

1st ANNUAL CONFERENCE/AGM GARDEN CITY 2019

////////// THEME //////////////////////////////////////

**IMPACT ASSESSMENT
A TOOL FOR ACHIEVING THE SUSTAINABLE
DEVELOPMENT GOALS IN NIGERIA**

7th-8th November, 2019

**Ebitimi Banigo Hall,
University of Port Harcourt.**

BOOK OF ABSTRACT



SUSTAINABLE DEVELOPMENT TRAINING CENTRE

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09:30	11:50	02:20	OPENING PLENARY	
11:40	11:55	00:15	Tea Break	
11:50	13:30	01:40	TECHNICAL SESSIONS 1A [Climate Change I] -Hall A	CHAIRMAN: Dr. Daniel Utibe; REPERTOIRES:
11:50	13:30	01:40	TECHNICAL SESSIONS 1B [Health, Social Well-Being and Economic Development]; Hall B	CHAIRMAN: Mr. Ahmed Sanda; REPERTOIRES:
13:30	14:30	01:00	LUNCH	
14:30	16:10	01:40	TECHNICAL SESSIONS 2A [Climate Change II] -HALL A	CHAIRMAN: Mrs. Chizoba Chinweze REPERTOIRES:
14:30	16:10	01:40	TECHNICAL SESSIONS 2B [Smarter Infrastructure System/Air Quality] -HALL B	CHAIRMAN: Dr. Zulfikar Adamu; REPERTOIRES:
16:10	17:50	01:40	TECHNICAL SESSIONS 3A [Environmental Justice and Equality] -HALL A	CHAIRMAN: Mr. Ibrahim Salau; REPERTOIRES:
16:10	17:50	01:40	TECHNICAL SESSIONS 3B [Impact Assessment and Sustainable Development Goals I] -HALL B	CHAIRMAN: Mr. Abbas Suleiman; REPERTOIRES:
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09:00	10:40	01:40	TECHNICAL SESSIONS 4A [Waste Management/Cultural Heritage] -HALL A	CHAIRMAN: Dr Mukhtar Namadi REPERTOIRES:
09:00	10:40	01:40	TECHNICAL SESSIONS 4B [General Research and Development I] -HALL B	CHAIRMAN: Dr. Bassey Uzodinma; REPERTOIRES:
10:40	10:55	00:15	TEA BREAK	
10:55	12:35	01:40	TECHNICAL SESSIONS 5A [General Research and Development II] -HALL A	CHAIRMAN: Prof. Bode Gbenle; REPERTOIRES:
10:55	12:35	01:40	TECHNICAL SESSIONS 5B [Impact Assessment and Sustainable Development Goals II] HALL B	CHAIRMAN: Ms. Bolanle Ajayi REPERTOIRES:
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PREFACE

On 1st January 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development, adopted by world leaders in September 2015 at an historic UN Summit, officially came into force. With these new Goals that universally apply to all, countries committed to mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind.

The SDGs build on the success of the Millennium Development Goals (MDGs) and aim to go further to end all forms of poverty. The new Goals are unique in that they call for action by all countries, poor, rich and middle-income to promote prosperity while protecting the planet. They recognize that ending poverty must go hand-in-hand with strategies that build economic growth and addresses a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection.

In achieving the SDGs in Nigeria, AEIA recognises that the importance of impact assessment as a tool in promoting environmental governance, as well as the integration of environmental, social and health considerations into economic development plans.

Hence, this Conference is aimed at bringing together policy makers, industrialists, the academia, research institutes, and IA professionals from the private and public sectors, to brainstorm and proffer solutions to challenges in effective implementation of the SDGs in Nigeria.

**Engr. Mamoud Bello Abubakar -Chairman,
National Organising Committee**

**Dr. Ijeoma Vincent-Akpu -Co-Chair,
National Organising Committee**

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Dr. Banji Adekoya (Immediate Past President)
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Dr. Lola Okwuosa (Treasurer)
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Dr. Bode Gbenle (Chairman Board of Trustees)

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Prof. Prince C. Mmom
Prof Olufemi M. Adesope
Dr Ibitoroko George-Opuda
Dr. Banji Adekoya
Prof Eunice O. Nwachukwu
Dr. M. K. Hamadina
Dr. S. O. Nzeako
Dr. Meshach O. Ojile
Onyagbodor Oghogho Peter – LOC Secretary

SPECIAL GUEST



Prof Ndowa E. S. Lale

The Vice Chancellor, University of Port Harcourt



CHAIRMAN: Yaw Amoyaw-Osei (Past President of IAIA, 2015 - 2016).

Yaw is a former Director of the Environmental Protection Agency, Ghana, and currently the CEO of Centre for Environment & Health Research & Training (a leading environmental consulting firm in Ghana), and the Executive Director of Green Advocacy Ghana (an NGO in e-waste management). Yaw played a lead role in developing the Ghana EIA Procedures and Regulations; and for over a decade (1992 – 2003) facilitated all EIAs conducted/reviewed in Ghana. He has over twenty-five years of Impact Assessment (IA) experience (conducting over 70 IAs and several publications); and consulted for the Canadian International Development Agency, European Union, the World Bank, etc. He pioneered EIA capacity building in Ghana; was a part-time lecturer in EIA and Environmental Law at the Environmental Science Graduate Programme of the Kwame Nkrumah University of

Science & Technology (KNUST); and was a World Bank/IUCN trainer in Expanding Sub-Regional Capacity in EIA in West Central Africa.

Yaw was the President of the International Association for Impact Assessment (2015 – 2016); served as a Board Member of IAIA from 2014 - 2018; and also, the President of the Ghana Affiliate of IAIA from 2012 – 2017. He had his formal education at KNUST, Kumasi; University of Aberdeen, Scotland, UK; and the University of California, Davis, USA. He was a scholar of the International Ocean Institute – Dalhousie University, Halifax, Nova Scotia, Canada; and a visiting scientist at the Global Environment Monitoring System/Monitoring & Assessment Research Centre, Kings College, London.



KEYNOTE SPEAKER: Mr. James O. Obakpolor, SDGs Focal Desk Officer, Federal Ministry of Budget & National Planning, Abuja

James O. Obakpolor is an erudite Development Planning Officer from the Ministry of Budget and National Planning Abuja and has several years of experience as the SDGs Focal desk officer, among other duties in the Ministry.

He is a graduate of Economics, MBA (I.T), Postgraduate Diplomas in the Management Sciences and a U.N Institute certified Sustainable Development Planner and Evaluator. His outstanding leadership qualities were recognized by the NYSC Governing Board in Lagos State in his national service year, and he served among sector team members that produced Nigeria’s medium and long term plans that have typically mainstreamed the SDGs towards acceleration and policy support to achieve development goals in the future.

The speaker would be giving the Conference keynote on “Strategies for Achieving Sustainable Development Goals in Nigeria” in recognition of the pivotal role that the ministry plays in jointly coordinating and mainstreaming SDGs implementation in Nigeria.



LEAD SPEAKER: Mr. John Adesanya Alonge, Director of Environmental Assessment, Federal Ministry of Environment, Abuja.

TOPIC: Impact Assessment as a Tool for Achieving Sustainable Development Goals in Nigeria

John joined the Federal Civil Service in 1984 and rose through the ranks to become the Director of Environmental Assessment Department of the Federal Ministry of Environment. He has over three decades’ cognate experience in Environmental Policy Formulation, Environmental Management, Environmental Assessment, Environmental Regulations, Monitoring and Enforcement. He was educated at KDEA Primary School, Odo-Ere, Kogi State (1966-1972), Titcombe College, Egbe, Kogi State (1973-1977), University of Ibadan (B.Sc. Forest Resources Management in 1983 and M.Sc. Agricultural Extension in 1990), and NAVASCOTIA, Canada where he obtained certificate in Environmental Management in 1996. Currently, he is doing a Ph.D in Nasarawa State University, Keffi



ARE YOU READY FOR IAIA20?

IAIA's international conferences are held in a different location each year, drawing 600-1000 environmental professionals from 70+ nations. Lively exchange and learning opportunities are provided through technical visits, training courses, workshops, theme forums, concurrent sessions, poster displays, networking, and social activities.

The next conference -IAIA20 with the theme: **SMARTENING IMPACT ASSESSMENT** is scheduled on **26-29 May 2020** at Seville Conference & Exhibition Centre (FIBES,) Seville, Spain.



CONFERENCE TOPICS

- Decision impacts: How is impact assessment truly influencing decisions?
- Strengthening the effectiveness of impact assessment through collaboration
- Efficient communication for streamlining processes
- Big data analytics for tackling the biodiversity crisis
- Impact assessment and management through technological advancements
- Information overload and impact assessment: Effectively communicating risks and uncertainties
- Tackling contemporary environmental issues: The contribution of smart technologies to monitoring
- Investment and financing for environmental protection

Discussions will also address general IA topics and the world of IAIA special-interest Sections.



For registration and details about the conference visit <https://conferences.iaia.org/2020/>



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AN AFFILIATE OF INTERNATIONAL ASSOCIATION FOR IMPACT ASSESSMENT (IAIA)

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- Shoreline Assessment (Using SCAT)
- Design of Remedial Action Plan
- Remediation



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DETAILED PROGRAMME

DAY 1 7th November, 2019				
START	FINISH	DURATION	EVENT	SPEAKER
8:00	13:50	2:50	OPENING SESSION/PLENARY	
			CHAIRMAN:	Mr. Yaw Amoyeye-Odeh, (IAIA Past President -2015/2016)
			REPORTAIRES	
9:00	9:05	0:05:00	Opening Prayer	
9:05	9:10	0:05:00	National Anthem	ALL
9:10	9:15	0:05:00	Welcome Address	Mr. Ahmed Sanda (AEIAN President)
9:15	9:20	0:05:00	Chairman Opening Address	Mr. Yaw Amoyeye-Odeh, (IAIA Past President -2015/2016)
9:20	9:30	0:10:00	Guest Speaker	Vice-Chancellor, University of Port-Harcourt
9:30	9:55	0:25:00	Keynote Address: Strategies for Achieving the SDGs in Nigeria.	Mr. James Obakpolor (ACPD -Sustainable Development) Federal Ministry of Budget and National Planning.
9:55	10:20	0:25:00	LEAD PAPER 1: Impact assessment as a tool for achieving SDGs	Mr. Ademola Akonge (Director Environmental Assessment, Department, Federal Ministry of Environment)
10:20	10:45	0:25:00	LEAD PAPER 2: Strategies in Addressing climate change challenges in Nigeria	Dr. Peter Iarfa (Director Climate Change Department, Federal Ministry of Environment)
10:45	11:10	0:25:00	LEAD PAPER 3: The Integrated Smartification of buildings, utilities and infrastructure for national growth	Dr. Zulfikar Adamu (Associate Prof. of Strategic IT in Construction), School of The Built Environment and Architecture, London South Bank University, UK
11:10	11:35	0:25:00	LEAD PAPER 4: Strategies for addressing soot and creating cleaner cities	Prof. B.S. Kenya (Former Commissioner of Environment, Rivers State)
11:35	11:40	0:05:00	Message from AEIAN	Prof. Bode Gbenle (AEIAN BOT Chair)
11:40	11:45	0:05:00	Closing Remarks	Engr. Abubakar, Mahmoud Bello (Chairman National Organising Committee) Dr. (Jeoma Vincent-Akpu (Co-Chair National Organising Committee)
11:45	11:50	0:05:00	Vote of Thanks	Prof. Bechukwu Agbagwa (Chairman Local Organising Committee)
11:40	13:55	0:15:00	Tea Break	
			END OF PLENARY AND DEPARTURE OF INVITED GUESTS	
11:50	13:00	1:40:00	TECHNICAL SESSIONS 1A (Climate Change I) - Hall A	
			CHAIRMAN: Dr. Daniel Utiha;	
			REPORTAIRES:	
11:50	12:10	0:20:00	Effects of Climate Change on Aquaculture and Fisheries in Niger Delta, Nigeria	Okoselimeha Ifikubara Joshua And Vincent Akpu (Jeoma Favour
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14:30	14:47	0:17:00	Comparative Analysis of Landuse Landcover Changes and its Implications on Surface Temperature Between Inland and Coastal Cities of Enugu and Port Harcourt, Nigeria	Anthonya Nwoga and Victor N. Sunday
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15:21	15:38	0:17:00	Adoption of Climate Smart Agriculture by Artisanal Fish Farmers in Okrika Local Government Area of Rivers State, Nigeria	Henri Ukoha, Osoji, E. E. and Ekan, N. T.
15:38	15:55	0:17:00	Population Growth, Climate Change and Sustainable Development in Nigeria: The Nexus	Onyia Israel Jackson; Nwosozu Chikobe and Ibe Chidi
15:55	16:12	0:17:00	Food Waste Management: A Parable for Sustainable Mitig.	Hughan, Queenesther and Zabary, G.
16:10	16:10	0:00:00	TECHNICAL SESSIONS 2B (Smarter Infrastructure Systems/Air Quality) -HALL B	
			CHAIRMAN: Dr. Zulfikar Adams	
			REPORTAIRES:	
16:10	14:50	0:20:00	Assessment of Port Performance in Nigeria	Dani I. Gbolahan, Omoko Victor and Nwaogbe-Obioma R.
14:50	15:10	0:20:00	An Empirical Analysis of Air Transport Operational Performance: A Structural Equation Model Approach	Ibrahim A. Akonobi, Olatunji K. Nwogbo, and Victor Omoku
15:10	15:30	0:20:00	Determination Of Carbon dioxide Equivalent From Electricity Consumption Using Ratscreens offshore	Fusuf Mohammed Babu, Abdulhadi Mohammed Ewidi and Engr. Dr. Kalayut O. Adesomi
15:30	15:50	0:20:00	The Effect of Atmospheric Pressure on CH4 and CO2 Emission from a Closed Landfill Site in Manchester, United Kingdom	Nwachukwu Arthur Nwachukwu
15:50	16:10	0:20:00	Simulation of Black Carbon emissions from Gas Flaring activities in the Niger Delta	Freekoro, Chikere
16:10	17:05	1:40:00	TECHNICAL SESSIONS 3A (Environmental Justice and Equality) -HALL A	
			CHAIRMAN: Mr. Ibrahim Salau	
			REPORTAIRES:	
16:10	16:15	0:20:00	Ebonyi River Basin as a Common Property Resource: Benefits, Problems and Solutions in Iri Area of Ebonyi State	Onyebator E.N, Ashigbu, G.N. And Onye C.M.

