AJUMOGOBIA SCIENCE FOUNDATION ANNUAL LECTURE

55th Annual Conference of the Science Teachers Association of Nigeria (STAN)

@

Federal College of Education (Technical), Asaba, Delta State

SUSTAINING THE HUMAN ENVIRONMENT ON THE FOUNDATION OF SCIENCE AND TECHNOLOGY

By

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August 20, 2014

SUSTAINING THE HUMAN ENVIRONMENT ON THE FOUNDATION OF SCIENCE AND TECHNOLOGY *by Akin. Akindoyeni*[1]

FIRST WORDS

It is now common knowledge that the mode of global human environment development is becoming a subject of concern for those who are looking towards the future of humanity on this planet. The credit (or discredit) of the resultant environment has been laid at the feet of Science and technology. At a time in human history when each group of people look to the survival of its own society, it seems pertinent that Nigerian Scientists and Technologists look critically at the long term survival challenges confronting Nigeria and those who dwell within the nation's boundary. Obviously, a paradigm change is indicated, so that some of our environmental sustainability challenges could be resolved. This is a discussion on a very few of the relevant parameters meant to stimulate the consideration of the Ajumogobia Science Foundation and the 55th STAN Conference. A brief discussion of each of them is made, sometimes ending with a question or two. At the end some indicative pointers are proffered towards probable strategies for solutions.

Key Words: Human; Environment; Sustainability; Science; Technology.

1. DEFINITIONS[2]

It is hardly necessary to define the key words of this discussion with intellectuals like this assembly. However, so that we do not have disagreements about the intended meanings of these key words, let us agree on the following:

Science:

Science (from Latin *scientia*, meaning "knowledge") is a systematic enterprise that builds and organizes knowledge in the form of testable

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[2] All Definitions are from Wikipedia, the Fee Encyclopedia. Some expansions of definitions are the author's

explanations and predictions about the universe. In an older and closely related meaning, "science" also refers to a body of knowledge itself, of the type that can be rationally explained and reliably applied. A practitioner of science is known as a scientist.

Technology

“Technology (from the Greek word *techne*, meaning "art, skill, cunning of hand") is the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, and methods of organization, in order to solve a problem, improve a pre-existing solution to a problem, achieve a goal, handle an applied input/output relation or perform a specific function. It can also refer to the collection of such tools, including machinery, modifications, arrangements and procedures.”

Technologies significantly affect human as well as other animal species' ability to control and adapt to their natural environments. The term can either be applied generally or to specific areas: examples include construction technology, medical technology, information technology, etc.

Human

When I was a few months younger and lived in another country, a Caucasian colleague of mine was extolling the virtues of the Darwinian Theory of Evolution. I rejoined by pointing out that his great grandfather might have been a monkey, but mine was not; this drew some laughter from our colleagues. It is true that there are disagreements about the evolution of humans but it is generally agreed that “Humans are the only extant *Homo Sapiens* with bipedal locomotion; manual dexterity, increased tool use; and a general trend toward larger, more complex brains and societies”.

Anthropological Environmentalists hold that the spread of humans on the earth’s surface and their large and increasing population has had a destructive impact on large areas of the environment and millions of native species worldwide. While these environmentalists might hold on to this argument, others maintain that the impact has been more progressive than destructive. This observation is predicated on the fact that the resultant impact has granted mankind increasing advantage over nature and the

environment. This argument might also be contestable. The latter protagonists argue that the anthropological advantages that explain this evolutionary success include a relatively larger brain with a particularly well-developed neocortex, prefrontal cortex and temporal lobes, which enable high levels of abstract reasoning, dynamic language development, problem solving capabilities, sociality, and cultural growth through absorbent social learning.

Humans use tools to a much higher degree than any other homo sapiens, are the only extant species known to build fires and cook their food, as well as the only extant species to clothe themselves, evolve scientific cultures and create and use numerous other technologies and arts. Incredible beings, aren't we?

Those of us who believe in God and have accepted biblical faith would insist that these attributes form the main evidence of being "made in the image of God", i.e., our creativity and discerning intellectualism.

