

Assessing risk in a changing climate

The IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation African context

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Outline

**Africa's exposure to climate change
and extremes**

**Key Messages / Risk Management
and Adaptation**

A changing climate is leading to changes in extreme weather and climate events



Impacts from weather and climate events depend on:



nature and severity of event



vulnerability



exposure

Africa's exposure to climate extremes

- **Drought** : Africa Sahel drought –severe famines, human & livestock losses, e.g. the 2003-2004 drought cost the Namibian Government (US\$43-48 million) in provision of emergency relief. A 14% reduction in rainfall is projected to cause losses of around US\$4.65 billion to Cameroon's economy .
- **Floods**: generally beneficial but with poor infrastructure and health services it can be devastating (Mozambique and Somali).
- **Heat Stress**: Particularly in urban areas- it can also impact agricultural crops and human health.
- **Tropical Cyclones**: largest increase in physical exposure to TC e.g. Madagascar & Mozambique)- projected SLR is expected to compound TC surge impacts.

Increasing frequency & intensity of climate extremes

























- Disasters are appearing in everyday news
- in Africa **the deadliest** weather disasters are droughts followed by famines.
- From October 2010 to September 2011, a severe drought in the Horn of Africa caused **widespread famine** and **large-scale migratory movements**,
- Around 80% of the livestock of Somalia's nomads died, some 13 million people required humanitarian aid, and an **estimated 50,000 lost their lives.**



Observed Changes in climate extremes affecting Africa
























Table 1: Observed changes in temperature and precipitation extremes since the 1950s^a

Table 1 shows observed changes in temperature and precipitation extremes, including dryness in regions of Africa since 1950, with the period 1961–1990 used as a baseline (see Box 3.1 in Chapter 3 of SREX for more information).

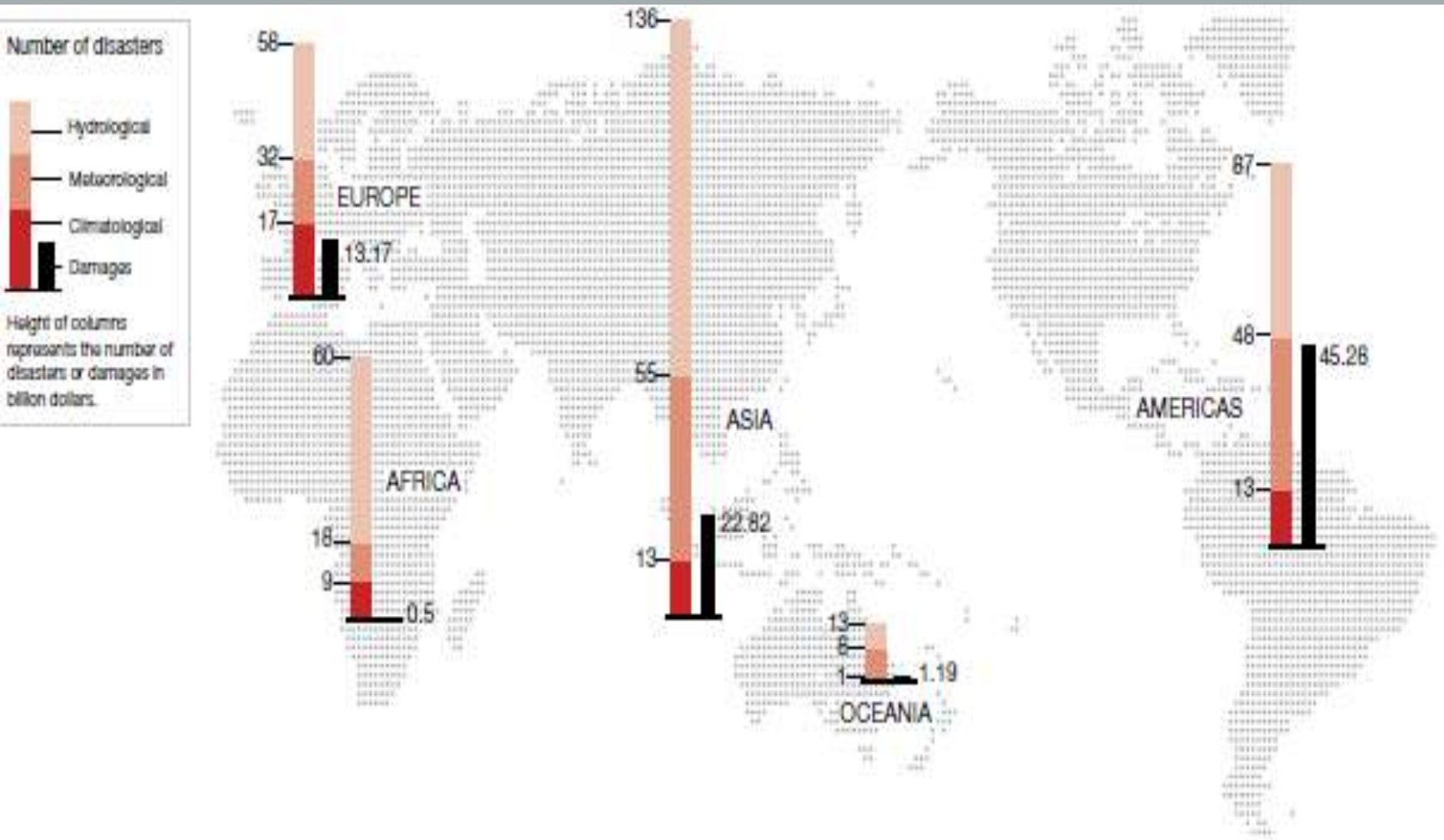
Region and Sub-region	Trends in maximum temperature (warm and cold days) ^b	Trends in minimum temperature (warm and cold nights) ^b	Trends in heat waves/warm spells ^b	Trends in heavy precipitation (rain, snow) ^b	Trends in dryness and drought ^b
West Africa	<p> Significant increases in temperature of warmest day and coldest day in large parts</p> <p> Insufficient evidence in others</p>	<p> Decreasing frequency of warm nights, decrease in cold nights in large parts</p> <p> Insufficient evidence in others</p>	<p> Insufficient evidence for most of the region</p>	<p> Precipitation from heavy rainfall events decreased in many areas, rainfall intensity increased</p>	<p> Increased dry spell duration, greater inter-annual variation in recent years</p>
East Africa	<p> Lack of evidence due to lack of literature and spatially non-uniform trends</p>	<p> Spatially varying trends in most areas</p> <p> Increases in warm nights in Southern tip (decreases in cold nights)</p>	<p> Insufficient evidence</p>	<p> Insufficient evidence</p>	<p> Spatially varying trends in dryness</p>
Southern Africa	<p> Increase in warm days; (decrease in cold days)</p>	<p> Increase in warm nights (decrease in cold nights)</p>	<p> Increase in warm spell duration</p>	<p> No spatially coherent patterns of trends in precipitation extremes</p>	<p> General increase in dryness</p>
Sahara	<p> Lack of literature</p>	<p> Increase in warm nights</p> <p> Lack of literature on trends in cold nights</p>	<p> Insufficient evidence</p>	<p> Insufficient evidence</p>	<p> Limited data, spatial variation of the trends</p>