DETAILED PROGRAMME

16:45	18:00	01:15:00	Social Impact Management in the AI Process: A Review of Current Practice in Nigeria	Dr. Ibrahim Olayinka
17:00	17:15	0:15:00	Capitalism and Environmental Pollution: Theorizing global planetary and pain from a Utilitarian perspective	Matthew David Ogidi
17:15	17:30	0:15:00	Impacts of Agro-Industrial Innovation and Revolution in African Agricultural Sector	Orji (E.E.), Anorwu (U.G.), Okoro (M.D.), Gburegbure (J.M.), Tin-Ahamea (A.)
18:10	17:50	1:40:00	TECHNICAL SESSIONS 04 (Impact Assessment and Sustainable Development Goals) - HALL B	
			CHAIRMAN: Mr. Ansole Suleman	
18:10	18:20	0:10:00	Traditional Perspectives of Environmental, Social and Health Impact Assessment (I-E-H) Practice in Nigeria: A Vital Instrument for Sustainable Development	Chinike Adeniyi, O. Kabi, Munko Okonkwo, Samuel Ikem, Olowu, Tolope Oluwalaniran
18:40	18:50	0:10:00	Environmental Impact Assessment (EIA) and Its Contribution to Sustainable Development: Voices from the Nigerian Oil Fields	Muhammad Yusuf
19:50	17:10	0:20:00	Environmental Assessment in Nigeria: Towards Achieving the SDGs	Edward T. Eze (Abigyan) et
19:10	17:30	0:20:00	Environmental and Social Impact Assessment: A Tool for Achieving the Sustainable Development Goals in Nigeria	Wale Olatunji and Henry Olayinka
17:30	17:50	0:20:00	Strategic Implementation of Environmental Impact Assessment: Pathway to Achieving Developmental Goals in Nigeria	Phaedon K. C. And Hart, AJ
			DAY 2	
			START FINISH DURATION PAYMENT	
8:00	10:40	1:40:00	TECHNICAL SESSIONS 04 (Waste Management/Cultural Heritage)	HALL A
			CHAIRMAN: Mr. Gbolahan Ajayi	
8:40	9:30	0:50:00	Status of Polytopic Academic Hydrocarbon (PH) in Soil from Remedial Workshops in Oloru (Lagos Local Government Area, Rivers State, Nigeria)	Muhammad, U.G., Olu, U.G. and Mwak, J.P.
9:10	9:40	0:30:00	Modeling the Fate of Diesel in a Shallow Sandstone Reservoir in Niger (2010)	Thompson, C. N., Ayejemi, O. and Olayinka, E.
9:40	10:00	0:20:00	Soil Serial Bank Studies in Special Project Districts in Some Communities in Rivers State, Nigeria	Ayinde, A. F. O., Waziri, B. E., Oshinwa, E. B. and Ogidi, C.A.
10:30	10:20	0:10:00	Challenges in the Implementation of Cultural Heritage Impact Assessment in Nigeria	Ayemil, Friday Samson
10:40	10:50	0:10:00	Dealing with Cultural Heritage Aspect of Environmental Impact Assessment in Nigeria	Felix, Oluwalogun
10:50	10:58	1:08:00	TECHNICAL SESSIONS 04 (General Research and Development) - HALL B	
			CHAIRMAN: Dr. Festus Udojemu	
8:40	9:30	0:50:00	Seasonal Variability of Phytoplankton Species in The Sakin, Ikere/Oloru, River, Rivers State, Nigeria	Ikem, A. T., Oshinwa, B. E. (Olu), Oluwalaniran, S.
9:10	9:40	0:30:00	Final and Proximal Activities of Microorganism Isolated from Cassava Waste Water Contaminated Soil	Sylvester O. Oluwalaniran and Esther Derenigbo Olorunsogo
9:40	10:00	0:20:00	Selected Heavy Metals and Microbial Density in Double Tomatoes Sold in Some Selected Markets in Port Harcourt Metropolis, Rivers State, Nigeria	Waziri, B. E., Oshinwa, E. B. and Sylvester Oluwalaniran
10:30	10:20	0:10:00	Microbial changes in the food plasma of A. niger (Asp. 1) African mackerel (C. garipinus) on exposure to cadmium (linear regression analysis)	O. Udojemu-Felix
10:50	10:40	0:10:00	Sublethal effects of cadmium on the growth of <i>A. niger</i> and <i>Asp. 1</i> in a phosphate environment	Edun, Udojemu
10:50	10:15	1:15:00	TECHNICAL SESSIONS 04 (SUPPLEMENTARY) - HALL C	
			CHAIRMAN: Dr. Abiodun Ojo	
9:00	9:25	0:25:00	INTRODUCING AFRICAN TOGETHERNESS AND RIVER BASIN MANAGEMENT: THE CASE OF THE NIGERIAN'S MEANDERING OF NIGER RIVER PROJECT	Chigbo, Blessing C., Saka, Opeyemi S., Nwajia, Chidi and Nwamaka, E. Onyiah
9:15	9:30	0:15:00	SPATIATION OF SUB AND SUPER SATURATED ZONES IN DELINEATION OF GROUNDWATER POTENTIAL ZONES IN RUMUJILLI SAN	Chris Fubor
9:40	9:45	0:15:00	SELECTION OF WATER RESOURCES USING MULTICRITERIA STATISTICAL METHODS FOR ENVIRONMENTAL MONITORING AND POLLUTION STUDIES	Muhammad, Hengry (Olayinka), Mwak, J.P., Olu, U.G., Oluwalaniran, S. and Oluwalaniran, S.
9:45	10:00	0:15:00	ENVIRONMENTAL IMPACT ASSESSMENT OF A SUBSIDED YOUTH HOUSING PROJECT	Wale, U.G., Olayinka, E. M., Oshinwa, B. E. and Okoro, M. M.
10:30	10:15	0:15:00	RESPONSE TO AIR WASTE CONTAMINATION TO CLIMATE CHANGE IN NIGERIA	Abudu, C. M., Anyehiagor, F. A., Oluwalaniran, G. O. & Olayinka, E. E.
10:15	10:20	0:15:00	IMPACT OF CLIMATE VARIABILITY ON THE INCIDENCE OF TUBERCULOSIS IN RIVER STATE, NIGERIA	Wale, U.G. (Olayinka) and Mwak, J.P. (Oluwalaniran)
10:40	10:55	0:15:00	ESTIMATION OF HEAVY METALS IN SELECTED MUNICIPAL SOLID WASTE DUMPSITES IN PORT HARCOURT, RIVER STATE	Ikem, A. T., Oshinwa, B. E. and Olayinka, E. E.
10:50	10:55	0:15:00	LUNCH	
10:55	12:00	1:05:00	TECHNICAL SESSIONS 04 (General Research and Development) - HALL A	
			CHAIRMAN: Prof. Bode Olaniran, REPORTER: ...	
10:55	11:15	0:20:00	Land Soil Diversity: A Case from Nigeria to Agro-Pastoral in Oloru (Lagos Local Government Area, Rivers State, Nigeria)	Orji (E.E.), Oluwalaniran, S. and Olayinka, E. E.
11:15	11:25	0:10:00	Evaluation of Selected Heavy Metals and Potential Elements in Crude Palm Oil from OLRUBs in South-West and South-South Nigeria	Paul, Rufus Oluwalaniran, Oluwalaniran, S. and Olayinka, E. E.
11:25	11:25	0:00:00	Effect of Habitat on the Diversity and Ecological Services of Amphibian Diversity in Rivers State, Nigeria	Oshinwa, E. B., Olu, U.G. and Anwar, C. C.
11:55	12:15	0:20:00	Newer Method for Gold Recovery from Ore Deposit	A. W. Anthony, U. A. Gani, A. V. Ayo, and S. S. Magaji
12:15	12:25	0:10:00	Pre-Combustion Alterations and Hydrocarbon Characteristics of Enkoma Clay Shale	Chinyere, U. V., Olu, U.G. and Mwak, J.P.
12:55	12:55	1:40:00	TECHNICAL SESSIONS 05 (Impact Assessment and Sustainable Development Goals) HALL B	
			CHAIRMAN: Mr. Adekunle Alango, REPORTER: ...	
12:55	13:15	0:20:00	Health Impact Assessment: A Tool To Advance The Knowledge Of Public Health Understanding Sustainable Development Goals	Paula Victoria Oshinwa, Chinike Adeniyi Oluwalaniran and Olayinka, E. E.
13:15	13:35	0:20:00	Disease Etiology and Remediation of Sustainable Development Goals: Revisiting Rural Households in Rivers State, Nigeria	Olayinka, E. E., Oshinwa, E. B., Oluwalaniran, S. and Olayinka, E. E.
13:35	13:25	0:10:00	Evaluation of Plant Growth Performance in Remediated and Polluted Contaminated Soil	M. T. Jason-Ogidi, P. C. Mwan, I. Daka, and J. A. Oluwalaniran
13:45	13:15	0:30:00	Evaluation of PAH-Associated With Auto-Induced Wastewater in Port Harcourt Metropolis, Rivers State, Nigeria	Olayinka, E. E. and Olayinka, E. E.
13:15	13:25	0:10:00	Implementation Of Project Management Instruments A Tool For Sustainable	Ayemil, Friday Samson and Ansole Suleman
12:15	12:25	0:10:00	LUNCH	
12:30	12:45	1:15:00	Annual General Meeting (AGM)	

KEYNOTE PAPER: STRATEGIES FOR ACHIEVING SDGs IN NIGERIA BY JAMES OBAKPOLOR (SDGs/MBNP) on behalf of Permanent Secretary Ministry Budget and National Planning (MBNP)

Protocol

Distinguished Ladies and Gentlemen,

It is my humble pleasure and honour to be here at this auspicious 2019 Annual Conference of the *Association for Environmental Impact Assessment of Nigeria* and to feature among you as a Keynote Speaker on the theme: *Impact Assessment: a Tool for Achieving the SDGs in Nigeria*. I bring you courteous greetings from my Principals at the Ministry and let me take this opportunity to sincerely appreciate and thank the AEIAN Conference Organizers for the erudite coordination and logistic of the event at this auspicious period in our nation's development history. I have been invited to speak on the *Strategies for Achieving SDGs in Nigeria*, which would largely delve on Nigeria's sustainable pathways among its recognized stakeholders of development across the entire spectrum of the 17 Goals, 169 Targets and 240 Indicators along Social, Economy and Environment dimensions to largely impact on the teeming population of about 200 million Nigerians today, and counting.

2. Since the commencement of the new global development agenda in 2015, a number of activities geared towards achieving the SDGs by the year 2030 have been put in place by the Office of the Senior Special Assistant to the President on SDGs (OSSAP-SDGs) in a coordinative collaboration with the Ministry of Budget and National Planning, relevant MDAs (Ministries-Departments-Agencies), development partners, Non-State actors and other stakeholders. These include among others; the review and production of an End-Point Millennium Development Goals Report that details the various key implementation milestones and achievements during the MDGs, notable policy drivers, main challenges and key lessons learnt at both national and sub-national levels.

3. This was followed by a Country Transition Strategy to the SDGs which provided details on the timing and conditions precedent to the phasing of SDGs implementation in Nigeria. The document outlined key strategic options that best support effective transitioning and implementation of the SDGs in Nigeria structured around eight thematic areas that are at the heart of the SDGs. An Action Plan of the SDGs Office, developed in collaboration with the UNDP and UK DFID, encouraged the implementing partners to focus resources on these SDGs areas in order not to leave anyone behind. The Office worked assiduously to establish the policy, financial and institutional frameworks needed for the successful implementation of the SDGs in Nigeria.

4. Paying due consideration to vertical and horizontal relationships with the Administration and Line MDAs, strong advocacy and sensitization efforts commenced with the mainstreaming of the SDGs to the relevant MDAs at both Federal and States levels through their development plans for the nation. A coordination compact for MDAs was developed and a review of the Implementation Manual of the Conditional Grants Scheme (CGS) has been concluded with relevant partners charting the way forward on the implementation of the SDGs in Nigeria. Working with the Office of the Vice President, Google Nigeria and the Mind the Gap, flagged-off a digital training programme to empower 125,000 youths initially, and more across Nigeria.

5. Distinguished Ladies and Gentlemen, advocacy meetings have also been held with prominent key players in Governments at national and sub-national levels including the leadership of the National Assembly in an effort to enhance SDGs-sensitive budgeting as well as an efficient use of resources. In order to ensure that the SDGs do not remain a federal initiative alone, the SDGs Office and Ministry of Budget/National Planning are in partnership with State and Local Governments towards prioritizing specific SDGs in accordance with local development priorities. At the Federal level, there are efforts to ensure that the SDGs are prioritized and mainstreamed into the Economic Recovery and Growth Plan (ERGP: 2017 -2020) which was launched by Mr. President in March 2017.

6. The SDGs Office collaborated with the National Bureau of Statistics (NBS) and the United Nations Development Programme (UNDP) to successfully conduct a mapping of all existing SDGs related baseline data to benchmark SDGs progress in Nigeria. Baseline data are needed for effective evaluation of the national implementation of the SDGs. UNDP as well as other relevant development partners are providing technical assistance in the implementation of the SDGs, such as on the Mainstreaming-Acceleration-&-Policy Support training tools (MAPS), and the recently launched Integrated SDGs (iSDGs) Nigeria Model, domesticated for Nigeria to conduct an SDGs Needs Assessment and Costing exercise to underline resource requirements for the achievement of the SDGs in Nigeria. The costing is used to strengthen planning and budgetary processes by linking plans and budgets at both Federal and State levels inclusive of the LGAs.

7. The Presidential Committee on the Assessment and Monitoring of the SDGs in Nigeria has been mobilized, and the Committee comprises of one Executive Governor per geopolitical zone, representatives of International Development Partners, Civil Society, National Assembly Members and Ministers from line MDAs, amongst others. The Committee sits at the apex of the SDGs Monitoring and Evaluation system in Nigeria. The SDGs Office interfaces with sub-national governments through the Conditional Grants Scheme (CGS). The CGS was acclaimed as a global best practice by the United Nations as an effective local vehicle for domesticating a global development agenda. The implementation manual of the CGS has been reviewed and this will continue to guide the relationship between the Federal, State and Local Governments in the deployment of the SDGs. A number of advocacy visits to take the SDGs message to the grassroots have taken place concurrently. An Inter-Ministerial Committee on the SDGs was also inaugurated in early 2017. In

addition, a Coordination Compact setting out the operational guidelines to guide the activities of the MDAs was developed and disseminated at the inaugural meeting of the Inter-Ministerial Committee on SDGs to representatives of line MDAs for their inputs.

8. Distinguished Ladies and Gentlemen, in that same year, His Excellency, Professor Yemi Osinbajo, *GCON, SAN*, Vice President, Federal Republic of Nigeria, inaugurated the Private Sector Advisory Group (PSAG) on the SDGs. This Advisory Group engage and coordinate the organized private sector (OPS) in Nigeria to partner with the SDGs Office as well as other key stakeholders to implement the roadmap that will ensure public-private alliances provide large-scale solutions towards achieving the SDGs in Nigeria. To this end, the SDGs Office has almost finalized the National Strategy for Private Sector Engagement on the SDGs which would provide guidance for the work of the PSAG. The Strategy is a highlight of the national contextual imperatives, which also details the draw backs that hampered the successful implementations of the MDGs as a background lesson to note, going forward. Similar platforms as well as strategy documents are being developed for other non-state actors such as civil society, the academia, and donor agencies, amongst others.

