17.12. Regional case studies: Africa

**Question:** Are conflicts in Africa driven more by resource scarcity or by resource abundance?

**Recommended readings:**


**Background material (optional):**


Africa after World War 2
Armed conflicts in Africa

Africa: Home to longest-running civil wars, with devastating consequences

Wars are generally persistent and readily transmissible

Many wars are contagious and do not respect borders

Armed conflicts impoverish the countries, create food insecurity, destroy infrastructure, etc

Armed conflicts highly persistent; lasting 7 years on average

Rarely lead to successful societal transformation

v4-2009 of the UCDP/PRIO Armed Conflict Dataset
Agricultural trends in Africa

Declining agricultural productivity per capita:
Down 16% in 30 years
Past 20 years: little change in crop productivity, steady fall in livestock

Source: FAO
Estimated HIV/AIDS prevalence among young adults (15-49) by country (2008)

Observed and projected changes in annual average temperature in Africa

Source: IPCC 2014, WG-2
Observed and projected changes in annual average precipitation in Africa

Source: IPCC 2014, WG-2
Projected biome changes and vulnerabilities in Africa

(a) Projected biome change from the period 1961–1990 to 2071–2100

(b) Vulnerability of ecosystems to biome shifts based on historical climate (1901–2002) and projected vegetation (2071–2100)

Projected worst-case biome changes

Temperate
- Conifer forest
- Broadleaf forest
- Mixed forest
- Shrubland
- Grassland

Tropical
- Grassland
- Woodland
- Deciduous broadleaf forest
- Evergreen broadleaf forest
- Desert

Vulnerability to biome change

Confidence:
- Very low
- Low
- Medium
- High
- Very high

Source: IPCC 2014, WG-2
Effect of rainfall & temperature changes on mean crop yield in West Africa

Relative to 1961–1990 baseline for different scenarios, averaged over 35 stations across West Africa and 6 cultivars of sorghum and millet

Source: IPCC 2014, WG-2
Climate Change Vulnerability in Africa

- **North Atlantic Oscillation** a key factor in international climate vulnerability, with impact on fisheries industries.
- Rainfall variability modulated by vegetation dynamics, surface properties in the Sahel; empirical evidence of species changes.
- High proportion of population concentrated in coastal areas in West African cities such as Lagos and Banjul, thus especially vulnerable to sea-level rise.
- Regional climate modeling experiments show deforestation in Central Africa will impact the climate in other places.
- Coastal marine fishery likely to be negatively affected by changes in Benguela current.
- Long-lasting impacts of drought on national economies for SADC region.
- Complete loss or displacement of Succulent Karoo biome projected under climate change, and many species losses in other biomes.
- Intensity of extreme events increased significantly over South Africa; biome shifts will favor horticulture over plantation forestry; malaria risk areas projected to expand southward.

**The vulnerabilities**

- Desertification
- Deforestation
- Sea level rise
- Loss of forest quality
- Reduced freshwater availability
- Degradation of woodlands
- Spread of malaria
- Cyclones
- Impacts on food security
- Coastal erosion
- Coral bleaching

Source: Delphine Digout, Revised by Hugo Ahlenius, UNEP/GRID-Arendal
Confidence in detection and in attribution of observed climate change over Africa


(a) Observed climate change

(b) Observed impacts

Source: IPCC 2014, WG-2
Drought frequency in Africa (1980-2001)

Source: Busby et al. 2012
Wildfire frequency in Africa

Source: Busby et al. 2012
Drinking water accessibility in Africa

Source: Busby et al. 2012
Climate-related hazard exposure in Africa

Source: Busby/Smith/White/Strange (2011) Where Are the Most Vulnerable Places in Africa?
Example: Indicators for Democratic Republic of Congo

Source: Busby et al. 2012
Governance and political violence in Africa

Source: Busby et al. 2012
Climate vulnerability and conflicts: Hot spots in Africa
Will climate change lead to more violent conflict in Africa?

Surface temperature in North Africa increased 1-2°C (1970 to 2004)

Annual precipitation has declined between 1901 and 2005

Climate projections for Northern Africa lack precision and reliability (greening of the Sahara?)

