
VULNERABILITY TO CLIMATE CHANGE AND CONFLICT IN NIGERIA

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ABSTRACT

Climate change refers to change in climate attributable directly or indirectly to human activities, that alters the atmospheric composition of the earth. It has potential of affecting all human natural and cultural systems. Recent events have emphatically demonstrated our growing vulnerability to climate change, and may be a threat to human development and survival. Socially, politically and economically, these might leads to competition for scarce resources, which enhances and creates socio-environmental conflicts. However, in the quest for individual and collective responses to the possible impacts of climate change on humankind, there has been review of the situation from a conflict-sensitive perspective. To establish the way in which the effect of climate change can cause or further intensify socio-environmental conflicts. This paper has been prepared on the basis of survey carried out using primary and secondary sources.(interviews with selected key stakeholders and documentation including projects, press articles, official statistics).It later argued for the need to develop appropriate strategies in mitigating the impacts of these vulnerability to climate change on Nigeria environmental conflicts, The paper concludes that development and implementation of appropriate policy instruments will be important in ensuring that the country effectively addresses its adaptation challenges to deals with the issue of vulnerability to climate change and conflict management in Nigeria

Keywords; *Climate change, Environmental-Conflicts, Adaptability, Vulnerability, Mitigation.*

INTRODUCTION

It is now established that humanity is altering the concentration of greenhouse gases and aerosols, both of which influence, and are influenced by climate. Recently, and especially over the past three or four decades, the issue of global climate change due to the greenhouse effects, including global warming and sea level rise have been a subject of scientific discussions and public Climate debate. Change is a pattern of change affecting global or regional climate as measured by such things as average temperature and rainfall, or an alteration in frequency of extreme weather conditions. This variation may be caused by both natural processes and human activity. The impacts of climate change are already being experienced across the globe. The Intergovernmental panel on climate change (IPCC) concludes that human activity, (primarily related to fossil fuel consumption) is largely responsible .While climate change will affect everyone; it is expected to have a disproportionate effect on those living in poverty in developing countries. The IPCC Third Assessment Report, which assesses climate research up to 2001, concludes that global average temperature has increased by 0.6oc, over the 20th century and is predicted to increase by 5.8oc between 1990 and 2100; and average precipitation has increased over tropical latitudes by about 2 to 3% throughout the 20th century, and on average has

decreased by about 3% in the sub-tropics. These changes are leading to environmental impacts, such as global average sea level rise of 10 to 20cm over the last 100 years (expected to rise a further 10 to 90cm by 2100), and an increase in frequency and intensity of drought in parts of Asia and Africa in recent decades. Many of these changes have already led to multiple socio-economic impacts (i.e. changes in rainfall patterns, frequency and severity of drought flood, storms, sea level rise, and glacial melt). (IPCC 2001).

Nigeria like other developing countries contribute insignificantly to the greenhouse emissions but no matter the level of contribution, climate change and rise in sea level will have significant impacts locally regionally and globally, creating problems for sustainable development and resources management. Indeed climate change and sea level rise would compound the serious problems of sustainability of the environment and management of resources, as well as the currently serious problems in population consumption patterns and characteristics in many parts of Africa and other developing countries. A conflict on its own is disagreement between individuals or groups of people over ideas or interests is a normal part of life. It is neither good nor bad: it is how it is managed that is important. Wilmot and Hocket (1998) assert that conflict is an expressed struggle between at least two interdependent parties who perceived incompatible goals. Scarce resources and interference from other in achieving their goals, they said conflict can be destructive and constructive. Whatever form conflict takes, it is likely to have several impacts, which may include physical harm to humans and natural resource base, impact on productivity levels and economic developments more generally. In man's relationship with his environment, Dansereau (1960) remarked in his ecological Law of the optimum, that no species encounters in any given habitat (environment) the optimum conditions for all its functions. Man therefore tends to modify his environment to satisfy his needs and desires. The process of doing this implies an encroachment on the constituents of the ecological balance and in most cases breeds conflict rather than peace (Phil-Eze, 2009).

