A changing climate and African development

A Changing Climate and African Development

Chukwumerije Okereke

INTRODUCTION

Climate change is arguably the greatest development challenge facing Africa in the 21st century. As the continent most susceptible to climate variability and vulnerability, Africa faces a threat that can reverse many decades of national and international development effort and plunge large sections into severe poverty. Vulnerability to climate change is compounded and exacerbated by multiple stressors such as low level of development, rapid population growth, weak institutions and low adaptive capacity. Both historically and currently, Africa's contribution to climate change is very low compared to other world regions. This makes the changing climate in Africa and associated negative consequences very much an issue of global justice and equity. However, while climate change poses profound challenges to African development, it also offers unique opportunities to pursue low carbon growth and build more resilient economies. Whether or not climate change will impede African development or be turned into an opportunity for sustainable development will depend on how governments and other stakeholders at different scales – from the local through national to international level – choose to respond.

CLIMATE TYPES AND TRENDS IN AFRICA

Africa is a large and geographically diverse continent. The diversity in geography and climate regimes is determined by the location, size and shape of the continent, which is the second largest in the world. A number of climatic zones can be distinguished. These include the rain forest climate in the central portion of the continent, the equatorial climate in the Guinea coast, a large tropical savannah zone

which encompasses about one-fifth of the continent and the semi-temperate zone found in the extreme northwest and southwest of Africa. There is also a very large expanse of arid or desert climate zone comprising the Sahara (in the north), the Horn (in the east), and the Kalahari and Namib deserts (in the southwest).

According to IPCC (2007) the climate of Africa is controlled by complex maritime and terrestrial factors. The key forces include the El Nino-Southern Oscillation (ENSO) which influences mostly Eastern and Southern Africa and the North Atlantic Oscillation (NAO) which affects mostly Northern Africa. The Atlantic Ocean current together with the African Easterly Jet (AEJ) and the Tropical Easterly Jet (TEJ) have significant influence on Western and Central Africa. Sothern African climate is influenced by the combination of the Southern Oscillation Index (SOI), the Indian Ocean Sea-Surface Temperature (SST), the Inter Tropical Convergence Zone (ICTZ) and also ENSO. Terrestrial vegetation covers mostly in the Rainforest regions and the mineral dust in the Sahel region also has impact on climate systems. The complex interactions of these physical forces and human factors such as deforestation, land use and migration account for the extremely high climate variability of Africa. And precise knowledge of the mode of interaction and effect of these various forces is severely limited by paucity of data and a lack of modelling tools.

Observed temperatures indicate a greater warming trend since 1960 and the IPCC suggests that all of Africa is very likely to warm during the 21st century and at a rate that is larger than the global, annual mean warming throughout all seasons. Future and historical warming is not uniform within the continent but varies according to regions. For example, the observed temperature rise over the last three decades has ranged from 0.1oC in South Africa (Kruger and Shongwe, 2004) to 0.29 in the tropical forest region (Malhi and Wright 2004).

The current and future picture for rainfall look more complex but the trend clearly suggests high levels of variability in mean seasonal and decadal rainfall over the

century. In large parts of West Africa, there has been a 4% decline in mean annual precipitation with a decrease of up to 40% noted between 1968 and 1990 (Nicholson, 2001). In contrast, an average 10% increase in rainfall in the last 30 years has been reported along the Guinea coast. Southern African does not shown a significant long term trend, although increased inter-annual variability has been observed (IPCC, 2007). Overall, Africa has witnessed increased anomalies in weather pattern, and more extreme weather events including droughts and floods. These changes have major implications on African lives and economy in ways that are more significant than many populations in other continents.

