

**FRONTIERS IN ENVIRONMENTAL RESEARCH
AND SUSTAINABLE ENVIRONMENT
IN THE 21ST CENTURY**

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Edited by

**Adeniyi A. Gbadegesin
Oluwagbenga O.I. Orimoogunje
Olutoyin A. Fashae
Eze Bassey Eze**

**IBADAN UNIVERSITY PRESS
2015**

Ibadan University Press
Publishing House
University of Ibadan
Ibadan, Nigeria.

© 2015 Department of Geography, University of Ibadan, Ibadan, Nigeria

First published 2015

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ISBN: 978 – 978 – 8456 – 92 – 6

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ACKNOWLEDGEMENTS

The organizers are highly indebted to many scholars who have helped us in producing this book in honour of the two Giants of Geography – Emeritus Prof. Adetoye Faniran and Prof. Olusegun Areola. In particular, we wish to thank the past and present students of the Department of Geography, University of Ibadan, and other numerous contributors whose encouragement helped us greatly in publishing this book. We hereby place on record our special thanks to all reviewers, whose invaluable contributions in reviewing and assessing the quality of the manuscripts published in this book, have made this possible. The editors owe a debt of gratitude to the authors whose papers are included in this book, for their cooperation in revising their papers and for their patience through the difficult editorial phase. Finally, the editors, on behalf of the ARENIRAN Planning Committee, thank Dr. Ola Falaye of English Department, Obafemi Awolowo University, Ile-Ife, Nigeria and the University of Ibadan Press for editing the manuscripts.

We wish to express our sincerest thanks to all the past and present Vice-Chancellors, in particular, our chief host, the Vice-Chancellor, University of Ibadan, Nigeria, for the support and the fatherly role played throughout the National Colloquium; the present Vice-Chancellor of Ladoke Akintola University of Technology, Ogbomosho; immediate past Vice-Chancellor of the University of Maiduguri, Maiduguri, Borno State; the Director, Centre for Educational Institute, University of Calabar, Calabar, Cross River State, and Scholars from Oxford and Stirling University, United Kingdom for financial support and moral encouragement in making this story a reality.

We must also acknowledge the University of Ibadan that brought us together as a family while at the same time acknowledging Emeritus Prof. Adetoye Faniran and Prof. Olusegun Areola, our teacher, supervisor and mentor, whose life, career and intellectual footprints provided the foundation for embarking on this laudable book project. We are using the Chinese proverb which says, “Whatever you do to people, you also open doors to receive the same thing because a bit of fragrance clings to the hand that gives flowers”. Innovation distinguishes between a leader and a follower. We appreciate you. Here is your testimonial!

Adeniyi, S. Gbadegesin & Oluwabenga, O.I. Orimoogunje

PREFACE

The primary object of this book is to present current issues and problems relating to environmental sustainability and to discuss them as elements of the earth's surface. This book is timely because of the widespread interest in geographical approaches to solving environmental problems. This interest is present in research, management and academic areas. However, the celebration of the two Giants of Geography – Emeritus Professor Adetoye Faniran and Professor Olusegun Areola from the Department of Geography, University of Ibadan, Nigeria affords scholars to share their interest especially because of the opportunity to celebrate the erudite Giants by holding a National Colloquium on *Frontiers in Environmental Research and Sustainable Environment in the 21st Century*. The collection of articles in this book results from the scholars' concerns to evaluate environmental geography applicability to environmental management in several natural resource fields. The study of such complexes requires more than one individual. This has led to the concept of interdisciplinary research which involves diversity of skills and specialties. Environmental geography has for some time been prominent in research and management studies, but only a few components have been measured or considered in most instances.

The book is in seven divisions. General Introduction focuses on keynote address and guest lectures. Under this subdivision, Mabogunje explores globalization, existing Nigeria governance paradigm and environmental changes. He submits that all frontiers research into environmental sustainability is fraught with considerable uncertainties but with very challenging prospects of rewarding efforts. He therefore concludes that the research frontier will need to be populated by scholars from other disciplines, hopefully in a multi-disciplinary or interdisciplinary alliance, offering their special insight into the underlying causes impairing environmental sustainability in particular areas or regions of the country whose activities are bound to impact significantly on the environment. Thomas explores some of the routes, priorities and achievements in the study of geodiversity in the humid tropical environment to date, and highlights distinctive features of these environments that deserve emphasis in future research for sustainable resource use while Goudie reveals that dry lands have a large range of environmental hazards to which more and more people are being exposed and that human activities exacerbate some of these hazards which may later be modified by global warming.

