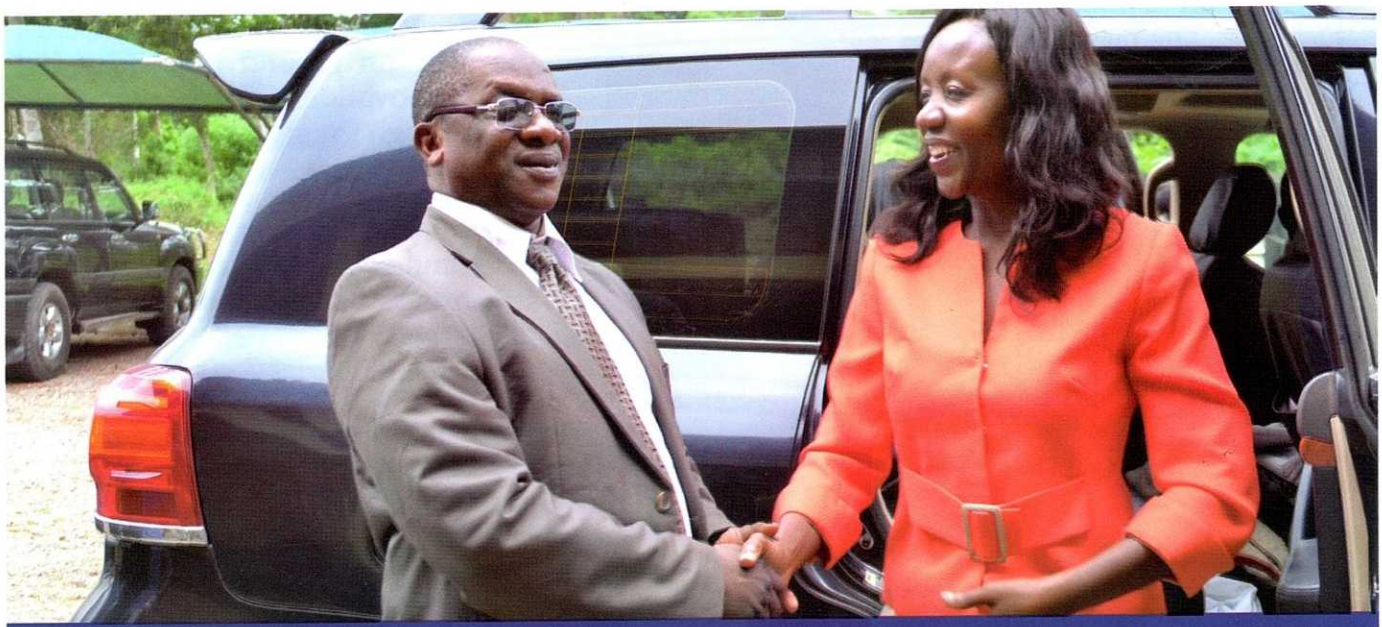
NBRRI Newsletter

Vol. 6 No 3, October, 2017

3RD QUARTER EDITION

The Quarterly Newsletter of the Nigerian Building and Road esearch Institute



HOUSE OF REPS COMMITTEE ON SCIENCE & TECHNOLOGY ON OVERSIGHT VISIT TO NBRRI

>>13

DR. SHAMAKI IS NEW PERMANENT SECRETARY, FMST

>>3

Handling Procurement In NBRRI....

Engr. Hassan Danjuma (Director Procurement, Physical Planning and Maintenance)

>>4

NBRRI NEWSLETTER

Director General/CEO
Prof. D.S Matawal

Ag. Editor-In-Chief
Daniel O. Makava

Associate Editor
Peter Mashem

Staff Writers
Oneshi Umoche
Josephine Adeyemi
Aminat Adekunle
Yatasu Abdulsalam
Blessed Ugbede
Uham Danshak
Makava Richard

Photographer
Olotu Mohammed

Address
NBRRI, Plot 449, Samuel Ogedengbe Crescent, Jabi - Abuja

PMB 1055 Ota, Ogun State

website: www.nbrri.gov.ng
All Correspondence to the Direcctor General/CEO

NBRRI
(VISION, MISSION & CORE VALUES)
BUILDING CAPACITY & SETTING THE PACE IN INDIGENOUS CONSTRUCTION TECHNOLOGY DEVELOPMENT

VISION

To evolve and use a conprehensive and integrated appraoch in capacity building and investment promotion so as to foster the application of environment-friendly and energy-effecient innovation construction materials, manufacturing tecchnologies and cost-effective building and road construction practices.
Which will enhance job-creation, wealth generation and poverty reduction as well as nuture the emergence of vibrant, knowledge-based and highly competitive indigenous construction companies capable of meeting global standards.

MISSION

Integrated R&B, Capacity building and robust extension services in which tecchnology innovation and knowledge-based practices in the fields of buildingroad and engineering materials will be used to provide adequate and affordable housing and road infrastructure as well as increased economic empowerment.

CORE VALUE

- Professionalism
- Resourcefulness
- Commitment and Integrity
- Innovativeness

EDITORIAL

With pleasure, on behalf of the Editorial Board of this quarterly Bulletin, I welcome our esteemed readers to the 3rd quarter of the 2017 NBRRI Newsletter. In this edition, we are pleased to bring to you the numerous achievements and activities of NBRRI in the previous months.

The much anticipated 12th Abuja International Trade Fair has come and gone with a lot of fun fair, education and expose on Nigeria's vast natural endowment. NBRRI was fully on ground to display its technological innovations. Come along as we take you through the sights and sceneries from the fair.

This edition presents to you a Radiologist per excellence and an administrator, Dr. Mrs. Amina Muhammed Bello Shamaki, the new Permanent Secretary of the Federal Ministry of Science and Technology.

An educative interview with the Director of Physical Planning, Procurement and Maintenance Department of NBRRI, Engr. Hassan Danjuma succinctly reveals the gains of the procurement process in Nigeria and other related activities in NBRRI.

A pictorial representation of the visit of the House of Representatives Committee on Science and Technology to NBRRI National Laboratory Complex, Ota, Ogun State has a space in this edition.

Courtesy calls by Metallurgical, Mining and Materials Engineers alongside Institute of Polymer Engineers; Research papers on North East Development Commission of Nigeria: An Engineering Perspective; and Impact of Climate Change on the Development of Infrastructure are included in this edition.

All of these are carefully and creatively packaged in this Edition for your educative reading at no cost.

Wishing us all a happy reading.

Daniel O. Makava
Acting Editor-In-Chief

Published by Nigerian Building and Road Research Institute (NBRRI)

Mrs. Shamaki Is New Permanent Secretary, FMST

DR. (MRS.) Amina Muhammed Bello Shamaki is the new Permanent Secretary of the Federal Ministry of Science & Technology. She replaces Mrs. Belema Wakama who has retired from service.

A medical doctor (Radiologist), Mrs. Shamaki was born on 17th April, 1960, in Jega, Kebbi State. She attended Maiyama Primary School and Federal Government College Odogbolu, Ogun State where she made a Division one (distinction) in West African School Certificate in 1977. She proceeded to Ahmadu Bello University Zaria where she obtained MB.BS in 1984. She did her residency at Lagos University Teaching Hospital (LUTH) where she bagged a Fellowship of African College of Surgeons in Radiology in 1996. She also holds a Fellowship of International College of urgeons, Post Graduate Diploma as well as Masters in Business Administration.
She has attended several courses at home and abroad in her profession and administration amongst which is National Institute of Policy and Strategic Studies (NIPSS), Kuru, in Plateau State.

After her NYSC at Lagos Island Local Government Clinic, City Hall, Dr. Shamaki joined the Federal Civil Service in 1987 as a medical officer II at the Military Hospital (Creek), Lagos and became a Consultant Radiologist in 1996. She was seconded to set up the Radiology Department at State House Clinic, Abuja in 1997 and National Hospital, Abuja in 1998. Through promotion, she became a Consultant Special Grade I (Chief Consultant Radiologist) in 2006. Her service

Dr. (Mrs.) Amina Muhammed Bello Shamaki

was transferred from Ministry of Defence to Federal Ministry of Health in 2009.

At Federal Ministry of Health, she headed Regulations and Professional Schools Division of the Department of Hospital Services from 2009 to 2011. She also served as Acting Executive Secretary of the Defunct Tertiary Hospitals Commission in 2012. From 2013 to October, 2014, she was the Head of Hospital Services Division/Teaching Hospitals in the Department of Hospital Services. She has served as a member of Anti-Corruption and Transparency Unit, board member for the Optometrists and Dispensing Opticians Registration Board and Ahmadu Bello University Teaching Hospital, Zaria.

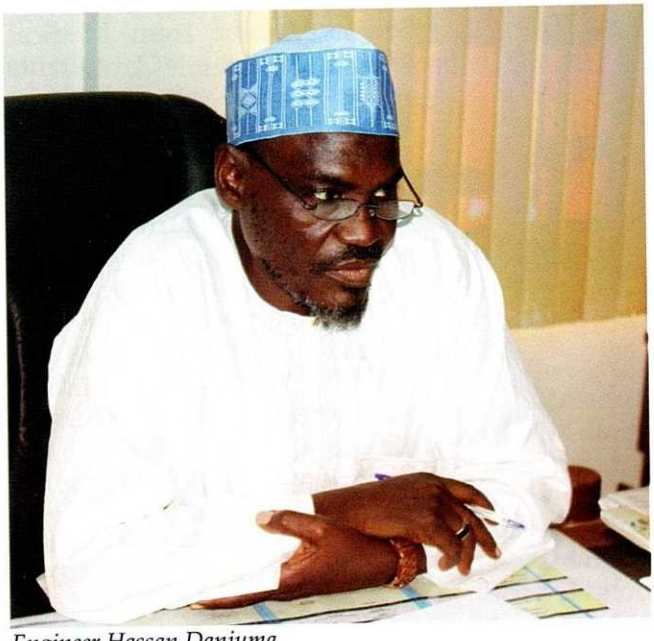
She is also an author of a few research papers and dissertations. Dr. Shamaki is a member of Several Professional and Philanthropic Organisations. These include; Association of Radiologist of West Africa and Nigeria; Radiological Society of North America; Fellow of Institute of Corporate Executives; and member, African Association of Public Administration and Management. She has received a number of awards amongst which are, Distinguished Service Award from Medical and Dental Consultants Association of Nigeria, and Distinguished Service Merit Award for Excellence from Institute of Corporate Executives Of Nigeria.

Dr. Shamaki was appointed Permanent Secretary in the Federal Public Service in October, 2014 and posted to the Special Duties Office of the Office of the Head of the Civil Service of the Federation. In November, 2015, she was deployed to Federal Ministry of Health and in August, 2016, she was deployed to the Federal Ministry of Women Affairs and Social Development. She was again deployed to the Special Duties Office, Office of the Secretary to the Government of the Federation in October, 2016.

She is an advocate of morals and discipline, and has passion for excellence. She is driven by her conviction to make positive difference in society and motivates others to achieve success. She is married to Mallam Yahaya Abdullahi Shamaki and they are blessed with three children. She enjoys reading and cooking, amongst other hobbies.

Handling Procurement In NBRRI

Engineer Hassan Danjuma is one very busy Director in the Nigerian Building and Road Research Institute. As the one overseeing the Physical Planning, Procurement and Maintenance Duties of NBRRI, the simple, friendly and unassuming Director has a lot to do in that office. Getting him to sit down for this interview took days before it finally happened due to his tight work schedule. Speaking with our Editorial team, Engineer Danjuma shares the complexities that go with handling a vital component in any organisation known as Procurement....Here are excerpt of the Interview



Engineer Hassan Danjuma

NBRRI NEWSLETTER: Sir, you have been in NBRRI for a while and currently a Director. May we further know more about you?