Environment

The natural environment encompasses all living and non-living things occurring naturally on Earth or some region thereof. It is an environment that encompasses the interaction of all living species. The concept of the *natural environment* can be distinguished by components such as:

a) Complete ecological units that function as natural systems without massive human intervention, including all vegetation, microorganisms, soil, rocks, atmosphere and natural phenomena that occur within their boundaries.
b) Universal natural resources and physical phenomena that lack clear-cut boundaries, such as air, water, and climate, as well as energy, radiation, electric charge, and magnetism, not originating from human activity.

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

Foundation

For the purpose of this discussion, this word is defined as the lowest supporting element of any system or structure, such as in *building foundation.*

Sustain

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

2. CURRENT CHALLENGES OF THE PLANET EARTH

Whose earth is it anyway?

This gathering is convocation of scientists, applied scientists, science teachers, technologists and scholars in technology. A number of us may sincerely believe in the biblical doctrine of creation and therefore respond that this "earth belongs to God"[3]. Others may be skeptical of that position and posit that whoever grabs any portion of it is welcome to its title and rights. The basic truth, however, is that mankind has pronounced occupation of the planet earth. We believe that we can do whatever we wish, (*and the emphasis is on the word **WISH***), with it. We forget that the earth with all its component content is finite in quantity and quality. We obey the law of expediency which satisfies the whim of the moment without a thought for its consequences, except that which is our immediate goal. So we invent machines which use exhaustible material recourses and pollute the environment at the same time. So far as the adverse effect is not immediately deleterious to our immediate family life, we are satisfied. Can this be right?

Earth's Limitations

At a period in mankind's occupation of this planet, when we are gradually being made aware of the discrete quantum of all the gifts of nature through the grace of Almighty God, the whole world is being made sensitive to the fact that if we continue to mismanage the resources God has given us, we

[3] The Christian Holy Bible, Ps.24:1

may not continue to have the grace to exist, at best with comfort; at worst, at all. The industrialised countries control virtually all the economies of the planet, and in direct or indirect ways, the rate at which natural resources are being utilised, damaged or enhanced. They also contribute the largest proportion of the pollutants of the planet through their economic activities, resulting in the depletion of the ozone layer as well as the climate change factors of the planet. However, the developing nations, which include Nigeria, are also the dubious beneficiaries of the results of these acts of environmental mismanagement. It is an accreditation of a Nigerian adage that says, **"….If the heavens are falling down, it will not be on a single person's head"[4].** We are therefore as involved as those who have started causing the problem.

Environmental Development and Climate Change

As a continuation of the United Nations' Millennium Development Goals (MDG) initiative on the environment, the UN-Habitat Cities & Climate Change Initiative disclosed[5], through several research projects, that:

a) Human activities are releasing greenhouse gasses (GHG) into the atmosphere;
b) These gasses are trapping radiation from the sun and depleting the ozone layer;
c) This causes global warming and climate change.

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

- The population vulnerability to climate change impacts;
- Reducing GHG emissions

[4] An adage of the Yorubas of Nigeria
[5] Kehew, Robert – Green Building Ratings for Africa, Nairobi 2010

3. THE CHALLENGES FOR NIGERIA

The National Profile: Nigeria

Population:	154.7 million (UN, 2009)
Estimated Population growth rate:	3.8% pa (2005-2010 estimates)
Capital:	Abuja
Area:	923, 768 km^2
Largest city:	Lagos
Major language:	English
Major Ethnic Languages:	Hausa, Yoruba, Igbo
Major religions:	Christianity, Islam
Life expectancy:	47 yrs/men, 48 yrs/women (UN)
Literacy:	68% of people over the age of 15 can read and write (UNICEF)
Monetary unit:	Naira
Main exports:	Petroleum and petroleum products, cocoa
GNI per capita:	US $1 160 (World Bank 2008)

We can conclude that Nigeria is comparatively a large, potentially rich but relatively illiterate country.

The Search for Human Survival

The leading industrialised nations have set the stage and trends in scientific research and technological innovation for the mitigation of the effects of climate change. It is common knowledge that they are seriously searching for planets in outer space, which may be similar to this planet, as alternative habitation for mankind. If they succeed, it is doubtful that people from the developing nations would be indiscriminately included in the eventual migration. In any case, the two earthlike planets recently discovered to be hovering around a sun similar to ours, have been discovered to be so hot that humans may not survive life on them. As for Nigeria and such other developing nations, in the foreseeable future, the priorities could be seen to be different. Apart from sharing the effects of the global environmental degradation, we also create more environmental challenges of our own.