KEY DIMENSIONS OF IMPACT

Climate exerts significant influence on economic activities in Africa from the national to household level. This is primarily because the African economy is still heavily resource-based with a very large portion of the population depending on rain-fed subsistence agriculture for their livelihood. Accordingly, even slight to medium variability in seasonal climate can have immediate and direct impact on yield and livelihood. Climate variability affects the degree and pattern of precipitation, temperature and water availability. Climatic change is also associated with increased floods, droughts, cyclones, typhoons and frost. These events on their own or in combination can result in increased risks of crop failure with devastating effect on food security. The effects of these weather events are more difficult to mitigate given the general lack of mechanization, improved seed varieties and irrigation systems. Indeed Sub-Saharan Africa is the world's poorest and most rain-dependent region. The result is that several millions in this region have been exposed to the risk of hunger, malnutrition and death associated with drought and crop failure in the last three decades. For example, it has been estimated that up to 8.7 million where affected by the drought that beset Ethiopia in 1994. This drought resulted in the death of about 1 million people and 1.5 million livestock (FAO, 2000).

More recently millions are facing malnutrition, famine and death with the East African drought of 2009-2011 proving to be one of the worst that the Horn of Africa has faced in 60 years. Southern Africa experienced an over 50 per cent drop in cereal harvest with more than 17 million exposed to the risk of starvation at the beginning of the 1990s (FAO, 2000). Both the West African and the Sahelian regions have experienced drought of unprecedented severity and frequency in recorded history since 1960 with millions facing famine and death (Zeng, 2003)

Predictions about possible future scenarios do not offer much comfort. For example, it is suggested that by 2010, an estimated 32% of Sub-Saharan Africa's total population of 400–500 million will suffer from malnutrition, compared with 4%–12% in other developing countries (Baro and Deubel, 2003). Furthermore Arnell (2004) estimates that between 75 million and 250 million people in sub- Saharan Africa could have their livelihoods compromised by 2020 due to climate, while the IPCC report (2007) suggests that climate change could result in about 50% drop in agricultural production in Africa by 2030.

The situation in agriculture and food security mirrors the situation in other sectors, including water, health, ecosystem, energy, infrastructure and human settlement. About 25% of Africans experience acute water stress and of the 69% that live in areas of relative abundance, a significant majority does not have access to clean water. These figures are very much likely to increase in the future as a result of climate change induced factors such as flash flooding, siltation of river basin and degradation of land water sheds.

Rising temperatures, flooding will affect pathogen life cycle and rate of infections. The health consequences of climate change are likely to be felt far more in Africa than in any other continent. For example, the loss of healthy life years as a result of climate change is predicted to be 500 times greater in poor African populations than in European populations (McMichael et al., 2006). Climate change will affect the spread of malaria, meningitis, neglected tropical diseases, and a host of other water

and air borne diseases. Infections and deaths are likely to be compounded by decrease in immunity due to malnutrition and famine. Indeed, malnutrition is considered the most important health risk globally as it accounts for an estimated 15% of total disease burden in disability adjusted life years (DALYs). At present, under-nutrition causes 1.7 million deaths per year in Africa and is currently estimated to be the largest contributor to climate change related mortality around the world (Patz et al., 2005).

Many ecosystems will collapse due to a combination of drought, increase in population and land use changes. In the absence of effective adaption measures, this will likely result in the exacerbation of drought, hunger as well as a loss of earnings from tourism. Many zones, countries and entire sub-regions are so vulnerable to sea-level rise and flooding to the degree that makes climate change a major threat. These pressures will affect critical infrastructure such as roads, housing and energy installations. Ultimately, the result will be large-scale human displacement followed by unprecedented levels of internal and cross-border migrations. It is evident then that African development hangs on a balance due to climate change and that effective climate adaptation is one of the most urgent needs facing Africa.

AFRICA AND CLIMATE JUSTICE

Historically and currently, Africa's contribution to climate change is very low compared to other world regions. This makes the changing climate in Africa and associated negative consequences very much an issue of global justice and equity. On the basis of global surface temperature mean increases in 2000, it has been calculated that the average contribution of Africa to climate change, based on a start date of 1890 is a mere 7%, a statistics which pales in comparison to the 40% contribution from OECD countries and 24% contribution from Asia (den Elzen et al., 2005; Höhne and Blok, 2005) (see figure 1). The picture looking forward does not

tell a significantly different story. Hohne and Blok calculate that by 2050 the OECD will be responsible for about 41.7% of global average surface temperature increase due to fossil CO2 while Africa and Latin America combined would be responsible for just 17.05% (Höhne and Blok, 2005). Given the huge disparity in both current and historical contribution and the negative consequences involved, climate change is essentially a case of the rich imposing their burden on the poor.