Poor people live in warmer regions of Africa (Gleditsch et al. 2010)

Conflict constellations in African climate hot spots: degradation of freshwater resources, decline in food production, migration

Projected increase in civil war as a result of climate change? (Burke et al. 2009)

→ Analyse multi-causal relationship
Warming increases the risk of civil war in Africa

Marshall B. Burke, Edward Miguel, Shanker Satyanath, John A. Dykema, and David B. Lobell

Department of Agricultural and Resource Economics and Department of Economics, University of California Berkeley, Berkeley CA 94720; Department of Politics, New York University, New York, NY 10012; School of Engineering and Applied Sciences, Harvard University, Cambridge MA 02138; and Program on Food Security and the Environment, Stanford University, Stanford CA 94305

Climate not to blame for African civil wars

Halvard Buhaug

Centre for the Study of Civil War, Peace Research Institute Oslo (PRIO), 0134 Oslo, Norway
Environmental conflicts in Africa (1980–2005)

WBGU 2007
**Selected cases in Africa**

**Ethiopia (1974- today):** Soil degradation and scarcity of natural resources (e.g. water and farm land) increase existing tensions between inhabitants of the highlands (Amharen and Oromos). Several hundred people killed by collective use of violence.

**Somalia – Ethiopia (1886-1991):** Drought in Ethiopia leads to refugee movements and increased resource scarcity.

**Mali (1970-1996) and Niger (1970-1995) (Tuareg):** Overuse of semi-aride areas and droughts lead to spread of desert in Niger and Mali, and to tensions between Tuareg, settlers and government. Many Tuareg forced to migrate largely to Algeria and Lybia. About 10,000 were expelled, other recruited for the military. Armed conflict between Tuareg rebels, Tuareg settlements, additional groups and the government cost thousands of victims.

**Senegal-Mauretania (1989-1993):** Ecological scarcity caused conflicts through the overutilization of water and soil and climatic conditions. Scarcity caused degradation and migration, provoking conflict between government (military), civilian society, ethnic groups. Peaceful means of conflict resolution played a role in Senegal, but 240 deaths and 70000 refugees.

**Kenia (2005):** Increased tensions between Turkana and other herder groups, since water and pasture land became more scarce as a result of climatically induced drought periods and decreasing or irregular precipitation. Leads to territorial invasions, cattle thefts and brutal attacks and assassinations.

*Carius et al 2006*  p. 24
Population development in North Africa

Source: CLISEC based on PRB 2010; FAO 2008
Arab nations are the largest importers of grains

NET EXPORTS  NET IMPORTS (MILLION METRIC TONNES)

NORTH AMERICA
105.4

LATIN AMERICA & THE CARIBBEAN
8

ARAB NATIONS

EUROPE
11.6

SUB-SAHARAN AFRICA
26.9

ASIA
46.9

FORMER SOVIET UNION
21

OCEANIA
9.1

Spike in global wheat prices

JSD PER TONNE

$350

300

250

200

150

2008 2009 2010

SOURCES: UN FOOD AND AGRICULTURAL ORGANIZATION. IFAD


Food import and price in North Africa
Arab Spring in North Africa and Mideast

http://www.swissinfo.ch/eng/multimedia/picture_gallery/Turmoil_in_Egypt.html?cid=29390414
Case: Morocco

Impacts of environmental change:

- Flash floods triggered by heavy rainfalls kill people every year and cause important damage to housing and transportation infrastructure.

- South of country is especially affected by droughts and decreasing water availability, threatening livelihoods in predominantly agrarian regions.

- Climate change will entail decreasing rainfalls and higher temperatures causing increased evaporation of water and loss of fertile land.
Case: Morocco

Interactions between environmental change and socioeconomic trends:

- Traditional dependence on food import in drought years, increasing food insecurity induced by climate change and impact of free trade agreements.


- Dependency on volatile world food markets may decrease the availability of public funding for other sectors.

- Increasing marginalization of small farmers and nomads as well as higher competition over water and fertile land may reinforce migration to cities and may increase the potential for resource conflicts, especially in rural and periurban areas.

- As Morocco is only 14 km away from the Spanish coast, migrants from Sub-Saharan Africa, from Morocco itself but also from many other countries seek to cross the border to the EU.

- Increasing pressure on natural resources and livelihoods in countries of origin and lacking migration policies may further reinforce illegal migration.