Conflicts between people and their environment are known as socio-environmental conflicts, and they have increased considerably in recent decades including in Nigeria. A socio-environmental conflict happens when two or more interdependent actors disagree as to the distribution of certain material or symbolic elements related to the control, use of, and access to natural resources and act on the basis of these inconsistencies. These conflicts are social events, and due to the impacts they cause in the public arena they contain not only social and environmental aspects, but also economic, cultural and political dimensions. There are multiple factors contributing either directly or indirectly to the emergency of the situations, such as the overexploitation of resources, disproportionate consumption, population explosion, the inequality distribution of Natural resources, inconsistencies in policies and lack of appropriate public policies. The climate changes that lead to rising sea levels, flooding or droughts might force people to move temporarily or permanently to another safer place where there is access to shelter, water and food. These population shifts mean that there are more people seeking access to food or land. These can be seen as competition over

resources land, food and water, which can engender conflicts. Changes in climate also have different impacts all over the world some positive and some negative; rising sea levels can flood farmlands and disrupt or harm fish populations. Severe or extreme weather events can disrupt or harm agricultural land. According to research of the US Institute of Peace and Independent Nigeria's (1999) climate is likely to see growing shifts in temperature, rainfall, storms, and sea levels throughout the 21st century. Poor adaptive responses to the shifts could help fuel violent conflicts in some area of the country. The report stated that casual mechanism links climate change with violence in Nigeria. Under it, poor responses to climatic shifts create shortage of resources such as land and water, and are followed by negative secondary impacts, such as more health problems hunger, and joblessness. Poor responses to these, in turn, open the door to conflicts. Migration is also something of wild card among the climate change-induced conflict risks. Nigerian could move in anticipation of climate-related crises or flee trouble once it land. Results again could be mixed: relocating might lessen the resources shortages or deepen them, both in the spots migrants leave and the places they moves.

CONCEPTUAL OVERVIEW ON CLIMATE CHANGE AND CONFLICTS

Climate change has been blamed upon human activities which result in increased release of green house gases and widespread deforestation both of which alter the balance of atmospheric gases in favors of the green house gases (GHGs). These greenhouse gases are carbon dioxide-carbon monoxide (CFCS) (Fawehinmi, 2007). In addition, that methane nitrous oxide, chlorofluorocarbons (CFCs) added to these gases increases these GHGs leading to the progressive depletion of the ozone layer in the stratosphere (Goldberg 1994). The ozone layer is the shield that absorbs about 90% of the harmful dectro-magnetic energy emitted by the sun on the earth. The abundance of greenhouse gases result in phenomenon of greenhouse effect, the greenhouse gases allowed shortwave energy to get to lower atmosphere but held back long wave radiation from escaping thus regulating the earth's heat budget. It is now widely recognized that climate change is having will have significant impacts on social ,economic and ecological systems and processes as socio-economic inequalities widen locally as well as globally (Intergovernmental Panel on Climate change, IPCC, 2007). Thomas (2007) states that an examination of climate change needs to include the relationships between global process (including emissions effects and international convections), national responses and local outcomes, and particularly the effects of national decisions and policies on local opportunities and abilities to adapt. Thus aspects relating to environmental conflicts are important to consider.

Barnet and Adger (2007) Observes that climate change is increasingly being called a security problem because there is concern that climate change may increase the risk of violent conflict. The underlying proposition is that climate change is likely to undermine human security by reducing the natural resource base and limiting access to existing natural resources which are central to sustainable live hoods, especially in developing countries. The impacts of climate change on socio-political systems are many, thus Davis (2001) cited in (Barnet and Adger 2007) shows how the El Nino. Events and famines of 19th century,

triggered by droughts resulted in political and economic colonization that deprived local people of their entitlements to natural resources, and another example is the issue of Barkasi- Peninsular conflicts between Nigeria and Cameroon in which some local people have been deprived of their right.