ENGR. HASSAN: Thank you for the opportunity. My name is Hassan Umar Danjuma. I am the Director of Procurement, Maintenance and Physical planning. I am a Civil Engineer by profession. I hail from Daura in Kastina State and I am married with eight (8) children. Thank you.

NBRRI NEWSLETTER: Sir, can you tell us about the department of Procurement, Maintenance and Physical planning?

ENGR. HASSAN: The department is scheduled to carry out procurement activities of the Institute. You know that procurement in Nigeria is guided by the procurement act of 2007 which spells the way procurement will be carried out. We also carry out the maintenance of the Institute's structures be it building, vehicles and other equipment and also the physical planning. We are a research institute as such; we operate like any other Educational Institution like Universities and so on. We are into planning of the physical structure of the Institute. For example, we are currently constructing the permanent office complex of the Institute. These are the components of the department and that is what we do.

NBRRI NEWSLETTER: Sir, what are some of the challenges faced by the department?

ENGR. HASSAN: No doubt we face challenges however, we are forging ahead and you can see the department is one of the newly created departments of the institute. Our challenges are:

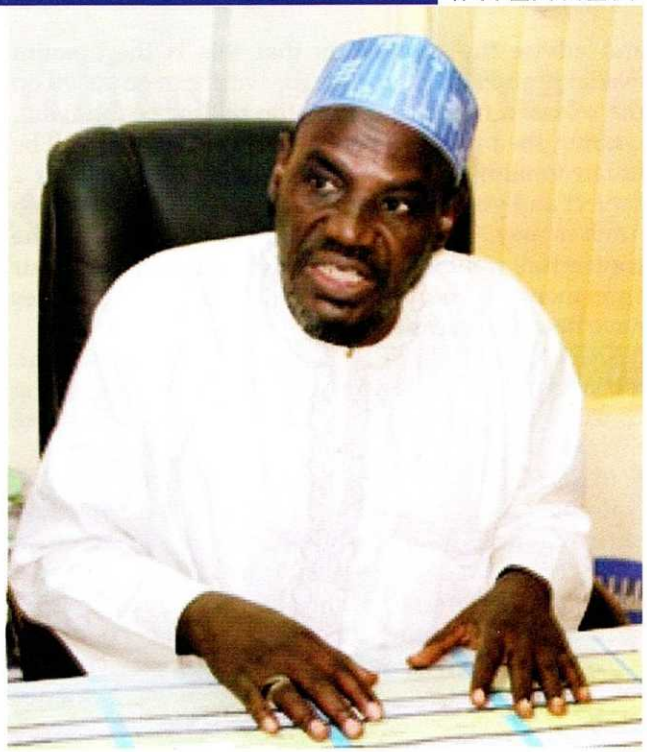
1. Staff: Procurement in Nigeria was brought about in 2007. The conduct of the procurement activity is guided by that Act. We don't have enough staff to carry out these procurement activities. I was among those that took part in the procurement course conducted by Bureau of Public Procurement (BPP). We were only two (2) on the procurement cadre that attended the course from this Institute. By the regulation of BPP, procurement activities are carried out only by trained staff that did the course that is why we have been into training of our staff on the course. Recently seven (7) of our staff took part in the procurement course conducted by the Nigerian Society of Engineers (NSE) in conjunction with a private company. Also, four (4) of our staff have been recommended for the course conducted by BPP and they will now be converted to procurement cadre. The shortage of staff strength is affecting the output of our project mostly supervision of work by professionals. Last year we had lots of projects spread across the country. It was too stressful and costly for those of us in Abuja to do the traveling and supervising. To this, we made good use of the staff we have in our zonal offices, but the number of staff there are less than required. This year will be worse because the projects we have at hand are double of that of last year. So far, we have no other option than managing the professionals in the zonal offices and see how we can employ more professional hands also.

2. The procurement process itself starts from what we call 'needs assessment'. At the end of each financial year, you are expected to look at your activities as far as procurement is concern and then you now determine what you are going to do. Talking about 'needs assessment', you get the scope, the specification and what so ever, you have it ready including your design then you do what we call procurement plan. The procurement plan will show your activities, scope and method timeline for each activity and then the next stage is the advert and so on.
3. Release of budget is also a big challenge. This is so because of the late release of budget. E. g, the last budget was signed in July which is a late period for the process. This gives no time to conduct the process because you cannot be sure of the procurement plan until the release of budget. It is after the release of budget that the needs assessment can be done. So this hinders the due process required for effective procurement. You see that before all these procedures will be done with, we are left with just one to three months in the financial year to do the actual implementation. This is a huge problem in completing the project on time, which is one of the major reasons of "rollover" most times. Like the Ministry of Works, what they do is if they have a project for next year, they do the plan and design this year and then do the implementation next year.
4. Fund is one of the major challenges. Without fund, a contract is not supposed to be awarded unless the funds are made available. Most a times, its only 11% of such funds that is released.

NBRRI NEWSLETTER: Sir, you talked about time being a challenge in the procurement process. As an experience hand in this aspect, let's have you give your candid suggestion on the way forward.

ENGR. HASSAN: It is necessary to note that the 2007 procurement act gives the guideline for procurement activities in Nigeria. This was brought about in 2007 by the Yar'adua administration. Right from that time a lot of transformation has taken place as far as procurement activity is concern. I think the government has to review the procurement process. From the period of your advert placement and submission of bids is six weeks. If you have two stage processes, that is technical bids, you need evaluation first which will enable you to access and invite those that qualify technically before opening of the financial bid. You see that at the end of the six weeks for the technical bids, you need additional two to three weeks for the evaluation before opening of the financial bid. This is not all, after these, you do another evaluation of the financial bid which will take about two weeks again before inviting the tenders board and the award of contract takes place. The process is very long and time consuming. This is why I am suggesting that the procurement act needs review mostly the duration of time for the entire process.

The passage of budget is another process that the Executive and National Assembly need to look into. The delay of this passage do affects this procurement process immensely. As for NBRRI, I will advise we try as much as possible to dialogue with the owners so



that we do the designs and specifications on time so that as soon as budget is passed we go ahead with the adverts and documents are ready.

NBRRI NEWSLETTER: Sir, you talked of changing from one cadre to procurement cadre, what qualifies one for this change and as a student, what are the relevant fields needed to study to become a procurement officer?

ENGR. HASSAN: Well, I think some of the suitable professions are the Engineering professions and other relevant professions in purchase and supply and other technical lines. What we do now is we nominate from Engineering sector and other related professions to BPP. Also, it is relevant that such nominee is registered with COREN before taking the training mostly Civil Engineers.

NBRRI NEWSLETTER: Sir, how can you define the attitude of Nigerians in respect of the rules governing procurement of government projects.

ENGR. HASSAN: The attitude of Nigerians is always to cut corners and we have been having a lot of challenges ensuring that the rules are abide by. You find people trying to influence you to break the laws. My advice is that you as a person should always be guided by your conscience. We need to be guided by our conscience in whatever we do and it should be in accordance with the law of the land. As far as procurement is concerned, the 2007 act needs to be followed.

NBRRI NEWSLETTER: Sir, can you update us about ongoing projects, their level of completion and the challenges?

ENGR. HASSAN: As I said before, last year we had a good number of projects that we started and then one of the major challenges encountered was lack of funds and even the time. What we did is that all these projects were rolled over to this year's own. A project cannot be executed without money. Since the funds are being released on a quarterly basis, we inform

and advise the contractors that this is the amount available and this is how far the work can go based on the released funds that after the release of following quarter, the project can continue. You know it will be unfair to allow a contractor to spend all he has for a project and you later discover that there is no enough fund to pay. Last year, we had cases where some contractors went against our advice and do above our agreement on the project. Well, most of such cases have been taken care of.

NBRRI NEWSLETTER: Sir, in the 2017 fiscal year, NBRRI is set to embark on over 100 projects (including constituency projects), how do you intend to achieve this feat?

ENGR. HASSAN: Most of these projects come from the National Assembly. I think overall, they were pleased with our performance and this year, they gave us more than double of last year's. as earlier explained, one of the challenges we had last year was supervision of these projects which our zonal offices played good roles. But to me, it was not that effective because of low number of experienced staffs available. For someone to effectively supervise a project of such magnitude, he must be well experienced. We need other alternatives like getting extra hands of professionals for effective output. In a nutshell, we have a lot of projects this year but we are equal to the task and we will do our best to ensure that professionalism and good output carries the day.

NBRRI NEWSLETTER: Talking of professionals, since we have various professional bodies paying courtesy calls and indicating interest for partnership, is there any likely chance that we call in some of these bodies like NSE to render their quality service?

ENGR. HASSAN: It's one of the alternatives and we are working towards exploring it. We will do our best to ensure quality job. I want you to note that there are rules and regulations in engaging such professionals and we have to follow the rules and then if they are interested, we will definitely consider them.

NBRRI NEWSLETTER: Sir, what are the requirements for a company to successfully bid for a NBRRI project?

ENGR. HASSAN: We have about five (5) of them including the tax clearance. Others are experience, key staff, turn over, the reference form. This is to verify if you are operating a reliable account to avoid fraud. Though, there are other non-mandatory requirements which summed up can give the bidder a mark of 60 to 70 % and the mandatory ones. Then we go to the financial bid which deals on your price. In all, you have to be responsive technically, be the lowest in price and be evaluated. These are the requirements that you need to be recommended for the job.

NBRRI NEWSLETTER: Sir, how will you assess the management style of the current DG/CEO?

ENGR. HASSAN: Management is a collective role, but honestly I am proud to be part of the management especially in the last five to six years because I was in NBRRI since 2007 and with the coming of the present DG/CEO, we have witnessed a lot of transformation in the institute. My prayer is that the tempo will be sustained because if sustained for the next 4-5 years, the sky is the limit. When I say transformation, as far as infrastructure is concerned, I think we have made a lot of impact. If you have ever been to NLC OTA before now and you go now, you will see a different scenario all over; from the buildings to the road network, the facilities and so on. Presently, the management is working on making the new office complex a model in the sense that when you see the building from the interlocking blocks to the tiles, you see quality and a message is sent to you that you are entering a complex owned by the Nigerian Building and Road research Institute.

NBRRI NEWSLETTER: On a lighter note sir, how do you unwind after a hard day at the office?

ENGR. HASSAN: My habit is that I close late; in some instances I close 7 or 8 or 9 pm. Also, I actually find time to exercise myself with stuffs like weight lifting and jogging. The other thing I enjoy most is going to the Mosque and reading the scriptures and I also like traveling. THANK YOU

NBRRI Outstanding At The 12Th Abuja International Trade Fair

THE NIGERIAN Building and Road Research Institute, NBRRI has continued its excellent performance at Fairs and Exhibitions with another strong showing at the Abuja International Trade Fair.

