TRADITIONAL SYSTEMS OF ENVIRONMENTAL PROTECTION AND CLIMATE CHANGE MITIGATION AND ADAPTATION IN BAYELSA STATE

IBABA S. IBABA, ELLIOT A. SIBIRI, & INNOCENT B. BARIKOR

Abstract

This paper examined the linkage between traditional systems of environmental protection and climate change mitigation/adaptation in Bayelsa State. Based on a desk study, the paper interrogated some existing traditional/indigenous knowledge on environmental conservation and concluded that they contribute to climate change mitigation and adaptation. The paper notes that although the environmental practices were not purposely designed to deal with climate change, practices that controlled timber lumbering and pollution of water bodies, and also promoted land conservation, are in sync with modern strategies and methods of climate change mitigation and adaptation.

Key Words: Climate Change, environmental conservation, climate change adaptation, climate change mitigation, environmental protection, indigenous knowledge Bayelsa State

Introduction

Climate change has emerged as the greatest environmental challenge in the 21st century. (Bizikova, Neale & Burton 2008). This has attracted the attention of scholars, researchers and policy makers, who have showed concern for the threat it poses to the existence of the present and future generations (GLCA, 2009). Climate Change is a global phenomenon, but its effects are localized, impacting on communities, without regard to who contributed to it. Due to the damaging effects of climate change, governments, scholars and development agencies have focused on mitigation strategies and mechanisms designed to control its occurrence, and adaptation methods to enable man live with it.

In Nigeria, the government has adopted the National Policy on Climate Change and Response Strategy (NPCC-RS), to deal with the problems associated with climate change. The policy targets a reduction in the human factors that makes the country vulnerable to climate change, and also provides a framework for adaptation. However, it ignores the role of traditional systems of environmental conservation in climate change mitigation and adaptation. Similarly, the climate change policy of the Bayelsa State Government also fails to integrate the traditional systems of environmental protection into state policy. The literature has described traditional systems of environmental protection in varied forms. One of such, which captures the consensus in the literature sees it as:

Traditional environmental protection model is based on and relates to local knowledge of

indigenous people and rural people in Nigeria and other countries of the world. Local knowledge of environmental protection has remained a “living law” of traditional society the world over. This living law which is customary law is not only an inheritance but it is also inheritable from generation to generations in the traditional settings (Akpan, 2017, 32).

The linkage between traditional systems or indigenous knowledge to climate change mitigation and adaptation is considered very useful. According to the Climate and Traditional Knowledge's Workgroup (CTKW):

Incorporating traditional knowledge's (TKs) into climate change initiatives can strengthen the applicability of these initiatives by making them culturally appropriate and by applying indigenous peoples' knowledge's and lifeways to develop effective adaptive strategies. TKs may serve to: define earlier environmental baselines; understand the magnitude and effects of variability of ecological processes; help identify impacts that need to be mitigated; provide observational evidence for modeling projections or help to ground truth models; provide technologies for adapting; and identify culturally appropriate values for protection from direct impacts or from the impacts of adaptation measures themselves Another important contribution of TKs to climate change is its holistic perspective, which integrates climate change into a broad range of socio-economic, cultural, and ecological issues. Western science is only beginning to recognize the importance of holistic interdisciplinary perspectives. TKs can serve as a model for integrated climate-change research. In addition, indigenous peoples spend more time (and often over broader areas) on the land or sea than do western scientists and therefore are positioned to make and interpret observations (especially of rare events or species) than others less familiar with the region (CTKW, 2014,8)

Although studies in other areas have noted the role of indigenous knowledge and traditional systems of environmental conservation in climate change mitigation and adaptation it is under indicated in the climate change literature on Bayelsa State, despite the visible traditional environmental conservation systems. (Rim-Rukeh, Ierhievwie, & Agbozu, (2013); Yee Keong, (2017); Anoliefo, Nwokeji, & Ikhajiagbe, (2015)); Ayaa, & Waswa, (2016); Mehta, (2017). Although a study by Sibiri (2014) focused on traditional practices and environmental conservation, it was not related to climate change. This paper seeks to highlight this gap by highlighting traditional environmental practices that contributes to climate change mitigation in Bayelsa State. The discussion begins with a brief on the location and environment of Bayelsa State. This is followed by reflections on the causes and effects of climate change, the traditional environmental practices that contributes to climate change mitigation and adaptation, and finally, the conclusion.