Vulnerability Concepts: Vulnerability can be conceptualized in many different ways along a continuum from outcome to contextual vulnerability. Outcome vulnerability is characterized by the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change ,including climate variability and extremes while contextual vulnerability assesses `the susceptibility of a system to disturbances determined by exposure to perturbations, sensitivity to perturbations, and the capacity to adapt(IPCC,2001; Pearson and Langridge, 2008). Furthermore, vulnerability is influenced by both physical and socioeconomic characteristics which are themselves not static implying that vulnerability is context specific, and specific to place, time and the perspective of those assessing it (Adger, 1996; Aandahi, and O'Brien. 2001). The context specific nature of vulnerability means that there can be no single, unified or general purpose approach to conceptualizing it (Pearson and Langridge, 2008). Consequently, IPCC (2001). Defines vulnerability as "the degree to which a system is susceptible, or unable to cope with adverse effects of climate change, including climate variability and extremes. It is therefore a function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity Blaiki et al (1994) argues that households that have access to resources and social networks are less vulnerable. Although they may experience greater losses (in absolute terms) than the poor it can be argued that resources-rich households are more resilient in that they recover more quickly from a stress, stimulus.

A common theme in the climatic change vulnerability literature is the idea that countries, regions, economic sectors and social group differ in their degrees of vulnerability to climate change. This is due partly to the fact that changes in temperature and precipitation will occur unevenly and that climate change impacts will be unevenly distributed around the globe. This in turn is due to the fact that resources and wealth are distributed unevenly. Though vulnerability differs substantially across regions, it is also recognized that even within regions, vulnerability will vary (IPCC, 2001) While the word adaptation has been defined by different people in different ways. These numerous definitions are as a result of variation in the perception of the word by different people

Adaptation Concepts means, the way of reducing vulnerability, increasing resilience, moderating the risk of climate impacts on lives and live hoods, and taking advantage of opportunities posed by actual or expected climate change. Adaptation to climate has been defined as the process through which people reduce the adverse effect of climate on their health and well-being, and take advantage of the opportunity that their climatic environment provides (Burton 1992, quoted in Smit et at, 2000). Similar, adaptation involves adjustments to enhance the viability of social and economic activities and extreme events as well as longer-terns climate change (Smit, 2000, quoted in Smit, et al, 1993).

In one case, vulnerability depends on the adaptation that has taken place; in the other words, vulnerability is defined in terms of capacity to adapt and capacity to respond to stress is a starting point for impact analysis. However, the propensity of systems to adapt is influenced by certain system characteristics that have been called "determinants of adaptation" in the literature. These include terms such as 'sensitivity', 'vulnerability', 'resilience', 'susceptibility', and 'adaptive capacity' among others.

Mitigation Concepts of Climate Change; refers to taking actions to reduce green house emissions as well as enhancing "sinks" so as to reduce the extent of global warming. In other words, mitigation of climate change involves measures aimed at reducing GHGS emissions through improved efficiency of energy use, reduced deforestation, a switch to non-fossil fuels, and or capture of GHGS emissions underground and in oceans, vegetation and soils. Nordas and Gleditsch (2007). State that conflict-inducing effects of climate change have emerged in the literature and although several casual chains and/or paths to these conflicts have been suggested. While fundamental environmental factors for environmental migration are land degradation, droughts, deforestation, water scarcity, floods, storms and famines linked to food insecurity (Reuveny,(2007), environmental migration can also result from development. This point is shown in Omolo's (2010) opines that, in the light of increased droughts and given that livestock forms the foundation for food security in Kenya ,competition over grazing land and water has increased ,leading to violence. While the author reports that people have adopted a number of coping strategies to deal with climate variability, such as diversification into Agriculture, vulnerability is intensified because of an increase in militarized cattle raiding, attributed in part to economic decline in the Horn of Africa Reuvey (2007) opines that climate change-induced migration, which is likely to be more frequent given the extreme weather events, can create and intensify violent conflicts This is particularly frequent in developing countries where because of limited options to adapt to or mitigate climate change, people are migrate from the affected regions.

