TOWARD AN ESCAPE FROM POVERTY AND DEPRIVATION

The Dave Omokaro Inaugural Memorial Lecture

by

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INTRODUCTION

One of the primary targets of the Millennium Development Goals (MDGs) is the eradication of extreme poverty and hunger worldwide. At national and regional levels, programmes and projects have been configured and implemented with different levels of success, within economic development plans, to diminish poverty. Personal or community wealth is not a product of evolution but the result of deliberate planning and investments of resources in productive activities. As a socio-economic system, capitalism with its utilities and malcontents, endures because it rides on the natural tendency of people to prioritize their individual interests above group interest. The prospect of minimal sharing of the rewards of their efforts with others drives their inventiveness and enterprise in ways that improve the overall economy. Nevertheless, capitalism is ultimately indispensable as a means of human and infrastructural development, although other systems may thrive intermittently as society evolves. However, capitalism is a highly competitive system and often widens the gap in the quality of life between the rich and the poor, if some safeguards are not installed. Indeed, in many countries of the developing world, such safeguards are non-existent. Consequently, large segments of the population are barely at survival thresholds with respect to food, housing and basic amenities. Despite the gains that have been made in economic development, about 1.4 billion people globally, still live in poverty while about 1 billion people suffer from hunger.

Ultimately, the success of any country's economic development effort, if indexed by socio-economic factors, must be appreciated in terms of the percentage of its poor people that translate from banal poverty to the middle class. Personal economic success that often manifests in high standard of living, is not always directly proportional to talent and effort. Such a relationship is often precluded by the non-existence of a level playing ground due to pre-established differences in social class factors such as inheritance, royalty lineage, cast system and ethnicity. These factors can affect land ownership and access to other economic empowerment systems. Usually, poor people

have to work harder than nobility to achieve the same level of socio-economic success. The determinants of personal socio-economic success are lineage, talent, hardwork and opportunity in various mix-proportions.

HAZARDS TO THE POOR AND DESTITUTE

As a reflection of global macro-economic circumstances, the African Gross Domestic Product (GDP) growth rate which averaged 6% in the 2006-2008 period, decreased to about 2.5% in 2009. The envelope of estimates for 2010-2011 made by institutions such as the World Bank and in the African Economic Outlook, is 4.5 - 5.2%. However, it should be noted that although these African recovery rates are superior to those of other regions, the socio-economic configurations of most African countries show an excessive pyramidal wealth distribution in which less than 5% of the population occupies the pinnacle, and the rest are at or near the base of the wealth pyramid. A diminished middle class is punishingly characteristic of Sub-Saharan African societies. The rewards of economic development are distributed unevenly. Many people are left behind and survive with less than N200 (less than US$1.5) per day. This low-income class is society's most vulnerable to stressors and hazards such as those listed below.

- Lack of adequate housing that consigns the poor to destitution.
- Inflation that reduces the purchasing power of the poor.
- Natural disasters that displace the poor to even more deplorable conditions.
- Limited access to capital by the poor.
- Excessive exposure of the poor to contaminants and disease vectors in polluted environments.
- Lack of elevated social status that wins appropriate patronage and justice for the poor.
- Lack of recognition of subtle inequalities, opportunities and points of intervention against impoverishment.

- **Poor Housing**

Slums that surround many cities in the developing world are the most visible manifestations of disparities in the quality of life, between the "haves" and the "have nots". As recently noted by the leadership of UN-HABITAT, despite the gains that have been made on provision of housing to the poor, about 828 million people still live in urban slums worldwide. For Nigeria, the United Nations estimates that there is a 16 million housing deficit. This has to be considered as a large underestimate, considering the squalor around Lagos, Abuja, Kano, Port Harcourt, Ibadan and Kaduna. The efforts of the Nigerian federal government in remedying this circumstance should be applauded.