Section 1 focuses on **geomorphology and environmental management**. Faniran examines deep weathering and its significant implications for natural resources location in the humid tropical environments and how it facilitates ingress of water into the overburden. Nabegu, using aerial photographs, time series imageries and layout plans, assesses the impact of urbanization on the Jakara channel morphology and highlights the potential implications of this for sustainable urban channel management while Eze and Uquentan use the x-ray diffraction analysis to examine the clay mineralogical composition of lowland soils used for rice cultivation in Central Cross River State and conclude that rice yields were strongly influenced by clay mineralogical properties. Mshelia and Ode employ statistical technique, remote sensing and Geographic Information Systems (GIS) for the morphometric and land use/land cover analysis of three basins in Ibadan region and conclude that human activities impact negatively on stream network in the basins. Oparaku et al. report some field observations made on the impacts, characteristics, and causes of gully erosion on three geological formations of the Idah-Ankpa Plateau of the Anambra Basin, Nigeria and call for more detailed work to determine the extent of gully erosion – induced land degradation in the study area with a view to proffering ameliorative measures. Fashae examines the planform geometry of River Ogun for an improved understanding and predictive capability of the behaviour of large river channel. Dada examines geomorphological mapping from the point of view of cartography, and makes a systematic analysis of the relationship between geomorphological information and its cartographic representation in map form by combining slope data with other geomorphological features experimentally.

Section 2 is on **biogeography and environmental management**. Based on high spatial resolution geospatial technologies Areola highlights the need to return to the core values of geography as a field science that gives prominence to detailed knowledge of the local environment within the context of the wider earth environment as well as emphasizes the need for developing countries to embark on a renewed programme of detailed soil description and measurement to accumulate sorely needed technical data on their soil resources. Adewole examines various remediation techniques on metals and organic polluted soils being used in different parts of the world and offered suggestions on the need to guard against impacting damage on the soil for enhanced, healthy and sustainable ecosystem. Tomori et al. describes the distribution, mobility and impact of arsenic substances on ecosystem health and discovers that its abundance in the soils of the study area may pose serious threat to the quality of soil,

surface and underground water. Orimoogunje use soil and vegetation samples from different tree crop ecosystems over different soil associations to determine the degree and pattern of deterioration of edaphic and biotic elements under selected tree ecosystems and reveals that the substitution of tropical forest with tree crop results in ecological degradation. Ukpong examines the ecological status of the mangroves in relationship to *Nypa* palms an invasive species and its effect on mangrove structural development and established the importance of this for carbon sink. Based on data obtained from field study, Olanusi and Funmilayo advocate proactive strategies that would halt the rate of deforestation and initiate restoration of the vanishing species integrity. Omosuyi reviews various method of forest management practices and their relative effectiveness in Nigeria and recommends holistic management approach.

Section 3 is on **climate change, vulnerability, assessment, adaptation strategies and mitigation options for Nigeria**. Using Makkink, Turc and Hargreaves empirical models coupled with Geostationary Operational Environmental Satellite (GOES) data, he estimate potential evapotranspiration (PET) from solar radiation and atmospheric temperature, Onafeso and Olusola present a corollary ecogeomorphological classification that improves sustainable agriculture, flood/drought management and land administration practices in Nigeria. Based on temperature and rainfall data for 1931-2012, Umar establishes that annual rainfall pattern had changed from positive in 1931 to 1960 to negative in 1961 to 1990 and back to a positive in the 1991 to 2012. He also proffers that if this trend persists severe drought may occur from 2021 to 2050. Daramola examines urban populations and establishes the aspects that require strengthening in order to withstand the impacts of climate change; she also proposes development of indicators for assessing the vulnerability of urban areas in Nigeria. Using a review method Agbalajobi examines the Kyoto Protocols to answer the questions that border on gender and climate change and stresses the need to involve women actively in environmental decision making at all levels. Using focal group discussions, key informants interviews and household survey in 11 communities across 10 local Fasona et al., investigate perceptions on natural resource use, climate change and adaptation among rural communities in the wooded savanna. Finally, Oderinde and Gbadegesin examine the land use change and carbon emissions between 1984 and 2013 in Ibadan area and reveal that CO₂ emissions can be attributed to change in land use pattern

