author: MAIWADA A S
Email: abdulmaiwada24@gmail.com
Mobile Number: +234 (0) 8032256041

1&2Department of Geography, Umaru Musa Yar’adua University Katsina, Nigeria.

ABSTRACT
Globally, Gas flaring is considered as waste of potentially valuable resources and distinguished to be one of the world’s sources of black carbon released into the environment. In Nigeria, the Africa’s largest oil producing country, unsustainable and careless gas flaring occurs every day in areas of oil production for many decades. This article aimed to review the Nigeria’s environmental management acts and the laws related to natural gas and its unsustainable flare in order to find the reasons behind the failure of natural gas flare phase out. Acts and decrees from the petroleum act of 1969 to the procurement of the petroleum bill of 2012 all failed to implement the unsustainable gas flaring phase out despite the country’s commitment to the current global climate change regime. Trends of unsustainable flare of gas from 1970-2011 shows great fluctuations in the country. Some of the reasons found to be behind the flare phase out failure are the presence of corruption in the oil and gas sector, lack infrastructure from the country’s part to harness the oil and its associated products (Natural gas), lack of will from the oil companies to find other alternatives to market or utilise the Natural gas and the conscious fear of losing considerable amount of revenues from the oil companies. It is recommended that government needs a concrete mechanism to guarantee the coordination and implementation of laws regarding the environment and oil sector and make sure that all projects and plans work to their best possible capacity for this will surely enhance people's lives and confirm the country’s position and role in economic and political leadership in the African Union and the ECOWAS.

Key words: Failure; Gas flaring; Implementation; Nigeria; Policy.
Assessment of Changes in Aerosol Optical Depth Over Ilorin, North-Central Nigeria

Olaitan Razaq Abolaji
B.Tech. M.Sc Environmental Control and Mgt. Assistant Lecturer,
Department of Geography and Environmental Management
University of Ilorin, Nigeria.
Tel: +2347057354778 E-mail: abdulrazaqolaitan@gmail.com

Olorunfemi Funso
BSc, MSc, PhD Geography, Professor
Department of Geography and Environmental Management
University of Ilorin, Nigeria.
Tel: +2348033598639 E-mail: usmanadebimpe@gmail.com

Ajibade Tajudeen
BSc, MSc, PhD Geography, Professor
Department of Geography and Environmental Management
University of Ilorin, Nigeria.
E-mail: edabijalt2001@yahoo.com

Adepoju Kayode
BSc, MSc, PhD GIS, Research Fellow 1
Institute of Ecology and Environmental Studies, Obafemi Awolowo University
Ile Ife, Nigeria.
E-mail: adewaleadepoju@gmail.com

(Mrs) Adetoro Olusola
BSc, MSc, PhD GIS, Research Fellow 1
Institute of Ecology and Environmental Studies, Obafemi Awolowo University
Ile Ife, Nigeria.
Tel: +2348033598639 E-mail: omoige@gmail.com

Abstract
Existing studies have shown that anthropogenic activities over many urban areas in developing countries possess significant influence on the climatic system. However, there were uncertainties on the exact spatio-temporal patterns in the northcentral part of Nigeria. This study therefore analyzed the seasonal and annual distribution of satellite derived aerosol optical depth of the area which involved acquisition of GeoTIFF images from the Moderate Resolution Imaging Spectro radiometer data. The results showed a 0.6 micron decrease in the inter annual mean average aerosol concentration from 2000 to 2015 while there was a marked seasonal difference in the average mean values as 16.14 microns was recorded for rainy season whereas, 16.50 microns was obtained for the dry season respectively at annual values of 16.31 microns. The study suggested need for compliance to bush burning regulations to mitigate negative effects on water availability and food security.

Keywords: Aerosol Optical Depth; Northcentral Nigeria, Remote Sensing, GIS,
APPLICATION OF GEOSPATIAL TECHNIQUES IN TRACING THE EVOLUTION AND DEVELOPMENT OF MARKET CENTRES IN GOMBE TOWN, NIGERIA

Yakubu Dan¹, Yila C. Makadi², Bilkisu Y. Ahmed³

Gombe State University, Faculty of Science Department of Geography P.M.B 127, Tudun-Wada, Gombe, Gombe State of Nigeria.

Correspondent: ycaiaphas@gmail.com Phone No: 081-418-537-24, Remote sensing and Geographical Information Systems Units, Geography department.