- **Slave Labour**

Modern-day slavery has developed in many regions where socio-economic circumstances are such that human labour is priced above human dignity. In his 2009 analysis, entitled "Winning the Fight", K. Bales puts the number of people enslaved in South Asia at 27 million and those in debt bondage, at 10 million. Sub-Saharan Africa can not be much behind in these statistics. Sweat shops and mines that engage the poor in unsavory work conditions, abound in Africa, South America and Asia. The victims are most often migrants exemplified by the "campesinos" of Central America, whose domestic economic conditions offer even worse alternatives. It is estimated by the United Nations High Commissioner on Refugees (UNHCR) that as at 2009, 42 million people were displaced by wars and other armed conflicts. Each year, thousands of Sub-Saharan Africans risk death to cross the harsh Sahara Desert to perceived greener pastures in Europe. Often, they are trailed by poverty, anti-immigrant discrimination and destitution. The ubiquity of poverty and destitution around us dulls our sensitivity to the suffering of child beggars, lepers and others that circumstances throw on the streets. Others are even less fortunate. The International Labor Organization (ILO) estimates that annually, 1.2 million children are sold into labour for as much as $10 billion, about 16% of which involve African children.

- **Hunger and Malnourishment of the Poor and Destitute**

For centuries, agriculture has been the mainstay of communities, especially in river basins that have generated civilization. It is also a sector that has great potential for gainful employment of people of various social classes. Unfortunately, agricultural productivity has decreased in most of the poor countries, where its growth is most needed. A combination of land degradation, global climate change, urbanization, invasive species and occupational mobility has diminished this sector with dire consequences for the poor. As indicated in the 2008 Economic Report on Africa, unemployment in Sub-Saharan Africa has averaged around 10% since the 1990s. Due to doubling of international food prices between 2006 and 2008, an estimated 100 million poor people worldwide, became food-deficient. The Food and Agriculture Organization estimates that the number of people globally, who are malnourished or hungry is 900 million from a pre-2007 level of about 870 million people.

- **Inadequate Access to Health Support Systems**

There are profound relationships between poor health and poverty, especially in developing countries where public sector health services may not be adequate or affordable. Infirmities can push people from marginal subsistence into poverty. This is commonly the case with the aged. In 2006, the United Nations estimated that by 2050, the total number of elderly people in Africa (age 60 years and above) will rise to 205 million from a 2005 level of 48 million people. This increase is occurring in an environment in which health insurance is either unavailable or unaffordable to the poor and destitute. Indeed, the traditional social insurance in which adults ignore family planning and seek large numbers of children on which they can depend economically in their old age persists. It is estimated that about 90% of Nigerians are not insured. At the other end of the age spectrum, about 4.8 million children are projected to die in the world each year, before age 5 by a variety of agencies.

- **High Vulnerability of the Disabled and Aged to Social Stresses**

In the face of major socio-political problems that plaque many developing countries, consciousness about the plight of disabled people is very low. It was estimated by the World Health Organization in 2005, that 10% of the world's population is disabled, of which 80% live in low-income countries. This proportion may not have changed significantly in the past five years, Disabilities such as quadriplegia/paraplegia, blindness and deafness whatever their causes, increase the challenges of living under spartan conditions. As noted by the United Nations in 2007, the disabled slip into poverty easier than able-bodied people. They also suffer job discrimination exacted by organizations and people who do not focus on their capacities and potentials.

- **Impoverishment of People by Natural and Environmental Disasters**

In addition to the hazards outlined above, natural and environmental disasters continue to ravage communities by destroying human life, infrastructure and social support systems worldwide. As evidenced by the Haitan earthquake, drought in the African Sahel, floods along the West African Coast and oil spills in the Niger Delta, recovery by the poor is often delayed or unattainable, after to major disasters. An analysis by the Worldwatch Institute in its 2007 -2008 Vital Signs report, indicates that from 2002 to 2006, about 827 million people were affected by weather-related disasters. In 2006, 5.4 million people were made homeless by such disasters. While earthquakes, floods and wildfires occur dramatically, global climate change impacts on ecological systems and biodiversity are more gradual in occurrence. The World Conservation Union (IUCN) assessed the number of threatened species globally to be about 16,118 in 2006. In many of the sensitive ecological systems of the world, such as the fringes of deserts as exemplified by Sahelian West Africa, and coastal margins such as the mangrove regions of the world, natural disasters and global climate change will produce occupational losses, human migration and conflicts as migrants struggle with indigenes over diminishing natural resources. Conflicts between the Berom and the Fulani in the Middle Belt of Nigeria that have involved loss of life and property with addition of hundreds of people to the ranks of the destitute; can be viewed in this context.