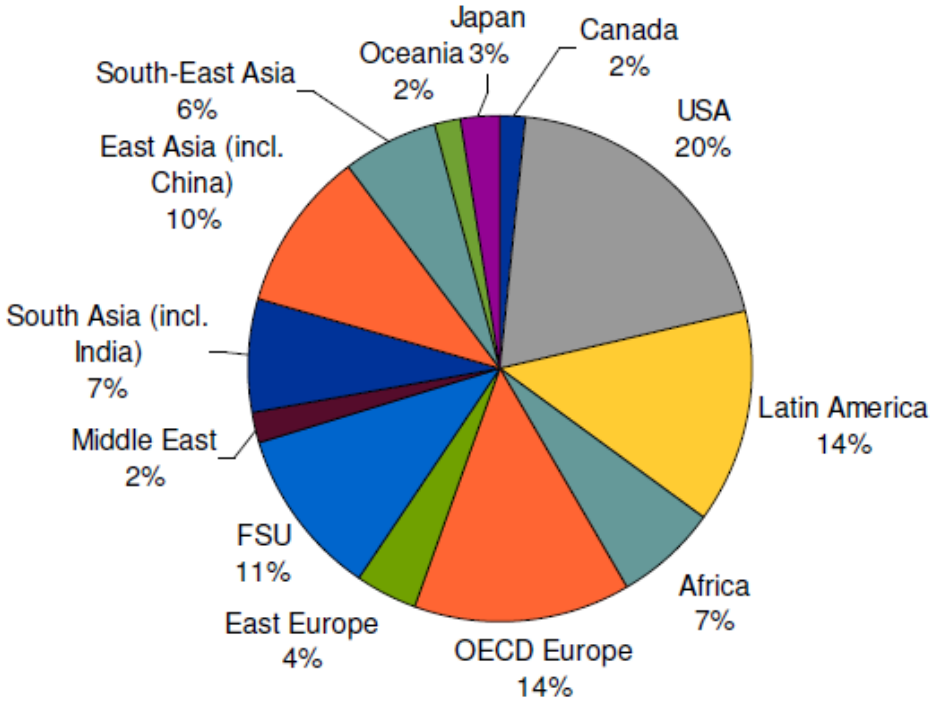

Figure 1 : Percentage Contribution of green house gas according to regions

Source: http://www.match-info.net

Although nearly all the other continents of the world will face climate change induced challenges, the effect in magnitude does not compare with what is envisaged in Africa. Moreover many of these economies have adequate financial, technical and institutional capabilities to cope. African countries and many

environmental organisations have therefore been making the case that justice should be placed at the centre of the international effort to tackle climate change (Okereke, 2010). Making justice the cornerstone of international climate co-operation requires at least four things (Okereke and Schroder, 2010). First is that developed countries should take urgent steps to cut their carbon and other green house gas emissions responsible for global warming and climate change. Second, developed countries must provide Africa with adequate and long term technical and financial assistance it needs to help adaptation to climate change and develop in a sustainable manner. Third, there should be greater commitment to procedural equity with more spaces provided for Africa to be effectively represented in climate negotiations. And fourthly, the global community needs to dismantle background structures of inequality such as unfavourable terms of international trade which work to exacerbate poverty in Africa (Okereke, 2011).

African governments themselves also have a lot to do to increase resilience against climate change. Effort should not be placed solely on achieving climate justice at the international level but also by pursing more equitable policies within borders. Relevant institutional reforms would have to be embraced to ensure that financial and technical assistance received from the developed countries are put to best use. And critically there should be greater commitment to more effective governance internal capacity building and home grown economic development. The emphasis should be on turning climate change into opportunities by pursing a different type of economic development – the so called climate resilient, climate smart or climate compatible economic development.

CLIMATE COMPATIBLE DVELOPMENT OPTIONS FOR AFRICA

It has been indicated that while climate change poses profound challenges to African development, it also offers unique opportunities to pursue low carbon

growth and build more resilient economies. Notable aspects of such a 'green development' approach would include greater exploitation of renewable energy, construction of sustainable cities and transportation systems and more effective land use and forest management.