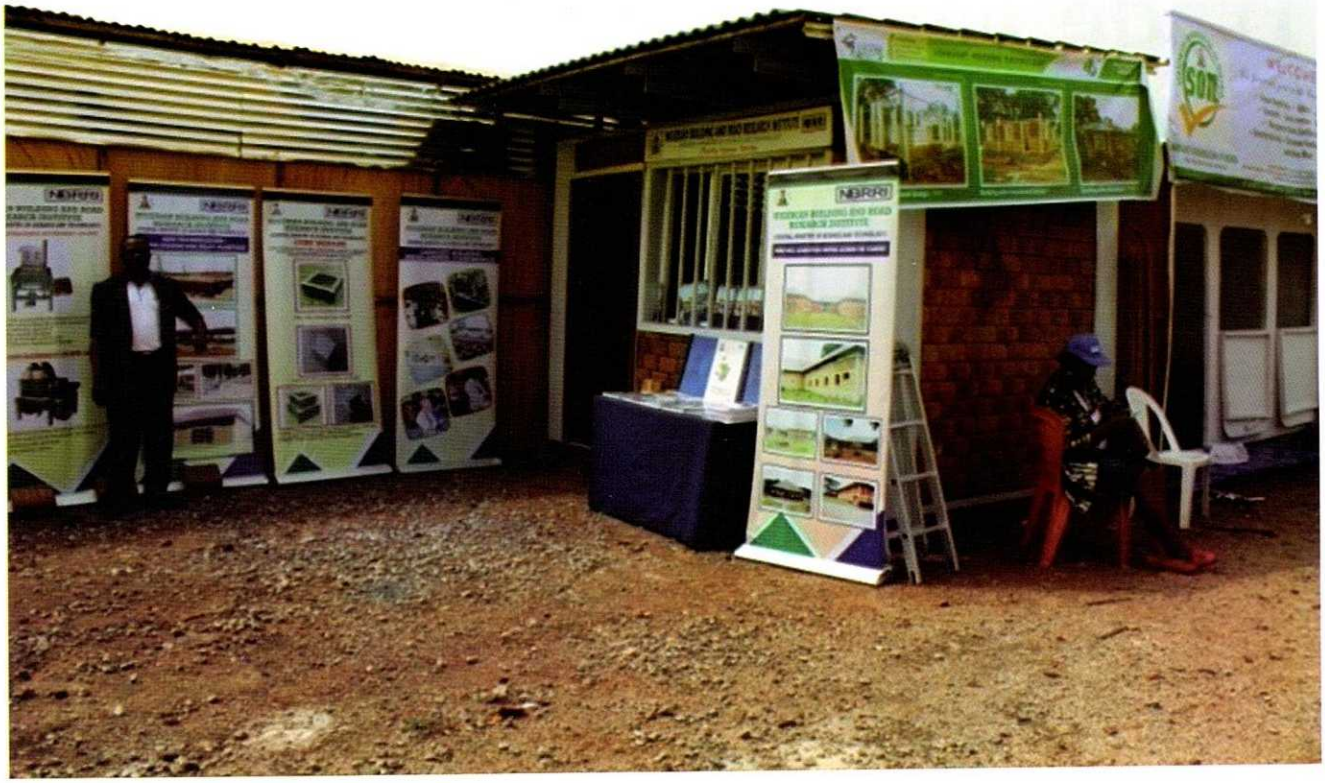
The event, which is the 12th to be organized by the Abuja Chamber of Commerce and Industry (ACCI) took place from 21st September to 7th October, 201 overnment Agency. While presenting the award, the President of ACCI, Prince Adetokunbo Kayode appreciated the active participation of NBRRI in promoting and uplifting the country's economy through its various innovations and research work.

The ACCI President said that the Trade Fair had a specified purpose of promoting accelerated development of commerce and Industry as well as showcasing Local Contents (Made in Nigeria goods). This he said was well achieved by what various participants displayed. He further encouraged the government to make good use of these opportunities in the drive of Economic Diversification and boosting the nation's economy.

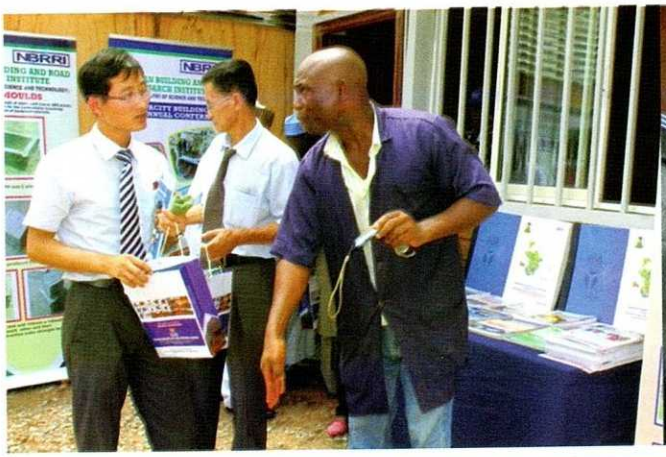
Also speaking after visiting the NBRRI stand at the trade fair, a former Minister of State for health Dr. Aliyu Idi Hong noted that NBRRI is a force to be reckoned with among Government agencies mostly in the areas of research and development. Dr. Hong who also held office as Minister of state for Foreign Affairs, said he was impressed by the technological innovations of the Institute adding that NBRRI can be used by Government to solve the huge housing deficit in the Country.

Highpoint of the Fair was the presentation of Awards to the winning participants. NBRRI award was received by the DG/CEO, Professor D.S Matawal represented by the Head of the Consultancy and Extension Sevices Department, Mr. Daniel Makava

PICTURE GALLERY OF NBRRI AT THE 12TH ABUJA INTERNATIONAL TRADE FAIR

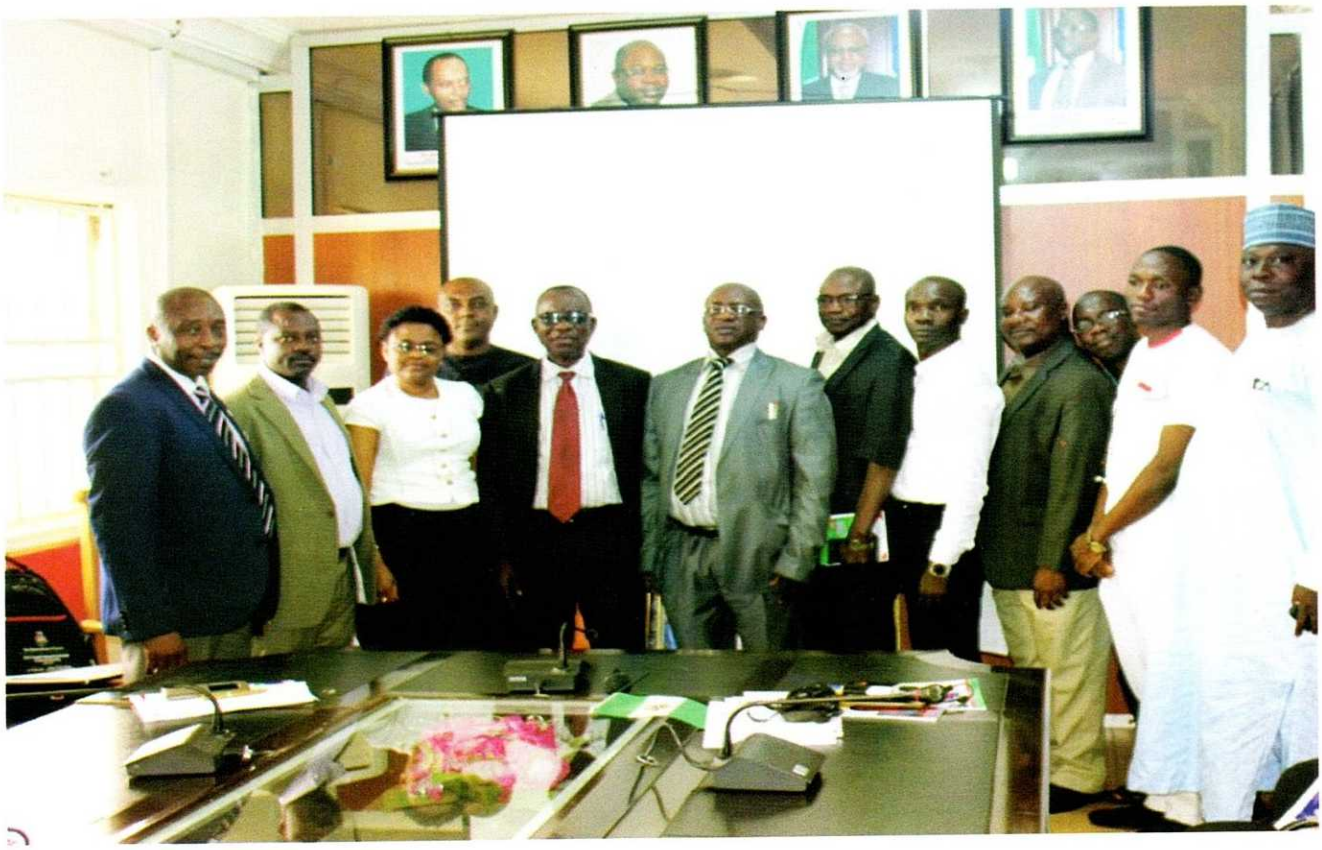



NBRRI
NIGERIAN BUILDING AN
RESEARCH INSTITU
(FEDERAL MINISTRY OF SCIENCE AND T
INTERLOCKING BLOCKMAKING MACHINE


NBRRI


NIGERIAN COMMUNICATION COMMISSION

Metallurgical, Mining And Materials Engineers Visit NBRRI



The delegation poses for a photo with the DG and some Staff of the Institute

GIVEN THE Research and Development responsibilities the Nigerian Building and Road Research Institute carry out in the Built, Road and Engineering sectors it often entails that the Institute remains constantly in touch with all relevant professional and regulatory bodies.

Some of these bodies include amongst others, the Nigerian Society of Engineers, Nigerian Institute of Building (NIOB), Nigerian Institute of Architects (NIA), Nigerian Institute of Town Planners (NITP), Council for the Regulation of Engineers in Nigeria (COREN), Architects Registration Council of Nigeria (ARCON) etc

It is in light of this that, the Institute recently granted audience to the Institute of Metallurgical, Mining and Materials Engineers, at its administrative headquarters in Abuja. The delegation was received by the DG/CEO of NBRRI, Professor D.S Matawal along with some top management Staff of the institute.

Speaking at a brief but elaborative session, the President of the Nigerian Institute of Metallurgical, Mining and Materials Engineers, Engr. Professor Daniel Nnamdi Obikwelu said, NBRRI has no doubt significantly impacted on the Engineering sector of Nigeria.

Engr. Obikwelu who updated the DG/CEO of NBRRI, on some of the Association's activities, further appreciated the efforts made by the Institute in the areas of innovation. He assured that, his association, which formerly operated as a Division, has been upgraded to an Institute as such; it is ready to partner with the Institute in any area that will benefit the Country.

Responding, Prof. Matawal thanked the delegation for the visit and assured them that the long standing relationship between the Institute and NBRRI will continue to grow.

The DG stressed the significance of these bodies to the Institute's vision and mandate in various fields of, building, road and engineering and added that the Nigerian Institution of Metallurgical, Mining and Materials Engineers can work with NBRRI in its R&D (Ceramic tiles) and the fabrication of her machines.

According to him, Nigeria should strive towards perfecting its machines in industrialization and production while also ensuring that the assembly takes place in the country. As lack of these aspect is partially responsible for the nation's backwardness.

...Institute Of Polymer Engineers Also

Engr. Mrs. Ishidi presenting the Award to Prof. D.S Matawal during the courtesy call

IN A similar visit, the Institute of Polymer Engineers led by its President, Engr. Mrs. Edith Ishidi reiterated their desire to providing quality service in order to enhance professional competence and development of its members at all times.

Engr. Ishidi, who led her Exco to NBRRI, noted that the major activity of the Institute is to ensure that polymer related firms and establishments abide by the tenants of engineering practice in Nigeria.