For Africa, estimates of soil erosion are highly variable spatially, but are in the range of 900 – 7000 tonnes per square km per year. In the Action Plan for the Environment Initiative drawn up for Africa, under the leadership of the United Nations Environment Programme and the African Ministerial Council on the Environment in 2003, it is recognized that about 500 million hectares of land, has been degraded in Africa since 1950, out of which 65% is agricultural land. This has happened in an environment in which population continues to increase.

- **Inadequate Land Ownership by the Poor**

Despite increasing urbanization rates, about 55% of the global population still reside in rural areas, within which are 70% of the world's poorest people. As estimated by the International Fund for Agricultural Development (IFAD) in its Rural Poverty Report of 2011, about 80% of rural households depend on farming for their subsistence. Inequalities in the distribution of land which have divided peasants and lords and spurned revolutions for centuries, continue to disadvantage the rural poor, especially, in Sub-Saharan Africa, Central America, Southeast Asia and some countries in South

America. Often, without land and/or access to financial capital, poverty is propagated across generations for rural peasants.

SOCIO-ECONOMICS AND THE GEOGRAPHY OF CONFLICTS

The geography of insurgencies, crimes and other conflicts shows significant spatio-temporal correlation with inequities, poverty and unenlightenment. These social stressors spurn cross-generational disadvantages that boil over into open conflicts intermittently or permanently. Experiences in Darfur and South Sudan, Soweto of South Africa, Western Sahara, the Niger Delta of Nigeria and the favelas of Brazil are examples. It is relatively easy to recruit poor, destitute and uneducated people to perform inhumane acts in conflicts that may not serve their interests. Education increases the likelihood of human enlightenment when indoctrination with bias is minimized through exposure. Direct proportionality has often been found between educational attainment and socio-economic status of people in almost all societies. For any society, the challenge is to educate the citizenry to increase human capacity, lift many people out of poverty, and at least, produce the critical mass of people that can provide leadership and generate innovation for sustainability of the society.

Youth unemployment in Sub-Saharan Africa has hovered around 18% for the past 15 years or so. As indicated by the United Nations Economic Commission for Africa (UNECA) in its 2008 report, North Africa had a youth unemployment of 25.7%, a high level that has persisted with dire consequences that unfolded in key countries there in early 2011. The latter example is a clear indicator of the relationship between youth unemployment and social unrest.

MECHANISMS FOR ELEVATION OF COMMUNITIES FROM POVERTY

The wealth, stealth and health of nations depend on their capacities to elevate a large fraction of their poor citizens into the middle class through socio-economic empowerment programmes. Most poor people are enterprising but are merely locked into their status by the externalities that are described in the preceding paragraphs. Systems that allow the poor to be respected and equal participants in governance; allow them access to capital; and involve them in human capacity development programmes are bound to succeed. The poor and destitute need to be empowered not only for their interest, but for the socio-economic interests of communities at all jurisdictional levels. The responsibility for empowerment lies with public agencies, the private sector and philanthropic organizations.

- **Inclusive Governance Systems**

Top-down governance systems that are constructed for planning and implementation of local and regional economic development programmes are often unsuccessful. All stakeholders, including the poor, need to be represented and involved in decision-making processes at appropriate levels. The use of referenda and community engagement processes in the prioritization and implementation of programmes is encouraged. In order to promote the cost-effectiveness of programmes and projects that are designed to counteract the challenges faced by the poor, programme planners should adopt systematic approaches that include:

- Determination of the spatio-temporal scale of the challenges that are faced by vulnerable people;
- Formulation of risk/hazard reduction objective in consultation with stakeholders;
- Generation of a list of options that can be used to improve circumstances the vulnerable people;
- Selection and application of options screening factors that include minimum implementation time to attain targeted results, available budget, jurisdictional authority and legality;
- Implementation monitoring of the screened programmes and projects and subsequent evaluation against the original objectives.

- **Socially Responsible Investments (SRI)**

It is desirable for private corporations to make socially responsible investments to reduce social hazards while providing economic opportunities for poor people. In communities that are disadvantaged in terms of environmental hazards and low level of employment, SRI can include establishment of green factories, micro-finance systems, schools and skills training centers. Recently, some governments, including the Federal Government of Nigeria, have started to specify the implementation of local community development projects as part of major infrastructure development projects that are won by contractors.