- Local adaptation processes to climate change such as in the agricultural sector (water economy), regarding dispute regulation (between farmers and nomads) or in infrastructure also point to growing coping capacities.
Conflict types on the Nile: Upstream/downstream, hegemony of Egypt, growing water demand, land flight/urbanisation

Interstate water wars more unlikely than conflicts of low intensity, diplomatic tensions or cooperative use.

Earlier water agreements in favor of Egypt, new agreements for fair water distribution with upper riparians.

Projected precipitation change in upper Nile basin (by 2050 varies between -11% und +44%, river runoff between -32% and +80% in 6 GCMs.

Sea-level rise in Nile delta

Agent based model of water use of four riparians of the Nile

Scenarios of climate change (20 year period):
1. Baseline scenario without climate change
2. Reduced water availability by 20%
3. Increased water availability by 20%
Simulated water investments and water use

- **Total water investments**
- **Water consumption**
  - Constant costs
  - Variable costs
Water supply and water consumption in the Nile region: GIS-based modelling

Annual sum of runoff-fraction of precipitation (SurfaceRunoff and drainage) in m³ water per cell (25km²) per year (2000). Data: MPI for Meteorology, Hamburg (Source: C. Alwardt)

Total area-based water withdrawal (2000) in kg/m² per second (mm/s). Data: WaterGap (for EUWatch) (Source: C. Alwardt)
Land use and conflicts in Kenya

- High dependence on agriculture, fertile land under stress
- Doubling of population until 2050; food insecurity.
- Political instability: corruption, refugee camps, violence in neighbor countries (Sudan, Somalia, Ethiopia, Uganda); access to arms.
- High vulnerability against climate change: Warming rate above global average, increasing precipitation variability and weather extremes (drought, flooding).
- Mixed impacts on temperature and precipitation changes on violent conflict in East Africa. Conflict risk higher in warmer and dries years but cattle frequent in rainy seasons.
Projections of relative precipitation change in Kenya
2061-2090 compared to 1961-1990 (IPCC scenario A1B)

Schilling 2012, based on Hänsler 2011
Farmer-herder interaction and climate-resource interaction

Based on Schilling/Scheffran/Link 2010
GIS-based analysis on the climate-conflict nexus in Kenya/Uganda

Literature and data-based risk indicators of environmental conflict, with focus on vulnerability and Reduced Potential of Agricultural Productivity (RPAP).

Geo-referenced mapping of risk area in Kenya and Uganda.

Comparison of spatial data with qualitative case studies in Kenya (Loitoktok, South Turkana/North-Pokot) and Uganda (Karamoja) shows agreements and discrepancies between remote data and local experiences.
Composition of the integrated risk indicator

<table>
<thead>
<tr>
<th>Concept</th>
<th>Indicators (Sub-indicators)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Expo</td>
<td>Soil degradation (Rate of soil degradation; Extent of soil degradation)</td>
</tr>
<tr>
<td>(30%)</td>
<td>Higher temperatures</td>
</tr>
<tr>
<td>+</td>
<td>Reduced precipitation</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>Variable precipitation</td>
</tr>
<tr>
<td></td>
<td>Household and community vulnerability (Education; Daily necessities; Health; Access to healthcare)</td>
</tr>
<tr>
<td></td>
<td>Governance vulnerability</td>
</tr>
<tr>
<td></td>
<td>Population density</td>
</tr>
<tr>
<td></td>
<td>Environmental dependence</td>
</tr>
<tr>
<td>Risk of violent</td>
<td>Population size</td>
</tr>
<tr>
<td>conflict onset</td>
<td>Level of development (Poverty; Under five mortality)</td>
</tr>
<tr>
<td>(40%)</td>
<td>Economic growth</td>
</tr>
<tr>
<td>+</td>
<td>Past collective violence</td>
</tr>
<tr>
<td>Risk of Violent</td>
<td>Medium level of democracy</td>
</tr>
<tr>
<td>conflict Onset Related to</td>
<td>Risk of Violent Conflict Onset Related to RPAP</td>
</tr>
<tr>
<td>RPAP</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

Ide/Schilling/Scheffran/Ngaruiya/Weinzierl, On Vulnerability and Violence
Risk indicator and conflict events in Kenya und Uganda (2001-2010)

Based on: Ide et al., On Vulnerability and Violence
Areas for case studies in Kenya and Uganda