The Location and Environment of Bayelsa State

(a) Location

Bayelsa State is in the heart of the Niger Delta, and is located within latitudes $4^{\circ} 15' 1''$ North and $5^{\circ} 23' 1''$ South and longitudes $5^{\circ} 22' 1''$ West and $6^{\circ} 45' 1''$ East. The State is one of the six oil and gas producing states in the south-south geopolitical zone of the country and is the cradle of commercial crude oil exploitation. The state has a common shore line on the coast of the Atlantic Ocean as its southern frontier. The North–West frontier is bounded by the Niger, Forcados and Ramos Rivers, and the Bomadi creek which marks the western boundary with Delta State. The North–East frontier is bounded by the Ahoada West Local Government Area of Rivers state, while the eastern frontier is bounded by Akuku-Toru Local Government Area, also of Rivers State, as demarcated by the St. Bartholomew River through the Brass Creek to the Santa Barbara estuary. Bayelsa State is the southernmost state in the country and the southern shores are less than five degrees of latitude north of the equator. Figure 1 highlights the eight Local Government Areas (LGAs) in Bayelsa State and its location in Nigeria

Figure 1: Map of Bayelsa State showing the eight LGAs and the capital Yenagoa

Source: Brisibe and Pepple, 2018, 173

The state is criss-crossed by several lakes, rivers and creeks, which in addition to the swampy terrain constitutes about 75 percent of its land mass covering an area of about 11,109 square kilometres. Figure 2 show the Ijaw settlements at the lower part of the map, demonstrating the difficult terrain of the area. Rainfall is heavy, and is more persistent between April and November. The temperature ranges between 20 and 30 degrees centigrade. Its physical features can be categorized into three belts namely; fresh-water swamp area, sandy beach ridges, and salt

water swamp area. It is also characterized by annual seasonal floods which last between July and November.

(b) Environmental Challenges

Bayelsa State is faced with both oil and non-oil related environmental problems. The oil related environmental problems are largely made of oil spills and gas flare. Resulting from the operations of oil exploration and production. Oil industry in Nigeria is associated with operational and equipment failures that results in oil spillages. These oil spills have destroyed farmlands, marine life, crops, economic trees and nutrient value of impacted soils. As a consequence of these effects, agricultural output has declined, and the local economies have been destroyed, leading to occupational displacements and the exacerbation of poverty. Similarly, gas flaring, which is very massive in Nigeria, has contributed to ecological devastation and productivity losses. On the other hand, human activities such as tree felling, erosion, use of chemicals for fishing, bush burning, among others, have contributed environmental pollution and unsustainable exploitation of resources that now puts the environment at risk.

(c) Climate Change Related Environmental Challenges

Due to its universal impact, climate change has impacted on the environment in Bayelsa State in varied forms as captured in Table 1 below.

Table 1: Environmental Problems linked to Climate Change

Climate Change Effect	Type of Environmental Problem	Impact on Environment
Sea Level Rise	(a)Coastal/ river bank erosion	(i) Loss of coastal vegetation (ii) Destruction of settlements and economic infrastructure such as oil pipelines (iii) Destroys farmlands, crops, and economic trees (iv) Removes top soil
	(b)Coastal Flooding	(a) Enhances the Intrusion of sea water into fresh water sources. (ii) Increases the salinity of surface and underground water (iii) Worsens erosion (iv) Removes top soil (v) Destroys settlements and infrastructure such as roads (vi) Destroys farmlands and crops
Change in Rain Fall Pattern	Makes the dry and rainy season unpredictable	Disrupts agricultural activities and reduces crop yield

Source: Adapted from Uyigue & Agho, 2007, pp.8-12; Efe 2010, pp.2-3; Onuoha & Gerald, 2010, pp.11-19

Climate Change: Causes and Effects

Climate change is the variation in the Earth's global or regional climate overtime (Etuonovbe, 2008, p.4) as a result of natural variability or anthropogenic factors caused by increasing concentrations of greenhouse gases (GHGs)¹. The production and consumption patterns of different regions and countries have resulted in the" emission of high volumes of gaseous materials such as carbon dioxide (CO₂), methane (CH₄) and Chlorofluorocarbons (CFC) into the atmosphere, leading to the absorption of the earth's radiation, warming of the earth's surface, and altering of the world's climate" (Efe, 2011, p.43). "The burning of fossil fuels (oils, natural gas and coal); burning of wood, wood products, and solid wastes; raising of livestock and the decomposition of organic wastes ion solid wastes landfills; combustion of solid wastes and fossil fuels in industrial and agricultural activities; bush burning; and deforestation" (Idowu, Ayoola, Opele, & Ikenweiwe, 2011, p. 147) are the primary sources of GHGs that have resulted in global warming.