9. Distinguished Ladies and Gentlemen, in terms of promoting Citizens well-being in view of SDGs1-4, 8, 10 and 17, the Government through the Federal Executive Council (FEC) in July 2017 approved the National Social Protection Policy (NSPP), and this was globally launched in February 2019. The Policy basically caters for all citizens of the country from cradle to grave in line with the Social/Economic dimensions of the SDGs. The approved National Policy serves as the basis for the implementation of Social Protection and Social Investment Programmes (SIP) in Nigeria, which is coordinated and driven by the Ministry of Budget and National Planning. The Federal Government established the National Social Investment Programmes (NSIP) in 2016 to tackle poverty and hunger across the nation. The NSIP focuses much more on addressing the declining and worrisome trend in Nigeria's socioeconomic indicators for health, education, nutrition and jobs as an important feature of promoting well-being, empowerment, among others.

10. In terms of ecosystem response, the Federal Government provided specific packages of support in environmental resource management in developing adaptive and mitigating strategies to reduce carbon dioxide (CO₂) emissions; including the initiative on reducing emissions from deforestation and forest degradation, among others in line with achieving environmental protection targets of SDGs 6, 12-15 and the ERGP on restoring ecosystem and shared prosperity. Nigeria's SDGs advocacy and development campaigns have also been prioritizing environment sustainability matters, while equally mainstreaming climate change concerns into its national development plans. Nigeria Vision 20:2020, and the ERGP on Agriculture and Food Security highlights the loss of agricultural land to residential and industrial development, relative to increasing desertification phenomena arising from global warming, which may reach 30 per cent by the year 2050.

11. In 2011, the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN) was launched; and In September 2012, the Federal Executive Council approved the Nigeria Climate Change Policy Response and Strategy. In November 2015, the President approved the Nigeria Intended Nationally Determined Contribution (INDC) in line with SDGs13, 15 and related goals. To develop a national response to climate change towards addressing SDGs13, 14 and 15, the Climate Change Department was created in the Federal Ministry of Environment (FMEnv) in Nigeria, and it also mobilized the Inter-ministerial Coordinating Committee on Climate Change. The National Commission on Climate Change (NCCC) was also established to coordinate and support the multi-level and cross sector adaptation responses.

12. As part of the Mainstreaming activities under environmental concerns aspects of the SDGs, plans are ongoing towards the domestication of the COP agreements in the Nationally Determined Contribution (NDC) at both the National and Sub-National levels. This will assist States in the federation to integrate the provisions of the CoP Paris Agreement into their development Plans. In the African sub-region, the Government has been collaborating with 11 countries on the Great Green Wall (GGW), an intervention strategy by Global Environment Facility (GEF) to achieve a low carbon economy in the regions and the Continent at large. Nigeria was the first African country to issue a climate bond certified sovereign green bond, and world's 4th Sovereign issuer of green bonds. According to UN Under-Secretary General, Amina Mohammed, Nigeria's N10.69 billion Sovereign Green Bond issued on December 18, 2017 is the world's first fully-certified sovereign green bond; this is also known as climate bonds, and are fixed income securities issued to finance projects that have positive impacts on the environment.

13. Distinguished Ladies and Gentlemen, I make bold to say that despite the above ongoing efforts, there have been challenges, such as the alarming incidence of poverty, unemployment rate, dwindling Government revenue base, Climate Change concerns, among others; and it is pertinent to note that these are typical in every developing country, as no single programme or intervention would be able to address all the important issues at once. However, we as Government have sector plans developed for the periodic realization of the ERGP to buttress the achievement of the SDGs in Nigeria.

14. Let me reiterate here that the Federal Government is committed to the strategic initiatives and numerous constituency interventions of the SDGs and the ERGP in Nigeria, and all hands must be on deck to achieve this global and national development agenda for the good people of Nigeria today and in the near future.

15. I thank you all.



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BOOK OF ABSTRACTS

EFFECTS OF CLIMATE CHANGE ON AQUACULTURE AND FISHERIES IN NIGER DELTA, NIGERIA

OKOSEIMIEMA IBIFUBARA JOSHUA AND VINCENT-AKPU IJEOMA FAVOUR

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Abstract

More than 80 percent of Nigeria's total domestic production is generated by artisanal smallscale fishers from coastal, inshore, and creeks of the Niger Delta, lagoons, and inland rivers and lakes. In Niger Delta, majority of people depend on fisheries and aquaculture for food, essential nutrients and livelihood. Their role in food production has become more relevant as a way of reducing poverty and enhancing food security. The fishers are vulnerable to environmental threats as they are often dependent on their immediate environment for survival. Climate change is seen to challenge the effectiveness of contemporary fishery and aquaculture management and has given rise to significant additional uncertainties and risks to fishers and fish farmers' livelihoods. Such uncertainty has imposed new challenges for risk assessment, making it critical for resources planning and management to take into account the greater possibility of unforeseen events, such as the increasing frequency of extreme weather conditions especially for the survival of fishery stock. In Niger delta region of Nigeria Climate change induce changes on patterns of fish species migration, increased invasion of non-native species to the aquatic environment, and the state of the fish stock. Thus, affecting fishery production, ecology, post-harvest operations, communities and their livelihood among others.

Keywords: Climate change, livelihood, fishing, Niger Delta

IMPACT OF OIL AND GAS EXPLORATION ON MANGROVE FOREST IN COASTAL COMMUNITIES IN THE NIGER DELTA, NIGERIA: EVALUATION, MITIGATION AND MANAGEMENT STRATEGIES

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Abstract

Oil and gas exploration in the Niger Delta over the years have had great impact on the environment. Some of these impacts are mangrove deforestation, crude oil spillages, air pollution amongst others which at most times go unnoticed because they are not reported by either the industries or the regulatory agencies. Different samples were collected in-situ from Okrika, which is a host to the Port Harcourt Refining Company (PHRC), and a site for the evacuation of natural gas liquid (NGL). Thus, the research work hypothesized that by the nature of the project there will be some impacts on the environment. Series of baseline studies were conducted; historical data collected, expert knowledge used, and a modified Leopold Matrix method used to score the different project phases with the highest impact. Local and international laws guiding the activities of the oil industry were used as a guide for the project plan. The result indicates that construction phase of the project will have more devastating effect on the environment (78%) followed by operational (18%) and decommissioning (4%) phases at a significance value of $P < 0.05$. It is thus recommended that high mitigation measures be adopted during the construction phase and minimal mitigation measure be adopted during other phases. The protection of the environment in the face of economic gain from exploratory activities should be paramount in the environmental management plan to foster a win-win situation for both the environment and man.

Key words: mangrove forest, mitigation, Niger Delta, oil and gas exploration

RURAL HOUSEHOLDS' KNOWLEDGE OF CLIMATE CHANGE EFFECTS ON THEIR LIVELIHOODS

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Abstract

The study assessed the rural households' knowledge of climate change effects on their livelihood in Tai Local Government Area of Rivers State. Multi-stage sampling technique was used to select 62 respondents. Data were collected with the aid of structured questionnaire and analyzed using descriptive statistics. The study found that majority of the respondents (51.6%) fall between the ages of 41-50 years while 87.20% of the respondents have one form of formal education or the other. The respondents had some knowledge of climate change by affirming that generally undefined climatic seasons (67.70%), increased intensity of sunshine (91.90%) were some of the indicators of climate change. Out of the twenty variables used to assess climate change effects on livelihood patterns, rural household heads agreed that 19 are evident in the study area which include: reduction in crop yield ($M = 4.0$); incidence of unusual crop pests and diseases ($M = 3.0$); increased rate of flooding which reduces yield ($M = 3.02$); reduced productivity of livestock ($M = 3.98$); and decrease in overall family income ($M = 3.77$). Based on the results of this study, it was recommended that agricultural extension agents should not relent in intensifying efforts to enlighten the rural households on the concept of climate change through workshops and seminars. Also, relevant stakeholders such as the government, research institutions, extension service providers, should train the households on climate change adaptation strategies to mitigate the effects of climate change on their livelihood pattern.

Keywords: climate change, rural households, knowledge

GENDER ANALYSIS OF TECHNOLOGY TRANSFER OF AGROFORESTRY PRACTICES AS A CLIMATE CHANGE ADAPTATION IN ABIA STATE, NIGERIA

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Abstract

Agroforestry provides a set of innovative practices designed to enhanced productivity. Despite numerous international commitments to climate change technology especially agroforestry practices, it is generally acknowledged that the transfer of climate change relate technologies to the developing countries has been limited. This study focused on analysis of technology transfer of agroforestry practices as a climate change adaptation in Abia state, Nigeria. Specifically, this study ascertained the participation, perception, traditional and improved level of knowledge of farmers of agroforestry practices; and identified the factors that affect the utilization of technology transfer of agroforestry practices as an adaptive practice to climate change in the study area alone gender line. A hundred and fifty farmers (75 male and 75 female farmers) were selected for the study and data were collected through field survey with the aid of structured questionnaire and interview schedule. Data obtained were analysed using percentages, mean score, z-test and regression analysis. Findings shows that female farmers participated more in technology transfer of agroforestry practices as an adaptive practice to climate change than their male counterpart. Perception of female farmers on the various technology transfer of agroforestry practices exposed to them significantly ($z = 4.258, P \leq 0.05$) differs from that of their male counterpart. Male farmers significantly ($z = 3.901, P \leq 0.05$) had more traditional knowledge of agroforestry practices to adopt in coping with climate change than female farmers. However, female farmers significantly ($z = 4.011, P \leq 0.05$) had more improved knowledge of agroforestry practices to adopt in coping with climate change than male farmers. Age, level of education, household size, farm size, annual income, farming experience, extent of training on agroforestry practices, land ownership status, communal regulations and gender differentiation significantly affected the utilization of technology transfer of agroforestry practices by farmers. In other to ensure sustainability of agroforestry practices as a means to adapt to climate change, gender mainstreaming need to be included in the developmental policies of Abia state. Efforts should be geared towards resolving the various identified factors hampering the utilization of agroforestry practices as an adaptive mechanism to climate change in the study area.

Key Words: Technology, Transfer, Perception, Participation, Utilization, Climate Change

CHANGE IN LANDSCAPE IMPOSED BY A FLOOD REGIME IN BENUE RIVER BASIN AT JIMETA-YOLA, ADAMAWA STATE, NORTHEASTERN NIGERIA

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Abstract

The Benue river basin provides more than 200 hectares of productive Fluvisols adjacent to Jimeta bridge, an area locally known as Kukan PRP at Jimeta-Yola. The area is part of the flood plains along the Benue River Basin which has been utilized for over 30 years by local peasant farmers for vegetables production under irrigated and rain-fed cultivation systems. Due to its location at the city's edge, the area is also notoriously utilized as the city's refuse dump site. A major flood event on River Benue in 2012, brought serious changes to this landscape, such that large hecterage of the productive Fluvisols were buried under thick deposits of rivers. This work was carried out to estimate the hecterage of the productive Fluvisols now buried under river sand and evaluate the chemical properties of the soils and adjoining water samples. Results showed about 287,773m² (29 hectares) of the vegetable farmlands were buried under thick river sand following the flood event in 2012. Chemical analysis showed that the soils were slightly acidic in reaction (pH 6.5), with moderate organic carbon (OC = 1.15%). Analysis of the soils for heavy metals showed Lead (Pb) concentrations reached 0.65mg/L in dry season and about 0.42mg/L during the wet season irrespective of the location. The results for river water quality suggests suitability for irrigation purpose, with need for seasonal monitoring due to fluctuations in concentration of some ions (Ca²⁺) and (Na⁺) between the wet and dry seasons.

Key words: Flood, Fluvisols, Irrigation, Heavy metals, Water quality

COMPARATIVE ANALYSIS OF LANDUSE LANDCOVER CHANGES AND ITS IMPLICATION ON SURFACE TEMPERATURE BETWEEN INLAND AND COASTALCITIES OF ENUGU AND PORT HARCOURT, NIGERIA.

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Abstract

Urbanization is a great driver of microclimatic variations. With more than 78% of Nigerians living in cities, urban growth and its associated expansion of built up areas will inevitably continue to accelerate the microclimatic variations of emerging smart cities. Port Harcourt and Enugu are two distinct geographical regions experiencing rapid urbanization. As activities combine to alter the land cover of the earth's surface, especially by removal of vegetakover, which is peculiar to urbanization, inadvertent climate modifications occur resulting in a remarkable Urban Heat Island (UHI) effect. The intensity and the duration of heat, however, vary between a coastal city and an inland city, consequently, this study compares urban growth and temperature response patterns in Port Harcourt and Enugu. Landsat Multispectral and Enhanced Thematic Mapper images obtained over a period of 30 years were used to quantify Land use Landcover changes and Land Surface Temperature (LST) responses. The Contribution Index (CI) was used to link urban growth to LST, in order to unveil how changes per land use/cover class contributed to computed average city surface temperatures in both cities .The coastal city (PH) is expected to be cooler than the inland city (Enugu) due to proximity to the ocean; even if it might have a greater population and built up extent. Results from the study provide a critical geo-information to guide sustainable heat mitigation strategies for both inland and coastal emerging smart cities in developing countries, especially Nigeria.

Keywords: Urbanization, Microclimate, Landuse, Landcover, Land Surface Temperature

RENEWABLE ENERGY (RE) FOR NATIONAL ENERGY SECURITY: A CASE FOR NIGERIA

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Abstract

Today, more than ever, we are experiencing the disastrous and debilitating impacts of climate change in Nigeria and the world at large. These challenges will persist and threaten to annihilate humanity if drastic measures are not put in place to stop; and then reverse the trend. The major factor implicated for climate vagaries is the consumption of fossil fuels, whose by-product (greenhouse gases) are responsible for increasing average global temperature (global warming). The energy sector accounts for over 50% of global CO₂ emission; Therefore, any effort to address or curb emissions from this sector, could lead to drastic fall in the concentration of Co₂ in the atmosphere, and thus, their impact. Integrating RE into the energy mix is claimed to address the above challenge. In this paper, effort is directed at x-raying how RE integration can lower the concentration of Co₂ in the atmosphere; and by extension, reversing the trend of climate change.