Ide et al., On Vulnerability and Violence
## Comparison of risk indicator with case studies

<table>
<thead>
<tr>
<th></th>
<th>Environmental Exposure</th>
<th>Vulnerability</th>
<th>General Risk of Violent Conflict Onset</th>
<th>RPAP-related Violent Conflict Onset Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>risk index</td>
<td>case study</td>
<td>risk index</td>
<td>case study</td>
</tr>
<tr>
<td>Loitoktok</td>
<td>moderate to high</td>
<td>moderate to high</td>
<td>low</td>
<td>very low</td>
</tr>
<tr>
<td>Southern Turkana-Pokot North</td>
<td>low</td>
<td>high</td>
<td>moderate to high</td>
<td>moderate to high</td>
</tr>
<tr>
<td>Karamoja</td>
<td>low</td>
<td>high</td>
<td>very high</td>
<td>very high</td>
</tr>
</tbody>
</table>

Ide et al., On Vulnerability and Violence
Field research in Northwest Kenya

Schilling/Opiyo/Scheffran (2012)
Raiding pastoral livelihoods, Pastoralism.
Precipitation and cattle raids in Northwest Kenya

592 violent deaths through raids in Turkana 2006-2009
2006 and 2008 partly explained through "rains and raids" theory; no clear pattern 2007
But: in 2009 precipitation is lowest and raids highest
Source: Schilling/Opiyo/Scheffran 2012
Theoretical explanations

Resource Abundance and Scarcity Threshold (RAST) Hypothesis

- In regular years with sufficient rainfall cattle raids happen mostly before or during rainy seasons to increase chances of wet season.
- If rainfall fails over extended period and a scarcity threshold is reached, raids are seen as measures of compensation and survival, despite unfortunate conditions.

Spiral of violence

- Violence multiplier
  - socio-economic marginalization
  - armament/disarmament
  - climatic changes/resource scarcity

- Violence preventer
  - provide income alternative
  - facilitate intercommunal meetings
  - secure mobility/provide fodder

- Violence
  - arming
  - distrust
  - insecurity
Adaptation options of farmers and pastoralists

Source: Schilling/Freier/Hertig/Scheffran 2012
Case study and field research in South Kenya (Loitoktok)

Barriers & strategies of climate adaptation in the framework of ecosystem services

Analysis of resource conflicts, conflict resolution and cooperation

Application of Social Network Analysis (SNA) in stakeholder networks

Source: Grace Wambui Ngaruiya
Actors in rural social networks in Southern Kenya

The rural network structure involved in resource governance in Loitoktok District

Quelle: Ngaruiya 2013

*Numbers represent actors – full description is in appendix A
African migration
Migration routes from Africa to Europe

http://newsimg.bbc.co.uk/media/images/42481000/gif/_42481600_africa_migration416x355.gif
Spanish enclaves in Morocco
Emigrants from Africa (2010)  
(percent of population)

Major destination countries for emigrants from Africa (2010)
Remittances and other resource flows to Africa (1990–2010)

Climate change and migration in the Western Sahel
Role of remittances in Western Sahel

- Majority of transnational Sahelian emigrants remain in the “South”, remittances from “North” usually higher

- African immigrants remit twice on average than immigrants from other developing countries

- Malians and Senegalese in France transfer 10-15% of monthly income

- In the Senegal River valley migrant remittances provided for 65% of households’ cash income.

- International remittances steadily increase despite financial crisis (World Bank 2011).

- Individual remittances mostly directed to support family members and to invest in homes and businesses for the projected return

- In some countries, remittances exceed foreign aid, and in some regions, they constitute a significant fraction of household resources.
# Role of remittances in Mali, Mauritania and Senegal

<table>
<thead>
<tr>
<th>SOURCE COUNTRY</th>
<th>POPULATION MILL</th>
<th>EMI-GRANTS AS % OF POPULATION</th>
<th>NORTH EMI-GRANTS % TOTAL</th>
<th>NORTH REMITTANCES %TOTAL</th>
<th>SOUTH EMI-GRANTS % TOTAL</th>
<th>SOUTH REMITTANCES % TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mali</td>
<td>13</td>
<td>7.8%</td>
<td>10%</td>
<td>33%</td>
<td>90%</td>
<td>67%</td>
</tr>
<tr>
<td>Mauritania</td>
<td>3.3</td>
<td>3.5%</td>
<td>26%</td>
<td>57%</td>
<td>74%</td>
<td>43%</td>
</tr>
<tr>
<td>Senegal</td>
<td>12.5</td>
<td>5.1%</td>
<td>40%</td>
<td>70%</td>
<td>60%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Source: Marmer/Sow/Scheffran (2012)
Co-development and migrant networks

- Since 1960s Sub-Saharan African migrants in France created organizations and initiated co-development projects to construct schools, clinics, wells and irrigation systems.