- **Entrepreneurship Training Programmes**

Many people operate in the informal economy, worldwide. They need training not only on elements of the production of the goods or services that they deliver, but on basic principles of accounting, marketing, customer relations, logistics, etc. It is commendable that governments of many countries, including Nigeria, have started entrepreneurship training programmes. They need to be expanded to cover more people. There is the potential to increase local and national productivity through engagement of the urban and rural poor in entrepreneurship development programmes.

- **Greater Access to Capital**

The Nobel Prize-winning economist – Dr. Yunus, has proven the utility of micro-credit schemes for the poor through his work with low income entrepreneurs in Southeast Asia. Indeed, loan default rates of poor borrowers are not necessarily higher than those of rich borrowers. Unfortunately, yet lenders in developing countries often conjure up concerns to the contrary, as the rationale to deny poor artisans, farmers and petty traders loans. Loans, even at the level of N0.15 = 1.5 million (US$1.0 – 10,000), if made to the enterprising poor, with adequate monitoring, can spur economic activities by low income people and reduce poverty.

- **Affordable Health Maintenance Systems**

Among the poor, even modest improvements in healthcare systems can reduce the number of days of sickness and absence from work, catering for sick relatives, and mortality. Rich people can afford private healthcare within and outside their regions of residence but the poor and destitute rely primarily on public health systems. The latter need to be improved. Adequately equipped and staffed health centers should be established in every local area as a part of a regional network that includes specialized higher-class regional hospitals. Using Nigeria as an example, the cost of networked health facilities can be accommodated by state budgets. Activities on the implementation of national health insurance schemes should be accelerated. It is worthy of note that Ghana presently operates such a scheme. It covers 67% of the population and has reduced out-of-pocket health expenditures by as much as 50% for Ghanaians. Ofcourse, the challenges are greater for, developing countries that have high population, such as Nigeria, Egypt, Ethiopia, Indonesia and Brazil.

- **Use of Innovative Technology to Develop Low-Cost Mass Housing Schemes.**

The development of mass housing schemes has been the target of many governments in the developing countries. Unfortunately, such houses are often designed and build with high-cost traditional materials (concrete, steel and aluminum). Consequently, upon their completion, they are usually beyond affordability by low-income people. Few banks are willing to provide mortgage loans to those who earn less than N60,000 (US $300) per month to purchase "low-cost" houses that costs not less than N15 million (US $100,000). Local materials such as laterite bricks, bamboo, waste plastics, etc, can be used with innovative designs and low-cost construction methods, to build houses that do not exceed N2 million (US $13,400) each for low-income people. Such an intervention would greatly help in the effective physical outlay of infrastructure for delivery of services such as water supply, wastewater collection and emergency response. The development of low-cost building materials and designs is herein, posed as a challenge to civil and materials engineers, and architects.

CONCLUSION

In many developing countries, especially those with large population, opportunities are inadequate for large segments of the population. Many people whose circumstances do not provide them with the tools of competition and attainment of personal economic success are consigned to poverty and deprivation.

The swelling population of disenfranchised people is disrupting the social systems of the affected countries, as evident in increasing crime rates, prostitution and drug-related activities. Candidates for office and other public servants are urged to recognize that the creation of frameworks and opportunities for people to succeed is the most feasible and cost-effective approach to sustainable development. Countries should not waste their human resources at any social stratum. They need to nurture talent and extract the intellect of their citizens to implement entrepreneurship support systems to decrease poverty levels and promote peace. Without the creation of opportunities, personal talent is latent. Individuals also have to posture to take advantage of opportunities that the public and private sectors may create. Such posturing requires education, enlightenment, capacity to navigate across cultures, and high moral values.

THE POOR AND DESTITUTE ARE OFTEN CHALLENGED BY THE HOPELESSNESS OF THEIR ENVIRONMENT

The Landless Workers Camp in the Favela in the hills above Rio de Janeiro, Brazil in 2003

CHILD LABOUR AND IMPOSITION OF STREET SURVIVAL SKILLS ON CHILDREN IS INJURIOUS TO SOCIETY

The Speaker with Renaldo, the five-year old street kid who edged a living to support his three year old sister in Bahia, Brazil, June 2003