Keywords: Renewable energy; Energy security; Climate change; CO₂ emission

CLIMATE CHANGE RESILENCE STRATEGIES IN BONNY INDUSTRIAL AREA

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Abstract

Heightened human activities have led to increase in global temperatures causing climate change. The study analyzed climate change resilience strategies in Bonny industrial area, Rivers State, Nigeria. Air quality parameters measured included carbon dioxide (CO₂) and methane (CH₄) and weather parameters included temperature, relative humidity (RH) and wind speed. The air quality and meteorological data were collected with respect to distance from the pollution source (Bonny industrial zone) at various locations at irregular interval between 50m-300m using composite sampling technique with the location being geo-registered by global positioning system (GPS). Oral interview and administration of questionnaire were also conducted to ascertain the resilience strategies employed in the study area. Convenient sampling technique was used to administer a total of 100 copies of the questionnaires using hand to hand approach. Descriptive statistics was employed for data presentation while inferential statistics employed was the Pair-wise statistics. The mean values of meteorological parameters of temperature ranged between 30.0 and 31.6⁰C with a RH mean values of range 62.2% and 71.5% at a wind speed of range mean values of 0.83m/s and 1.2 m/s. Results of air quality parameters for CO₂, and CH₄ recorded range mean values of between 655 - 718 ppm and 701-707ppm respectively. Results revealed statistical difference between sampled air quality parameters and WHO air quality standards. Perception assessment indicated evidences of climate change effects and coping strategies identified were tree planting (58.2%), waste management (61.4%), adequate ventilation (73.1%), change of clothing to reduced exposure (66.8%) amongst others. Coping strategies were ineffective due to lack of commitment on the part of the government, lack of appropriate technologies, lack of community sensitization and others. The study recommended cleaner technologies, urban greening and alternative energy usage amongst others.

ADOPTION OF CLIMATE SMART AGRICULTURE BY ARTISANAL FISH FARMERS IN OKRIKA LOCAL GOVERNMENT AREA OF RIVERS STATE, NIGERIA

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Abstract

The study investigated the adoption level of climate smart agriculture (CSA) by artisanal fish farmers in Okrika Local Government Area of Rivers State, Nigeria. Multi-stage sampling was used to select 63 artisanal fish farmers. Data were obtained through the use of questionnaire and interview schedule. Data were analyzed using descriptive statistics such as the mean, frequency count, percentages and Logit model. Results showed that majority (31.7%) of the artisanal fish farmers fell within 50–59 years while 28.6% fell within 40–49 years of age with a mean age of 45 years. 63.5% of fish farmers were males while 23.5% were female and a mean of 11 years of schooling. Results further revealed that 76.2% of the artisanal fish farmers are not aware of climate smart fishing practices while 23.8% are aware of the climate smart fishing practices. Coefficients of age, household size, level of education, fishing experience and distance from the river were significant and important determinants of adoption of climate smart fishing practices in the area. The study recommended that agricultural extension agents should educate and encourage the artisanal fish farmers to adopt climate smart agriculture to combat the devastating impacts of climate change in the study area.

Keywords: Adoption, Climate Smart Agriculture, Artisanal Fish Farmers, Okrika, Logit Model

POPULATION GROWTH, CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT IN NIGERIA: THE NEXUS

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Abstract

Nigeria is one of the most populous nations which is currently experiencing rapid urbanization. The UN population estimate suggests that by 2050, Nigeria may become the third most populated countries, after India and China. Interestingly, Nigeria is striving to achieve the UN sustainable development goals amidst its burgeoning population. On the contrary, climate change is one of the challenges facing the country, along its implication for agricultural productivity, poverty and biodiversity. Sustainable development may be difficult to attain if climate change continues to jeopardize environmental stability, economic growth and social progress of the country. In this respect, this research will apply correlation analysis of time series data to x-ray the nexus between population growth, climate change and the quest for sustainable development in Nigeria. Results from this study are expected to inform, and influence policy debate on climate change and sustainable development in Nigeria.

Keywords: Sustainable development, Climate change, and Population growth

FOOD WASTE MANAGEMENT: A PANACEA FOR SUSTAINABLE MITIGATION OF CLIMATE CHANGE

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Abstract

Climate change and global warming are issues in our environment and with a quest to bring solution to rapid change. This paper is aimed at discussing how to reduce the effect of climate change and global warming through food waste management. As a result of climate change, flooding is one of the effects of global warming and its scenarios are occurring frequently causing major damage to urban areas and in countries all around the world. Food waste constitutes one of the largest proportions of waste that has promoted flooding too, even though plastics and other wastes are involved. This paper highlights the use of food waste to produce organic manure that will aid the growth of natural climate solutions such as trees and promote the growth function of agriculture through feed production. Thus, saving our environment and impacting lives. Because wasted food has been a big impact on climate change through the release of methane (a toxic gas) into the atmosphere when it has been left on the landfills. The amount of food waste generated from modern societies is a great tool in repairing our broken climate. This research is environmentally friendly, sustainable and can be replicated to affect our climate at large. It's also aimed at eradicating pollution caused by food waste. The United Nations sustainable goals are friendly with this work. Good health and wellbeing, clean water and sanitation, climate action, life on land and partnerships to achieve goal.

Keywords: food, waste management, global warming

AN ASSESSMENT OF THE DOMESTIC WATER SUPPLY SITUATION IN OLD KARU AREA OF ABUJA, NIGERIA

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Abstract

The study examines the water supply situation and conditions in old Karu Area of Abuja, which lies between latitudes $9^{\circ}0' N$ and $9^{\circ}34' N$ of the equator and longitudes $6^{\circ}20' E$ and $7^{\circ}13' E$ in the Federal Capital Territory. The study established the true domestic water supply situation in old Karu. In view of the above, necessary procedures were selected to accomplish this. The data was sourced from both primary and secondary sources. Percentages and tabulation were used to present data. Analysis of Variances (ANOVA) was used for the hypothesis analysis at 95% level of significances. The data analysis revealed that there is no consistency of water supply in old Karu, it provides an insight on the sources of water supply, its present status quantitatively and qualitatively. There was also laboratory assessment of water quality, it also showed that a large population experiences poor water supply, it is therefore recommended that urgent operational and sustainable infrastructural facilities management programs and action to meet up with water supply requirement.

Keywords: ANOVA, Water, Sanitation, Old Karu

EFFECTS OF VEHICULAR EMISSIONS ON RESPIRATORY FUNCTION OF DRIVERS AND ROAD TRANSPORT WORKERS IN PORT HARCOURT

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Abstract

The study was carried out to assess the effects of long-term exposure to air pollutants on respiratory function of apparently healthy non-smoking male adults. The impact of vehicular emission on ambient air quality and the peak expiratory flow rate (PEFR) of drivers were assessed in selected Motor Parks in Port Harcourt. The Motor Parks monitored include Choba Motor Parks, Rumuokoro Parks, Rumuola Parks, Water lines Parks, Mile 1 Town Parks, Artillery Parks and Rumuomasi Park. Triplicate readings were taken in each location. The range of Sulfur Oxides from the different motor parks in Port Harcourt was between 0.04 ± 0.03 and 0.14 ± 0.034 (ppm). The values of Nitrogen Oxide for all location was <0.01 . Rumuokoro had the highest CO levels of 36.67 ± 22.79 and Mile 1 Park had the lowest of 7.34 ± 1.46 . The values recorded showed Choba, Rumuokoro, Water Lines and Artillery had high levels of hydrocarbon; Rumuokoro had the highest level of 3 ± 0.589 , while Mile 1 and Rumuomasi had the lowest of 0.34 ± 0.33 each. Hydrogen Sulfide (H_2S) was observed to be <0.01 which is below the air quality limit. Particulate Matter values recorded showed Particulate Matter 2.5 ranges from 11 ± 1.56 to 22.67 ± 7.45 , while Particulate Matter 2.10 ranges from 15 ± 1.74 to 34 ± 6.43 . The peak expiratory flow rates ranged from 266.67 ± 44.096 to 556.67 ± 29.6 . The lowest was recorded at Rumuokoro, which had the highest PM 2.10 (33.67 ± 5.93). Vehicular Emission vitally contributes to the declining air quality in Port Harcourt. The levels of pollutants in air around motor parks in Port Harcourt, Rivers State, Nigeria is significantly high. Vehicular Emissions may be seriously affecting the health of drivers and commuters. The Peak Expiratory Flow readings indicate relatively low pulmonary integrity and lung capacity. Vehicles should be well maintained, and drivers educated on effect of vehicular air pollutants on their health. Eco-friendly vehicles should be available and affordable for both private and public transport.

Key words: Air Quality, Vehicular Emission, Peak Expiratory Flow, FMENV, Particulate Matter

SOURCE APPORTIONMENT AND HUMAN HEALTH RISK OF HEAVY METALS IN CONTAMINATED AGRICULTURAL SOIL FROM EGI COMMUNITY, NIGER DELTA

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Abstract

The study was to identify the source and evaluate the health risk of heavy metals in contaminated agricultural soil from Egi community (Oboburu, Obagi and Ogbogu), Niger Delta, Nigeria. Multivariate and health risk equations were employed to achieve this. The mean of heavy metals in samples of Oboburu indicated high levels for Fe (271.0±156.6 mg/kg), Pb (111.2±94.97 mg/kg), and Mn (27.92±23.80 mg/kg), Obagi was high for Fe (248.4±175.9 mg/kg), Mn (80.46±12.40 mg/kg), and Co (116.3±193.7 mg/kg), and Ogbogu was high for Fe (160.9±150.3 mg/kg), Co (240.1±412.1 mg/kg), and Mn (42.90±16.82 mg/kg) respectively. Geo-accumulation index and contamination factor indicated that Pb, Cd and Co was of high contamination and the enrichment factor showed that metals were of anthropogenic sources. The Principle component analysis revealed 3 principal components accounting for 88.448%, it showed that the contamination in the sample was more of anthropogenic than biogenic. The Cancer Risk estimate for children population was of high risk for Ni, Cr, Cd and Pb (10^{-5} to 10^{-6}) while adult population was 10^{-6} and lower. The non-carcinogenic risk indicated highest value for children in Co (2.75), Pb (1.70E-1) and Fe (1.32E-1), while adult in Co (1.007) and Fe (3.29E-2). The findings suggest human activities have contributed greatly to the contamination of the agricultural soil.

Key words: human health risk, agricultural soil

MOSQUITO HABITAT MAPPING AND ITS IMPLICATION ON MALARIA ELIMINATION IN THE UNIVERSITY OF PORT HARCOURT CAMPUSES, CHOBA, RIVERS STATE

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Abstract

Despite all efforts to reduce mosquito population in the world, it is constantly on the increase. With the effect of global warming, more places are becoming conducive for the growth of these deadly vectors. Hence, malaria and other mosquito transmitted diseases are rapidly taking over as most deadly diseases in the world. In 2010, an estimated 700,000 people were killed by Malaria globally and approximately half of the world's population are at risk of the disease. Africa being located in the tropics and having prevalent conditions conducive for mosquito breeding is at most risk of the disease and suffers most deaths from the disease. Over time, these diseases have grown immune to regular drug used for treatment, hence, there is a continued call for preventive methods rather than curative methods. This paper therefore, unveils Mosquito Habitat Surveillance and Mapping, as one of the ways, malaria can be prevented and elimination. The study area, being, the University of Port Harcourt is located on an extensive swamp of the New Calabar River, hence, it is at risk of malaria almost all year long. The study made use of the NASA Globe Observer Mosquito Mapper App, for geospatial data acquisition of mosquito habitats in the area and further processed in a Globe Observer Mosquito database. To ascertain the vulnerability of the area to Mosquito habitats, Land use Land cover classification, temperature and soil moisture was analyzed. The study identified the spatial location of mosquito habitats in the University campuses, as represented in a campus map showing vulnerable residents to malaria outbreaks as well as the degree to which residents become resilient to malaria prevalence in the area.

Keywords: Mosquito Habitat, Mosquito Mapping, Malaria Elimination, Resilience

THE ECONOMY, PUBLIC PARTICIPATION AND IMPACT ASSESSEMENT

Okowa Amutolani Jenny

Abstract

The need for an effective public participation in the Impact Assessment (IA) process cannot be over emphasized. It is not only a legislative requirement, but it also boosts the productivity of the IA processes as a whole. In fact, many are advocating for public involvement right from the very start of the IA process. As much as this area is important, it still faces some challenges and is one of the areas that have the poorest effectiveness and quality based on previous researches. In Nigeria, it is an area that suffers greatly and so there is a need to address the issues that hinder its effectiveness. This paper addresses the issues in public participation as well as the issues with public participation in Nigeria especially; with appropriate recommendations. Some of the issues identified from various author's include; lack of awareness of the public to environmental matters, illiteracy, inability to actively participate due to inadequate information on a proposed project, etc. This paper will however explore the effectiveness of public participation from an economic standpoint; using Circular Economy Theory and will show why there are constant issues in adequate stakeholder engagement. Despite several attempts to eliminate some internal showstoppers in the process; the ineffectiveness stems from a Global scale and can only be eliminated at the global level. This will lead to better and more effective public participation which in turn will lead to an improved IA process in Nigeria.

Key words: public participation, impact assessment

ASSESSMENT OF PORT PERFORMANCE IN NIGERIA

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Abstract

This study focuses on assessing the efficiency of Nigerian ports from 2008 to 2017 by applying Data Envelope Analysis. The data were sourced from Nigeria Port Authority Abstract from 2008-2017, for three seaport (Apapa, Onne and Rivers port) and Data Envelope Analysis was used to determine their technical efficiency over time. The results reveal that Apapa port and Rivers port technical efficiency is 1 (One) and Onne port is 0 (Zero); meaning that Onne port is not performing efficiently compared to Apapa port and Rivers port over the ten year period under study. The Policy implication for Nigerian ports is that Onne port should be privatized.

Key words: *efficiency, data envelopment analysis, performance, assessment and seaports.*

AN EMPIRICAL ANALYSIS OF AIR TRANSPORT OPERATIONAL PERFORMANCE: A STRUCTURAL EQUATION MODEL APPROACH

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Abstract

This study investigates the overall airport operational performance as regards the quality of service and level of services for air transportation in some selected airports in Northern Nigeria. The study focused on both the airports and the airlines as service providers. Structural Equation model was used in measuring the operational performance, quality and level of service as regards customers' perception. Domestic and International travels only were studied, with data obtained from well-structured questionnaires to evaluate performance and perception in airports as well as in airlines. A structured questionnaire was distributed to 200 respondents during the study. The level of service at Nigerian airports needs to be improved so as to encourage the passengers to use the airport and as well reduce many queues at the baggage collection area. The air travel industry is currently challenged in a recessed economy resulting in lower service standards, lower patronage, increased missed trips, flight cancellations, passenger complaints, and faltering loyalty. The findings of the study will, therefore, be useful to the managers of the airports and airlines, the economic regulator of the aviation industry and other stakeholders. Policy implications was made on how to regulate the industry to meet the ICAO standard.

Key words: Airports, airlines, service quality, passenger satisfaction, Performance.

