Africa’s Vulnerability to Climate Variability and Change

Anthony Nyong

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Department of Geography and Planning
Faculty of Environmental Sciences
University of Jos, P.M.B. 2084, Jos
Plateau State, Nigeria
Outline

• Introduction
• Multiple Stressors and Africa’s Vulnerability
• Africa’s Climate
• Vulnerability to and Impacts of Current Climate Variability, and Projected Climate Change
• Adaptation in Africa
• Africa and the Kyoto Protocol
• Some Challenges
Introduction

- Why Africa?
- Climate Change or Climate Variability?
- Vulnerability to or Impacts of Climate Change/Variability in Africa?
- Climate change adds another dimension to existing vulnerabilities in Africa.
- Africa’s overall vulnerability arises from the effects of multiple stressors
- Reducing Africa’s vulnerability requires economic growth.
- Climate change should not be divorced from Africa’s development
SIZE OF THE AFRICAN CONTINENT COMPARED TO OTHER LAND MASSES

<table>
<thead>
<tr>
<th>Country</th>
<th>SQUARE MILES</th>
<th>SQUARE KILOMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRAZIL</td>
<td>3,300,161</td>
<td>8,547,378</td>
</tr>
<tr>
<td>JAPAN</td>
<td>377,727</td>
<td>978,308</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>2,966,189</td>
<td>7,682,394</td>
</tr>
<tr>
<td>EUROPE</td>
<td>1,905,731</td>
<td>4,935,820</td>
</tr>
<tr>
<td>U.S.A. (Continental)</td>
<td>3,120,066</td>
<td>8,080,934</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>11,669,874</strong></td>
<td><strong>30,224,835</strong></td>
</tr>
</tbody>
</table>

AFRICA (including MADAGASCAR)

<table>
<thead>
<tr>
<th>Country</th>
<th>SQUARE MILES</th>
<th>SQUARE KILOMETERS</th>
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<tbody>
<tr>
<td>AFRICA</td>
<td>11,715,721</td>
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This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, demarcations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.
Social Vulnerability

- Rapidly growing population, twice global average
- Widespread hunger
- Heavy disease burden
- Low Human Development Index
- Lack of access to resources and services
- Limited technological means
- Poor governance.
- Armed conflicts
Economic Vulnerability

- Economies of most African countries largely based on primary production, with little value added.
- Investments in most African countries depends on aid/loans.
- Between 1970 and 2002 Africa received $540 billion in loans. Within same period, paid back $550 billion—at end of 2002 still owed $293 billion.
- Poverty is endemic in many areas of Africa.
- Number of Africans living below the poverty line increased by 50% in past 14 years.
- About 65% of the LDCs are in Africa, home to 34 of the world’s poorest countries.
- By 2002 Africa had just 2% of the global trade
Environmental Vulnerability

- Arid/Semi-arid regions cover about 43% of the land area.
- Droughts and floods are common with impacts on population increasing exponentially.
- About 23% of all reported natural and technological disasters between 1973 and 2002, with climatic events constituting 53%.
- Number of people killed and affected by climate-related disasters in Africa between 1993-2002 is over 130 million.
Future Socioeconomic Situation

- By 2030, every third person added to the world’s population will be a sub-Saharan African.
- By 2050, this will rise to every second person.
- By 2100 population estimated at about 2.85 billion, three and a half times today’s population.
- Incomes are expected to grow very slowly.
- Numbers living in poverty could rise from 240 million in 1990 to 345 million in 2015.
- 15% of the population or 183 million people will still be undernourished by 2030.
Africa’s Climate

- Africa warming through the 20th century at about 0.05°C per decade.
- Warming could be up to 7.5°C by 2100.
- Global attention on temp while precipitation drives Africa’s development.
- In parts of the Sahel, 30-year ppn means have decreased by 20 to 40% between the periods 1931–60 and 1968–97, with recent recovery.
- Increased inter-annual variability.
- Increase in extreme events (droughts & floods).
- Little model agreements on projected rainfall.
Key Vulnerabilities and Impacts of Climate Variability and Change