All countries of the world, both developed and developing contribute to climate change. For example, Russia, Nigeria, Iran, Iraq, Algeria, Angola, United States, Kazakhstan, Libya, and Saudi Arabia contribute to climate change through gas flaring. Data indicate that in 2010, these ten countries flared a total of 3,364 billion cubic feet of gas (ERA, 2007, P.7).). Nigeria is a major culprit of gas flaring in the world. In 1970 for example, it flared 91.04 percent of the 8.04 trillion cubic feet of gas it produced (Adeyemo, 2008, p.64). Available information indicates that as at 1993, Nigeria flared gas more than any other country in the world and contributed significant release of CO₂ into the atmosphere estimated at 30 million tons in 1989 and 35 million tons in 1994 (Singh, Moffat & Linden, 1995, p. 50). Akinro, Opeyemi, & Ologunagba, (2008) have also noted that Nigeria is "the highest emitter of greenhouses in Africa". The country is reported to have 123 flare sites and some 45.8 billion kilowatts of heat are discharged into the atmosphere.... from flaring 1.8 billion cubic feet of gas every day" (2008, p., 170).

Essentially, climate change manifests as "increases in global temperatures (or global warming); changes in cloud cover and precipitation particularly over lane; melting of ice crops and glaciers; and reduced snow cover and increases in ocean temperatures and ocean acidity" (Akinro, Opeyemi, & Ologunagba, 2008, p., 167). Global warming is expected to make the climate warmer, wetter, and wilder' (Berghot & Lujala, 2012, p.147). On account of climate change, the earth's temperature is estimated to increase by 0.3⁰-1.1⁰ since 1990, an increase that is expected to result in increase precipitation in about 2-3 percent fo reach degree of global warming and sea level rise by 50cm (Efe, 2011, p.54).The Intergovernmental Panel on Climate Change (IPCC) has made some forecast on climate change impact on different regions of the world that raises serious concerns for development and human existence.

¹ They are called greenhouse gases because they display effects similar to that in a 'greenhouse'. The glass in a 'greenhouse' allows the sunlight to pass through but trapping the heat formed and preventing it from escaping, thereby causing a rise in temperature.

Table 2: Forecast on Climate Change Effects on different Regions of the World

Region	Forecast
North America	Decreasing snowpack in the western mountains; 5-20 percent increase in yields of rain-fed agriculture in some regions; increased frequency, intensity and duration of heat waves in cities that currently experience them
Latin America	Gradual replacement of tropical forest by savannah in eastern Amazonia; risk of significant biodiversity loss through species extinction in many tropical areas; significant changes in water availability for human consumption, agriculture and energy generation
Europe	Increased risk of inland flash floods; more frequent coastal flooding and increased erosion from storms and sea level rise; glacial retreat in mountainous areas; reduced snow cover and winter tourism; extensive species losses; reductions of crop productivity in southern Europe
Africa	By 2020, between 75 and 250 million people are projected to be exposed to increased water stress; yields from rain-fed agriculture could be reduced by up to 50 percent in some regions by 2020; agricultural production, including access to food may be severely compromised
Asia	Freshwater availability projected to decrease in Central, South, East and Southeast Asia by the 2050s; coastal areas will be at risk due to increased flooding; death rate from disease associated with floods and droughts expected to rise in some regions.

Source: Adapted from National Aeronautics and Space Administration (nd), Vital Signs of the Planet: Global Climate Change, www.nasa.gov

The above indicates the impacts of Climate change and the huge disaster that awaits the world if it remains unchecked. The literature has noted that climate change effects are environmental, social, economic and political. Although the discussion of the impacts was initially based on projections and potentialities, empirical literature has emerged to document actual impacts of climate change in some regions and countries. Droughts, floods, and typhoons have become typical environmental effects of climate change globally. However, because of the link between the environment, development and the social well-being of man, climate change has triggered socio-economic and political problems. An exciting debate has emerged on the linkages between climate change, economic growth, conflict, and political stability. One of such literatures made this point that:

An evolving consensus that the earth is becoming warmer has led to increased interest in the social consequences of climate change. Along with rising sea levels, varying patterns of precipitation, vegetation, and possible resource scarcity, perhaps the most incendiary claims have to do with conflict and political violence. A second consensus has begun to emerge among policymakers and opinion leaders that global warming may well result in increased civil and even interstate warfare, as groups and nations compete for water, soil, or oil.... climate change will give rise to an increase in heated confrontations as communities compete in a warmer world (Gartzke, 2012, p. 177).