Section 4 is on **space application and Nigeria's changing landscape**. Ayeni et al., applies satellite imageries to assess land use/land cover dynamics using Markov environment modelers to predict future

land use/land cover change while Ayanlade uses GIS interpolation and down scaling methods to assess how gap in climatic parameter could be filled. Makinde reviews the capability of geospatial techniques in monitoring, assessing and analyzing the dynamics of Nigeria forests. Oderinde and Eludoyin using time series imageries, examines the land use/land cover of Oluyole Local Government Area, Ibadan, and its implication on the direction of change. Adesina and Maduekwe use geospatial techniques to assess the relationships between socio-economic factors and the spatial dynamics of vegetation cover in Idemili River Basin of South Eastern Nigeria. Adegbite and Ebeiyambba use satellite imageries to examine distributional pattern of the daycare centres in Ile-Ife' Osun State and demonstrated the value of GIS and GPS in locational analysis.

Section 5 deals with urbanization and its environmental challenges.

Olokesusi and Olorunfemi examines the nature of vulnerability of the city of Oyo to disasters while Onwuemele and Olorunfemi assess the impacts of urbanization and flood risks as well as institutional responses and coping strategies among residents in Lagos metropolis while Adetunji et al. assesses the waste management system in a rapidly developing city of Lokoja with a view to ascertain the best method for waste disposal while Attah examine the challenges associated with solid waste generation and management and their impact on the environment in Obubra metropolis in Cross River State. This was with a view to investigating the link between content of waste stream, amount generated and management strategy of waste in the study area. Olayungbo assesses the methods of household solid waste disposal and its implication on ecosystem services in some selected wards in Ife Central Local Government Area of Osun State, Nigeria while Ezenwaji identifies human activities and land uses that tend produce wastes and the extent of pollution of the river by these contaminants using physico-chemical and microbiological parameters. Ige et al. examine the effect of industrial activities in residential environmental health in Oluyole Estate of Oyo State while Muili et al., evaluates the socio-economic effects of urban development in Osogbo with a view to formulating appropriate strategies for sustainable urban development. Asiyanbola et al. examines the challenges of urban fringe while Umaru identifies the factors influencing the use of pedestrian bridges, and the propensity to violate related traffic code by users and policy tools to discourage such violation.

Section 6 considers religion, environmental sustainability and high school geography. Ekanade considers the relationship between religion and a clean environment and advocates environmental education to the people through many programmes of various religions while Faniran

reviewed the recent developments the sustainability debate with a view to broadening the scope of environmental sustainability research with special reference to indigenous and religious aspects, so as to accurately reflect the all-encompassing nature of the earth's environment while. The last paper deals with high school geography in which Aderogba examines the adequacy or otherwise of Geography Laboratories and Gardens for effective teaching and learning in Nigeria. She concludes that well-equipped Laboratories, Meteorological and Geographical Gardens should be integrated parts of the school facilities for sustaining interest in geography teaching and learning.

Professor Adeniyi S. Gbadegesin

CONTRIBUTORS

Abubakar Aminu, *amingeog@gmail.com*; Department of Geography, Sokoto State University, Sokoto.

Adebayo Oluwasegun. H., *adebayooluwasegunhezekiah@gmail.com*; Department of Geography and Regional Planning, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria.

Adegbite Abdul-Rahman, *rahmann1@yahoo.com*; Centre for Space Science & Technology Education, P.M.B. 019, OAU Post Office, Ile-Ife.

Adenike A. Olayungbo, *anikuje3@yahoo.co.uk*; Natural History Museum, Obafemi Awolowo University, Ile-Ife, Nigeria.

Adeniyi, S. Gbadegesin, *adeniyig@yahoo.com*; Department of Geography, University of Ibadan, Ibadan.

Adetoye Faniran, *toyefaniran@gmail.com*; Department of Geography, University of Ibadan, Ibadan, Nigeria.

Adetunji, M.A., *maadetunji@yahoo.com*; Atomode, T.I. and Isah, O.I. Department of Geography, Faculty of Arts & Social Sciences, Federal University Lokoja, Kogi State, Nigeria.