Challenges for Nigeria's Environmental Survival

While charting goals for Nobel laurels in the foreseeable future, I sincerely advocate that the survival challenges for Nigeria's urban and rural built environment should be the most intimate concern for Nigerian Scientists and Technologists. Our human environment and welfare development efforts have several critical parameters that are similar to those of most other African countries south of the Sahara, but different from those of industrialised nations. To identify a few: -

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

ii) The national population continues to increase at such alarming rate despite the inability of both the material and soft infrastructure to cope with the demand for comfort and welfare.

iii) It is estimated that more than 80% of Nigeria's population live below the global poverty line set by the United Nation.

iv) This country lacks the ability to cope with any disease epidemic or natural disaster.

v) The education system has suffered a disconcerting collapse to the extent that our qualifications are mostly discredited by other countries' educational systems.

vi) The National Universities Commission, at one time, had to close down a university department of Chemistry that graduated students without a laboratory.

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

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

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

x) There is a gradual desertification process resulting from the ignorant deforestation habit of our people in the rural areas as well as natural

desert encroachment exacerbated by global climate change conditions.

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

xii) There appears to be a preference for concrete paving and an aversion to the creation of grassed and planted gardens and domestic landscapes in the urban areas; and our rural development is notoriously characterized by making the space around dwellings bare and bald, rendering such areas vulnerable to erosion.

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

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

xv) Buildings are still being built with non-recyclable materials and technologies.

This list is not exhaustible. The environmentalists in this assembly can continue the list ad-infinitum. The point being made is that research work in the fields of science and technology in Nigeria, has made little or no impact on improved environmental development in real terms. Maybe this is the time to commence serious thoughts on the mitigation of these challenges, not only at government policy levels, but also at the primary, secondary and tertiary education levels, amongst interventional Non-Governmental Organisations, in industrial Research and Development outfits as well as Commercial Operations environments and community social circles.

4. A FEW BASIC FACTORS OF THE PROBLEM

Human Capital Development for Awareness

Nigeria has a healthy population of highly educated and globally exposed intellectuals. The fundamental confusion plaguing human capital development, however, is our lack of ability to synergise the grains of wisdom collected from several different educational cultures to yield robust fruit in our environment. To illustrate this, we discover that those Nigerians who studied in the Eastern countries would refuse to see any virtue in the system from the West. Indeed, those who studied in the United States of

America refuse to see any value in the British system. They fail to see that educationists and scientists from these academic zones freely cooperate for the development of their citizenry. Our gurus, however, create a crisis of confusion for their protégés, each claiming local victories for themselves. We refuse to see the forest for the trees. The story is told of a highly respected Vice Chancellor who was requested to develop an academic brief for one of our pioneer Universities of Technology. He studiously wrote the histories of the establishments of universities of that genre in Germany, United Kingdom and the United States of America. He then went on to produce the Academic Curriculum for his university. When he was asked to include the socio-economic or cultural reasons for the establishment of those foreign universities and by extension, to proffer the reasons why such institutions need to be established in Nigeria, he took offence. He could not, or maybe would not, see that the nature and characteristics of solutions are expected to grow out of the parameters and constraints of the relevant problems. Hence we have a significant number of products of our educational institutions who are not, indeed cannot, be productive in their avowed fields in the marketplace; "for they know not what they do". Nigeria still has developmental problems. How long must we continue to adopt other people's solutions for our intrinsic domestic problems which differ from those of the foreigners?

Rural Development

The rate of urban growth in Nigeria is the result of rural-urban migration. National development policies have never taken cognizance of the fact that a large proportion of the population dwell in the rural areas. The overdependence on the petroleum economy has made agricultural development almost nonexistent. Hence, infrastructural development is virtually nonexistent in the rural areas. Consequently, young people, as well as a significant number of old ones, now flock to the cities for better life. The results are:

- ♣ Increased demand loading on urban utility infrastructure such as water, electricity, transportation, etc
- ♣ Insufficient housing; the housing shortfall in Nigeria was estimated at 750, 000 housing units per annum as at 2011's development plan,

the total shortfall at that time being estimated as 17 million[6] housing units.