- Since 1990s West African migrants increasingly settle in Spain and Italy, extending their organisations and co-development activities to host countries.

- Co-development projects either financed by diaspora organizations or co-financed by governmental and private organizations in home and host countries.

- Projects by French immigrants from Senegal River valley: 36% dedicated to health care and education, 23% water and agriculture.

- Migrants invest physical and social capital, innovation and knowledge transfer.

- Diaspora Association of Engineers for the Development of the Sahel, provides support and advice for over 200 projects in Kayes region of Mali

- Advantage of migrant projects: use of migrants’ social network and knowledge of local communities.

- Significance of migrant contribution, favorable conditions and role of institutions to climate change adaptation in Sahel yet to be assessed.
## Development projects by migrant organizations with relevance for climate adaptation

<table>
<thead>
<tr>
<th>Country</th>
<th>Region</th>
<th>Sector</th>
<th>Actors</th>
<th>Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mauritania</td>
<td>Guidimaka, Bouanze</td>
<td>Water</td>
<td>Emigrant Organization in Spain, Spanish governmental and non-governmental organizations</td>
<td>Social, financial and cultural capital of emigrants</td>
</tr>
<tr>
<td>Senegal</td>
<td>Podor, Matam, Bakel</td>
<td>Water</td>
<td>Emigrant Organizations in France, private companies, governmental and non-governmental organizations in Senegal, African and European Countries</td>
<td>Social and financial and cultural capital of emigrants</td>
</tr>
<tr>
<td>Mali</td>
<td>Kayes</td>
<td>Renewable energy</td>
<td>Emigrant Organizations in France, non-governmental organizations in Mali and France</td>
<td>Technological innovation, social and financial capital of emigrants</td>
</tr>
<tr>
<td>Mali</td>
<td>Kayes</td>
<td>Electrification</td>
<td>Emigrant Federation in France, Private companies in France</td>
<td>Partnership between emigrants and private businesses</td>
</tr>
<tr>
<td>Mali</td>
<td>Koulikoro</td>
<td>Renewable energy</td>
<td>“Second generation” return migrant from Italy, US American, Italian and Malian NGOs</td>
<td>Technological innovation, social capital</td>
</tr>
</tbody>
</table>

Source: Marmer/Sow/Scheffran 2012  p. 58
Example Senegal

- Since the 1970s, Waoundé was strongly affected by droughts
- Agriculture was no longer sustaining livelihoods
- Residents install irrigation systems, but no institutional support has been offered
- Sharp raise of emigration rate from 20% of young men to 90%
- Senegalese Diaspora is strongly organized and contributes to development, predominantly in water and education
- Adaptation policy calls for a greater co-ordination between government institutions to overcome funding limitations
- By integrating migration in adaptation policy framework additional financial and human resources can be offered to communities and the government to adapt to climate change

Source: www.waounde.de
"Selbsthilfegruppe der Bürger Waoundés in Europa eV"

Founded in Munich, Germany, in 1994 by the emigrants from Waoundé (10,000 inhabitants), Senegal River valley

- "Selbsthilfegruppe" has 90 members and implements developmental projects predominantly in education
- Cooperates with:
  - NGOs in Germany, Austria and Luxemburg
  - German Federal Ministry for Economic Cooperation and Development
  - Senegalese Ministry of National Education, Technical Education and Vocational Training
Example Senegal

A vocational training centre was established in 2006; today it offers training to 200 students.

Students are trained in wood- and metal working, electricity, tailoring and hair dressing.

- Since 2008, the centre participates in a photovoltaic project of the French *Electriciens Sans Frontières*.
- Installation and maintenance of solar collectors in schools and dispensaries.
- Income diversification, electrification, renewable energies.

Source: www.waounde.de