Low carbon development has the potential to help some African countries reduce economic vulnerability associated with dependence on oil, especially since about one-third of African countries are landlocked and pay huge amounts to import oil. Many African countries have access to abundant renewable energy such as solar wind and hrdyo power. Although gas is a finite energy source it is much cleaner than oil and coal. There is a vast reserve of proven oil in many African countries such as Nigeria, Congo and more recently Ghana. African governments and their development partners would need to concentrate their effort on how best to harness these vast renewable resources for economic growth and increased energy security within the continent.

The finance available for international climate is a still a far cry from what is needed. But public and private climate funding is getting significant and likely to grow even more in the coming years. The Green Climate Fund established in Cancun for assisting poor countries is expected to be worth USD 100 billion a year by 2020 and frontline donor agencies such as the World Bank will likely be committing considerable money to climate development. African governments could find creative ways to leverage these and related funding mechanism in an effort to build climate smart economies. Individual African counties would need to prepared detailed climate resilient growth plans which identify strategies that are sensitive to their unique circumstances. Such plans would be needed to attract the much needed funding from international donor agencies but also provide a clear road map for pursuing economic growth that will not exacerbate climate change and related vulnerabilities. In Africa and elsewhere climate change also warrants serious question about what exactly development is all about and how best to achieve the desired objectives. Given the finiteness of earth resources and ever rapidly

increasing population, there is a need for a thorough examination of prevailing thinking which ties development too strongly with economic growth, mass production, and mass consumption.

REFERENCES AND GUIDE TO FUTHER READING

Arnell, N.W. (2004) 'Climate Change and Global Water Resources: SRES Emissions and Socio-Economic Scenarios,' *Global Environmental Change*, 14: 31‑52.

Baro M. and Deubel, T. F. (2006) 'Persistent Hunger: Perspectives on Vulnerability, Famine, and Food Security in Sub-Saharan Africa', *Annu. Rev. Anthropol*. 2006. 35:521–38

den Elzen, M. Fuglestvedt, J. Höhne, N. Trudingerd, C., et al., (2005) 'Analysing countries' contribution to climate change: scientific and policy-related choices,' *Environmental Science & Policy* Vol 8 (6), 614‑636.

FAO, (2000) FAO STATISTICS Database, United Nations Food and Agriculture Organisation, Rome.

Höhne, N., Blok, K., 2005, 'Calculating historical contributions to climate change: discussing the 'Brazilian proposal", *Climatic Change* 71, 141–173.

IPCC, (2007) 'Mitigation- Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change: Metz, O.R. et al., (Eds). Cambridge and New York, Cambridge University Press.

Kruger, A. C. and Shongwe, S. (2004) 'Temperature Trends in South Africa: 1960-2003', *Int. J. Climatol.,* 24 1929-1945.

Malhi, Y. and Wright, J. (2004) 'Spatial patterns and recent Trends in the climate of Tropical Rainforest regions', *Philos. T. Roy. Soc. B,* 359, 311-329.

McMichael, A. J., Woodruff, R. E and Hales, s. (2006) 'Climate change and human health: present and future risks,' *Lancet* 367: 859–69.

Nicholson, S.E. (2001) 'Climatic and environmental Change in Africa during the last two centuries', *Climate Res.,* 17, 123-144.

Okereke C. (2011) 'Moral Foundations for Global Environmental and Climate Justice', *Royal Institute of Philosophy Supplement* 69: 117-135.

Okereke, C. (2010) 'Climate justice and the international regime', *WIREs Climate Change* 1:462-474.

Okereke, C. and Schroeder, H. (2009) 'How can the objectives of justice, development and climate change mitigation be reconciled in the treatment of developing countries in a post-Kyoto settlement?', *Climate and Development*, 1 (1): 10-15.

Patz, J., Campbell-Lendrum, D., Holloway, T and Foley, J. (2005). 'Impact of regional climate change on human health', Nature, 438:310-317.

Zeng, N. (2003) 'Drought in the Sahel', *Atmospheric Science,* Vol. 302 no. 5647 pp. 999-1000