- ♣ Increasing unemployment in all sectors despite government policies on SMEs.
- ♣ Increasing crime rate in the face of insufficient number of personnel in the law enforcement agencies
- ♣ Galloping corrupt practices in the public service sector
- ♣ General lack of welfare and physical security

The solution is obviously the even spread of infrastructure over rural as well as urban areas.

Food, Agriculture and Nutrition

Fig 1 - Nigerian vendors display their vegetables for sale at Mile 12 market in Lagos on January 14, 2012. (courtesy - Pius Utomi Ekpei /AFP/Getty Images)

It is often reported that many Nigerian children are undernourished. This is not because Nigeria does not grow foodstuff. The truth is that quite a significant proportion of what is produced is wasted annually – tomatoes, potatoes, yams, plantains, bananas, peppers, greens, onions, etc. These commodities are vended for cash, hence their inclusion in the GDP is pure

[6] Report of the Ministerial Committee on Transformation Agenda 2011-2015 – Priority Policies, Programmes and Projects of the Federal Government of Nigeria. May 26, 2011

guestimate; substantial proportions are wasted on the highways and in marketplace dump heaps. There are very few industries for, or systems of preservation, yet preserved versions are imported from Europe and Asia.
Nigeria imports food even from other developing nations as well as from the industrialised nations. Table 1 shows the comparative proportion of agricultural and food merchandise imported into Nigeria between 1990 and 2010. Note that while the percentage appears to have reduced, the quantum in real terms has alarmingly increased.

The Punch Newspaper reported on November 28, 2012:

"*According to the Minister of Agriculture, Akinwumi Adesina, the nation spends over N1 trillion annually on only four food imports: wheat, N635bn; rice, N356bn; sugar N217bn; and fish, N97bn.*

The rising rate of food importation into Nigeria is as disturbing as it is regrettable. Undoubtedly, the economy of a nation that depends largely on food import is on the edge of a precipice. In 2011, the Federal Government had promised to end rice imports and make the staple available locally before 2015.[7]"

	1990	2000	2010
Agricultural raw materials imports (% of merchandise imports) in Nigeria		0.9	0.8
Food imports (% of merchandise imports) in Nigeria		19.9	10.3
Merchandise imports (US dollar) in Nigeria	5627000000.0	8721000000.0	44235269000.0
Merchandise imports from developing economies in East Asia & Pacific (% of total merchandise imports) in Nigeria	3.6	7.5	18.9

Table 1 – Nigeria Import 1990 – 2010
Source: World Bank staff estimates from the Comtrade database maintained by the United Nations Statistics Division.

[7] Alarming food import bill; November 28, 2012 by Punch Editorial Board

2015 is just around the corner, we need to see the indicators now.

With the number of Agronomists, Agricultural Production process scientists, Agricultural Engineers and geochemists in Nigeria and the established zones suitable for growing rice, wheat and sugar cane, is it possible to establish a time scaled strategy to reduce importation of rice, wheat and sugar over an equilibrate period of less than a decade? Nigerian marine biologists and fishery experts are developing the fishery industries in other countries. Could Nigerian fish farmers be convinced that fish species other than cat fish could be produced in Nigeria, and in economic quantities?

5. SOME AREAS OF ENVIRONMENTAL SURVIVAL CONCERNS

Pollution

It has been stated above that most of our energy use is derived from non-sustainable sources – fire wood or fossil fuel. In each situation we produce green house gas which is invariably emitted into the atmosphere. Granted that the intensity of our emission is not yet at the rate of the industrialised nations such as the United States of America or the People's Republic of China, the fact is that we pollute the environment.

Furthermore, every urban growth center has the undesirable policy of depositing its solid waste in a dump and setting it on fire. This further emits GHG as well as foul odours. The basic principles of energy transfer have made it possible to create energy from waste – be it solid waste or effluence. The controlled burning of garbage has been proved efficient in the production of energy. Uzoma Nganyadi[8] (2013) identified that this has been proved economically viable in more than 30 countries in all continents except Africa and South America.

In many urban settlements either on a river course or on the seaside, effluence is discharged into the waterways. Is it not better to adopt technologies already proved to extract energy (methane gas), fertilizers and public garden irrigation from this common waste? The cost of domestic black water treatment would then prove to be cheaper than having your septic tank emptied.