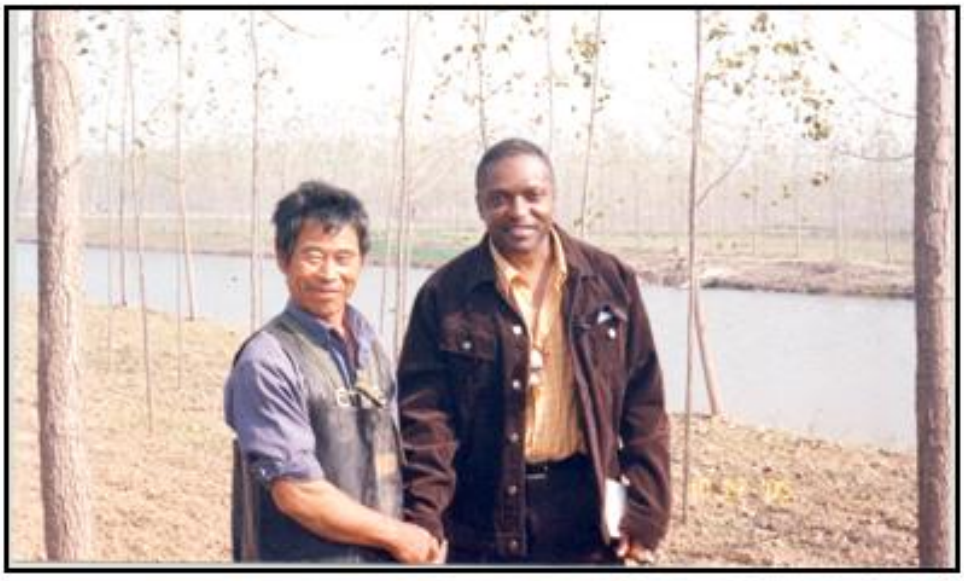
SO, IN THIS HOSPITAL, THE BEDSHEETS WERE NOT AVAILABLE, A SYMPTOM OF INADEQUATE HEALTH CARE FACILITIES FOR THE POOR

At a dilapidated hospital facility, in Ikot Nkpene, Nigeria, August 8, 1999

RURAL COMMUNITIES NEED SAFEGUARDS FOR FOOD PRODUCTION SYSTEMS

I joined the Khanty natives of Siberia (with my colleagues) to feast on Sturgeon Fish and other delicacies during an environmental research trip near Nizhnevartovsk, Siberia, Russia in July, 1996

FARMLANDS MUST BE PROTECTED FROM THE RAVAGES OF DISASTERS TO THE DIRECT ECONOMIC BENEFIT OF THE RURAL POOR



The Author with a Chinese farmer on reclaimed mine land in Jiangsu, China, Oct. 27, 2003

LANDLESSNESS OF RURAL PEASANTRY IS A CONTRIBUTOR TO POVERTY AND DISENFRANCHISEMENT IN MANY COUNTRIES

With the leaders of the Landless Workers Movement near Rio de Janeiro, Brazil, June 2003.

INFORMATION NEEDS FOR PROGRAMME/PROJECT IMPLEMENTATION TO COUNTERACT POVERTY

Risk Management Scenario

- **Spatial and temporal scale of the problem**
- **Risk reduction objective**
- **List of identified options**
- **Screening factors and constrains**
- **Decision maker**
- **Prospective implementer of selected options**

Options Performance Information

- **Chance of success of an option within a given constraint**
- **Chance of success of composite options within a given constraint (including synergistic and antagonistic effects)**

OPTIONS FOR IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT PROGRAMMES

OPTION CATEGORIES	EXAMPLES OF SPECIFIC OPTIONS
1. ENGINEERING	a. design and Installation of Structural Mitigation Systems b. technology development through research
2. COMMUNICATION/ EDUCATION	a. community outreach b. formal education c. technical guidance d. research support
3. REGULATON	a. control of production process b. banning of products c. facility siting controls d. facility operational controls
4. ENFORCEMENT	a. litigation b. fines
5. MARKET INCENTIVES	a. tax relief b. relaxation of controls c. subsidies d. direct purchase of friendly products
6. INTERNATIONAL/INTER-GOVERNMENTAL COOPERATION	a. international treaties b. international standards (ISO) c. tariffs on goods d. foreign aid/loan
7. ENVIRONMENTAL MANAGEMENT SYSTEMS	a. application of technology and techniques to mitigate risks, and direct use by communities for operations and planning