The point here links climate change to future resource scarcity and conflicts in countries, a debate that is hinged on the resource scarcity-violence nexus. Resource scarcity is linked to frustrations, discontent and grievances that create conditions for conflict (Evans, 2010; FT, 2010). Given that the environmental effects of climate change tend towards resource scarcity, the concern is that climate change effects can either trigger or aggravate conflict. However, the literature does not suggest a cause and effect relationship between climate change and conflict; neither does it argue that climate change can stand alone as a causal factor of conflict. Rather, it posits that climate induced resource scarcity makes society prone to violence in combination with other factors. While some look at this from the point of inter-state violence, others consider intra/inter-ethnic or communal violence (Slettebak, 2012; Gartzke, 2012 ;) Hendrix & Salehyan, 2012; Bergholt & Lujala, 2012).

The other point is that climate change impacts negatively on economic growth and by extension poverty reduction. Although there are no quantitative data to illustrate this point, empirical studies have provided a strong indication that climate change effects undermine economic growth. For example, Koubi, Bernauer, Kalbhenu, & Spilker (2012) noted in a study on “Climate Variability, Economic Growth, and Civil Conflict”, that “rainfall growth increases economic growth in Africa, just as higher temperatures have negative effects on economic growth in poor countries” (117). Agreeing with this, Devitt & Tol (2012) notes that climate

change slows growth and traps some countries in poverty, while Bergholt & Lujala (2012) insists that climate-related natural disasters impacts negatively on growth and highlighted the impacts of climate related disasters on economic activity to include- “income changes, demand and supply shocks, shifting terms of trade, and increased inflation (P 148). In a study entitled, “A Review of Linkages between Climate Change, Agricultural Sustainability and Poverty in Malaysia”, Siwar, Alam, Murad, & Al-Amin (2009) concluded that:

The development rates of agriculture crop... accelerate in response to an increase in CO₂ concentration from 160 ppm (parts per million) to 900 ppm with standard temperature (<35oC). But the increasing temperature above the tolerance limit (>26oC) and CO₂ variation reduces the photosynthesis, increase the respiration and shorten the vegetation and grain-filling periods and ultimately decreases the overall Malaysian agriculture yields (p.315)

The issues raised above points to the negative impacts of climate change on economic growth, necessitation mitigation and adaptation.

Traditional Systems of Environmental Protection and Climate Change Adaptation/Mitigation in Bayelsa State

The traditional systems of environmental conservation are governed by customary law, which guides resources exploitation. Thus, for example:

... Community law restricts the exploitation of the forests resources only to the indigenous people.....a stranger.....can only be allowed if he is found worthy and upon the regular payment of tributes and compliance with all the laid condition.....customary laws ensure that the forest of the community were categorize. some were categorized as evil forest.....exploitation of the resources in such forest was considered a taboo.....some other forests were regarded as the natural abode of the community's deity..... the cutting of wood or trees was absolutely prohibited.... even the forest that open for general exploitation, restrictions were imposed on their exploitation. The felling of some trees species was out rightly prohibited..... there were restriction as to the size of the trees that must be cut, very young trees were prohibited from being felled..... the collection of medicinal plants and woods were reserved for the "professionals" (Environmental Watch, December 2001:6)

The customary laws gave rise to traditional systems of environmental conservation such as a "Bouteri" "Toruteri and "Suo Kiri" (Bush fallow). "Bouteri" was a cultural practice that limited some productive activities for a period. For example, Palm cutting, Timber lumbering and hunting are not allowed during the period. Generally, the duration is for a minimum of 4 months per annum. The thinking here is that the “holiday” period creates a regeneration period for the vegetation which supports life. This helps to check over use and thereby helps to retain the quality of the environment. However, the practice has been abandoned due to the erosion of cultural values, poverty and high population growth. “Toruteri” is only applicable to rivers creek, lakes and other fishing grounds. Its mode of operation is similar to the “bouteri -system”, Thus a period of the year, usually from October to January, is closed to the use of some fishing gears for fishing. What this means is that for a period of about 4 months, the use of certain gears for fishing are outlawed. It is significant to note that only the hook is permitted for fishing. All

categories of fishing nets are banned for use during this period. This was designed to check over fishing; thus, protecting the quality of the environment.