[8] Philip Uzoma Nganyadi;Thermal Waste Treatment facilities using Martin technologies in Sustainable Buildings in Luxenbourg , Oct. 2013

Greening the Built Environment

Greening the built environment does not mean only planting trees and grass; it actually means the principle of sustainable environmental development in practice. We had established earlier that man's developmental activities have had a destructive impact on large areas of the environment. Consequently, natural resources which are being used for our built environment are gradually being depleted. The argument is that they will eventually be exhausted. Akindoyeni[9] (2012) stated that "Sustainable Development is therefore a pattern of consistent resource use that aims to meet human needs while preserving the environment to the extent that these needs can be met not only in the present, but also for generations to come. It contextualises development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development ties together concern for the carrying capacity of natural systems with the social challenges facing humanity."

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

The process of executing development for human safety, comfort and prosperity without jeopardising the sustainability of extant natural resources is the process of greening the built environment. Since Science asserts, in every constituent discipline, the knowledge of the structure, content and principles of the cosmos, then it should also be able to apply the permutation of the knowledge to the combination of systems which would sustain the same.

Creating Awareness

Nigerians live in a total environment of physical, psychological and social plenty with complacency. The rain comes every Rain season; the land is largely arable – enough for subsistence rural farmers; no Nigerian with a sense of "root" can go hungry for long, even if he/she does nothing. So there is no potable water supply and electric power is not available for weeks on end? The tendency to want to bury our heads in the sand like the

[9] Akindoyeni, Akin; Sustainable Development and Environmental Protection; IERD Conference Procedure, Ota 2012

proverbial ostrich is real, not only for the illiterate Nigerian, but also for the so called educated. The average Nigerian does not feel inconvenienced by little difficulties like lack of water, electricity, transportation, etc. But it is when one is aware that these things are important for human safety and comfort that the more esoteric factors of human existence become important. Elsewhere, virtually every scientific discovery and technological innovation contributive to human comfort and is widely reported for community awareness. Recall the development of a little gadget for pounding yam which was developed at the University of Ife but gained community awareness only when Japanese manufacturers introduced it into the Nigerian market? This attitude of creating awareness is essential for the survival of our community. Conducting the research and publishing the result in scientific or other journals is important. Telling the community what benefit(s) can accrue from the result is most essential for community survival. Is there any area in which scientific research is not carried out – food, clothing, shelter, transportation, construction, health and human medicine, human psychology and sociology, the environment and, minerals and mineralogy, etc, etc. Is there any of these fields which does not touch on human life and welfare?

Science and Technology to the Rescue

An attempt has been made to scratch the surface of some of the various human survival challenges as they concern Nigeria. Afterall, charity begins at home. There are other fields such as Energy and Power, Solid and fluid mineral exploitation, construction technology, etc, which have not been discussed. Nigerian Scientists and Technologists can show the rest of the world that they have what it takes to evolve solutions to these problems. I have no doubt, however, that most developing nations are generally in the same situation. The Nigerian strategy for the solutions will encourage others to do the same. Developed nations will transfer machinery and equipment but not the detailed technology to other nations.

6. RECOMMENDATIONS

This assembly is in a position to take realistic looks at some of the factors affecting human survival on this planet, if not globally, at least as far as it concerns the survival of those who dwell in the nation boundary called

Nigeria. To this effect, and relative to the few areas discussed above, the following recommendations are humbly proffered:-

i) On Human Capital Development:

It is recommended that:

- ✓ Basic Science education should be related to the simple needs of the child's home and environment; e.g. in the 1940s, we were taught to know that decayed vegetable matter make excellent organic fertilizer.
- ✓ Field experiments should be conducted with laboratory ones so that the student could see that the theory has pragmatic utility.
- ✓ Postgraduate students should be made to research slices of their supervising Professors' research projects.
- ✓ Research and development in the sciences and technologies be made to address Nigeria's fundamental problems and that utility factors be established for research products to assess the usefulness of the work.

ii) **On Rural Development:**

It is recommended that:

- ✓ This assembly should formally request the various levels of Government to adopt a policy of rural micro-infrastructure in which the small town or village would be shareholders; e.g. – small scale water supply projects (not boreholes), designed to also include micro-hydro electrical generating systems. This is sustainable and presents very little or no danger of vandalisation. Furthermore, it is reported that UNDP partly supports such projects. It falls under the PPP policy of the government within the ambience of the NEED/SEED/LEED programmes for MDGs. (The first two secondary schools in my home District of those days were such community projects).
- ✓ Universities, especially the Universities of Technology, as well as Polytechnics should be encouraged to participate in the design and construction stages of such projects, using the projects as learning vehicles for their students in the appropriate disciplines.
- ✓ Rural Communities should be encouraged to establish local corporations for the development of bio-digesters for methane gas

production with the waste product being recycled for organic fertilizer production.