DETERMINATION OF CARBONDIOXIDE EQUIVALENT FROM ELECTRICITY CONSUMPTION USING RETSCREENSOFTWARE

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Abstract

This study is aimed at estimating the emission of CO₂ from electrical energy use within the main campus of University of Abuja. A preliminary energy audit was performed to determine the current situation and for simulations, an energy management tool (RETScreen) software was used, that enables modelling of a building energy use. The annual total energy consumption from the facility plan of 1563491KWh (₦55,879,168.34) gave fuel savings of 312,487KWh (₦11,168,285) on a 20% fuel consumption /emission reduction target set, the RETScreen model used revealed that the amount of annual GHG for the base case system is 1154(tCO₂/yr) and for the proposed case is 923 (tCO₂/yr), while the Gross annual GHG emission reduction or savings amounted to 231 (tCO₂/yr), and for End-use target, simulation on RETScreen revealed fuel savings of 354,466KWh (72.5%) for electrical equipment (Desktop Computer, Photocopier, Refrigerator, Lap Top, AC, Central AC, TV and Fans) and 134,587 KWh (27.5%) for light alone. Therefore, it would be effective to reduce CO₂ emissions on campus through the reduction of electrical energy consumption, adoption of an efficient energy conservation measures and above all introduction of a renewable and more sustainable alternative energy source.

Key words: Energy Audit, Energy Consumption, RETScreen, University Campus, Energy Conservation Measures (ECMs).

THE EFFECT OF ATMOSPHERIC PRESSURE ON CH₄ AND CO₂ EMISSION FROM A CLOSED LANDFILL SITE IN MANCHESTER, UNITED KINGDOM

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Abstract

A time series study was conducted to ascertain the effect of barometric pressure on the variability of CH₄ and CO₂ concentrations in a closed landfill site. An in-situ data of methane/carbon dioxide concentrations and environmental parameters were collected by means of an in-borehole gas monitor, the GasClam (Ion Science, UK). Linear regression analysis was used to determine the strength of the correlation between ground-gas concentrations and barometric pressure. The result shows CH₄ and CO₂ concentrations to be variable with weak negative correlations of 0.2691 and 0.2773, respectively, with barometric pressure over the entire monitoring period. Although the R² was slightly improved by considering their concentration over single periods of rising and falling pressure, single periods of rising pressure and single periods of falling pressure, their correlations remained insignificant at 95 % confidence level. The result revealed that atmospheric pressure is the acclaimed major control on the variability of ground-gas concentration is not always so. A case was made for the determination of other possible controls such as changes in temperature, soil permeability, landfill water depth, season, and geology of the borehole and also how much of control each factor would have on the variability/migration of CH₄ and CO₂ concentrations from the studied landfill.

Keywords Greenhouse gas, Global warming potential, Climate mitigation policies, Explosive mixture, Asphyxiant, Risk prediction, Gasclam.

SIMULATION OF BLACK CARBON EMISSIONS FROM GAS FLARING ACTIVITIES IN THE NIGER DELTA

EZEOKORO, CHIKERE

Abstract

Gas flaring contributes to Black Carbon emissions in the Niger Delta Region. There is no Black Carbon emission inventory for Nigeria and no standard Emission factor with which to measure the volume of emissions. This study aims at providing baseline emission inventory for the volume of Black Carbon released into the environment from gas flaring activities in the NDR between 1965 to 2016 (52 years) using Nigeria's associated petroleum gas related emission factors; modelling of the estimated Black Carbon emissions using logistic growth model and comparing this method with that of Giwa et al., (2014). Volume of gas produced and flared within this period was sourced from NNPC annual bulletins and other literatures. The work shows that: for the period under review, 1.8trillion cubic meters of gas was produced and 0.91 trillion was flared, only 11% of gas produced was flared in 2016. Estimated cumulative Black Carbon emission shows that Black Carbon emission from gas flare is decreasing as volume of gas flared is decreasing. The model shows that 487050, 1116157tons, 19438, 44544tons and 0.10 are the respective carrying capacities, initial Black Carbon volumes and growth rate for the upper and lower Black Carbon emissions. Re-injection and Utilization of flared gas for cooking purposes and placing a heavy penalty on gas flaring activities are among solutions given to reduce gas flaring.

EBONYI RIVER BASIN AS A COMMON PROPERTY RESOURCE: BENEFITS, PROBLEMS AND SOLUTIONS IN IZZI AREA OF EBONYI STATE

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Abstract

The study was carried out to assess Ebonyi River as a common property resource base and ascertain the benefits and problems as well as proffer solutions. Primary data were obtained through interview schedules administered to 180 respondents from three (3) Local Government Areas in Izzu Clan that have common boundaries with the River complemented with direct observation. Data analysis was done with the use of descriptive and inferential statistics such as mean, frequency table, percentages, mean scores and factor analysis. The study showed that Ebonyi River basin resources included water, fishes, firewood, vegetables, medicinal plants, building materials and natural plants. Others included diverse fruits and nuts, games, snails, mushrooms, sand, stone, recreation and other social and spiritual benefits. Analysis reveals that 80% of respondents drew their supply of water for drinking and other uses from the river. Similarly, 15% percent depend primarily or secondarily on fishing in Ebonyi River for their income, while 95% depend on Ebonyi River forest for fuel. The misuses of Ebonyi River resources identified included washing and bathing and fermenting cassava inside the river, use of chemicals in fishing, setting fire on forest for hunting or farming purposes and dumping of refuse into the river. Twenty-four plant and animal species were reported to have gone extinct through use and abuse of the river basin and forest resources. Also, result of factor analysis identified environmental and social constraints to efficient use of Ebonyi River basin resources. Recommendations included regulation of the exploitation of Ebonyi River basin resources by community leadership, and environmental education through advocacy.

Keywords: Ebonyi River, River basin, Common property, River resources, Forests

PUBLIC PARTICIPATION IN IMPACT ASSESSMENT

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Abstract

Just as Impact Assessment is a tool for achieving sustainable development goals, Public Participation is also imperative for sustainable development, because government alone cannot achieve environmental protection goals: they need the support and guidance from the public. Often, questions do arise on what gives one party the legitimacy of making decision for another. Increased public participation, therefore, builds a more engaged citizenry and helps to ensure that decision makers have valuable local knowledge and incorporate them in planning process. This paper discusses the concept of "Public Participation" and attempts to define the term. It examines what it is all about and why is it necessary in environmental decision making. It also looks at various theoretical bases for Public Participation, their strengths and weaknesses and various assumptions for these theories. Furthermore, some models of Public Participation are discussed with regards to levels of participation. Specifically, Arnstein participation ladder and Mitchell models are illustrated. Attempt is made to discuss hypothetical Environmental and Social Impact Assessment processes and areas where public participation is expected, the current practice in Nigeria and how to improve the status, from both theoretical and empirical bases, for improved sustainable development. The paper also looks at Public Participation as a tool for sustainable development as it helps in addressing the justification or the necessity of a project. Furthermore, the paper discusses the challenges with Public Participation and how these challenges can be addressed in order to achieve the desired objectives. It is rounded up with a case study arising from plural interests occasioned by public participation and how the problem can be solved both from theoretical and practical approaches.

Key words: public, participation, impact assessment

SOCIAL IMPACT MANAGEMENT IN THE IA PROCESS: A REVIEW OF CURRENT PRACTICE IN NIGERIA

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Abstract

Impact assessments commonly called Environmental Impact Assessment (EIA) in Nigeria have come a long way. The EIA Act No. 86 of 1992, further elaborated by the EIA CAP E12, 2004 makes the preparation of EIAs mandatory for all industry planning new projects. This involves the assessment of the environmental, socio-economic, health impacts associated with proposed projects development. A review of the Nigerian EIA system for improvement and to align with current international best practice is currently ongoing. Resource-rich communities and government have concerns around social impacts and issues associated with rapid economic development within their domains. The EIA system requires that the outcome document, EIA report have an Environmental Management Plan (EMP) incorporated to manage all identified potential and associated impacts that may result from projects development. For a long while now, impacts mitigation monitoring as a prime content of the EMPs are undertaken by proponents of projects that have Federal Ministry of Environment (FMENV) approval. Social Impact Management Plans (SIMPs) are also expected to be prepared alongside the EMPs, but more often than not subsumed under the general EMP. Recently, some corporations have been demanding for separate SIMPs particularly in response to international funding requirements. This paper considers whether current SIMP practice reflects leading practice, drawing on the author's experience as a social impact assessment (SIA) practitioner in the mining, oil/gas and infrastructure sectors in Nigeria. While the introduction of SIMPs is to be applauded, the author argues that there are elements of practice that needs refinement.

Keywords: Environmental impact assessment, environmental management plan, social impact management plan; social impact assessment; resource industry; mining; oil/gas

CAPITALISM AND INDUSTRIAL POLLUTION: THEORIZING GLOBAL PLEASURE AND PAIN FROM A UTILITARIAN PERSPECTIVE

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Abstract

Market-oriented industrial capitalist production has inflicted so much excruciating pain on humanity that some are raising doubts about the future of organic life on planet earth. Environmental impact assessment is an internationally standardized tool for measuring the possible, real and subtle negative outcomes of industrial production as an integral component of the development of capitalism. This paper theorized on the global reality that industrial development comes with the indispensable contradictory effects of pleasure and pain. It investigated the negative dimensions, in terms of a terribly devastated environment, of the celebrated wonders of capitalist industrial production in the contemporary world. It also argued that efforts at the mitigation of environmental pollution through impact assessment policies would not achieve much success due to the functional dynamics of the capitalist market that controls and directs global industrial production and consumption. It is an essentially qualitative study that relied on secondary sources of data with logical content analysis of available facts and records as its method of analysis. The theory of utilitarianism by Jeremy Bentham and J.S. Mill was adopted as its theoretical framework. The paper concluded that environmental impact assessment per se does not guarantee sustainable development and therefore recommended that peoples' environmental rights should be adequately protected despite the lure of industrial investment and development.

Key words □ Environment, Impact, Capitalism, Pollution, Development

IMPACTS OF AGRO-INDUSTRIAL INNOVATION AND REVOLUTION IN AFRICA'S AGRICULTURAL SECTOR

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Abstract

The impact of agro-industrial innovations and revolutions in Africa's agriculture cannot be grossly undermined. Agriculture occupies a central position in raising the gross domestic product (GDP) of most African countries as it has remained the dominant occupation of over 70% of the African rural farmers worldwide. Raising the dwindling performance of Africa's agriculture through agro-industrial innovations and revolutions is therefore a sine-qua-non to achieving poverty reductions and increased farm productivity leading to overall development of the agricultural sector. The emergence of the agro-industrial innovations witnessed a quantum leap in agricultural production. New sources of energy and power especially coal and steam had replaced wind and water to create labour saving machines that dramatically decreased the use of human and animal labor which deface agriculture making it a tedious enterprise. The invention and introduction of advanced emerging technologies (Agro-robotics, agro-automated machines, agro-mechatronics, etc) in agriculture had obviously overhauled the entire sector projecting it as a profitable and viable enterprise capable of upturning the poor livelihood of the African farmers. Thus, these techniques had increased the level of agricultural productivity in terms of yields, outputs, and overall economic gains. The study, therefore, recommends African governments to fully maximize the benefits of agro-industrial innovations and revolutions to foster economic growth, development and impactful transformation of the agricultural sector.

Key words: Agriculture, Innovations, Revolution, Industrialization, Policies, Africa

PRACTITIONERS' PERSPECTIVE OF ENVIRONMENTAL, SOCIAL AND HEALTH IMPACT ASSESSMENT (ESHIA) PRACTICE IN NIGERIA: A VITAL INSTRUMENT FOR SUSTAINABLE DEVELOPMENT

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Abstract

Local participation is always beneficial for sustainable action and environmental problems resulting from urban implementation due to the failure of social and institutional change necessary for a successful transformation of rural life to urban life ahead of the rapid movement of the population. Despite good legal practice and comprehensive guidelines, evidence suggests that Environmental Impact Assessment (EIA) or more broadly Environmental, Social and Health Impact Assessment (ESHIA) has not yet been found satisfactory in Nigeria, as the current system amounts to duplication of efforts and cost. However, ESHIA have been developed and integrated to help manage project activities, facilities and operate in a sustainable manner, so that both economic and ecological profits are accrued (sustainable development) or ensure that any development project does not result in excessive deterioration of and/or the irreversible adverse effect on any component of the environment a recipe for sustainable development. The thrust of this study is to evaluate the potential benefits of ESHIA as a tool for sustainable environmental development. The evaluation and implementation of the EIA is one of the strengths of these tools. Indeed, EIA is the first and foremost management tool employed to help mitigate adverse, potential and associated impacts of proposed major developments in our environment. EIA is a regulatory requirement that is efficiently used to improve performance, project design, enhancing decision-making and facilitating policy programs in a sustainable environment. An evaluation of the EIA systems reveals several weaknesses of the EIA system. These include inadequate capacity of EIA approval authorities, deficiencies in screening and scoping, poor EIA quality, insufficient public participation and weak monitoring and erratic government policies. Overall, most EIA study rarely meets the objectives of being a project planning tool to contribute to achieving sustainable development and mitigate impact from development project. The study recommends some directions for the future to ensure that entire content of the EIA are religiously implemented, review the existing EIA act, increase the expertise of EIA consultants, create a liaison office with international organization and with sister agency, ESHIA must enjoy Improved budgetary provision, time latitude, spatial contexts and methodological improvements for outcome measures to achieve results that are relevant to sustainable development by improving project design, enhancing decision making and facilitating policy programs.

Key words: Environmental, Social and Health Impact Assessment (ESHIA), Local participation, Sustainable Environmental Development, Proposed major developments, Policy programs, Approval authorities, Nigeria.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND ITS CONTRIBUTION TO SUSTAINABLE DEVELOPMENT: VOICES FROM THE NIGERIAN OIL FIELDS

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Abstract

The role of Environmental Impact Assessment (EIA) as a tool for achieving sustainable development in relation to exploitation of natural resources (petroleum) is investigated. EIA of three (3) projects (Exploratory Drilling of Ekedei Deep A, Construction of an 8-inch 38km Crude Oil Pipeline and 3D Seismic Exploration in OML 35) were assessed against four criteria of sustainable development (Public Participation, Conflict Resolution, Natural Resource Protection and Improved Planning). A major achievement of the EIA of the projects is the general acceptability the project received from the community people based on participatory approach and conservation of natural resources such as forests.

The paper concludes that the PC \longrightarrow CP (Potential Conflict to Cooperation Potential) approach which sees environmental resources as a catalyst for peace and development through dialogue, cooperation and participative management of the resource should be adopted.

Keywords: Environmental impact assessment; sustainable development; pipeline; well drilling; community, seismic.