One major practice, which facilitated the “totureri” culture, was the ownership of rivers, creek, etc. by families or communities. However, State-laws removed such ownership from the people, leading to abandonment of the practice. Bush fallow is a system where farmlands not exploited for a period (usually 3-5 years) after harvesting has taken place. The method sought to check over farming. The ultimate objective is to retain the quality of the nutrient value of the soil. However, High population growth, poverty and the acquisition of land by government and oil companies for their activities has led to land fragmentation which in turn has destroyed the bush fallow system. Thus, in the communities the fallowed period has been reduced to one year or is no longer practiced. In Bayelsa State, some portion of land is considered to be sacred or evil. The sacred lands are thus dedicated to the gods of the land. On the other hand, evil land is that which is used to bury some category of persons, such as Wizards and Witchcrafts, women who die with pregnancy, accident deaths, etc. A significant feature of such lands is that no form of economic activity takes place in them, no farming, no hunting for game, etc. Given this, the entire area set aside as “sacred or evil land” retains its natural vegetation without any form of distortion. Indeed, they can be compared to any of the government -defined environments, which are conserved or reserved. Certainly, this can be seen as a traditional system of environmental conversation.

Religion and changes in cultural values has undermined this. For example, Christians have challenged the usefulness of the sacred/evil forest. These forests are now exploited for agricultural activities, or used for the execution of government projects. The traditional systems of environmental conservation have great prospects for environmental projects. The traditional systems of environment conservation have great prospects for environmental conservation in the communities, as it helps to sustain the naturalness of the environment. They are however associated with problems, which include depriving the people from their means of livelihood for a given period of time (“bouteri and toruteri” for example). Perhaps of more significance is the fact that the traditional systems of environmental conservation come into conflict with government policies and programmes. For example, the traditional ownership rights which reinforced the traditional systems of environmental conservation, is in conflict with state laws which places land ownership with the government (Land Use Decree). The people thus have limited rights, undermining their interest in environmental protection. The World Bank Report on the Niger Delta (1995:89) noted in this regard that:

...Without complete title to their land, communities and individuals are unlikely to manage it for maximum sustainable benefits. Instead, inhabitants place greater emphasis on managing the land for uses they control, such as agriculture, over resources, which they have less control, such as timber, thereby leading to inefficient use of the land... for example, farmers are unlikely to invest in land improvement if their ownership of the land is uncertain.

It is proper to argue here that the land Use Act has weakened traditional systems of land conservation. It therefore negates sustainable development. Equally, Government functionaries often time misunderstand the values and norms of the people. For this reason, the traditional systems of environmental conservation n are seen to be “crude” practices. Thus, for example, “sacred” lands have been acquired for government’s development programs. Indeed, a mass of evidence show that several conflicts between the communities and oil companies operating in the area is traceable to the violation of cultural practices by the companies. Such conflicts, at times violent, have resulted to loss of lives and property, negating wealth creation and poverty reduction that are objectives of sustainable development. In another dimension, the traditional systems of environmental protection are seen to constitute a violation of human rights. The restrictions it places on farming, and other economic activities are seen as obstacles to individual’s liberties, particularly economic right. Individual and groups who hold this view have challenged these cultural practices. This partly explains the abandonment of these traditional systems of environmental protection by some communities in the State. The Gbarain clan is an example.

Conclusion

This paper interrogated the linkage between traditional systems of environmental protection and climate change mitigation/adaptation in Bayelsa State. It observed that the culture of the people has made several provisions for environmental protection and sustainable exploitation of resources in a manner that contributes to climate change mitigation and adaptation. The paper pointed out that although the indigenous practices were not designed to deal with climate change, practices that controlled timber lumbering and pollution of water bodies, and also promoted land conservation, are in sync with modern strategies and methods of climate change mitigation and adaptation. It noted however that government legislations have undermined the efficiency of these cultural practices, just as the observance of human rights provisions of the country’s constitution have made it difficult to execute some of these practices that clashes with some economic rights. However, it is the view of the paper that the traditional systems of environmental protection can be integrated with modern practices and requirements of state legislations and conventions on human rights to help secure the environment and subsequently contribute to climate change mitigation and adaptation.