Changes in climate are expected to have major negative consequences in certain parts of the world. In developing country like Nigeria are likely to see significant drops in food production, with increased temperatures possibly accelerating grain sterility, shifts in rainfall patterns accelerating erosion and desertification and rendering land infertile, sea-level increases and flows inundating farmlands and disrupting fish populations, and extreme weather events disturbing agricultural processes. Water scarcity also may increase with shifts in rainfall, while disease may spread with increased temperatures. Thomas and Twyman (2005) identify the implications of climate change for equity and justice among vulnerable groups at local and sub-national levels. Equity and justice, they assert, are important to consider because the poorest and most vulnerable groups (especially in developing countries where the natural resource dependency is high) will disproportionately experience the negative effects of climate change. There is unsurprising consensus that climate change will have disproportionately harmful socio-economic effects on developing countries, (i.e. Nigeria) even though they have contributed to it least. Another leading report in this area is the " Stern Review", prepared for the British government by economist Sir Nicholas Stern argues that

developing countries are particularly vulnerable because of their topical geography; their high population growth, heavy dependence on agriculture and rapid urbanization; and their weak infrastructures and lack of resources. It also discusses a broad range of effects that countries or regions may experience. The Stern report and other studies have suggested that climate-induced scarcities – of food, water and health – will increase poverty, affect migration patterns and potentially lead to or exacerbate deadly conflict. To better understand this climate-conflict link it is important to consider the complex factors that determine the degree to which societies will experience climate effects and those that determine whether deadly conflict will commence and/or persist.

The degree to which societies will experience the negative environmental and socio-economic effects of climate change depends in large part on their vulnerability to it. This vulnerability can be measured by looking at:

*The extent to which societies are dependent on natural resources and ecosystem services.
The extent to which the resources and services that societies do rely on are sensitive to changes in climate. The capacity of societies to adapt to changes in these resources and services "adaptive capacity".*

But these factors inevitably interact with others – such as governance, political stability and ethnic issues – making it difficult to predict whether and if so how violence will break out in any particular situation. While climate change can certainly play a role in deadly conflicts, it is highly unlikely to be the sole or primary cause. The key therefore is to reduce risks as much as possible and to focus on environment and resource dimensions of actual and potential conflict situations.

IMPACTS OF VULNERABILITY TO CLIMATE CHANGE AND CONFLICTS IN NIGERIA

The impact of climate change is however spatially heterogeneous across a diverse range of geopolitical scales. For instance at the international level, the risk is generally believed to be more acute in developing countries because they rely heavily on climate-sensitive sectors, such as agriculture and fisheries, and have a low GDP, high levels of poverty, low levels of education and limited human, institutional, economic, technical and financial capacity (Preston et al., 2006; IPCC, 2007; UNFCCC, 2007; WBGU, 2008). At the national level, various ecosystems, sectors, and sub-populations within a country have been identified as being more or less at-risk in a changing climate depending on length of coastline, level of emergency preparedness and economic and livelihood sensitivity to climate related elements such as rain, wind etc (NEST, 2004; Allen Consulting, 2005; IPCC, 2007). The implication is that vulnerability of countries and societies to the effects of climate change depends not only on the magnitude of climatic stress, but also on the sensitivity and capacity of affected societies to adapt to or cope with such stress (NEST 2004) There is agreement that the social and economic impacts of climate change on developing countries are greater even though they contributed least. A report on this matter was by the Economist Sir Nicolas Stern and entitled the **Stern Review**, Concludes that developing countries are most vulnerable to

climate change because of their Topical geography, High population growth Rapid Urbanization, Dependence on Agriculture, Weak infrastructure Nigeria's economy today remains mono-cultural and heavily dependent on the oil sector, which accounts for about 80% of government revenues, 90-95% of export revenues, and over 90% of foreign exchange earnings. Despite attempts to diversify her economy, Nigeria's economy stands to remain dependent on fossil fuels. This is particularly worrying because fossil fuels are the chief culprit implicated in the socio-environmental conflict of climate change and adaptation.