ABSTRACT

This study, “The Application of Geospatial Techniques in Tracing the Evolution and Development of Market Centres in Gombe Town” employed spatial data and historical written literatures of the state to examine the origin and development of market centres/settlements in Gombe town, the proceeding development that led to the current state/condition of market centres as well as their contributing factors. Result of the findings revealed that the number of market centres that evolved through the phases increases proportionally as population of the town grow; phase 1 has 2 market centres with 16,000 people, phase 2 has 4 markets with about 25,000 people, phase 3 has 7 markets with 47,000 people, phase 4 has 10 markets with 208,000 people and phase 5 has 16 market with more than 400,000 people. Also, identified factors that led to the observed growth from above statistics included capitalization of the town as the headquarter of the Emirate and Gombe Division in 1919 and subsequently the capital city of Gombe State in 1996, centrality of the town surrounded by large and smaller order settlements, and high number of immigrants from different part of the state and country at large. The study recommends that growing settlements and other cities should observe and monitor the location of their market places so that they conform to the standard of centrality and ease of access to redistribution centres within the market thresholds.

Keywords: Geospatial Techniques, Evolution, Market Centres, settlements, population.
KINETIC AND EQUILIBRIUM STUDIES FOR THE ADSORPTION OF TETRACYCLINE FROM AQUEOUS SOLUTION ON CARBONIZED PALM KERNEL SHELL

U. J. Ahile¹, T. Ogbole¹, T. T. Uzah¹ and S. T. Torsabo², H. N. Iorav¹

¹Department of Chemistry, Benue State University, P.M.B. 102119, Makurdi, Nigeria
²Department of Chemistry, AkaweTorkula College of Advanced and Professional Studies, Makurdi, Benue State

*Corresponding Authors: ahileuj@gmail.com +2348064049464, terlumuntorsabo@gmail.com+2347030756765

Abstract:
In the present study, activated carbon was synthesized under optimized conditions with NH₄Cl. Activation from a pre-cursor; palm kernel shell, was applied as an adsorbent to remove tetracycline from aqueous solution. The result for physico-chemical characterization showed, 6.68 for pH, 0.714gL⁻¹ for bulk density, 42.06% for attrition, 4.25% for moisture content, 1.45% for ash content and 632mgg⁻¹ of iodine value. The equilibrium adsorption was studied for Langmuir, Freundlich and Tempkin. The Freundlich isotherm fitted best with R² value 0.942. The kinetics was studied for both pseudo first order and pseudo second order kinetics. The absorption process follows pseudo-second order with R² value of 0.997 (approximately 1.000). The Fourier-transform infrared spectrophotometer (FTIR) results show functional groups of carboxyl, phenols, nitriles, alkynes, aldehydes, alkyl halides, aromatic amines and alkanes. The Scanning Electron Microscope (SEM) results revealed images of pore sites at various magnifications, where significant adsorption occurred on the surface of the adsorbent. From the results obtained, the adsorbent proved to be an effective adsorbent for the removal of antibiotics from aqueous solutions.

Keywords: Adsorption, absorbent, palm kernel shell, physicochemical, tetracycline.
THE IMPORTANCE OF AN ECO-FRIENDLY ENVIRONMENT FOR WASTE MANAGEMENT AND SUSTAINABLE NATIONAL DEVELOPMENT

Sule Ada Florence¹, IorbeeBenjamin Fateman², UwehPhilomemaOkwa³ and TorsaboTerlumunSamuel⁴

¹,²&⁴DEPARTMENT OF CHEMISTRY, AKAWETORKULA COLLEGE OF ADVANCED AND PROFESSIONAL STUDIES MAKURDI, BENUF STATE. NIGERIA
³DEPARTMENT OF BIOLOGY, AKAWETORKULA COLLEGE OF ADVANCED AND PROFESSIONAL STUDIES MAKURDI, BENUF STATE. NIGERIA

The population of Nigeria is increasing steadily without a corresponding increase in land area, as Nigerians interact with the environment through urbanization, deforestation, desertification, overpopulation and all kinds of pollution. These impacts have both negative and positive effects on the natural environment. The unwise use of the natural environment due to ignorance, poverty, overpopulation and greed amongst others has led to the degradation of the environment. Therefore, there is need for Environmental education as an effective instrument to create consciousness of ecological balance that development need not necessarily degrade the natural environment. This paper examines some of the resultant impacts of man’s interaction with his environment with a view to outlining their contribution to environmental problems, and suggested ways of having an eco-friendly environment for a sustainable national development.