The Institute according to Ishidi, is worried with the huge pollution around the environment which are majorly caused by used polymer based domestic items and has come up with world class management options. These options will include industrial conversion of this so-called waste to other useful items particularly for the building and road infrastructural sector. The reclaimed plastic waste would be used to formulate composites for the building sector and other applications.

She further noted that Nigeria is yarning for a fruit dropping research which NBRRI has already keyed into by providing alternative building materials for the building and road infrastructure. Pledging her Institute's unalloyed support and collaboration especially in the area of knowledge exchange.

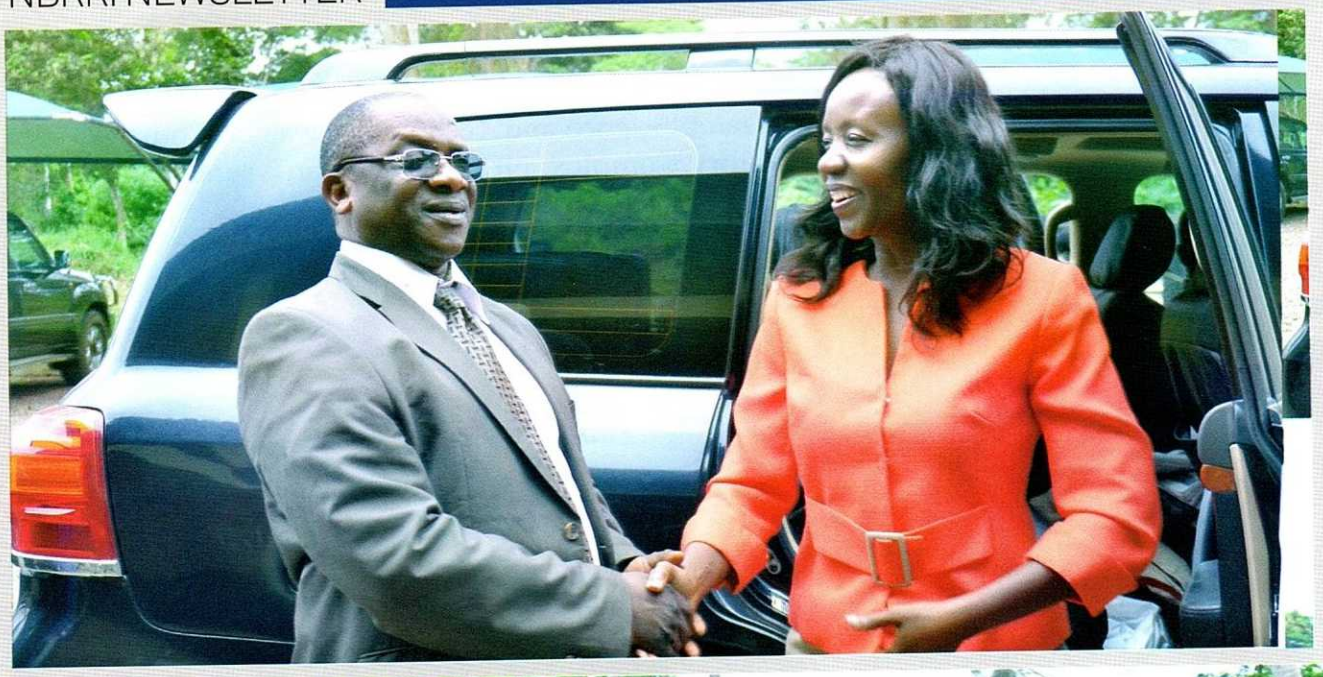
Ishidi stated that the significance of polymer engineering cannot be overemphasized as it is undoubtedly the fastest growing field of engineering, with vast application in many other engineering sectors such as Mechanical, Civil, Chemical, Electrical etc. It has also in the most recent time become a point of attraction in the field of engineering materials globally.

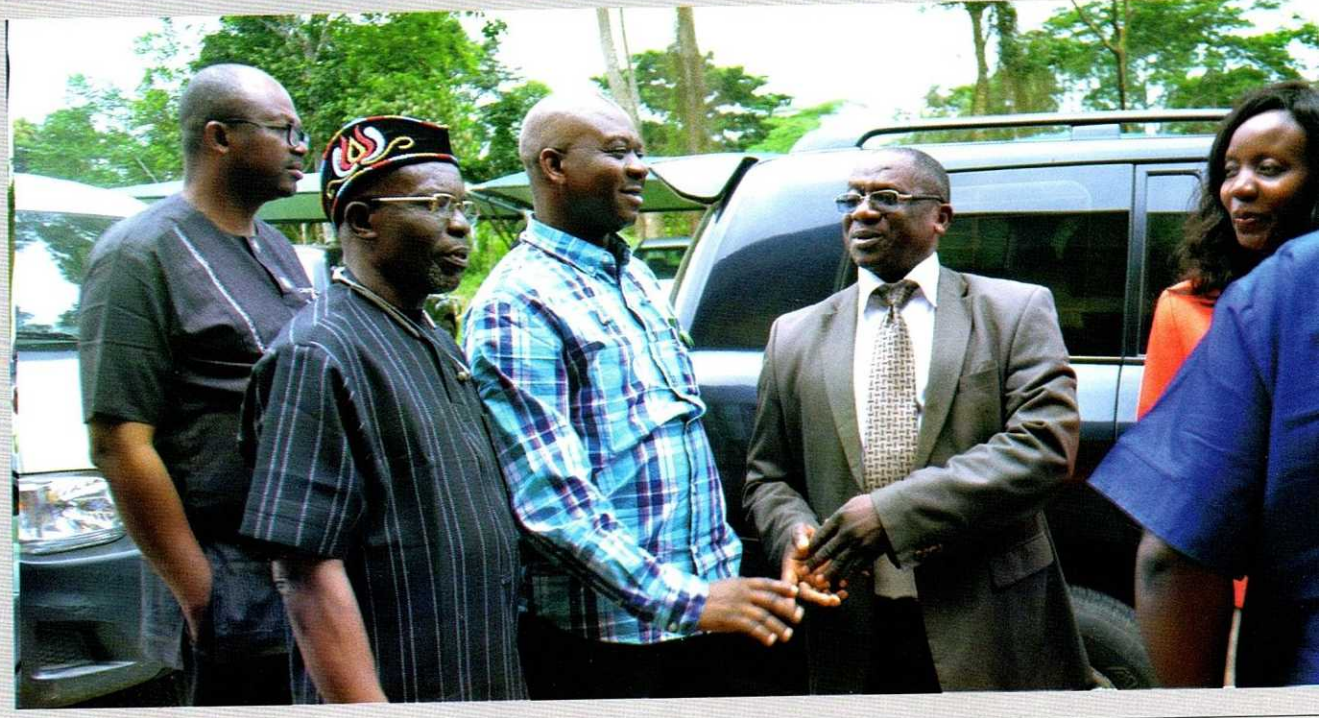
The DG/CEO of NBRRI, Prof. D. S. Matawal assured the Nigerian Institution of Polymer Engineers that as an Institute, NBRRI is already utilizing polymer materials in various aspects. Polymer based solutions are being applied to soil as it shoots up the strength of the soil. Similarly, the NBRRI lab is at the verge of producing bricks with the use of polymer and asphalt to determine its strength and durability.

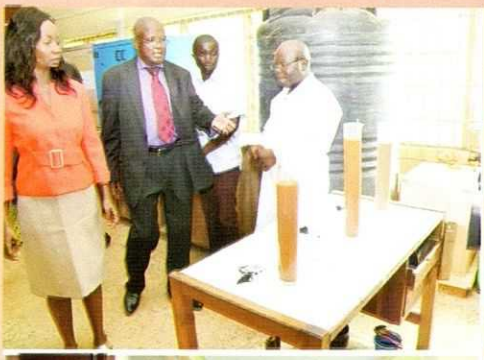
Highpoint of the visit is the presentation of an award of honour for the DG/CEO of NBRRI, Prof. D.S Matawal by the Institute of Polymer Engineers in recognition of his commitment to the Research and Development sector of the economy.

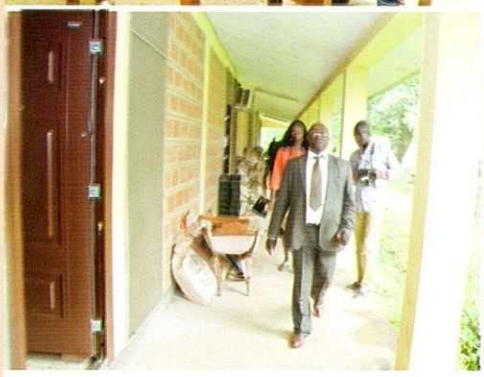
PHOTO GALLERY

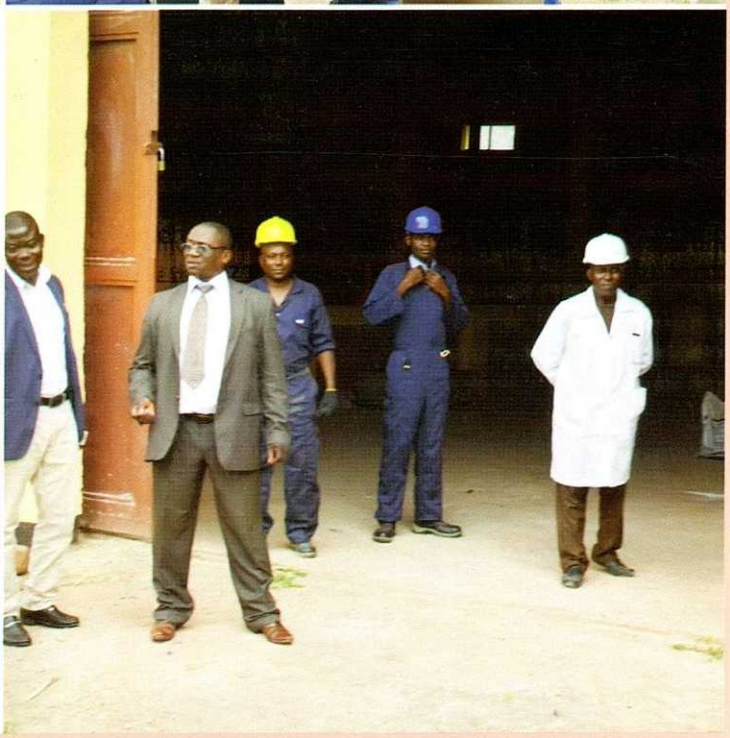
The House of Representatives Committee on Science and Technology was on Thursday 21st September, 2017 at the National Laboratory Complex, NLC, Ota, for an oversight function. NBRRI Newsletter brings you the visit in pictures:












BRRP/O 530/16

North East Development Commission Of Nigeria: **An Engineering Perspective**

By Professor Danladi S MATAWAL

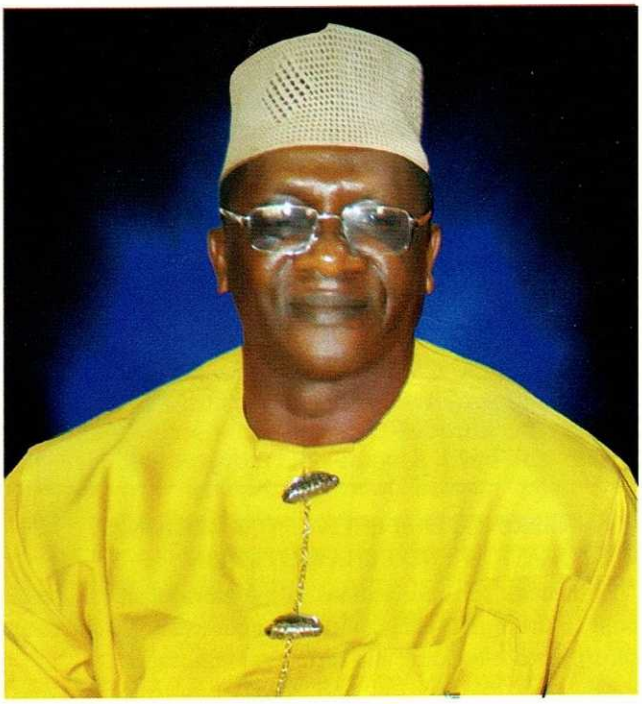
(Paper presented at the Annual General Meeting of the Nigerian Society of Engineers, Bauchi Branch, Bauchi – Nigeria, on Saturday 26th August, 2017 at 11am)

INTRODUCTION: BOKO HARAM CRISIS AND THE NORTH EAST GEOPOLITICAL ZONE OF NIGERIA

THE NORTH East (NE) Geopolitical Zone of Nigeria covering nearly one-third (280,419 km2) of Nigeria's land area (909,890 km2) comprises of the six(6) states of Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe. The concept note for the NE development commission uses NBS data that projects this zones population to be 13.5% (i.e. 23,558,674) of Nigeria's population of 173,905,439. The Zone shares international borders with three countries: Republic of Cameroon to the East, Republic of Chad to the North East and Niger Republic to the North. The zone is a major contributor to national net food production, but has a poor record of socioeconomic condition in the Country. Its average absolute poverty rate is 69%, which is above the national average of 61%). FGN taking cognizance of the poverty rate proposed the North East Development Commission to be domiciled in the Region. However, the other major driving reason for establishment of the NEDC is the security profile in the zone precipitated the serious security challenges due to activities of bokoharam, BH (the Jama'atu Ahlus-Sunnsh Lidda' Awati Wal Jihad) which started with the first attack on a police station in Maiduguri, July 26, 2009 to a situation that has degenerated into insurgency and terrorism. The group's activities often characterized by incessant attacks in virtually all the States in the zone and beyond, have resulted in many lives lost and property worth billions of Naira destroyed. The security situation further degenerated in 2013, leading to the declaration of a State of Emergency in Adamawa, Borno and Yobe States. It is generally now accepted that the many serious sectarian crises that bedevilled States like Plateau, Kaduna and Kano were also due to the activities of the same group of bokoharam.

INITIATIVES TOWARDS BROAD RESTORATION OF NORTH EAST

It is generally accepted that the poverty level in the north east geopolitical zone has been high but this situation has further been complicated by activities of the bokoharam. Restoration activities have primarily and logically been targeted at peace restoration evolved to include all tiers of government including private sector, International Development Partners as well as local communities. I have no mandate to speak on behalf of any government or group of persons but I am aware that the "Federal Government taking a lead role in regards to the peace initiatives consulted state governments in the Zone in order to define a shared vision, develop workable strategies and allocate responsibilities to all stakeholders to achieve the economic resurgence of the Zone". As a consequence, the Federal Government initiated a 5-year special intervention package to quicken the socio-economic development of the states in the zone by building functional partnership involving the Federal Government, state and local governments. At



inception, two billion naira was earmarked in the 2014 budget to alleviate the challenges of the worst hit states - Borno, Yobe and Adamawa. The Victims Support Fund is a Private Sector complement for the same purpose. Undoubtedly, governments and other stakeholders have made admirable efforts in their bid to address the security challenges in the North East Zone of the Country. However, these interventions have not achieved their stated objectives of restoring peace, stability and prosperity to the Zone. Hence, there arose the need to change strategies and approach in order to create lasting peace within the zone.

Thus to foster a sustainable solution to the problem of insecurity and address the root cause of insurgency in the North East, a well-structured, holistic and integrated approach was proposed based on a solution to drive and coordinate using an institution with relevant statutory mandate. Hence the establishment of a North-East Development Commission (NEDC) was proposed to be responsible for the coordination of all efforts towards peace and socioeconomic empowerment of the zone and interfacing between civil and military. It is important to buttress the point that strategies and solutions must address both issues of physical insecurity as well as socio-economic ones in order to restore citizens trust and commitments to the nation. Special attention to the empowerment of the youth and women in the affected communities, capacity building to build capability and encourage active community involvement are prime targets of the commission to promote the economic growth and well-being of citizens through regional development. Thus in

addition to security, infrastructure, education and agriculture are paramount spheres of engineering engagement to restore economic performance confidence in the region and stimulate growth and wealth creation.

The insurgency and insecurity situations in the north east and other states of Nigeria contiguous with this region has implied dwindling sources of revenue for State and Local Governments while scarce available resources are devoted principally to maintaining security, law and order at the expense of development needs. In order to help restore the dignity of the citizens living in the zone, help bolster socio-economic development that addresses the root cause of the insurgency, and probably set example for others to follow, there is the need to establish a strong engineering base to drive development effectively and efficiently too and thus the emphasis for this paper.

Some Socio-economic Indicators

INDICATOR	PERFORMANCE	
	North East	Nigeria
Absolute Poverty in 2010	69 %	61%
Income Inequality Coefficient in 2010	0.447	0.447
Out of School Children (Primary School) in 2011	45%	26%
Out of School Children (JSS) in 2011	50%	26%
% of Candidates with 5 credits and above including Mathematics and English (2012 WAEC)	9%	31%

Source: NEDC Concept Note of Senate of the Federal Republic, May 2015. It is well known that these statistical figures took a dive for the worse at the peak of bokoharam insurgency in 2014 and 2015 when whole schools had to be shut down because of insecurity and hundreds of Children physically abducted and kept for two years and beyond, some not recovered to date.

ENGINEERING PERSPECTIVES FOR REGIONAL RESTORATION AND REHABILITATION

Framework for interventions in the North East have been built on the four(4) pillars of political/governance, diplomatic, security/peace-building and socio-economic tracks.

However, the physical and social infrastructure, which will provide the basis for a sustainable and confident future economy and lead to lasting peace are merely mentioned but not elaborately spelt out, and these constitute the contributions of engineering. The cumulative effect of the conflict worsened the general socio economic and governance situation in the this zone as it had a similar effect in other adjoining states affected by incursions from the insurgents, notably Kano, Plateau and Kaduna states. Major economic and social engineering infrastructure for transportation, communication systems, health care, education, banking structures, water supply, agriculture and industries have either been destroyed or seriously damaged. As a result of the destruction, economic activities have been disrupted, social interaction restricted and social exclusion increased thus reducing opportunities for positive engagement. Economic growth has been hampered and wealth creation and generation initiatives and schemes as well as science, technology, engineering and innovation institutions have been hampered and the knowledge industry severely incapacitated due to the prolonged conflict leading to detrimental impact on economic opportunities and the job market. Youth unemployment has spiralled out of control, thus increasing the number of youths readily available for recruitment for destructive purposes by the insurgents and numerous Internally Displaced Persons, IDPs, have become very numerous leading to large IDP camps to cater for both the originally displaced as well as thousands recovered from ravaged insurgency settlements routed by the national security agencies in which these persons were serving as sex or labour slaves after being abducted from their homes, markets, schools (including the infamous Chibok girls' case) and wherever possible. All these require some form of engineering solutions that can lead to rapid provision of both temporary and permanent housing, water supply, transportation (roads and animal/mechanically driven modes), educational, agricultural, communications and other relevant infrastructure. Additionally, engineering innovative solutions for job creation and capacity building need to be designed as interventions targeted at creating programs and strategies that reintegrate these vulnerable groups into the society. It is important to know that the North East does not lack capacity but when the intervention measures are designed, cognizance should be taken of neighbouring states because their own problems and challenges can also slow down meaningful progress and development in the region.

The objectives of the engineering schemes that are to be brought into innovation should facilitate relevant capacity and capability building for youth and women; (re)equip youth with basic skills in artisanship and craftsmanship as well as security and intelligence processes as a step toward neutralization of insurgency cells; strengthen community institutions/self-help structures and promote their synergy with public ones; design and execute programs of safe return and re-integration of refugees/IDPs to their original homes including a general improvement of their housing and sanitation conditions; general stabilization of the socio-economic situation in communities affected by insurgency; encourage initiatives that will promote a long-term economic recovery process like re-engaging in well-established but abandoned agricultural activities.

However, there are some clear interventions streamlined

based on post-MDGs (or sustainable development, SDG) goals. Some clear examples of challenges to engineers include the establishment of IDP and refugee camps, which should have peaked up already; the development and implementation of relocation plans; design and stabilization of agricultural production schemes including irrigation to meet immediate and future food demands; relevant education development especially Skills Acquisition; construction of affordable houses (mass and social housing units); increase in power coverage with emphases on hydro and renewable energies; and the (re)construction of major roads and bridges. There must also be development planning through the formulation and institutionalization of the implementation of economic development plan with focus on agriculture, education and infrastructure and the resurgence of the fishing activities in Lake Chad and in major rivers like the Benue and Gongola.

PINE LONG-TERM ECONOMIC RECONSTRUCTION AND REDEVELOPMENT PLAN

PINE is an acronym for Presidential Initiative for the North East, which is a document that contains the Initiatives, Strategies and Implementation Framework for the long term economic reconstruction and re-development of the region from 2015 to 2020 and is elaborate and comprehensive in its engineering planning. It is an intervention plan designed to mobilize targeted resources to jumpstart the economies of the North-Eastern States while strategically repositioning the region for long-term prosperity. Not unexpectedly, it addresses issues of insecurity in the north east and has such foresight that capture Emergency Assistance and Economic Stabilization (EA-ES), which is short term. The PINE strategy for creating a nexus between the short term and the long term plans for the region is to leverage on the stabilization effect created by this immediate, comprehensive response as the foundation to all its plans for sustainable economic re-vitalization.

The (EA-ES) includes Accelerated Relief Materials; Comprehensive Relief Materials; Social Assistance + Rapid Medical Support Productive Works; and the Fast Tracking of Federal Projects. Since PINE is a 2015 document, the north east should have been in a position to assess whether these short term EA-ES measures have been successful and the engineering component of providing infrastructure for assistance should have been in place in 2015 and latest by 2016 and the federal projects that required fast tracking already completed. I must confess my absence from the region on continuous elongated times at these periods but the engineering audience here should have judged for itself. In 2015, work had already established that over 4million people had food insecurity while Health facilities were not functional. There were IDPs host communities that were severely stressed and New IDP sites were still emerging rapidly in Borno & Adamawa States with several IDPs residing in schools at night, many of which had been destroyed with severely reduced Humanitarian and FGN access. If we view the progress from these defined challenges, then it will be easier to accept that there has been progress since as at the time of this presentation in August 2017, we can confidently assert that many refugees have indeed returned home and even Sambissa forest, which was the fortress of the insurgents cover, had partially been liberated except for the recent flash resurgence that has been swiftly confronted.