The consequence for the Nigerian people is a geographical pincer threat from desertification in the north and coastal erosion in the south. Through a combination of overgrazing abuse of woodland for fuel and increasingly unreliable rainfall, the Sahara is advancing at an estimated rate of 600metres per annum .Over 55,million people in 10 northern states were affected. The situation across the northern Nigeria especially Jos and Kaduna is linked/blame on climate change, Conflicts that have led to death of hundreds of people in Jos and Kaduna are not religious .Ethnicity and Religion are just triggers because they are major sources of identity for most Nigerians. The key issue is fight for economic and political control between the indigenes and settlers and the tussle began. By contrast, rising sea levels threaten Nigeria's coastal regions. The Niger delta may be the source of oil wealth but its low-lying terrain criss-crossed with waterways makes it extremely vulnerable to flooding and Stalination. The protective mangroves of this coastlines have been largely lost human intervention ,half of the 15 million population of the city of Lagos lives less than six feet above sea level, especially, at Victoria Island are the in the front line, along mushrooming slum settlements. In the rural economy, almost all small farms presume stable rainfall patterns n their choice of seed and plant sessions. An eco-regional approach is essential when considering the way in which climate change affects the existing social-environmental conflicts or leads to new types conflicts .An eco-region is a reoccurring pattern of ecosystems associated with specific combinations of soil and natural resources that characterize the region. In Nigeria the Niger delta areas comprises of (Bayelsa, Akwa Ibom, Calabar, Delta, Edo, River Cross River), they are often referred to as **Core areas**) the core areas rich oil region with variety of environmental goods and services that the whole country depends on. Multiple jurisdictional entities claim responsibility over the development of the areas, Nigeria stands to suffer income losses when the global community begins to substitute renewable energy alternatives for fossil fuels. Given the exclusive reliance on fossil fuels for foreign exchange and the predominant focus on further expansion of this sector of the economy by the Nigerian government, the impact of the global shift away from fossil fuels is bound to cripple the Nigerian economy.

AGRICULTURE AND LAND RESOURCES

Agriculture is already only marginally possible because of hot climate and little rain in many parts of the world globally (Montgomery, 2006). In Nigeria for example, hot climate and little rain are experienced in the extreme northern States, According to some estimates ,fully two-third of Bauchi, Borno, Gombe, Jigawa, Kano, Kaduna, Sokoto, and Yobe could turn to desert or semi-desert in the 21st Century, where desertification is fast encroaching on arable lands,

and agriculture is highly dependent on irrigation. It has been established that one of the most significant climatic variations in the north eastern region of Nigeria since the late 1960s, has been the persistent decline in rainfall (Ayoade, 2004) and this has reduced agricultural productivity in this region. Furthermore, increased temperature as a result of climate change is a favourable condition for pests such as grasshoppers that destroy or reduce crop yield to thrive and multiply. Changes in climatic and atmospheric composition will also negatively affect Bio-diversity and likely help to diminish Nigeria's forests. The upper limits of the tropical rainforest are already receding. Given the sensitive nature of the forest ecosystems, forest resources have become highly vulnerable to even slight changes in climate systems. Changes in temperature, precipitation and water cycle dynamics, therefore, can lead to remarkable forest-cover loss (Adejuwon, 2006).