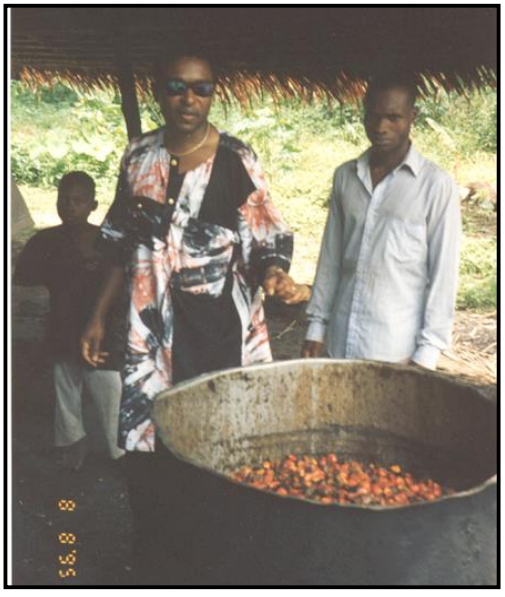
SCREENING FACTORS AND EVALUATION CRITERIA FOR SELECTION OF SUSTAINABLE DEVELOPMENT OPTIONS

- **Common Screening Factors**
  - Budget
  - Time
  - Jurisdictional Authority
  - Legality
- **Detailed Evaluation Factors**
  - Cost Analysis
  - Cost/Benefit Analysis
  - Risk/Benefit Analysis
  - Failure Analysis

SKILLS TRAINING CAN PREVENT THE DISABLED FROM SLIPPING INTO POVERTY

He demonstrated to me at the Leprosy Hospital in Etinan, Akwa Ibom State, Nigeria that despite his physical disability, he could use appropriately- designed machines to earn a living.

FOOD PRODUCTION NEEDS TO REACH ECONOMY OF SCALE SO THAT PRODUCTION LEVELS CAN BE HIGH ENOUGH TO REDUCES PRICES FOR THE POOR



The speaker inspecting a manually operated kennel and palm oil processing machine in Ikot Ubok Udom Village, Nigeria on August 8, 1999

INNOVATIVE AND AFFORDABLE INVENTIONS THAT REDUCE HARDSHIPS FOR THE POOR ARE NEEDED

With the proprietor of a fleet of taxis that have eased transportation problems in Jiangsu, China, Oct. 27, 2003.

Prof. Hilary I. Inyang

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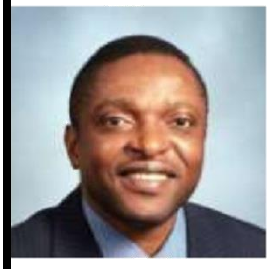

Prof. Inyang is currently the Duke Energy Distinguished Professor of Environmental Engineering and Science, University of North Carolina, Charlotte, USA; Prof. Inyang has made more than two decades of technical and policy contributions to regional and global sustainable development as an educator/administrator, researcher, government official and corporate leader. He is a former President of the African University of Science and Technology, Abuja, Nigeria and Founding Director of the Global Institute for Energy and Environmental Systems (GIEES) at the University of North Carolina-Charlotte. In 2008, he was a finalist for the position of United Nations Under Secretary-General and Rector of United Nations University in Tokyo. He is currently the President of the International Society for Environmental Geotechnology (ISEG) and the Global Alliance for Disaster Reduction (GADR). In 2008, he was selected as a Technical Judge of the US Nuclear Regulatory Commission. From 1997 to 2001, he was the Chair of the Environmental Engineering Committee of the United States Environmental Protection Agency's Science Advisory Board, and also served on the Effluent Guidelines Committee of the National Council for Environmental Policy and Technology. Prior to his position at the University of North Carolina-Charlotte, he was DuPont Professor/University Distinguished Professor at the University of Massachusetts, where he helped establish the Graduate School of Marine Science and Technology of the University System, while serving as the Founding Director of the Lowell-based Center for Environmental Engineering, Science and Technology (2000-2005). He taught previously at Purdue University, George Washington University and the University of Wisconsin-Platteville where he started his academic career 22 years ago. He has helped establish research institutes and operate educational programs in Brazil, Japan, Korea, India, Canada, Nigeria, Ghana, United Arab Emirates and China at where he has been an Honorary Professor/Concurrent Professor (CUMT and Nanjing University) since 2004 and 1999, respectively.