There is an Economic Reconstruction and Redevelopment (ERR) phase of PINE that defines goals for Continued Productive Works; Infrastructure Development; Agricultural Revitalisation; Health System Reform; Educational Transformation; Good Governance; Safety & Security Enhancement; Entrepreneurship & Job Creation; Regional Planning and Strategic Growth Management; and International Trade & Market Development. It is here that Long Term Programmatic Goals aim to build on the accomplishments from the Short-Term Emergency Assistance and Economic Stabilization (EA-ES) program. The Leverage clearly identified strategic assets of the region in fashioning an economic turnaround, with a special focus on opportunities that are unique to the region and mutually beneficial to Nigeria. Thus there is defined the goal to create a critical mass of enterprises and industries that will drive employment, generate income and create wealth that is sustainable. It also aims to build a regional economy that is globally competitive and relevant that will require a revamp of the key pillars of regional prosperity namely agriculture, infrastructure, education, entrepreneurship/innovation, safety and security, good governance and health. There is therefore a plan that seeks to aid leap frogging of the region while avoiding competing with other regions that have already progressed way ahead of it, which I must say is outside any of the northern regions of North Central and North West.

The attainment of long-term prosperity is based on nine identified pillars of prosperity namely infrastructural development, agricultural rehabilitation, educational transformation, health sector reforms, good governance, safety and security enhancement, promotion of entrepreneurship and job creation for youth and women empowerment, international trade and market development, regional strategic growth and planning. The selection of the most impactful programs has been based on a criteria involving needs assessment in each sectorial pillar, the interest of the various state governments and desired projects by Federal agencies, etc. and the outcome is to last until 2020.

HIGHLIGHTS OF THE INFRASTRUCTURE DEVELOPMENT PLAN

A strong infrastructure base is needed to reposition the region and empower its agriculture and other industries. Growth potentials are extremely handicapped by infrastructural deficits, In addition to the fact that much of what infrastructure was existent in the region was destroyed by the Boko Haram crisis. Deficits identified by the regional planning effort focused on the areas of power, information/communications technology (ICT), transportation, housing, environment, water and sanitation. For these pillars of infrastructural development, an estimated immediate costing need of approximate US$700 million was required in 2015. Costing estimated by the National Integrated Infrastructural Master Plan for the region is as high as 304 Billion Dollars for an estimated time period of about 30 years, to clear out these deficits. The scheme identified 17 Infrastructure Initiatives, over 98 Infrastructure Projects and went as far as as carving over 38 Infrastructure Partners on a total budget of N1.8 Trillion with total Existing Funding for Infrastructure of N215.96billion leaving a Total Funding Gap for Infrastructure N1.58 Trillion.

Prime Targets (Infrastructure) were identified to include Mass renovation of homes destroyed by insurgents and accelerated

housing development and Strategic power projects in Mambila (hydro power); Dadin Kowa (hydro-electric); Kashimbilla Dam (Clean Energy Initiative); Yankari Independent Power Project; Adamawa State Solar and Wind Energy Project; Gombe State Balanga hydro-power project; and Yobe State Green Cowrie Solar Power Plant project. It was projected that up to 20% increase of the population would have access to energy; up to 50% increase in megawatts of electricity was to be realised from embedded power generation in the region; as well as enhancement of power distribution connectivity by the completion of rural electrification projects, transmission lines and substations.

Repair and construction of strategic Federal highways and State road networks (connecting the region to the South East, to neighbouring urban centres as well as neighbouring countries); encouragement of private sector participation and creating enabling environments for public private partnerships was envisaged. Repair and construction of feeder roads (to connect agricultural hubs with their key markets) and general improvement of the road networks including the reconstruction and repair of connecting bridges destroyed by Boko Haram. Channelization of the River Benue to improve water transportation of goods and people was also planned and the deployment of strategic air transport infrastructure for the movement of goods and services, regional deployment of new airport safety/security (surveillance and detection) equipment and regulations. Greater economic and cultural connectivity between the region and the rest of the world through information and communication technology was viewed as an achievable target while fast-tracking the completion of major railway lines within the region, the rehabilitation of rail links to inland container depots/ airports and the acquisition of additional locomotives and railway vehicles was projected. Strategic deployment of markets to increase economic productivity and commercial independence was seen as necessary complementation to the other infrastructure plans. There was to be the development and provision of appropriate legal and regulatory framework for ensuring wider consultation with the Federal Government, the State Governments, the organized private sector as well as international development partners and to thereby boost access to finance for infrastructural development through private capital investment.

WATER, SANITIZATION AND HYGIENE INITIATIVE; OTHERS

Water, next to air, IS one of the most important basic requirements for human existence. In spite of this, a large percentage of the Nigerian population do not have access to adequate water and sanitation, in quantity and quality with about 71 per cent of the rural population without access to safe water supply and adequate sanitation while only about 40% of the urban population have access to safe water and adequate sanitation. Access to clean water and sanitation can reduce substantially the incidence of water borne diseases and increase the average life expectancy of Nigerians. However, in the North East, less than one-third of the population use water from improved sources. Water supply and sanitation in the North East region, as in most other regions of Nigeria, is characterized by low levels of access, low and uncoordinated investment and poor cost recovery. The responsibility for water supply and sanitation is shared among the three tiers of Government, with the Federal Government being responsible for Water Resources Management, the State Governments for Urban Water Supply and Sanitation and the Local Governments for Rural Water Supply. The sector was and is still dominated by pockets of interventions spearheaded by several International Development Partners, including the World Bank, African Development Bank, European Union, United Nations Children's Fund (UNICEF) and other bilateral donors, such as China, Japan International Cooperation Agency (JICA), United States Agency for International Development (USAID) and Water Aid. Taking cognizance of these and FGN and State government projects, the PINE recommended a policy thrust in the water supply and sanitation sector by the expansion of water supply and sanitation facilities through increased reforms, the setting up of a regulatory framework and improved coordination for attracting more investments into the sector, and the provision of sufficient potable water and adequate sanitation in an affordable and sustainable

way, through participatory investment by the three tiers of Government, the private sector and the beneficiary areas. The targets in the Water and Sanitation Sector during the plan period include 20% increase in access to improved water and sanitation facilities; 30% reduction in the incidence of water-borne diseases; 40% increase in number of installed pre-paid Meters; and 50% increase in water rate collection. A number of projetcs were identified in Biu, Fika/Gadak, Potiskum, Damaturu, Nguru, Gashua, Gombe as priorities. They also included Urban and Rural schemes in Adamawa, Bauchi, Gombe, Taraba, and Yobe.

Within the overall framework of protecting the Nigeria environment, prominence was also given to the twin problem of drought and desertification. Combating desertification and deforestation; Adoption of clean energy and climate smart technology; Sustainable management of forest resources; Climate Change Management; Curbing illegal logging; and Promotion of agro-forestry, reforestation and community based conservation schemes were identified as priorities. States volunteered contributory coverage of the needs in this sector through the following projects:

- The Adamawa State establishment of 40 kilometers of shelterbelts and purchase of waste collection and disposal equipment at N500 Million
- The Bauchi State Erosion and Flood Control Construction around river banks at N400 Million
- The Borno State Production and planting of 1.5 million tree seedlings per annum at N1.5 Billion.
- The Gombe State Desertification Control N2.8 Billion Naira.

Others included Taraba State Sustainable Environmental Development N2 Billion; Yobe State Procurement of Kerosene Stoves and Solar powered cookers at N1.4 Billion and planting of fruit trees N1.5 Million. A 'Great Green Wall Initiative (An international program that cuts across the Sahel, other States such as Kano, Jigawa, Kebbi and three North East States: Borno, Gombe and Yobe) at US$2 Billion were suggested to the FGN as well as the Lake Chad Recharge Program (The restoration of the depleted water body of the lake with water contribution from Ubanji River in Congo to rejuvenate the depleted ecosystem and restore economic viability around the basin): an international project affecting the North East in which Nigeria, Cameroun, Niger and Chad are to spend US$14.5 billion on water transfer projects in the Lake Chad basin.

To avoid boring the audience, the comprehensiveness of the programmes encompassed Planning, Research, Statistics and Management Information System; Community and Rural Development; Environmental Protection and Control, Utilities Infrastructural Development; Solid Minerals and Agriculture; Education, Health and Social Services; Commercial and Industrial Development; and Projects Monitoring and Supervision. We can only imagine the level of development and sophistication North East and Nigeria in general would have attained if these level of planning was attained.

CONCLUSION AND OBSERVATIONS

In appreciating the Nigerian Society of Engineers, Bauchi, for making me it's Guest Speaker, let me say that the opportunity has accorded me the rare privilege of perusing through the document of the North East Development Commission. It is a marvellously crafted document put together by a bunch of eloquent zealous very ambitious experts. I suspect that if the projections are attained, not even the United States of America can compete with the North East economically because it will generate industries and establish economic prosperity and a healthy well educated set of citizens. In a sense, if the north east were to develop on this template alone, there will be problem for the region because some of us will like to migrate from our own regions to the north east. Imagine that there are massive earthdams everywhere propelling irrigation, dry season farming as well as routine wet season farming and harnessing the great potentials of the region in the production of cotton, groundnuts, maize, rice, water melon, mangoes, etc, and a follow up process for industrialisation, there will be no longer any reasons for insurgency in Nigeria. That is not all, the bluff by any region in Nigeria for secession will not arise because they would wish to benefit from the economic status of other regions.

Consequently, I urge all engineers to dust their intellects and look inwards because in whatever sphere of economic activity we explore, the tools for implementation are from us engineers. Engineering, Science and Technology are inevitable to grow the economy and provide stability in all regions and Nigeria, in general. Whether it is Education, Health, Agriculture, Tourism and all economic spheres, basic engineering infrastructure and services are necessary in the form of machines, ICT, Power and electricity, roads, railways, airports, waterways, dams, water supply, housing and other forms of buildings, etc. Imagine that Nigeria adopts and implements the type of comprehensive Railway network recommended for Nigeria in the NEDC document, who will ever care to risk travel by air or waste time on the roads? Therefore, the failure of this document is actually the failure of engineering.

Finally, I apologise for not putting up my paper on power point mainly because it took me a late decision to be sure I will be at this lecture. When I saw that a card had been printed with my name as Guest Speaker and my brief resume was being requested, I no longer was certain how a disappointment will be taken, so I prepared this document in place of my sleeping time. At the end, the point has been highlighted coupled with the series of bereavements in two weeks that I had to contend with, I think that the effort could not have gone beyond this.

I like to tell you a little thing that I have learned while in Abuja and often times exposed to the international arena. This thing is that globally, it is no longer sufficient to perform routines in engineering only but in all our contributions, emphasis must be made on INNOVATION, in addition to CONVENTIONS. Therefore, it is no longer enough for any government to come and tell the people that we shall build roads, provide electricity, etc. We must also be able to add the innovations to plan our cities, towns and villages and let everyone live in minimally comfortable homes with both solid and liquid neat waste effluent disposal systems with clean energy, water supply and sustainable sources of income through specialized industries and food supplies. It is no longer enough to provide fertilizer but we must also encourage cottage industries and wealth generation avenues that sell finished products, rather than basic commodities. I also invite you to partner with my agency, the Nigerian Building and Roads Research Institute, NBRRI, in the areas of affordable housing, commercialization of R&D, acquisition of Trade Skills and popularization of many Innovations of the agency.