ENVIRONMENTAL ASSESSMENT IN NIGERIA TOWARDS ACHIEVING THE UN SDGS

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Abstract

Environmental Assessment (EA) is an environmental protection and generic environmental governance tool by which the impacts of natural processes and human activities upon the environment are predicted and evaluated, to minimize and possibly eliminate adverse impacts of proposed development project-proposals and to maximize positive impacts of the proposals, so as to ensure qualitative environment and social equity in EA process and practice, towards environmentally-sound and socio-economically equitable Sustainable Development (SD) around the globe. Thus, by its inherent nature, EA can help sovereign states, especially developing countries like Nigeria, which are richly endowed with major natural resources but plagued by the resource-curse, to achieve the UN Sustainable Development Goals (SDGs), by promoting proper protection and management of the environment, to ensure that development projects EAs (i.e., development projects-level EAs [Environmental Impact Assessment - EIAs]) contribute to beneficial environment and SD. In particular, EA, via life-cycle and Strategic Environmental Assessment (SEA), has the potential to address the ongoing global problem and challenge of climate change by contributing to efficient environmental protection and management of life-cycle development projects, especially major natural resources Extractive Industrial Operations (EIOs) in global states like Nigeria. This paper will demonstrate how EA is a key tool for SD and how life-cycle EA of petroleum resources development projects in Nigeria can promote the objectives of the EA process and practice, towards achieving SD and thus the UNSDGs, particularly Goals 13 and 17 of the UNSDGs (respectively captioned Climate Action and Partnerships for the Goals).

Keywords: Environmental Assessment, Extractive Industrial Operations, Good Environmental Governance

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT A TOOL FOR ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS IN NIGERIA

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Abstract

The Sustainable Development Goals (SDGs) were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The 17 SDGs are integrated -that is, they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability. This study attempts to investigate how the implementation of Environmental Social and Health Impact Assessment (ESIA) has helped in achieving the SDGs in Nigeria. The study was conducted in Lagos state, Nigeria using the Eko Atlantic Shoreline Protection and Reclamation Project as a case study. The implementation of ESIA was used as a parameter to ascertain whether the project is a sustainable development. The instrument used for data collection included literature review, field survey using questionnaire distribution, interviews and personal observation. The results showed that the project represents a significant investment in infrastructural development in a region that is considered, based on most economic and social indicators, one of the least developed in the world. Secondly, the project will provide high quality land in an area which has been at risk due to extensive coastal erosion issues for future development and for economic importance. Continuous implementation of ESIA as a tool is required for the realization of the SDG goals.

Key words: social impact, health impact

STRATEGIC IMPLEMENTATION OF ENVIRONMENTAL IMPACT ASSESSMENT: PATHWAY TO ACHIEVING DEVELOPMENTAL GOALS IN NIGER DELTA.

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Abstract

The regulatory framework for Environmental Impact Assessment Implementation in Nigeria is the Act, No 86 of 1992. This confers the mandate to implement on the Federal Ministry of Environment in accordance with this law. It is mandatory for the proponents of all major development projects and activities to carry out Environmental Impact Assessment on the proposed projects/activities. Similarly, the Oil and Gas operations are governed by the Petroleum Act, 1969 and the Petroleum (Drilling and Production) Regulation, 1969. Due to the growing concern for the control of adverse environmental Impacts arising from industrialization and the need to ensure sustainable development through sound environmental management practices, environmental impact assessment is required for most development projects. In the same vein, there are provisions for penalties in cases of violation or non-compliance. It has been established overtime that environmental damage can be avoided, reduced or minimized while enhancing benefits from developmental projects. The main goal of sustainable development should be to achieve the greatest benefits possible at the present for the use of natural resources without compromising the future needs and the carrying capacity of environment. In view of these, it is inherent and absolutely imperative that a strategic implementation of Environmental Impact Assessment reports by keeping to the Environmental Management Plans therein, we shall achieve developmental goals and thus a better environment in Niger Delta.

Key words: environmental impact assessment, development, Niger Delta

HEALTH IMPACT ASSESSMENT: A TOOL TO ADVANCE THE KNOWLEDGE OF POLICY MAKERS UNDERSTAND SUSTAINABLE DEVELOPMENT GOALS

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Abstract

Health Impact Assessment (HIA) is a set of techniques used to examine the potential health effects of a proposed policy, program, or project which has globally generated significant interest over the past decade. It is a strong strategy for collaborating with other sectors to address the environmental determinants of health, and to achieve the most effective objectives for sustainable development goals. However, HIA could help bring attention to the broad determinants of health and suggest ways to promote healthy public policy in different sectors. The need for HIA in Nigeria seems to be increasing because it has been found that modifiable determinants of health in populations are rooted primarily in characteristics of the physical and social environments, thus requiring intersectoral analyses of possible health promoting policies and projects. The benefits of HIA as well as its weaknesses must be well communicated to other public health practitioners, policymakers, and ultimately the public. It can provide helpful information to policymakers and stakeholders about potential health impacts, but it cannot independently create healthy public policy. This review highlights the key elements of these advances and characterizes the way in which they contribute to improvement of standards and methodologies of HIA and compares different approaches to HIA and emphasizes that a better understanding of these advances is needed before environmental scholars and practitioners can begin to gather relevant information, analyze them within credible research designs and generate reliable evidence about the effectiveness of the myriad proposed solutions to the global health, environmental and social problems. Lessons learned from environmental impact assessment and experience with HIA can help improve the likelihood that HIA can fulfill its long-term goals of advancing and promoting sustainable development.

Keywords: Health Impact Assessment (HIA), Decision making, Sustainable Development Goals (SDGs), Determinants of health, Public policy, Policy making, Risk assessment, Nigeria.

ENERGY UTILIZATION AND REALIZATION OF SUSTAINABLE DEVELOPMENT GOALS' NEXUS AMONG RURAL HOUSEHOLDS IN IMO STATE, NIGERIA

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Abstract

This study analyzed rural household's access and utilization of domestic energy as it affects the realization of Sustainable Development Goals (SDGs) in Imo State. Multi-stage random sampling technique was used in selecting 120 respondents for the study. The study described the socio-economic characteristics of the respondents, described their household energy types, determined respondents' knowledge of the SDGs and ascertained the extent of respondents' awareness of the effects of their energy use on the realization Sustainable Development Goals. Results show that 53.33% of the respondents were male, 67.50% had formal education while their mean monthly income was ₦22, 500. The major type of household energy among respondents was fuel wood (87%). Majority (71.67%) of the respondents had no knowledge of the SDGs. On a five-point Likert scale, a mean score of (2.5) was obtained on the effects of their energy sources on the realization of the SDGs. Socio-economic factors that positively influenced the respondents' knowledge of SDGs were educational status, income and access to agricultural extension officer while age had a negative influence on their knowledge of SDGs (at $p < 0.05$). The study concludes that relationship between energy use and attainment of SDGs has not been adequately communicated to the respondents and recommends that more awareness campaign on the SDGs be carried out in the rural communities.

Keywords: Energy, Rural, Households, Sustainable, Development, Goals

EVALUATION OF PLANT GROWTH PERFORMANCE IN BIOREMEDIATED PETROLEUM CONTAMINATED SOIL

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Abstract

This study evaluates growth performance of *Telfairia occidentalis* (pumpkin) in certified bioremediated soils obtained from Ogoni land. A pristine soil and three bioremediated soils of different ages (6-, 12-, and 18- months after bioremediation) were collected and transferred into plastic buckets for the study. The physico-chemical characteristics of the soil samples were determined before planting nine *T.occidentalis* seeds in the various soil samples contained in the buckets. Seedling emergence vigor and final seedling emergence were determined for each set up. Plant growth indices were monitored bi-weekly for 12 weeks. Experiments were conducted in both dry and wet seasons. Results obtained indicated the presence of residual TPH in the three bioremediated soil samples albeit at varied concentrations. However, TPH concentrations in soils were lower than the DPR intervention limit. Seedling emergence occurred 11 days after planting. *Telfairia occidentalis* grown on pristine soil had the highest final percent seedling emergence in the dry season whereas, seeds sown in 18m-AB soil showed the highest final percent seedling emergence during the wet season. There were significant differences in the growth performances of *T.occidentalis* grown on pristine soil and bioremediated soils ($p < 0.05$) as plant growth was considerably hindered in bioremediated soils in both seasons. Best *T.occidentalis* growth performance was obtained on pristine soil followed by bioremediated soil that had been left fallow for 18 months after intervention. Data from this study suggest that bioremediated sites may not be suitable for crop production even months after intervention due to residual hydrocarbon contaminants in soil.

Key words: bioremediated soil, T.Occidentalis

EVALUATION OF RISK ASSOCIATED WITH AUTO-MECHANIC WORKSHOPS IN PORT HARCOURT METROPOLIS, RIVERS STATE, NIGERIA

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Abstract

Several occupational and health hazards are associated with auto mechanic workshops, this research study was designed to establish the risk associated auto-mechanics workshop in Port Harcourt metropolis, Rivers State, Nigeria. Taro Yamane's formula was used to identify the population size of auto mechanic workshops in the study area. A total number of 1,070 mechanic workshops were identified to be located within the Port Harcourt metropolis. Data collection was done by the administration of questionnaires using simple random sampling technique. Four hundred (400) copies of questionnaire were purposively distributed and three hundred and forty-two (342) were retrieved. Data analysis was done using descriptive statistics. About seventy five percent (75.4%) have knowledge of occupational hazards and 14% had no personal protective equipment, 90.6% had no regular medical check-ups, 86.2% eat in their workshop. The morbidity pattern shows that the back pain is the most common morbidity suffered by auto-mechanic technicians in this study, due to their rare use of mechanical aid to lift heavy objects. This assessment provided the fundamental occupational hazard associated with auto-mechanic workshop in Port Harcourt metropolis. We recommend regular training of auto-mechanic technicians on the use of personal protective equipment.

Key words: Evaluation, Auto-mechanic, Workshop, Risk and Port Harcourt.

IMPLEMENTATION OF IMPACT MITIGATION MEASURES: A TREND FOR SUSTAINABILITY

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Abstract

A key objective of an Environmental Impact Assessment (EIA) is to ensure that appropriate measures (mitigation) and procedures for reducing or eliminating the effects of associated and potential impacts of a proposed project are developed while enhancing the overall quality of the project. Associated and potential impacts and their respective mitigation and monitoring requirements are formulated into an Environmental Management Plan (EMP), which can only succeed through effective monitoring during all phases of project implementation. Effective monitoring provides feedback on the actual impacts of a project. Impact Mitigation Monitoring should be directed towards assessing the effectiveness of the proposed mitigation measures, measuring and evaluating changes brought about by projects, and insuring compliance of the different project phases with statutory requirements. All EIA reports provide for an EMP. Unfortunately, implementation of the EMP, the life of any EIA report, has barely succeeded in Nigeria for projects with EIA approvals. Progress in implementing EMPs has been impeded by lack of resources in terms of funds, skilled staff, apathy and lack of commitment on the part of the proponents and failure of the regulators to exercise absolute regulatory powers. This paper reviews the purpose and range of methods for implementing Impact Mitigation Measures, its benefits in sustainable development and promotion of good governance, and evaluates the current efforts and challenges facing regulators and project proponents - a - vis implementation of mitigation measures.

Key words: Good Governance, Environmental Management Plan, Impact Mitigation Measures, Impact Mitigation Monitoring, Sustainable Development

STATUS OF POLYCYCLIC AROMATIC HYDROCARBON (PAH) IN SOIL FROM AUTOMOBILE WORKSHOPS IN OBIO/AKPOR LOCAL GOVERNMENT AREA, RIVERS STATE, NIGERIA.

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Abstract

A study on the storage and disposal practices of spent oil from Automobile workshops in Obio/akpor Local Government Area of Rivers State was conducted to determine the levels of polycyclic aromatic hydrocarbons (PAHs) profiles in soil samples. Questionnaire was administered. A total of 150 mechanics was sampled. Taro Yamani formula was used to determine the sample size. Soil samples were collected at depths of 10-15 cm from 8 selected sample sites and analyzed for PAH. Control sample was from a non-spent-oil-contaminated soil. Results showed that auto-mechanics had little or no formal education. Only 51% of respondents had secondary/technical education. 94% of the study population disposed of their generated spent oil in various types of containers before disposal. 94% disposed of their spent oil by selling. 60% of the auto-mechanics were not aware that spent oil was hazardous. More so, 76% were not aware that spent oil could be recycled. Analysis of soil samples showed that mean concentration of PAH was lower than the DPR standard in all locations. Control values did not show any consistent pattern when compared with the sample values in all locations. Soil contamination by PAH in the study area ranged from minor to severe. The automobile workshops therefore is a potential source of PAH pollution and serious threat to environmental wellbeing. The study recommends enactment and enforcement of legislations to control the management of spent oil.

Keywords: Auto-mechanics, disposal practices, spent oil, Soil contamination, PAH

MODELLING THE FATE OF DIESEL AT BASE TRANSCIEVER STATION SITES IN NIGER DELTA

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Abstract

The fate of diesel at base transceiver station (BTS) sites in selected states in the Niger Delta was studied using a minilysimeter. A three factorial experimental design was obtained using the Response Surface Methodology (RSM). Three parameters, namely soil depth, contaminant volume and rainfall intensity, were varied using appropriate values from literature. Soil depth ranged from 30cm to 90cm, contaminant volume ranged from 50ml to 350ml and rainfall intensity ranged from 5mm/hr to 10mm/hr. The soil samples from the selected states (Rivers, Bayelsa and AkwaIbom) were obtained in an undisturbed condition, using auger and comprised mainly of silt, clay and sand. Models predicting the fate of diesel at BTS sites were developed with correlation coefficient (R^2) of 0.6737, 0.6309, and 0.6368 for leached and 0.7272, 0.8061 and 0.6825 for retained for Bayelsa, Rivers and AkwaIbom, respectively. The developed models adequately predicted the leaching and retention of diesel at BTS sites in the selected States and highly recommended for use in the Niger Delta region.

SOIL SEED BANK STUDIES IN SPENT ENGINE OIL SITES IN SOME COMMUNITIES IN RIVERS STATE, NIGERIA

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Abstract

Soil seed bank studies in spent engine oil sites was done in some communities in Rivers state using the seedling emergence method. Soil samples were acquired from nine locations within the three communities studied (Aluu, Nkpolu and Elioizu); six spent engine oil sites and three control sites at three varying depths (0-5cm, 5-10cm and 10-15cm respectively) and conveyed to the Centre for Ecological studies within the university of Port Harcourt where the soil was air dried, 100g plated and replicated twice under suitable conditions. Seedling emergence was monitored, and the seedlings identified, counted and recorded within a twelve weeks □ duration. Physicochemical examination of the soil samples was also carried out; analysis was also done for heavy metals (copper, zinc and lead). Statistical results were obtained using the two-way ANOVA. Results showed that control sites had the highest number of emergent seedlings and was significantly different at 5% significant level from the spent engine oil at all depths. There was no significant difference ($P > 0.005$) across the various depths for the different locations. Control had the highest species diversity particularly at 0-5cm depth. Heavy metals (copper, zinc and lead) were higher at spent engine oil. Hence, spent engine oil had detrimental effects on the soil seed bank in the locations studied. Measures and actions should be harnessed to curb these effects to preserve and ensure the regenerative potentials of these places.