Prof. Hilary was the first black person to be endowed as a distinguished professor in environmental engineering in the United States, as well as the first African immigrant to Chair a Committee of the congressionally mandated national science advisory body of a US agency. During his career in academe, the private sector and government, he has developed innovative materials, systems (including GEORAD Barrier Concept) and performance estimation tools for long-term (100-10,000 years) containment of contaminants and suppression of dust to reduce environmental and health risks in climatic zones, ranging from the hot/humid tropic to the frigid Arctic. He has led/performed research expeditions to Jiangsu Province of China on mining subsidence and erosion; Siberia (Russia) on oil spills; Niger Delta of Nigeria on oil spills; Alaska on Permafrost degradation due to global climate change; and Minas Gerais region of Brazil on fugitive dust emission studies. Hilary is a prolific developer of analytical frameworks, quantitative models and field-relevant data that have been used by agencies, researchers, private firms and students worldwide. He pioneered the incorporation of fundamental chemo dynamic mechanisms into contaminant leachability models for estimating emission source

terms for materials under scenarios in which they are subjected to both load and environmental stresses. His models and experimental data on physic-chemical interactions between natural/synthetic polymers and lateritic soils have provided rational bases for aqueous polymer application in dust control to safeguard human health in many countries. Among the several national and international environmental and economic development programmes that he has contributed to are the Nigerian Governments'programmes on oil spills management; environmental hazards control in Africa; science and technology development in Africa; and research support.

He has authored/co-authored more than 220 research articles, book chapters, federal design manuals and the textbook, *Geoenvironmental Engineering: principles and applications*, published by Marcel Dekker (ISBN: 0-8247-0045-7). His research and professional focus are on contaminant leaching and dusting from materials, containment systems and materials for barriers, energy systems and geohazards. He is the Editor-in-Chief of the *Journal of Energy Engineering* of the American Society of Civil Engineers (ASCE), an associate editor/editorial board member of 27 refereed international journals and contributing editor of three books, including the United Nations Encyclopedia of Life Support Systems (Environmental Monitoring Section). Professor Inyang has served on more than 100 technical and policy panels of governments and professional societies, and has given more than 130 invited speeches and presentations on a variety of technical and policy issues at many institutions and agencies in several countries, including the Goldberg-Zoino Lecture at MIT (1994), the AMOCO Foundation Lecture at Iowa State university (1996), the ALCOA Endowed Lecture at Carnegie-Mellon University (2002), and addresses at the Parliament of Switzerland in Bern (2001) and Nigerian Senate Environmental Committee (2008). He has chaired/co-chaired international conferences in Korea, Japan, Turkey, the United States, Brazil, Finland, Canada, Slovenia, Ghana, China and Nigeria. Professor Inyang holds a Ph.D. with a double major in Geotechnical Engineering and Materials, and a minor in Mineral Resources from Iowa State University, Ames, Iowa; an M.S. and B.S. in Civil Engineering from North Dakota State University, Fargo, North Dakota; and a B.Sc. (Honors) in Geology from the University of Calabar, Nigeria.

He has served as principal investigator, co-principal investigator and implementation leader on 40 projects. His research has been sponsored by NOAA, FHWA, USDOE, USDOD, USNRC, DuPont Corporation, Sandia National Laboratory, Duke Energy Corporation and the National Science Foundation. For his research contributions to advances in geoenvironmental science and engineering, professional practice in many countries, and public policies on energy and environmental issues, he has received several professional honors, including selection as a Fellow of the Geological Society of London, the 1999 Chancellor's Medal for Distinguished Public Service of the University of Massachusetts, Lowell; 2001 Swiss Forum Fellow selection by the American Association for the Advancement of Science ; the 1996 US National Research Council Young Investigator Selection; 1992 Eisenhower-Jennings Randolph Award of the International Public Works Federation/World Affairs Institute that was instituted to honor the international achievements of former U.S. President Dwight D. Eisenhower; the 1991 American Association for the Advancement of Science/USEPA Environmental Science and Engineering Fellowship; and election (by eminence) as a Board-Certified Member (BCEEM) of the American Academy of Environmental Engineers (2006). On October 2, 2002, he was honored in Washington, DC at a ceremony organized by the US Government to honor 10 environmental scientists for technical contributions to the United States through the USEPA.