References

- Adeyemo, A.M (2008). Environmental Policy Failure in Nigeria and the Tragedy of Underdevelopment of Niger Delta Region, Inaugural Lecture No. 63, University of Port Harcourt
- Akinro, A.O., Opeyemi, D.A. & Ologunagba, I.B. (2008). Climate Change and Environmental Degradation in the Niger Delta of Nigeria: Its Vulnerability, Impacts and Possible Mitigations, *Research Journal of Applied Sciences*, 3 (3) 167-173

- Anoliefo, G.O., Nwokeji, P.A. & Ikhajiagbe, B. (2015). Influence of Traditional Taboo Practices on Natural Resource Conservation in Uli, Ihiala Local Government Area of Anambra State Nigeria, *Journal of Environmental Sustainability*, 4 (4), 1-13
- Apkan, M.J.D. (2017). Fusion of Traditional and Modern Environmental Protection Models and Laws in Nigeria: A Case Study of Lagos and Akwa Ibom States Environmental Protection and Waste Management Laws, *Journal of Educational Policy and Entrepreneurial Research*, 4 (3), 32-45
- Ayaa, D.D & Waswa, F. (2016). Role of Indigenous Knowledge Systems in the Conservation of the Bio-Physical Environment Among the Teso Community in Busia County-Kenya, *African Journal of Environmental Science and Technology*, 10(12), pp. 467-475.
- Bergholt, D. & Lujaka, P. (2012). Climate-Related Natural Disasters, Economic Growth and Armed Civil Conflict, *Journal of Peace Research*, 49 (1)147-162
- Bizikova L., T. Neale & I. Burton (2008). Canadian communities' guidebook for adaptation to climate change. Including an approach to generate mitigation co-benefits in the context of sustainable development (First Edition), Environment, Canada and University of British Columbia, Vancouver.
- Brisibe, W.G. Pepple, T.D. (2018). Lessons Learnt from the 2012 Flood Disaster: Implications for Post-Flood Building Design and Construction in Yenagoa, Nigeria. *Civil Engineering and Architecture* 6(3): 171-180, 2018
- Climate and Traditional Knowledges Workgroup (CTKW) (2014).Guidelines for Considering Traditional Knowledges in Climate Change Initiatives, www.climatetkw.worldpress.com
- Devitt, C. & Tol, R.S. (2012). Civil War, Climate Change and Development: A Scenario Study for Sub-Saharan Africa, *Journal of Peace Research*, .49 (1)129-145
- Efe, S. (2011), Climate Change and Flood Hazards in the Niger Delta Region of Nigeria, *Niger Delta Research Digest*, 5,.43-60
- Efe, S.I & Ndakara, E.O. (2010), Environment And Sustainable Development: Climate Change and Vegetation in Gas Flaring area of Western Niger Delta Region of Nigeria, paper presented at the International Conference on Natural Resource, Security and Development in the Niger Delta, Organized by the Department of Political Science, Niger Delta University, in Collaboration with the Centre for Applied Environmental Research, Department of Geosciences, University of Missouri Kansas City, USA, March 8-11, 2010, Yenagoa, Bayelsa State, Nigeria.
- Environment Watch*, 11th -25th March, 2002.
- Environment Watch*, 16th – 31st October, 2001.
- Environment Watch*, December, 1998.
- ERA (Environment Rights Action) (2011). Mired in Fossil Trap, The Nigerian CMD Report
- Etuonovbe, A.K. (2008). Sustaining Coastal Management/Adaptation of Climate Change and Sea Level Rise in the Niger Delta, Integration Generation, FIG Workshop Week, June 14-19, Stockholm, Sweden.
- Evans, A. (2010). Resource Scarcity, Climate Change and the Risk of Violent Conflict, Centre on International Cooperation, New York University, [www.cic.nyu.edu/international security/scarcity.html](http://www.cic.nyu.edu/international/security/scarcity.html).