- **Water Resources**
  - Average discharge of West African rivers has dropped by 40-60% since 1970.
  - Over 400 million people will be living in at least 17 water-scarce African countries by the year 2010.
  - By the year 2025, about 370 million Africans will experience increases in water stress.
  - Projected future water stress and scarcity will have serious impacts on socio-economic development.
  - In the Nile region, a decrease in river flow up to more than 75% by the year 2100, with implications for agriculture and conflict.
  - A drop in the water level in reservoirs and rivers could exacerbate water-borne diseases and reduce the quality and quantity of fresh water available for domestic use.
• Agriculture and Food security
  – More than 600,000 km² of moderately constrained agric land could fall in the class of severe environmental limitations.
  – By 2080, a significant decline in the extent of suitable rain-fed land (up to 9% in sub-Saharan Africa)
  – Projected loses in cereal production potentials in SSA up to about 33 percent by 2060.
  – Negative impact on pastoral livelihoods through a reduction in water availability and biomass
  – Up to 40% of sub-Saharan countries will loose substantial share of their agricultural resources (a loss at 1990 prices of US$10-60 billion).
  – Global warming and sea level rise could threaten fisheries and shrimp production in Africa.
  – Climate change will place an additional 80-125 million people (±10 million) at risk of hunger by the 2080s, 70-80 percent of whom will be in Africa.
  – A 2-4°C increase in temp could see crop failure rise by 50–75% in Sub-Saharan Africa
Vulnerability to Food Insecurity

Source: Lucas and Hilderink, 2004
Health

- In 2002, 97% of all global cholera outbreaks were reported in Africa.
- Outbreaks of meningitis epidemics before the rains in West Africa and Eastern Africa.
- In South Africa, it is estimated that the area suitable for malaria will double and that 7.8 million people will be at risk (5.2 million being people that never experienced malaria) (Republic of South Africa, 2000).
- Climate change could be responsible in Africa for an additional population at risk of malaria of between 21 million (B1) and 67 million (B2) by the years 2080s.
- Rift Valley Fever epidemics are associated with flooding and could increase with a higher frequency of El Nino events.
Ecosystem

- Estimated rates of deforestation, for instance, are about 0.78 % per year for the period 1990-2000, representing a loss of 5.2 million hectares per year.

- 50% mortality of coral reefs from 1998 bleaching episode

- With a 2–3°C temp increase,
  - 80% Karoo lost endangering 2800 plants with extinctions
  - Loss Fynbos causing extinction of endemics
  - 5 Sub-Saharan African parks lose 40% animals
  - Great Lakes wetland ecosystems collapse
  - Fisheries lost in Malawi
  - Kalahari dunes could become active threatening agriculture and ecosystem.
Settlements and Infrastructure

- Number of people at risk from coastal flooding in Africa will increase from 1 million in 1990 to 70 million in 2080.
- 2°C rise in temperature could place an additional 20 million people at risk from coastal flooding.
- 4°C could result in 108 million at risk from flooding.
- In Egypt, about 2,000 km² of cropland could be lost with 0.5m SLR. With SLR of 1.0m, the population at risk is about 6 million with more than 4,000 square km of cropland that could be lost.
- The cost of a 0.5m sea level rise in Egypt without adaptation is estimated at about US$2.5 billion (at 1992 prices), in addition to a loss of up to 14% of GNP,
Adaptation to climate variability & change

- Adaptation to adverse environmental impacts is not new in Africa.
  - Seasonal changes and growing dates
  - Cultivation of different crop varieties and species
  - Water supply and irrigation schemes
  - Regional co-operations for managing shared river basins
  - Other inputs and management adjustments
  - Minimum and reduced tillage technologies
  - Improved short-term climate prediction.
  - Livelihood diversification
  - Construction of dams and coastal protection structures
  - Investment in malaria prevention services (Roll-Back malaria, ITN, etc).
Impediments to Effective Adaptation

- Pressure of existing vulnerabilities
- Institutions and Policies
- Africa’s geopolitics
- Slow uptake of technology/technology transfer
- Weak infrastructure
- Weakening of traditional social systems and values
- Increased frequency of exposure
What can be done?

- Strengthen Africa’s capacity to deal with climate change issues in an integrated approach.
- Investment in improved seeds adapted to African farming environments.
- Low-cost/appropriate technologies
- Mainstream climate change into development policies and plans.
- Funding and implementing adaptation measures
- Climate change is a moving target, therefore adaptation should be seen as a continuous process.
- Mitigation should be pursued vigorously
Some challenges

• Adaptation is not new in Africa. How can a more effective union of indigenous and external knowledge be achieved for sustainable adaptation?

• What should be the balance between more technical research on the one hand, and better understanding of the social, economic and institutional barriers to adaptation?

• Why is available knowledge on climate change not used as effectively as it should be for planning in Africa, and what steps should be taken to ensure that climate information reaches those who need it in a form that can be acted upon?

• What priority next steps are needed at the different scales to promote adaptive capacity and effective adaptation planning in Africa?