Impact Of Climate Change On The Development Of Infrastructure

By Itolima Ologhadien
Department of Civil Engineering, Rivers State University, Nkpolu Port Harcourt,
email: itolima2000@yahoo.com

ABSTRACT

Engineering infrastructure has been designed based on time invariant probability distribution, and can no longer perform accurately under climate change conditions. Climate change will intensify the frequency of natural hazards, corrosion of reinforcement in bridges, buildings, wharves and other concrete infrastructure, coastal flooding, urban storm systems, degradation of ecosystems, etc. The performance of existing infrastructure will be threatened when subjected to extreme climate –related hazards and will perform below their design levels. Furthermore, it will accelerate the deterioration process in concrete structure, cause corrosion-induced cracking and spalling, which will result in more costly and disruptive repairs, as well as strength loss of concrete structures. Also coastal flooding induced by extreme water level events in low-lying, high populated coastlines due to sea level rise. The challenges before engineers is how can we plan, design and deliver climate change resilient infrastructure. The results of the two quantitative studies in this paper indicate that the rainfall intensity magnitude will be different in the future and the potential change of IDF magnitudes is in the range of 28%. An economic analyses should be performed to justify the necessary investment that this change will require. While the second study indicates that 42.6% the Niger Delta is highly vulnerable to sea level rise (SLR), particularly Rivers State Coastal area will experience a sea level rise of 3.5m by 2100. There is urgent need to adopt climate adaptation engineering to existing and new infrastructure. Also, research cooperation with climate scientists to quantify impact change on load bearing structures.

INTRODUCTION

Climate change is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (IPCC, 1996).

Climate change has become the most important environmental threat that mankind currently faces due to upsurge in the number of extreme events. Some of the documental impacts of climate change include; The European heat wave of the 2003, which likely was the hottest summer at least since the year 1500, caused at least 35,000 deaths – more than all traffic accidents in Europe during the entire year. Decrease in electricity production potential at existing hydropower stations by more than 25% by the 2070s(Archer and Rahmstorf, 2012). Increase of pathogen load due to more heavy precipitation events in areas without good water supply and sanitation infrastructure. The impacts on the coastal zone increase the risk of flooding, loss of coastal ecosystem such as salt marshes, mangroves and the degradation of fisheries and freshwater resources (due to salt intrusion). It was estimated that over 120 million people are exposed each year to hazards from tropical cyclone, and these storms caused 250,000 deaths between 1980 and 2000 (IPCC 2007). These storms are becoming more hazardous as the sea level rises, and the intensity of the storms is increasing. The "Hot Spots" of greatest risk are the deltaic areas. The impact of climate change on Infrastructure performance is a temporal and spatial process, the most existing models of infrastructure design are based on stationary climate. The assumption of stationarity is clearly questionable under climate change conditions. Thus, there is urgent need to revise the current design standards and provisions and incorporate the predicted effects of climate change. This paper is divided into sections; section 2 contains understanding the characteristics of the climate with commendation to the 18th and 19th century science. The anatomy of climate change is discussed in section 3. Section 4 presents a brief description of current approach in modelling climate variables, while sub – section 4.3 highlights climate change hazards to infrastructure. The vulnerability of the Niger Delta region to climate change with of two quantitative examples are presented in section 5. Finally the main conclusion and recommendations are presented in section 6.

UNDERSTANDING CLIMATE

Global warming (Climate Change) occurs when short-wavelength radiation from the sun enters our atmosphere and heats the Earth, but the re-radiation long-wavelength heat is partially prevented from

escaping back into space by "greenhouse" gases.

The so-called "greenhouse" gases act the same way that a garden greenhouse maintains a higher temperature inside than outside. The "greenhouses gases" such as Carbon dioxide, Nitrous oxide, Chlorofluorocarbons (CFCs) and methane. Possible impact includes higher sea levels, altered patterns of rainfall and air temperatures, and increased frequency and intensity of severe storms.

Scientific understanding of the basic physics of the greenhouse effect, and the potential for global warming as a result of Carbon dioxide emission, has been building for over two centuries. We must commend the 18th and 19th Century scientists for laying a sound foundation in understanding the climate system. Some notable scientific contributors are presented in Table 2.1 for better understanding:

Table2.1: Some contributors to science of climate change.

S/NO	NAME	DATE	SCIENTIFIC CONTRIBUTIONS
1	Joseph Fourier	1827	Introduced the idea of greenhouse effect/ invented the greenhouse
2	Sir. William Herschel	1800	Discovered that energy can be transported by invisible infrared radiation
3	John Tyndal	1859	Identified carbon dioxide, methane and water vapour as greenhouse gases
4	Svante Arrhenius	1896	Proved that doubling carbon dioxide in the atmosphere would increase the temperature of the Earth by an average 4-6oC. Despite uncertainties due to crude data, he provided the answer to CO_2 emission correctly
5	Guy Steward Calendar	1938	Estimated the climate sensitivity due to equilibrium warming from doubting CO_2.
6	Stewart-Boltzmann Equation		Discovered that an ordinary object emits light all the time as long as its temperature is greater than absolute zero (-459°F or -273°C). This law makes it easier to calculate other aspects of the climate.
7	Clausius-Clapeyron Equation		Discovered that the amount of water vapour that fits into a given volume increases by 7% for each °C warming. This law shows that accumulated heat energy in the atmosphere causes greater evaporation, which results in more storms and increased storm intensity
	In Conclusion	Thanks to the science of the 18th and 19th century which laid the foundation for theories and models that are currently used to explain climate change.	

2. ANATOMY OF CHANGE

Stationarity is the scientific foundation for most engineering design (including civil engineering structures). In a broad sense, it means statistical parameters such as mean and variance are independent of time. It is necessary to distinguish between climate variability and climate change. Climate variability is random variation from a long-run distribution, whereas climate change is a trend or a shift in the long-run distribution.

Climate variability can be confused for climate change (trend) when records are short, which will disappear when more data are collected. So the detection of changes in longtime series is an important and difficult issue of increasing interest under climate change. Change can occur in numerous ways, for example long-term trend (progressive increase or decrease on the average), step – change (abrupt change) or long-tern cyclical variation.

The Change, therefore must be detected as a trend, step-change or cyclical behaviour, otherwise it is Never a Change. Thus, the occurrence of one or more tropical storms, like hurricane Katrina cannot tell us much about long-term trends or about the important question of whether those trends are influenced by global warming. Some of the widely used change detection tests are (i) Wilcoxon-Mann-Whitney test (ii) Pettit's test for step change, Spearman's rho, Mann-Kendall with Thiel-Sen's test. In conclusion there must be a substantial trend (upward or downward); step-change or cyclical variation for a change to occur. There must be a change, for climate change to occur.

4. CLIMATE MODELLING

The current approaches to modelling weather variables and extreme weather events under climate change are described under global circulation and weather generating models.

4.1 GLOBAL CIRCULATION MODELS (GCMs)

The global circulation models discretize the planet and its atmosphere into a large number of three dimensional cells, to which equations describing the conservation of mass, Momentum, heat, perfect gas laws, and conservation (and phase changes) of water, are supplied. Future climate is projected by defining carbon emission scenarios in relation to changes in population, economy, technology, energy, land use and agriculture. A total of four scenario families, i.e. – A1, A2, B1, and B2. Based on various overall scenarios

storylines are developed that each describes a possible path.

- The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1F1), non-fossil energy sources (A1T), or a balance use of all sources (A1B).
- The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities.
- The B1 storyline and scenario family places emphasis is on global solutions to economic, social, and environmental sustainability, including improved equity, but without additional climate initiatives.
- The B2 storyline and scenario family describes a world continuously increasing global population at a rate lower than A2, intermediate levels of economic development, and less rapid and more diverse technological change than in the B1 and A1 story lines.
- The application of GCMs involves two uncertainties; temporal scales and spatial scales. The uncertainties associated with GCMs are resolved through the use of weather generating models.

4.2 WEATHER GENERATING MODELS

Weather generating models offer one way of addressing deficiencies of global climate modeling for use at local scales. They are stochastic simulation tools that synthetically create climate information for an area by combining both, local and global weather data.

The weather generator takes as input historical climate information, as well as inputs from the global circulation models, and generates climate information for an arbitrary long period of time for the local weather station. The relationships between various models and methodologies used to interpret likely changes in hydrological models under a future climate is shown in Figure 1.

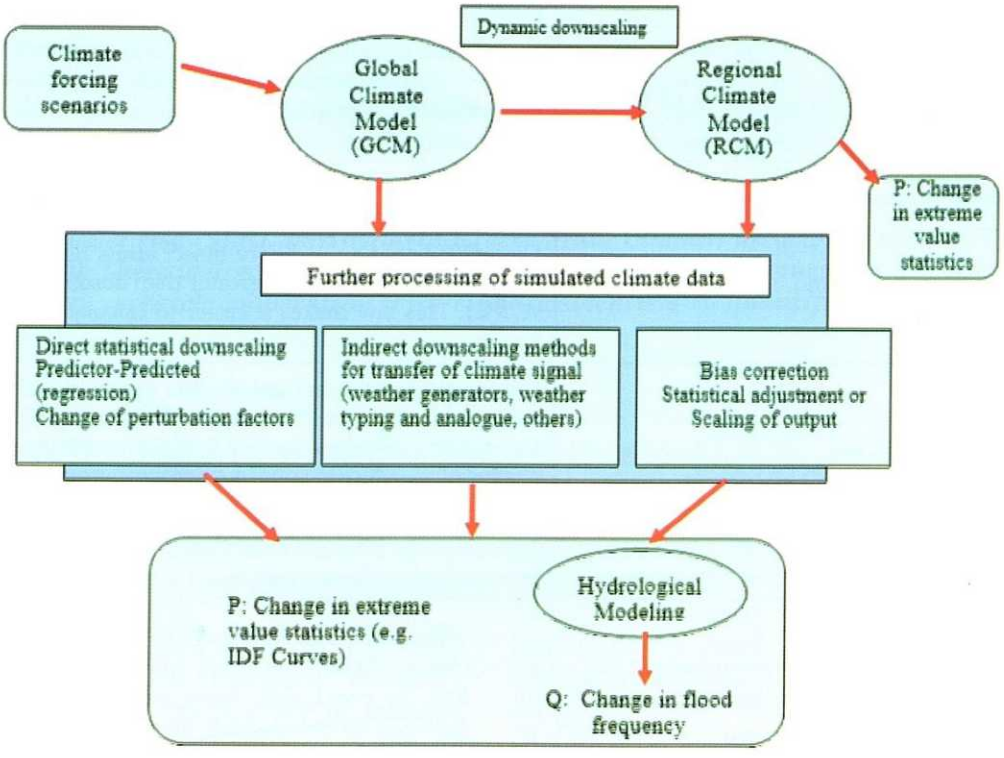


Figure 1. Model Relationships in Climate Change Predictions

4.3 CLIMATE CHANGE HAZARDS AND INFRASTRUCTURE

Climate change hazards on infrastructure may be evaluated in terms of future increase in temperatures, precipitation, and sea level rise . Infrastructure is a key component of human settlement that promotes economic activities through buildings, transport, energy, water and communication. Table 2 shows examples of infrastructure and assets that are likely to be affected by climate change.