- Gartzke, E. (2012). Could Climate Change Precipitate Peace? *Journal of Peace Research*, 49 (1)177-192
- GLCA (2009). (Global Leadership for Climate Action) Facilitating an International Agreement on Climate Change: Adaptation to Climate Change, www.globalclimateaction.org
- Hendrix, C.S. & Salenhyan, I. (2012). Climate Change, Rainfall, and Social Conflict in Africa, *Journal of Peace Research*, 49 (1) 35-58
- Idowu, A.A., Ayoola, S.O. Opele, A.I. & Ikenweije, N.B. (2011), Impact of Climate Change in Nigeria, *Iranica Journal of Energy and Environment*, 2 (2) 145-152
- Koubi, V. Bernauer, T. Kalbhenn, A. & Spilker, G. (2012), Climate Variability, Economic Growth, and Civil Conflict, *Journal of Peace Research*, 49 (1) 113-127
- Mehta, S. (2017). Role of Traditional Practices in Conserving Environment: A Case of Manesar Village, Gurgaon, *IOSR Journal of Humanities and Social Science (IOSR-JHSS)* 22 (11), 10-16
- Onuoha, F.C. & Gerald, G.E (2010) Climatic Change and National Security: Exploring the Theoretical and Empirical Connections in Nigeria, paper presented at the International Conference on Natural Resource, Security and Development in the Niger Delta, Organized by the Department of Political Science, Niger Delta University, in Collaboration with the Centre for Applied Environmental Research, Department of Geosciences, University of Missouri Kansas City, USA, March 8-11, 2010, Yenagoa, Bayelsa State, Nigeria
- Rim-Rukeh, A., Irehievwe, G. & Agbozu, I.E. (2013). Traditional beliefs and conservation of natural resources: Evidences from selected communities in Delta State, Nigeria, *International Journal of Biodiversity and Conservation*, 5(7), 426-432
- Sibiri, E.A. (2014)). Totemism and Environmental Preservation among Nembe People in the South-South Zone, Nigeria, *Mediterranean Journal of Social Sciences*, 5 (7), 519-529
- Singh, J., Moffat, D. & Linden, O. (1995), Defining an Environmental Development Strategy for the Niger Delta, World Bank, Report, Vol. 1.
- Siwar, C., Alam, M.M., Murad, M.W. & Al-Amin, A.Q. (2009), a Review of Linkages between Climate Change, Agricultural Sustainability and Poverty in Malaysia, *International Review of Business Research Papers*, 5 (6) 309-321
- Slettebak, R.T (2012), Don't Blame the Weather! Climate-Related Natural Disasters and Civil Conflict, *Journal of Peace Research*, 49, (1) 163-176
- Uyigue, E., & Agho, M., (2007), Coping with Climate Change and Environmental Degradation in the Niger Delta of Southern Nigeria, Community Research and Development Centre (CREDC), Benin, Nigeria
- Yee Keong, C. (2017). Sustainable development: The Nexus of Environmental Sustainability, Values, and Ethics, *European Journal of Sustainable Development*, 6 (1), 308-324

Authors' Profile

Ibaba Samuel Ibaba is Professor of Political Science (Development Studies), at the Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria. His research interests focus on peace, conflict and security, and sustainable development. He has published books and articles/papers on these areas. He can be contacted via eminoaiibaba@yahoo.com

Dr. E.A Sibiri is a Reader in the Department of Sociology, Niger Delta University, Wilberforce Island, Bayelsa State. He had his B.Sc., M.Sc., and PhD. Degrees in Sociology from the University of Port Harcourt. He is a member of several learned and scholarly societies such as; the Nigerian Anthropological and Sociological Association (NASA), Research and Development Network (RDN), National Association of Research Development (NARD) etc. His areas of interest include environmental sociology, sociology of development, socio-cultural studies, social change and problems and political sociology. The author has several articles published in both international and local journals, including several book chapters in reputable edited books. He currently serves as a peer reviewer for an internationally recognised Journal: The Mediterranean Journal of Social Sciences. He has also co-edited a book titled *“Major Themes in Sociology: An Introductory Text”*. He can be contacted via oyinkulesibiri@yahoo.com

Innocent B. Barikor holds a B.Sc and a PhD degrees in Political Science from the University of Port Harcourt. He also holds a diploma in Procurement Management in Public Sector from the International Labour Organisation's, International Training Centre in Turin, Italy. He is the author of several Journal Articles and chapters in Books. His research interest have been in areas of political economy, comparative politics and Development Studies. He also has significant experience in the Public Service. Innocent Barikor has served as the Rivers State Coordinator of the National Poverty Eradication Programme [NAPEP] and a Member of the Rivers State House of Assembly. He is currently a Senior Lecturer at the Department of Political and Administrative studies, University of Port Harcourt