Akin L. Mabogunje, *mabogunje1931@yahoo.com*; Chairman, Foundation for Development and Environmental Initiatives (FDI), Ibadan.

Aliyu Baba Nabegu, *aliyunabegu@kustwudil.edu.ng*; Department of Geography, Kano University of Science and Technology, Wudil.

Aliyu Tambuwal UMAR, *PhD. aliyuumar2@yahoo.com*; Department of Geography, Usmanu Danfodiyo University, Sokoto, Nigeria.

Amoo, I.A., Department of Chemistry, Federal University of Technology, Akure, Ondo State, Nigeria.

Andrew Goudie, *andrew.goudie@stx.ox.ac.uk*; University of Oxford, UK.

Akintuyi, A.O., Department of Geography, University of Lagos, Lagos – Nigeria.

Asiyanbola Raimi A., *rasiyanbola@gmail.com*; Department of Geography & Regional Planning, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria.

Atomode, T.I., Department of Geography, Faculty of Arts & Social Sciences, Federal University Lokoja, Kogi State, Nigeria.

Ayanlade Ayansina, *sinaayanlade@yahoo.co.uk*; Department of Geography, Obafemi Awolowo University, Ile-Ife, Nigeria.

Ayeni, A.O., *ayenia2000@yahoo.com*; Department of Geography, University of Lagos, Lagos – Nigeria.

Aiyesanmi, A.F., Department of Chemistry, Federal University of Technology, Akure, Ondo State, Nigeria.

Damilola Taiye Agbalajobi, *dtagbalajobi@oauife.edu.ng*; *dtagbalajobi@gmail.com*; Department of Political Science, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.

Daramola Adebukola Yewande, *bukidaramola@yahoo.co.uk*; Economic Policy Research Department, Nigerian Institute of Social and Economic Research, Ibadan.

Ebeiyamba Okon, *okon4goodnews@yahoo.com*; Centre for Space Science & Technology Education, P.M.B. 019, OAU Post Office, Ile-Ife.

Attah, E.E., *agbokim_attah@yahoo.com*; Department of Planning and Research, National Population Commission, Abuja, Nigeria.

Emmanuel Enu Attah, *agbokim_attah@yahoo.com*; Department of Planning and Research, National Population Commission, Abuja, Nigeria.

Makinde, E.O., *estherdanisi@gmail.com*; Department of Surveying and Geoinformatics, University of Lagos, Akoka, Lagos +2348054853454.

Wunude, E.O., Department of Geography, University of Lagos, Lagos – Nigeria.

Eludoyin, Olatunde, Department of Geography and Environmental Management, University of Port-Harcourt, Port-Harcourt.

Eze Bassey Eze, *zezebas@yahoo.com*; Department of Geography & Environmental Science University of Calabar, Calabar – Nigeria.

Ezenwaji, E.E., (PhD) *emmaezenwaji@gmail.com*; Department of Geography and Meteorology, Nnamdi Azikiwe University, Awka.

Adesina, F.A., *faadesin@yahoo.com*; Department of Geography, O.A.U. Ile-Ife, Nigeria.

Femi Olokesusi, *femioloke@yahoo.com*; Social and Governance Policy Research Department, Nigerian Institute of Social and Economic Research, Ojoo, Ibadan.

Dada, F.O.A., *foadada@yahoo.com*; Department of Surveying and Geoinformatics, Bells University of Technology, Ota, Ogun State, Nigeria.

Funmilayo, O.A., *olukemiolabode@yahoo.com*; Department of Geography, Adeyemi College of Education, Ondo.

Grace Oloukoi, *oreofeadeniji@yahoo.com*; Lead City University, Ibadan, Nigeria.

Ibrahim Gerarh Umaru, PhD *umaru8@gmail.com*; Department of Economics, Kaduna State University, P.M.B. 2339, Kaduna-Nigeria.

Ibrahim, R.B., Department of Urban and Regional Planning, LAUTECH, Ogbomoso, Oyo State.

Ige, J.O., *joige@lautech.edu.ng*; Department Of Urban And Regional Planning, LAUTECH, Ogbomoso, Oyo State.

Imoh Ukpong, *imohupong@yahoo.com*; Department of Geography & Natural Resources Management, University of Uyo, Uyo, Akwa Ibom State, Nigeria.

Iorkua, S.A., *alimonu2013@gmail.com*; Department of Geography, Benue State University, Makurdi.