KEY WORDS: Soil Seed bank, spent engine oil, metal scraps, dumpsites

CHALLENGES IN THE IMPLEMENTATION OF CULTURAL HERITAGE IMPACT ASSESSMENT IN NIGERIA

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Abstract

The common knowledge of Impact Assessment on cultural heritage in Nigeria is intrinsically linked with the Environmental Impact Assessment (EIA) process. With the fact that the EIA process does not holistically address impact of proposed project on heritage properties, there is the neglect of the assessment of impact of some other projects/programs on heritage properties outside the coverage of the EIA process. When Cultural Heritage Impact Assessment (CHIA) is implemented, it is limited to the World Heritage Sites and scheduled heritage's core settings where the National Commission for Museums and Monuments (NCMM) has the power to regulate proposed project/program. As a result, the outstanding values of some of the nation's cultural heritage have been lost and some destroyed due to unregulated human activities. This paper therefore examines the challenges in the implementation of CHIA in Nigeria. It observes that lack of specific requirement for CHIA within the EIA process, weak heritage legislation, non-implementation or enforcement of the relevant provisions of other legislation on heritage management in the country among others are responsible for the poor implementation of CHIA in Nigeria. The paper concludes by suggesting the need for collaboration among relevant agencies to utilize the opportunity provided by international and national regulations and legislations to enforce CHIA in Nigeria, without neglecting the review of the EIA and heritage legislations, by developing operational guidelines and policies in line with the statutory provisions so as to ensure sustainable cultural heritage management in line with goal 11 (4) of the Sustainable Development Goals.

Key words: Cultural Heritage, EIA, CHIA, Implementation

DEALING WITH CULTURAL HERITAGE ASPECT OF ENVIRONMENTAL IMPACT ASSESSMENT IN NIGERIA

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Abstract

The Nigeria natural and cultural environment have been under severe pressure and currently facing existential crisis, due to the unfriendly impacts emanating from major infrastructural development like road networks and dams, large -scale commercial agriculture, landscape- large scale mining and energy projects (wind farms). However, Environmental Impact Assessment (EIA) practice in Nigeria has been able, to a greater extent, address the challenges posed by developmental process on the biophysical environment, but impact on cultural heritage has not been adequately addressed. The implication is that Cultural Heritage Impact Assessment (CHIA) has been carried out loosely in Nigeria, despite the inclusion of cultural heritage in the baseline study and the Environmentally Sensitive Areas (ESAs); and existence of internal and external legal instruments that give priority to the protection of archeological and cultural sites. As such it is not out of place to begin to adopt Cultural Heritage Impact Assessment (CHIA) independent of Environmental Impact Assessment (EIA), as obtainable in developing countries like Tanzania, Uganda and Kenya. This paper therefore provides evidence of inadequate consideration of cultural heritage in EIA study. The paper concludes on the need for better guidance and domestication of trending international best practices on the assessment of impact on cultural heritage within the EIA concept. It equally emphasizes the need for early consideration of cultural heritage in the EIA process and greater stakeholder's participation for a sustainable management of cultural heritage in the country.

Key Words: EIA, CHIA, cultural heritage

SEASONAL VARIATION OF PHYTOPLANKTON SPECIES IN THE SAINT BARTHOLOMEW RIVER, RIVER STATE, NIGERIA

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Abstract

A pilot study was carried out on the seasonal phytoplankton assemblage of Saint Bartholomew River, with the aim of providing information for knowledge, and sustainable management of the aquatic system. Thus, a survey was conducted two months each, in the dry and wet seasons, when Phytoplankton samples were collected, and the diversity, abundance and composition assessed, using standard methods. Results revealed a dry season composition of twenty five (25) species from nine (9) families (Bacillariophyceae>Zygnematophyceae>Cyanophyceae>Coscinodiscophyceae>Xanthophyceae>Chlorophyceae, Mediophyceae, Ulvophyceae), while the wet season, recorded twenty (20) species from four (4) families (Bacillariophyceae>Coscinodiscophyceae>Cyanophyceae>Dinophyceae). Relative abundance in the wet season revealed a total numerical abundance of 2,187 phytoplanktons, where Bacillariophyceae was most abundant (83.2%) and Dinophyceae least (2.0%). However, the dry season having a lower total numerical abundance of 830 phytoplanktons, recorded higher Coscinodiscophyceae abundance (30.9%), closely followed by the Bacillariophyceae (27.0%), and Euglenophyceae least (1.1%). The analysis of variance (ANOVA) revealed significantly higher abundance in the dry season than the wet season. Also, diversity was significantly higher in the dry season with the Shannon-Wiener (H) range of 2.97 -3.03, Margalef's richness of 4.13-4.31 and Pielou's evenness of 0.92-0.94, compared to the wet season range of Shannon-Wiener (H) 2.41 -2.65, Margalef's richness of 2.71-2.91, and Pielou's evenness of 0.88-0.95. In conclusion, there was a clear seasonal variation in Phytoplankton community of the study area. It is recommended that further research be carried out, to ascertain the true cause of the variation for the sustainable management of the water body and its species.

Key words: Abundance Composition, Diversity, Dry Season, Phytoplanktons, St. Bartholomew River, Wet Season.

AMYLASE AND PROTEASE ACTIVITIES OF MICROORGANISMS ISOLATED FROM CASSAVA WASTEWATER CONTAMINATED SOIL

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Abstract

Agro wastes management is one of the problems faced by humans in their environment especially in developing nations. In Nigeria, several agro wastes are generated in enormous quantity including cassava mill effluents. Basically, Nigeria is the world leading producer of cassava accounting for over 57.134 million tonnes as at the end of 2016 economic year. It has been estimated that 5.142 million tonnes of cassava wastewater are discharged into the Nigerian environment. Of these, 45 -65% could be recovered. It has been projected that the wastewater could increase significantly before 2035. The cassava wastewater is often discharged without any formal treatment approach by *gari* processors in many areas in cassava producing communities in Nigeria. Untreated cassava wastewater leads to environmental degradation and loss of biodiversity due its lethal characteristics. Cassava wastewater can be managed through its use for biotechnological advances including enzymes production. This study was designed to assess the amylase and protease activities of microbial isolates (*Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas*, *Bacillus*, *Micrococcus*, *Proteus*, and *Enterobacter* species viz: bacterial, and *Saccharomyces cerevisiae*, *Aspergillus*, *Mucor*, *Penicillium* and *Rhizopus* species viz: fungi) from cassava wastewater contaminated soil. The protease and amylase activities from the isolates were carried out using standard microbiological processes. The result showed that all the microorganisms possessed amylase and protease activities except for *Escherichia coli* and *Enterobacter* species, and *Proteus* species for only protease activity. These enzymes (protease and amylase) can be utilized in several industrial sectors in the nation's economy. As such, the cassava wastewater contaminated soil microbes could be obtained and used for the production of useful enzymes with biotechnological potential.

Key words: Amylase, Cassava mill effluents, Enzymes, Microorganisms, Protease

SELECTED HEAVY METALS AND MICROBIAL DENSITY IN EDIBLE TOMATOES SOLD IN SOME SELECTED MARKETS IN PORT HARCOURT METROPOLIS, RIVERS STATE, NIGERIA

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Abstract

This study investigated some selected heavy metals and microbial density in tomatoes sold in some selected markets (Oil mill, Eneka and Atali) within Port Harcourt metropolis, Rivers state, Nigeria. Triplicate samples of fresh and stale tomatoes were obtained in each of the markets. Standard microbiological procedure was employed for the enumeration of microbial density. While flame atomic adsorption spectrometry was used for heavy metals analysis. Results showed that the values of chromium, copper, manganese, zinc, total heterotrophic bacteria and total fungi ranged from 0.396 to 0.896mg/kg, 0.602 to 2.434mg/kg, <0.001 to 1.770mg/kg, 0.110 to 2.048mg/kg, 2.300 to 7.167 x 10⁶cfu/g and 1.467 to 2.767 x 10⁵cfu/g, respectively. The analysis of variance showed that there were significant variations (p<0.05) between the different tomato conditions obtained from the different markets for each of the test parameters except for total fungi. Non-essential metals such as cadmium and lead were not detected in the tomatoes, an indication that toxicity associated with them is non-existent in the tomato samples. The microbial density was far higher than the acceptable ($\leq 10^3$) and tolerable (10^4 to 10^5) limits for ready-to-eat food as specified by International Commission on Microbiological Specifications for Foods. The increased microbial density is an indication of the need to improve on the handling, packaging, and storage techniques usually employed by local vendors. Hence, there is the need to frequently assess the level of microbial density and heavy metals to forestall the potential health concerns associated with its consumption, either in its raw or cooked form.

Keywords: Food, Heavy metals, Microorganisms, Public Health, Tomatoes

METABOLITE CHANGES IN THE BLOOD PLASMA OF JUVENILE AND ADULT AFRICAN MUDFISH (C. GARIPIPIUS) ON EXPOSURE TO DETERGENT (LINEAR ALKYL BENZENESULPHONATE)

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Abstract

The aim of this work was to evaluate the effect of detergent (linear alkylbenzenesulphonate) on selected blood plasma metabolites of African mudfish (*Clarias gariepinus*) juveniles and adults. The effect was assessed by comparing blood plasma metabolites profile in the two live stages of a control group (0.00mg/l) and that exposed to varied concentration of detergent (10.00, 20.00, 30.00, 40.00 and 50.00mg/l). Compared with control group, albumin was 10.92%, 8.48%, 9.10% higher than control at 10.00, 20.00 and 30.00mg/l and 12.08, 14.97% lower at 40.00 and 50.00mg/l for juveniles while for adult fish it was significantly (p>0.05) higher than control at all the concentration levels. Total protein was 11.70, 15.20, 15.79, 22.22 and 28.07% higher than control at all levels and significantly not found in the adult. Creatinine was respectively 45.29%, 125.96%, 55.25% and 50.36% higher than control at 10.00, 20.00, 30.00 and 50.00 and 2.75% less than control at 40.00mg/l while in adult fish it was observed that at 10.00 - 50.00mg/l, creatinine was respectively 72.73, 157.27, 239.09 and 280.00% higher than control. Interestingly, total bilirubin in juvenile fish was 69.50, 76.12, 86.91, 76.12 and 92.09% less than control while in adult fish, it was 15.58, 32.92, 63.03, 114.95 and 136.24% higher than control at 10.00 to 50.00mg/l. The exposed group for juvenile and adult fish showed a significantly higher (p<0.05) concentration of urea when compared with that of the control group.

Key words: linear alkylbenzenesulphonate, Total protein, juveniles, albumin, plasma metabolites, Creatinine, urea.

ISOLATION AND CHARACTERIZATION OF ANTIBIOTIC PRODUCING ACTINOMYCETES IN A RHIZOSPHERE ENVIRONMENT

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Abstract

A total of 13 soil samples were collected from various sites in Imo State University farm at 15cm deep into the rhizosphere soil at the root node of different plants. Serial dilution technique was used in order to reduce the bacterial load. The isolates were examined on the basis of the color, surface morphology and characterization. Starch Casein Agar and Nutrient Agar for isolation and propagation of Actinomycetes from the rhizosphere soil were used. Biochemical test which include; gram stain test, starch hydrolysis, casein hydrolysis, lipid hydrolysis, methyl red test, citrate test, catalase test, indole test, and sugar fermentation test were also performed. Out of the 13 isolates gotten only 5 showed potential antimicrobial activity against bacteria species used. These five isolates B, F, M belongs to the genus *Streptomyces*, while the L isolate, *Nocardia* genus that is to say that *Streptomyces* are more abundant in the soil.

LAND SNAIL DIVERSITY: A CASE FROM NATURAL TO AGRO PLANTATION IN UHIERE FOREST, EDO STATE, NIGERIA

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Abstract

The change from natural ecosystems to agro ecosystem is a major ecological concern due invertebrate biodiversity loss. Efforts to sustain or enhance wider invertebrate conservation in agro ecosystems have focused on the relatively small fragment important to agriculturist. A case for conservation rather than continuous neglects hence this study in agro landscape. A total of 366 land mollusc individuals representing 31 species (25 genera and 8 families) were recorded from 10 plots in this study. Each plot yielded between 19 and 38 species and between 28 and 60 individuals. Species richness was also dominated by four families, in declining order, Subulinidae, Streptaxidae, Achatinidae and Urocyliidae. The most abundant species was *Thapsiaoscitans* contributing about 27% of the total number of individuals and occurring in all sample plot. There is still continuous exploitation of the rich diversity of tropical forest to make ends meet. That is exactly the present state the study area has found itself, from a reserve to an agricultural landscape despite clarion calls for the complete stoppage of exploitation of the rich diversity and abundance of tropical rain forest.

Key words: Biodiversity, land snail, oil plantation, conservation

EVALUATION OF SELECTED HEAVY METALS AND ESSENTIAL ELEMENTS IN CRUDE PALM OILS FROM OIL MILLS IN SOUTH-WEST AND SOUTH-SOUTH NIGERIA

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Abstract

Crude palm oil (product of *Elaeis guineensis* Jacq Arecaceae) is a staple food in Nigeria and the whole world, being consumed for its nutritive values. This study aims to evaluate fourteen (14) elements in crude palm oil from fifty (50) Sampling Sites located along the roads in South-West and South-South Nigeria, cutting across five States (Oyo, Osun, Ondo, Bayelsa and Rivers States). The samples were digested using mixture of acids (HNO₃: HClO₄: H₂ SO₄ in ratio 1:1:1) analyzed using Atomic Absorption Spectrometer (AAS model: GBC Avanta PM A6600 and Flame Photometer. The obtained results in mg/L were in the ranges: Ca (11.46-81.12), Mg (1.89-12.60), Na (1.29-32.80), K (5.29-53.88), Fe (12.48-83.94), Mn (0.09-32.80), Ni (0.10-0.72), Cr (0.07-0.54), Pb (<0.001-0.06), Cd (<0.001-0.22), Cu (0.03-1.42), As (<0.001), Zn (0.94-18.32) and Al (0.33-6.23). Applying ANOVA and the Tukey's Pairwise Test to the data obtained revealed significant differences among some of the States such as Oyo and Bayelsa States (0.01175 and 0.03495 respectively for Ca), while there was no significant difference in Fe, Cr, Cu, Cd, As for all the States at 95% Confidence Limits. This can be ascribed to the different methods of palm oil production in the various States. The levels of the parameters determined show that the crude palm oil would contribute to dietary intakes of Ca, Mg, Na, K, Fe and Zn while the levels of toxic Pb, Cd, Al and As were low in comparison with standard regulatory limits and therefore safe for consumption.