Bio-diversity is terribly vulnerable to climate change. Many species of plants and animals are rapidly becoming extinct. Tree density and floristic richness is decreasing. Fish spawning patterns have changed; the extinction of rare and endangered species of plants and animals has increased. The consequence of these on the economy is poor agricultural output which can lead to excessive increases in food price. This in turn can put pressure on economic policy leading to higher interest rates.

COASTAL ZONE RESOURCES

Conflicts in coastal zone are interesting in that it could develop from combination of other types of conflicts ,in this issue, Ahmed (2010).highlights two types of coastal conflicts, those related to ecosystem change and those related to coastal development, Most of the densely-populated regions of the world are found in coastal areas which are the most threatened .Climate change impacts directly on local community ,especially on vulnerable parts of society ,conflict associated with poverty are thus enhanced by climate change impacts, This influences the access to basic resources to meet the needs of housing ,security, health and education. All these impacts negatively on the quality of life of this community, between 1992 and 2007, wind and rainstorms alone damaged or destroyed at least \$720million in economically productive assets across twelve of Nigeria's thirty-six states along the coastal area Conflicts believe the added production costs How far potential land losses overlap with vulnerable assets, populations and sectors of high strategic important needs better mapping. Drops in investment, and lost or deferred production could be heavy due to inefficiencies of land use system and manmade destruction-i.e. the traditional burning of field and Overgrazing by northern farmers or the Delta's many oil spills. s. Finally, climate changes leave the petroleum-dependent public sector with less oil wealth. Today, 80% of all government revenues and 97% of Nigeria foreign exchange come from Niger Delta's oil. Some hydrological modeling says 3 feet of sea level rise could put nearly all the Delta's onshore oil fields under water .with it easily flooded network of estuaries, rivers, creeks and stream s sits especially low ,as does Lagos. Some industry off

ENERGY, INDUSTRIAL AND COMMERCIAL ACTIVITIES

Climate change is affecting Nigeria's energy sector profoundly. conflict over the use of water resources among different economic sector, It has adversely affected the hydropower plants in Kanji, Jebba and Shiroro which is the key to the security of electricity supply in the country and represent about one-third of the country's total installed electricity generating capacity. These plants have produced significantly lower energy leading to epileptic power supply as a result of excessive drought that lead to evapo-transpiration affecting water volume and the capacity of the power plants to produce optimally. Incessant power outage increases the cost of doing business and hampers the pace of industrialization in the country. Industries that are dependent on climate sensitive resources or conditions e.g. agro businesses, construction, infrastructure, transportation, pollution control are potentially vulnerable to changes in the climate. Conflicts with indigenous people relating to their displacement changes to their natural habitat (deforestation, pollution degradation etc), and influences on their ancestral customs and modes of economic production. .conflicts may also demand greater participation in decisions that affect the population directly.

INFRASTRUCTURE AND GENERAL HEALTH

Climate change is a major problem caused by the increase of human activities leading to several direct and indirect impacts on health. Disasters have a direct impact on local infrastructure and indirectly produce social conflicts affecting the access to basic needs of food, housing and health. These climatic changes will have wide-ranging harmful effects including increase in heat-related mortality, dehydration, and spread of infectious diseases, malnutrition, and damage to public health infrastructure. Furthermore, an increase in the frequency and intensity of extreme phenomena and the occurrence of new disaster situations will increase vulnerability when it comes to health, mainly affecting the most vulnerable and poor population.

LABOUR SECTOR

It is anticipated that the impacts of climate change will lead to an increase in unemployment rates. There are no public policies to prevent climate change impacts on the labour sector. There could be some changes in this sector due to three main factors; Internal and external migration flows will trigger the need for groups of people to adapt both to a new territory and to new labour conditions. Also, as consequences of damaged infrastructure due to recurrence of natural disasters, it is estimated that there will be a period of mass unemployment in those sectors that rely on this infrastructure, until it has been rebuilt. Lastly, changes in production models will create new job profiles and bring about cross-sector labour movement.