Isah, O.I., Department of Geography, Faculty of Arts & Social Sciences, Federal University Lokoja, Kogi State, Nigeria.

Joel, M., Department of Civil Engineering, University of Agriculture, Makurdi, Nigeria.

Kofoworola Aderogba, kofoaderogba@yahoo.com; Department of Geography and Environmental Management, Tai Solarin University of Education, P.M.B. 2118, Ijebu-Ode, Nigeria.

Leslie Petrik, Department of Chemistry, Environmental and Nano Science Unit, University of Western Cape, Cape Town, South Africa.

Akindele-Igbekoyi, M.A., Department of Geography, University of Lagos, Lagos – Nigeria.

Mayowa Fasona, mfasona@unilag.edu.ng; Department of Geography, University of Lagos, Akoka, Lagos, Nigeria.

Michael F. Thomas, m.f.thomas@stir.ac.uk; University of Stirling, Stirling, Scotland, UK.

Moses Bamidele Adewole, badewole@oauife.edu.ng; Institute of Ecology and Environmental Studies, Obafemi Awolowo University, Ile-Ife, Nigeria.

Muili, A.B., muyatpc@yahoo.com; Department Of Urban And Regional Planning, Lautech, Ogbomoso, Oyo State.

Mustapha Sani, mustaphabinsani@gmail.com; Department of Geography, Sokoto State University, Sokoto.

Muhktar Nawait, muknawait@gmail.com; Department of Geography, Sokoto State University, Sokoto.

Mshelia, Z.H., zackmshelia@gmail.com; Department of Geography, University of Ibadan.

Maduekwe, N.I., nnam6p@yahoo.com; Nigeria Population Commission, Ile-Ife, Nigeria.

Obitoyinbo Ademola Solomon, Department of Geography & Regional Planning, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria.

Ode, G.O., Department of Geography, University of Ibadan.

Oderinde, Folasade, *sadeoderinde@gmail.com*; Department of Geography and Environmental Management, Tai Solarin University of Education, Ijebu-Ode.

Olanusi, O.B., *benolanusi@yahoo.com*; Department of Geography, Adeyemi College of Education, Ondo.

Olorunfemi, Felix Bayo, *felixba2000@yahoo.com*; Department of Social and Governance Policy Research, Nigeria Institute of Social and Economic Research (NISER), Ojoo, Ibadan.

Oluwagbenga, O.I. Orimoogunje, *oorimoogunje@gmail.com*; Department of Geography, Obafemi Awolowo University, Ile-Ife, Nigeria.

Olusegun Areola, *olusegunareola@yahoo.com*; College of Environmental Sciences, Bells University of Technology, Ota.

Olusegun Ekanade, *olusegunekanade@yahoo.com*; Department of Geography, Obafemi Awolowo University, Ile-Ife, Nigeria.

Olusola, O.A., *olusolaadeyemi.ao@gmail.com*; Department of Geography, University of Ibadan, Nigeria.

Olutoyin A. Fashae, *toyinafashae@yahoo.com*; Department of Geography, University of Ibadan, Nigeria.

Omosuyi, O.B. (Mrs.) *yemipaul2004@yahoo.com*; Department of Geography, Adeyemi College of Education, Ondo.

Onafeso, O.D., *oluonafeso@yahoo.com*; Department of Geography and Regional Planning, Olabisi Onabanjo University, Ago-Iwoye.

Onwuemele Andrew (PhD), *inofitshout@yahoo.com*; Department of Social and Governance Policy Research, Nigeria Institute of Social and Economic Research (NISER), Ojoo, Ibadan.

Oparaku, L.A., Department of Agric. and Environmental Engineering, University of Agriculture, Makurdi.

Peter Elias, Department of Geography, University of Lagos, Akoka, Lagos, Nigeria.

Tomori, W.B., *tomorifuta97@yahoo.com*; Department of Chemistry, Federal University of Technology, Akure, Ondo State, Nigeria.

Toyobo, E.A., Department of Urban and Regional Planning, Lautech, Ogbomoso, Oyo State.

Vide Adedayo, Department of Geography, University of Lagos, Akoka, Lagos, Nigeria.

Uquetan I. Uquetan, Department of Geography & Environmental Science, University of Calabar, Calabar – Nigeria.