Keywords: Crude Palm Oil, Heavy Metals, Essential Elements, South-West and South-South Nigeria

INFLUENCE OF HABITAT STRUCTURE AND ECOLOGICAL ZONES ON AMPHIBIAN DIVERSITY IN RIVERS STATE, NIGERIA

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Abstract

Research on amphibian diversity in Rivers State, Nigeria, was conducted between 2015 and 2019. The survey covered seven Local Government Areas and three ecological zones (lowland forest, freshwater swamp and short mangrove). The surveyed areas were Ikwerre LGA (Isiokpo), Emohua (Rumuji and Ndele), Okrika (Fiberesima Polo, ATC sandfill, GreameAma), Khana- Ogoni (Bori, Kaani 1), Ogba-Egbema-Ndoni (Omoku), Ahoada East (Ahoada main town, Ikata) and three locations in Obio-Akpor (Agbada, Rumuagholu, Rumuesara). The habitats included farmlands, fallow areas, swamps, streams and inundated areas, bush paths, human settlements and forested areas. Visual encounter and acoustic survey methods were used. Nineteen amphibian species were encountered including members of the Bufonidae, Dicroglossidae, Ranidae, Hyperoliidae, Ptychadenidae and Pipidae. Freshwater swamps and lowland forest habitats (characterized by human settlements and farmlands) had the lowest diversity of two Amphibian species. The highest diversity comprised of eighteen different amphibian species recorded in forested/swamp habitats of the lowland ecological zone. Five hundred and sixty nine (569) individuals were sampled from lowland forest/freshwater swamp ecological zone; 215 from lowland forest; 60 from short mangrove; and from freshwater ecological zone. Shannon diversity was highest in the lowland/freshwater swamp ecological zone ($H=2.12$) and lowest in the freshwater swamp zone ($H=0.52$). It is concluded that a forested habitat comprised of the combination of lowland forest and freshwater swamp ecosystems hosts a greater diversity of amphibian species.

Key words: habitat structure, ecological zone, amphibian and diversity.

NOVEL METHOD FOR GOLD RECOVERY FROM ORE DEPOSIT

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Abstract

Artisan and small-scale miners in Shanono, Kano State, Nigeria use hydrometallurgical technique for gold extraction purposes. This method presents considerable health, safety and environmental concerns, hence the need for safer and more efficient gold recovery techniques that are mercury free be designed. In 2013 Liu et al., made a discovery which uses alpha-cyclodextrin (α -CD) an inexpensive and environmentally friendly carbohydrate forco-precipitation of gold from gold-bearing scrap metals. Previous studies have shown α -CD gold recovery process has exhibited high recovery of gold from a simple bimetal alloy (Red gold alloy scrap: 89% yield and 97% purity and Yellow gold alloy scrap: 92% yield and 95% purity) utilizing mild reaction conditions. Further studies also showed the process to be highly specific for gold, even in the presence of other noble metals like platinum (Pt) and palladium (Pd). This paper used α -CD to recover gold from ores sourced from Shanono gold deposit site (N12.02495° E007.95637°) Kano State, Nigeria. Characterization of the gold ore using Fire Assay (FA) showed 4.71ppm of gold. The ore was concentrated using shaking table and froth floatation. The gold recovery from the ore concentrate was found to be pH sensitive, and gold recovery at varying pH (2.0, 3.6, 4.0, 5.4, 6.0) was experimented. AAS analysis showed highest gold recovery of 69% at pH 4.0.

Keywords: Alpha-Cyclodextrin; Characterization; Health, Safety and Environment

PHYSICO-CHEMICAL ALTERATIONS AND HYDROCARBON CHARACTERISTICS OF KOM-KOM OIL SPILL SOILS

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Abstract

The study focused on finding the alterations that occurred in physico-chemical and hydrocarbon characteristics of crude oil-impacted soil in Kom-Kom, Niger Delta, Nigeria. The soil samples were obtained randomly at 30cm depth using soil auger from three locations: PA and PB being the plots around the oil spill impacted area and PC being the control area which is about 200m away. Laboratory analysis was carried out on the Physicochemical Parameters (pH, Electric Conductivity, Potassium, Phosphate, Nitrate); Organics (Total Hydrocarbon Content (THC), Total Petroleum Hydrocarbon (TPH), Polycyclic Aromatic Hydrocarbon (PAH) and Total Organic Carbon (TOC)) and Heavy Metals (Iron, Zinc, Lead, Chromium, Vanadium). The data were analysed using descriptive statistics and One-Way ANOVA. pH, K and P values were all significantly different from their respective control values ($P \leq 0.05$). All organic parameters were also significantly different from the control values ($P \leq 0.05$). For heavy metals, only Cr and V values were significantly different in all three plots ($P < 0.05$). This study shows that crude oil spill alters the physicochemical

attributes of the soil and could significantly affect soil fertility as the people of Kom-Kom are mostly farmers and traders. In order to achieve the third sustainable development goal (SDG) which is to have good health and well-being of people, we recommend immediate and proper clean up using bioremediation approaches as a cheap, eco-friendly and an environmentally sustainable process.

Key words: hydrocarbons, physicochemical characteristics, Niger Delta

INTEGRATED APPROACH TO WETLANDS AND RIVER BASIN MANAGEMENT: THE CASE OF THE NETHERLANDS MEANDERENE DE MAAS RIVER PROJECT

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ABSTRACT

Stakeholder analysis and participation is very vital in the effective and efficient management of Wetlands. The Maas (Meuse) River basin project in the Netherlands involved the engagement of all stakeholders and interest groups to participate in the planning process which geared towards meandering the river, strengthening the city dykes, developing nature and increasing river water retention for effective water regulation to ensure national safety and in climate change conditions. This exercise involved in-depth consultations with stakeholders which were to culminate to a preferred design out of the six different designs developed to execute the Maas wetlands project. The scenarios and designs were revolved around one or both of agriculture, nature development, dyke resizing or relocation, river bank manipulations and to making more room for the river. So many individuals and organizations might be losing their farms, industries, business, houses, lands or nature area as a result. This study therefore revealed the varying challenges the project may be posing on the people and their respective interests which they want to protect and to be considered by the government. The ecosystem services were analyzed in the face of the scenarios as well as the features of each of them to assess the most eco-friendly option which should be based on both national and international guidelines and policies governing the implementation of wetlands and water-based projects according to the Netherlands water board. There is thus, the need for integrated approach to wetlands and water resources management projects for inclusive consideration, public participation and stakeholder education. Non-engagement of grassroots in such local based projects may have adverse effects on the implementation and management successes or may result to conflicts when devoid of proper communication and linkages.

Key words: Stakeholder Analysis, Wetland Management, Meuse River, Climate Change, Aquatic Ecosystem, Ecosystem Services

APPLICATION OF GIS AND REMOTE SENSING TO THE DELINEATION OF GROUNDWATER POTENTIAL ZONES IN YENAGOA L.G.A

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ABSTRACT

The integration of remotely sensed data and geographical information system (GIS) for the delineation of groundwater potential zones has become a useful tool globally for better and careful exploration of groundwater resource. The aim of this study is application of GIS and Remote Sensing in the delineation of groundwater potential zones in Yenagoa L.G.A. in order to achieve the objectives of this study, nine thematic layers (drainage density, drainage proximity, geology, landuse, lineament density, rainfall, slope, and soil) would be analyzed and integrated in the GIS working environment (ArcGIS 10.5) with the assistance of Analytical Hierarchy Process (AHP) a multi-criteria decision analysis tool, by assigning weights to them. Each of these weighted thematic layers are then computed statistically to get the potential zones of groundwater in the study area. The groundwater potential zones would be shown in three different classes, the high, the moderate, and the low class. The method applied in this study would reveal the usefulness of the result for future planning and better management of the groundwater resource.

KEY WORDS: Geographic Information System (GIS), Remote Sensing, Groundwater, Groundwater delineation, Potential areas.

GEOCHEMICAL DATA HANDLING, USING MULTIVARIATE STATISTICAL METHODS FOR ENVIRONMENTAL MONITORING AND POLLUTION STUDIES

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ABSTRACT

Multivariate statistics such as hierarchical cluster and principal component analyses were used in interpreting physicochemical parameters and potentially toxic heavy metals in water and stream sediment data. Three Principal components loadings (PC1, PC2 and PC3) were produced from water samples data. Eigen values (20.563, 8.477, and 7.635) for each PCs were obtained. The percentage total variance (28.563, 11.774, 10.605), cumulative eigen values PC1 (20.566), PC2 (29.043) and PC3 (36.678) were achieved and Cumulative percentage of PC1 (28.563), PC2 (40.337) and PC3 (50.942). In stream sediments, eigen values for PC1 (12.290), PC2 (5.473), PC3 (3.191) and PC4 (2.103) and Percentage total variance of PC1 (39.647), PC2 (17.651), PC3 (10.292) and PC4 (6.782) were obtained. Cumulative eigen values of PC1 (12.290), PC2 (17.762), PC3 (20.952) and PC4 (22.305) and Cumulative percentage for PC1 (39.647), PC2 (57.298), PC3 (67.590) and PC4 (74.372) were also obtained. PC2 scores revealed that the groundwater in the area flows through two different aquifer types. High positive NO₃ shows presence of anthropogenic contamination in water and stream sediments. High positive loading of Ba is due to barite mining in the study area. PC score loading show that none of the elements pose serious health threat due to contamination.

Keywords: Multivariate Statistics; Principal Component Loadings; Anthropogenic Contamination; Physicochemical Parameters; Potentially Toxic Heavy Metals

ENVIRONMENTAL IMPACT ASSESSMENT SKILLS NEED OF YOUTH

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ABSTRACT

No doubt, we live in a dynamic world; however, the 21st century comes with a lot of social, technological and economic changes. These have modified and redefined our way of life. Most employers of labour in developing countries have widely criticized the quality of graduates produced by higher educational institutions in developing countries, Nigeria inclusive. The skills need of youth have been shown to encompass soft and hard skills required to meet the ever change conditions in the environment. As a result of the fast paced change in our environment, most of the projects and programmes come with implications on the environment (pollution, climate change, release of gas, improved livelihood and so on). There is need to properly determine the effect of (future) projects and programmes to meet the Sustainable Development Goals of the United Nations. This study reviewed the environmental impact assessment need of youth, as our environment forms an integral part of our survival and sustainability, thus harm to the environment is harm to man's existence. As leaders and managers of the future, there is need to understand the skills youth should possess for proper environmental assessment and management.

Key words: Environmental impact assessment, skills need and youth

AGRICULTURAL WASTE CONTRIBUTIONS TO CLIMATE CHANGE IN NIGERIA

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ABSTRACT

This study was undertaken to review the strategies for reducing agricultural waste contributions to climate change in Nigeria. To achieve this purpose, literature materials concerning agricultural waste and climate change was reviewed. Findings from reviewed literature reveal that agriculture is a vast sector encompassing crop, animal, forest resource management and utilization systems. These systems especially in developing countries generate a lot of waste, of which on decomposition emits greenhouse gases. Agricultural wastes are mostly bio-degradable; however, some animals emit methane, urea and so on which may contribute to the concentration of Green House Gases in the atmosphere. Research has shown that plant parts when decomposed in large quantity as a result of microbial activities/spoilage release gases which facilitate global warming. Most toxic gases as it concerns agriculture are released during production, processing and even utilization (consumption, especially if not responsibly consumed) stages. Various agricultural activities lead to the generation of wastes and gases that have adverse effects on the environment. Agricultural activities such as bush burning, deforestation, fumes/air pollutants from farm machinery/equipment as well as processing plants also contribute to climate change. Strategies such as use of organic agriculture, reduced use of fertilizer and climate smart agricultural practices amongst others are greatly recommended. However, great attention should be given to these agricultural waste because there will be a substantial decrease in agriculture contribution to pollution and climate change in Nigeria if agricultural waste is properly managed.

Key words: Agricultural waste, climate change, Environmental impact

IMPACT OF CLIMATE VARIABILITY ON THE INCIDENCE OF TUBERCULOSIS IN GOMBE METROPOLIS, GOMBE STATE.

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ABSTRACT

This paper examined the impact of climate variability on the incidence of tuberculosis in Gombe metropolis. The study employed cross-sectional and ex post factor research design. Primary data was collected on perception of the people regarding the factors responsible for the incidence of tuberculosis using questionnaire. Data on rainfall, temperature, relative humidity and wind speed were collected from Nigerian Meteorological Agency (NIMET) for the period of 20years (1997-2016). Purposive sampling was used to select the centre for leprosy and tuberculosis, specialist hospital, in Gombe metropolis and 8 locations were used as sample for the study. Simple random sampling was used to select the individuals for the study and stratified sampling method was used to determine the quota of sampling size to be giving to each location. Times series analysis and simple linear regression were used for data analysis. Student T-test was used for testing hypotheses. Findings revealed that there is a weak positive relationship between rainfall and tuberculosis ($r = 0.043$), temperature and tuberculosis ($r = 0.037$), relative humidity and tuberculosis ($r = 0.194$), wind speed and tuberculosis ($r = 0.019$). The regression analysis reveals that 4.3%, 3.7%, 19.4% and 1.9% of the variance in tuberculosis can be explained by the climatic parameters under study. This implies that there are other factors which are responsible for the disease. Such factors include: malnutrition, lack of awareness and poor drug adherence. The disease is more during dry season than rainy season and it is clustered within the study area. From the hypotheses tested, there was impact of rainfall and relative humidity. This is because they were significant at $P(0.59) < \text{or} = 0.05$; $P(0.23) < \text{or} = 0.05$. Temperature and wind speed were not significant at $P(0.61) > \text{or} \text{not} = 0.05$; $P(0.71) > \text{or} \text{not} = 0.05$. Climate variation is accountable for 29.3% of the incident of tuberculosis in Gombe metropolis. There should be awareness campaign on tuberculosis, health education on the danger of smoking cigarettes and implementation of new policy on waste management.

ASSESSMENT OF HEAVY METALS IN SELECTED MUNICIPAL SOLID WASTE DUMPSITES IN POTISKUM, YOBE STATE

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ABSTRACT

This study was conducted on five municipal solid waste dumpsites that are provided, controlled and managed by the local council authority in Yobe state. Combustion and deposition were the main waste management practice and the waste consist of household waste, animal dung, leaves, polyethylene bags and those from commercial facilities. The concentration of As, Cd, Cu, Pb and Zn in these selected dumpsites were determined using Buck Scientific 201VGB Atomic Absorption Spectrometer (AAS). The concentrations and distribution of the metals were found to be As (0.15 ± 0.02) < Cd (0.88 ± 0.01) < Cu (100.41 ± 1.12) < Zn (191.72 ± 0.65) < Pb (194.66 ± 0.53). The concentration of As was found to be negatively correlated at $p < 0.05$ with Cd, Cu and Pb however it has weak positive correlation with Zn in the selected dumpsites. The mean concentrations of As, Cd, Cu and Zn were found to be within the acceptable limits in mgkg^{-1} of 40, 0.8, 100 and 7000 for As, Cd, Cu and Zn respectively while the concentration of Pb was above the limits of 85mgkg^{-1} limits set by the world health organization (WHO). Conversely, the heavy metals concentrations observed in these selected dumpsites were below the limits in mgkg^{-1} of 55, 380, 190, 580 and 720 set by the department of petroleum resources (DPR) for As, Cd, Cu and Zn respectively. Therefore, it is necessary to caution the inhabitants adjacent to these dumpsites against possible Pb contamination of ground water sources from the leachates and the health implications.



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