However, According to Climate Funds Update database, Nigeria has not yet received any adaptation funding from external bilateral or multilateral sources. This may in part be attributed to the country's slow moving institutional response to climate change. The focal point for coordination of government policies is intended to be a National Climate Change Commission .The bill to establish the commission was introduced to parliament as long as

2007. Disaster risk reduction plans appears to be less attuned to climate change than in other countries for example, there is a strong case for developing a network of meteorological stations and early warning systems for both coastal and inland regions. In resolving climate and conflict issue, it is necessary to adopt a conflict-sensitive approach while promoting the implementation of collaborative planning methodologies (based on tools which involve dialogue and building up cross-sector consensus) and the use of relevant governance tools. This approach will facilitate efficient, professional, and democratically managed collective decision-making processes required for the sustainable management of these areas. It will merge the technical and scientific standards needed for precise socio-environmental diagnosis, digital, strategic planning with the capacity to promote social consensus on the basis of participatory and conflict-resolution tools.

RECOMMENDATIONS AND CONCLUSION

In view of the above explanation and analysis some preliminary and recommendations are proposed as input for the development of appropriate climate change adaptation policy which includes a conflict-sensitive approach. This focuses in particular, on conflict arising from climate change. Promoting early warning systems and policies for adapting to climate change, including a conflict sensitive approach to environmental conflicts. Secondly, stimulating adaptation efforts through awareness and education of the potential impacts of climate change, the media is essential for putting the issue on public agenda and for promoting greater awareness on the need to develop climate change policies. Thirdly, appropriate policies there should be interdisciplinary participation and networking, climate change policies should be designed in a participatory and coordinated way, involving a variety of politician scientist, civil society organization, and the communities themselves. Policy success is linked to cross-sector, inter-disciplinary and multilevel approaches, with a strong focus on community contribution to the process. Fourthly, Promoting scheme of land-use environmental planning, this will strengthen democracy in Nigeria and it will reduce the risk that destructive conflicts between society and government. Land use environmental planning adapted to the contingencies of climate change can prevent a variety of conflicts, including economic conflicts rising from loss of production from flood and drought zone. Lastly, Promoting reforms of legal framework .It is necessarily to promote legislative reform and establish a policy framework for climate change, This include basic guideline to address the issue of environmental and natural resources from different ethnic group we have in Nigeria, from multi-jurisdictional standpoint.

CONCLUSION

While the environmental and socio-economic effects of climate change are projected to be widespread, they will not be uniformly distributed because of varying vulnerabilities. They are also difficult to estimate precisely, given the dynamic nature of the factors that go into the vulnerability. What is clear is that reducing vulnerability should reduce those negative effects. Thus, appropriate development policies are a critical priority. Whether deadly conflict will break out under climate stress is also complicated. Studies suggest that climate effects could contribute to violent conflict in a number of ways, including:

- long-term environmental deterioration may lead to scarcity (especially declining access to water or to land and the returns on use of land), increasing competition over those resources and possibly leading to violence;
- long-term environmental deterioration may lead to scarcity and contribute to massive migration ("environmental refugees"), potentially destabilizing neighboring areas; or
- Increased climate variability – intense droughts or floods or natural disasters – may cause short-term economic shocks, reducing employment opportunities – possibly increasing recruitment to armed groups – and leading to violence.

These patterns are cause for concern. Scarcity – particularly of land or water, and whether caused by climate change, mismanagement or other factors – has played an important role in many past and current conflicts. Large population movements present critical security issues under any circumstances. And there is evidence that low income per capita and short-term growth stocks are associated with increased risk of conflict.

But these factors inevitably interact with others – such as governance, political stability and ethnic issues – making it difficult to predict whether and if so how violence will break out in any particular situation. While climate change can certainly play a role in deadly conflicts, it is highly unlikely to be the sole or primary cause. The key therefore is to reduce risks as much as possible and to focus on environment and resource dimensions of actual and potential conflict situation.

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