Table 2. Overview of Climate Change Hazards on Development of Infrastructure

Infrastructure Sector and Component	Climate risk factor	Potential infrastructure impacts
Energy Production	Temperature	Increased user demand for and consumption of energy Potential for more frequent power outage

Infrastructure Sector and Component	Climate risk factor	Potential infrastructure impacts
Energy Production	Temperature	Overuse and strain on equipment and materials, increasing Maintenance Equipment damage
	Precipitation	Equipment damage from flooding
	Sea level rise	Equipment damage from flooding and corrosive effect of Seawater
Transmission and Temperature		Increase sag of overhead lines
Distribution overhead and Underground	Precipitation	Increase in outage frequency, extents (customers, lost), and Duration
	Sea level rise	Increase in number and duration of local outage from corroded equipment
Transportation Roadways	Temperature	- Increased road material degradation, resulting in increased road maintenance
	Precipitation	- Declining level of service from flooded roadways - Increase hours of delay from increased congestion during street flooding - Insufficient pumping capacity and associated increased energy use for additional pumping to remove excess water prevent flooding
	Sea level rise	- Declining level of service from flooded roadways - Increased hours of delay from increased congestion during street flooding episodes - Insufficient pumping capacity and associated increased energy use for additional pumping to remove excess water to prevent flooding.
Transit	Temperature	- Increased use of cooling equipment - Increased rail degradation and equipment deterioration, resulting in increased maintenance - For commuter rail, increase in transit accident from train collisions with overhead line sagging
	Precipitation	- Insufficient pumping capacity and associated increased use of energy use to remove excess water for prevention of flooding - Mean distance between failure (MDBF) decreases producing delays - Increase in number of stops due to emergencies - Increase in number of emergency evacuations
	Sea level rise	- Increased rail degradation and equipment deterioration from saltwater inundation. - Potential increase in infiltration into the distribution system
Waste (wastewater) Quality	Temperature	- Treatment capacity of wastewater treatment plants improved up to a point due to increase heat affecting biological processes but then decline of temperatures and extreme tolerance limits - Increase loading of equipment corrosion from salt water - If substantial evaporation or drought occurs, quantity of wastewater becomes insufficient to sustain treatment process.

Infrastructure Sector and Component	Climate risk factor	Potential infrastructure impacts
Quality	Precipitation	- Hydraulic capacity of sewers and wastewater treatment plants exceeded owing to increased flows - Treatment capacity of treatment plants exceeded from 8 dilution from increased flows - Decline in water reflected in Lean Water Act standard variances
	Sea level rise	- Reduced function of wastewater treatment plants if sea level overwhelms plant facilities - Sawer backups from excess and accumulated water
Waste (Solid Waste) Closed landfills	Temperature	- Alteration of chemical composition of contaminant below the surface, changing evaporation rates
	Precipitation	- Unexpected leaching of contaminants where precipitation penetrates the surface of closed landfills
	Sea level rise	- Release of contaminants from unexpected inundation of landfills increasing public health concerns
Marine transfer stations	Temperature	- Increased evaporation of contaminants and decay of refuse, thereby increasing public health concerns from vermin
	Precipitation	- Increased damages to curbside refuse containment and releasing refuse, increasing public health concerns
	Sea level rise	- Inundation of refuse from water release contaminants to streets and waterways, increasing public health concerns
Contamination Supplies: electric power	Temperature	- Power disruption/outage frequency and severity affects communication equipment
	Precipitation	- Equipment flooded and stored materials damaged
	Sea level rise	- Increased flooding of equipment and corrosion from salt water
Equipment: fiber-optic cable; cell towers; internet	Temperature	- Destruction of equipment and increased maintenance
	Precipitation	- Excessive precipitation flooding equipment - Line congestion, tower destruction, or lost of function - Call carrying capacity reduced, lost, or blocked - Internet traffic increases and accessibility declines
	Sea level rise	- Increased flooding of equipment and corrosion from salt water from increased sea level rise

5. VULNERABILITY OF THE NIGER DELTA TO CLIMATE CHANGE

Despite the looming threat to humanity, there is a dearth of quantitative assessment/studies particularly in the Niger Delta dealing with impact of climate change. The results of two quantitative studies were presented. They are;

i. Development of Intensity-Duration-Frequency Equation under climate change, and
ii. Modelling the effects of sea level rise on flooding in the Lower Niger Delta.

The result of the first study indicates that the rainfall intensity magnitude will be different in the future and the potential change of IDF magnitudes is in the range of 28% (Nwaogazie and Ologhadien 2014). An economic analyses should be performed to justify the necessary investment that this change will require. While the second study indicates that 42.6% the Niger Delta is highly vulnerable to sea level rise (SLR), particularly Rivers State Coastal area will experience a sea level rise of 3.5m by 2100 (Musa and Popescu 2014).

This claims are not mere speculations to frighten the audience, they are simply telling us, we cannot escape the hazardous impacts of climate change. Therefore, there is urgent need to plan for Adaptation and Mitigation measures.

6. CONCLUSION AND RECOMMENDATIONS

Responding to climate change is in two main aspects; Adaptation and Mitigation.

Mitigation of climate change requires a political will and cooperation unprecedented in the history of mankind. The main culprits of CO_2 emission may not accept the blame.

Even the most ambitious reductions in greenhouse gas emissions, such as those discussed at the 2009 global treaty-making conference in Copenhagen, (including a substantial shift to 20% renewable energy, a 20% improvement in energy efficiency and a 30% cut in greenhouse gases by 2020) will not be enough to head off temperature increases that threaten to drown small island nations, chase vast numbers of people from their homes in the river deltas of Africa, Asia and Latin America and cause public health problems far more dire than the 2010 earthquake in Haiti.

I therefore recommend that the way forward is adaptation; that is a coastal defense (e.g. dyke) taking climate change and the associated sea level rise (SLR) explicitly into account during design.

There is need for cooperation between climate scientist and engineers. Standards and design provisions are the main instruments of engineering practice, therefore we the research responsibility to address these challenges for the survival of our region.

In terms of quantitative studies, most of the work of IPCC i s done by thousands of research scientists at universities and national laboratories around the world. We need local capacity building to develop our manpower in all areas influence by climate change. Mathematical modelling studies should be commissioned (PhD degree

Research) to quantify the impact of sea level rise on coastal flooding. One of such studies is being concluded for Rivers State Coast in the Netherlands.

We need Early planning with proper Foresight, which is cheaper, than a "wait - and – see" approach, which is Costly and Unsafe in terms of dykes and other long – term infrastructure in response to climate change.

7. REFERENCES

1) David Archer and Stefan Rahmstorf (2012):The Climate Crisis: An Introductory Guide to Climate Change, Cambridge University Press.
2) Musa. Z, N and Popescu.I. (2014): Modelling The Effects of Sea Level Rise on Flooding in the Lower Niger River, 11th Int. Conf. on Hydrodynamics,HIC2014, New York City, USA.
3) FloodFreq Cost Action ES0901, WG4: Flood Frequency Estimation Methods and Environmental Change. ISBN: 978 – 1-906698-36-2.
4) Nwaogazie I.L and Ologhadien .I. (2014): Trend in Climate Change and Vulnerability Assessment of Nigerian Gulf of Guinea: SRL Publication.
5) Rae Zimmerman and Craig Faris (2010): Infrastructure Impacts and Adaptation Challenges; New York City Panel on Climate Change 2010 Report.

SOCIAL DIARY

BIRTHDAYS

NAME	DEPT.	DATE OF BIRTH
Egege Chimeziri C.	BRD	1st July
Ibrahim Solomon	EMRD	1st July
Nten Thankgod Sylvanus	BRD	1st July
Ayegba Martin Ojogbane	RRD	5th July
Metu Francisca U.	EMRD	8th July
Umanah Ikouwem I.	SLT	10th July
Daudu Paul	RRD	13th July
Kpanaki Martins	CES	14th July
Amos David	BRD	14th July
Otoide E.D	EMRD	16th July
Mbaso Ebele	A/F	17th July
Makinde W.O	EMRD	17th July
Emole Charles U.	PPM	18th July
Ochei E.S	EMRD	20th July
Akin Oso Oladapo	RRD	21st July
Uham Danshak Bass	PIT	21st July
Adekunle Aminat	PITD	23th July
Ibrahim Samuel	A/F	27th July
Samuel Okpute P.	RRD	27th July
Abu Y.	PITD	4th August
Zacchaeus J.E.A	A/F	6th August
Ogboji F. A	A/F	8th August
Akinyeye O.J	EMRD	11th August
Ajayi Samuel A.	BRD	14th August
Akorah Jude	RRD	17th August
Adekunle Adebayo	BRD	19th August
Oki Gbenga	BRD	22nd August
Ananso Georgina .N	BRD	26th August
Aruna Francis	PPM	2nd September
F.O Aitsebaomo	RRD	2nd September
Quadri Habeeb Adedeji	RRD	4th September
Olaifa Kayode	A/F	4th September
Ikong Aboyi Pius	BRD	7th September
Udo Itoro Gabriel	RRD	9th September
Okougha Ayemere F.	SLT	13th September
Umeobika Ndilichukwu	SLT	14th September
Mohammed A.L	BRD	16th September
Salifu Blessed Ugbede	PITD	20th September
Adewale Adefolarin K.	BRD	20th September
Okewole Babatunde O.	CES	20th September
Izabi H. A	A/F	22nd September
Oko E. John	BRD	23rd September
Yisa Godwin Lazhi	RRD	24th September
Mrs Inyang Millicent	A/F	25th September
Sulaimon N.A	RRD	25th September
Nwannenna Olachi C.	EMRD	26th September
Yahaya Babatunde	EMRD	26th September
Nwadinobi Nneka E.	A/F	30th September

WEDDINGS

Egbo Gerry Nnamdi of Building Research Department married former Miss Alice Alex Jatau on 8th of July 2017 in Bauchi.

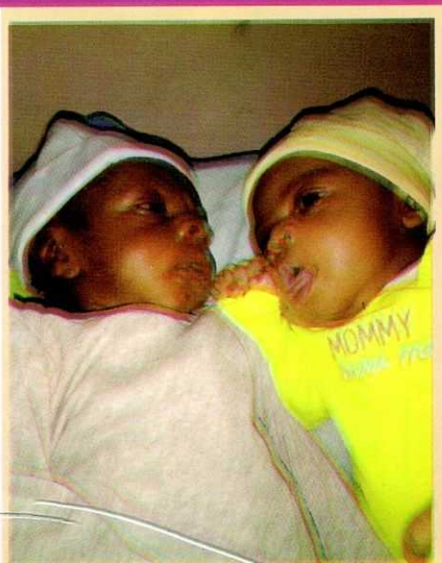
Grace Magaji of CES Dept. Abuja got married to Barr. Elihu Eskenah on 17th of June 2017 in Jalingo

Mr. Abdujalal Adamu Garkuwa of PITD, got married to former Miss Khalid Jibril on 14th July 2017 in Jos.

Director(PIT) Mr. T.M Adeyanju on 30th Sept gave his daughter Oluwakemi hand in marriage to Mr. Abbey in Lagos. Some NBRRI staff were around to celebrate with the Director

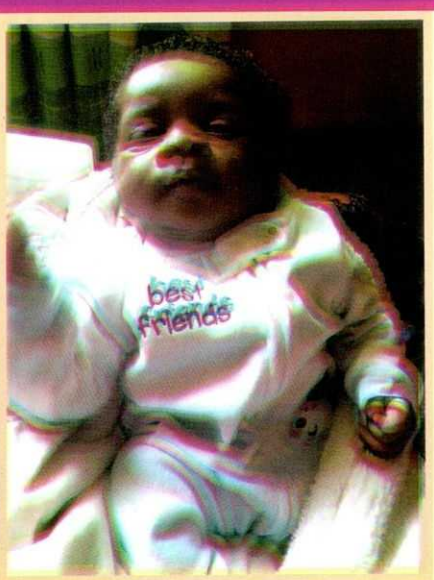
Mr. Kolade Emmanuel of Building Research Dept, married former Miss Blessingh Oluwafemi on 3rd June 2017 in Abuja

BIRTHS



Master Udisire and Miss Eskah born on 17 of August 2017 to the family of Mrs. Aisha S. Yakubu of DGs office Abuja

Oreoluwa Olivia born on 11 July 2017 to the family of Mrs. T. A. Arowolo of Building Research Dept. Abuja.



The family of Mr. Yahaya Babatunde of EMRD had a baby girl, Miss Ayomide Deborah on 24 of August 2017

NBRRI TECHNOLOGIES