iii) **On Food, Agriculture and Nutrition:**

It is recommended that:

- ✓ Results of research projects in the production of various food items should be made widely available to the public, for adoption by local farmers.
- ✓ Agricultural Economists should be made to provide outline economic viability outlines for small, medium and large scale farming profiles for each of these food items.
- ✓ Direct intervention projects on spending a proportion of the import estimates should be established to boost home production, jointly monitored by the various Ministries of Agriculture and the agricultural extension services of Universities and Research Centers.
- ✓ An advocacy should be embarked upon to enforce government policy implementation in these areas.
- ✓ Research into the preservation of various food items should be seriously embarked upon as critical priority projects.
- ✓ Quality control systems need to be established to ensure the quality of such agricultural products before their entry into the domestic and international market places.

iv) On Pollution and Greening the Built Environment:

It is recommended that:

- ✓ Where it is unavoidable to use wood for domestic firewood in the rural areas, firewood forest plantations should be established. It has been proved that eucalyptus trees are capable of being harvested for firewood every five years. Five plantations established every year for five years will sustain the community in firewood. Forestry experts should be able to determine the appropriate sizes of such annual forests.
- ✓ Experts in thermodynamics should be able to develop crude forms of energy extraction systems from urban solid waste. It is suggested that some State governments would support such an R&D project.

Biogas digester designs are now commonplace in India and the Far East. Small communities can be encouraged to be stakeholders in the production of domestic cooking gas from such installations. All effluent and organic waste can be discharged into the digester and the spent waste packaged as organic fertilizers.

- ✓ All research must answer a number of fundamental questions before accreditation. These should include the following:-
- Does the research outcome create disbenefit for humanity in a direct way?
- Does the process or outcome reduce, in any irreversible way, any gift of nature, without the merit of reuse or recycling?
- Does the residue or waste product of the resource(s) used have the potentiality injurious to human health?
- ✓ A monitoring group should be constituted to ascertain that research results or products negatively respond to the questions, no matter how lucrative the economic advantages are, in order to ensure the sustainability of human life and welfare on this planet.

v) **On Creating Public Awareness:**

It is recommended that:-

- ✓ In every discipline of Science and Technology, an urgent effort should be made to create a public awareness forum to increase community knowledge of the benefits of products of research to society.
- ✓ A multi-disciplinary panel is set up for the purpose of synergizing scientific products for secondary or tertiary benefits to the community.
- ✓ A monitoring team is constituted to ensure that such products are contributive to environmental sustainability as previously recommended.

vi) Challenging You to Action

A number of us in the Human Built Environment Industry got together and formed the Green Building Council of Nigeria (GBCN) as a non-governmental, private sector driven intervention group, to propagate and practice the principles of design, construction and operation of sustainable buildings and human settlements in Nigeria. We are recognised by the World Green Building Council

(WGBC) and we are working towards the status of an Emerging GBC. You too can join us.

- I am challenging each discipline in the sciences and applied sciences, represented in this assembly, to organise themselves for the purpose of cataloguing extant works of innovation that have qualities which would enhance the sustainability of human life and comfort, particularly in Nigeria and generally in the developing world. Specifically, I would address this challenges to:-
  i) those in the health sciences, to identify the efficacious qualities of Nigerian native herbs and roots for development and improving home grown drugs at affordable costs;
  ii) those in the industrial chemistry fields, to develop suitable non-toxic dyes for the textile industries;
  iii) those in the agricultural science and technology fields, to develop non-chemical fertilizers, simple agro-mechanical equipment to make the task of the rural farmer easier and more productive;
  iv) those in the biological and biochemistry fields, to find improved versions and species of our fruits, legumes, fungi, etc, that could be farmed at commercial levels.

These are indicative suggestions. There should be several other permutations and combinations of efforts to enhance the longevity of human life on this planet in general and to improve the quality of life of the Nigerian in particular, on a sustainable scale.

I thank you for your patience and attention.

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Abuja
August 2014