Projected Changes in climate extremes affecting Africa

Table 2 shows projected changes in temperature and precipitation extremes, including dryness, in Africa. The projections are for the period 2071-2100 (compared with 1961-1990) or 2080-2100 (compared with 1960-2000) and are based on GCM and RCM¹⁷ outputs run under the A2/A1B emissions scenario.

Region and Sub-region	Trends in maximum temperature (the frequency of warm and cold days) ¹²	Trends in minimum temperature (the frequency of warm and cold nights) ¹²	Trends in heat waves/warm spells ¹⁴	Trends in heavy precipitation (rain, snow) ¹⁶	Trends in dryness and drought ¹⁵
West Africa	 Likely increase in warm days (decrease in cold days)	 Likely increase in warm nights (decrease in cold nights)	 Likely more frequent and/or longer heat waves and warm spells	 Slight or no change in heavy precipitation indicators in most areas  Low model agreement in northern areas	 Inconsistent signal
East Africa	 Likely increase in warm days (decrease in cold days)	 Likely increase in warm nights (decrease in cold nights)	 Likely more frequent and/or longer heat waves and warm spells	 Likely increase in heavy precipitation	 Decreasing dryness in large areas
Southern Africa	 Likely increase in warm days (decrease in cold days)	 Likely increase in warm nights (decrease in cold nights)	 Likely more frequent and/or longer heat waves & warm spells	 Lack of agreement in signal for region as a whole  Some evidence of increase in heavy precipitation in southeast regions	 Increase in dryness, except eastern part  Consistent increase in area of drought
Sahara	 Likely increase in warm days (decrease in cold days)	 Likely increase in warm nights (decrease in cold nights)	 Likely more frequent and/or longer heat waves and warm spells	 Low agreement	 Inconsistent signal of change

Weather and climate related disasters and regional average impacts (damages in US\$ billion) from 2000-2008



Risk Management & Adaptation

flash floods in Nairobi, Kenya

Risk Factors

- rapid growth of informal settlements
- weak building construction
- settlements built near rivers and blocked drainage areas



Risk Management/Adaptation

- reduce poverty
- strengthen buildings
- improve drainage and sewage
- early warning systems

Projected: *likely* increase in heavy precipitation in East Africa

Risk Management & Adaptation

drought in the context of food security in W. Africa

Risk Factors

- more variable rain
- population growth
- ecosystem degradation
- poor health and education systems



Management/Adaptation

- improved water management
- sustainable farming practice
- drought-resistant crops
- drought forecasting

Projected: *low confidence* in drought projections for West Africa

High levels of vulnerability, combined with more severe and frequent weather and climate extremes, may result in some African coastal cities, being increasingly difficult places in which to live and work

Risk Factors

- shore erosion
- saltwater intrusion
- coastal populations
- tourism economies



Risk Management/ Adaptation

- Early warning systems
- maintenance of drainage
- Regional risk pooling
- relocation

Risk Management & Adaptation

Key messages

Even without taking CC into account, disaster risk will continue to increase in many African countries as more vulnerable people and assets are exposed to weather extremes



Case Study: Zimbabwe, 2008



Trends in vulnerability and exposure are major drivers of changes in disaster risk (*high confidence*)

- Understanding the multi-faceted nature of both **vulnerability** and **exposure** is a **prerequisite** for **designing and implementing effective adaptation & DRM strategies**.
- **Vulnerability reduction is a core common element of adaptation and disaster risk management.**

Recurrent drought in the Africa Sahel



Integration of **local knowledge** with external **scientific and technical knowledge** can improve local participation in **DRR& CC adaptation**

(high agreement, robust evidence)

- Community-Based adaptation can benefit management of DR and climate extremes, but is **constrained** by the **availability of human and financial capital** and of **DR and climate information** customized for local stakeholders

Local community from W,Sudan

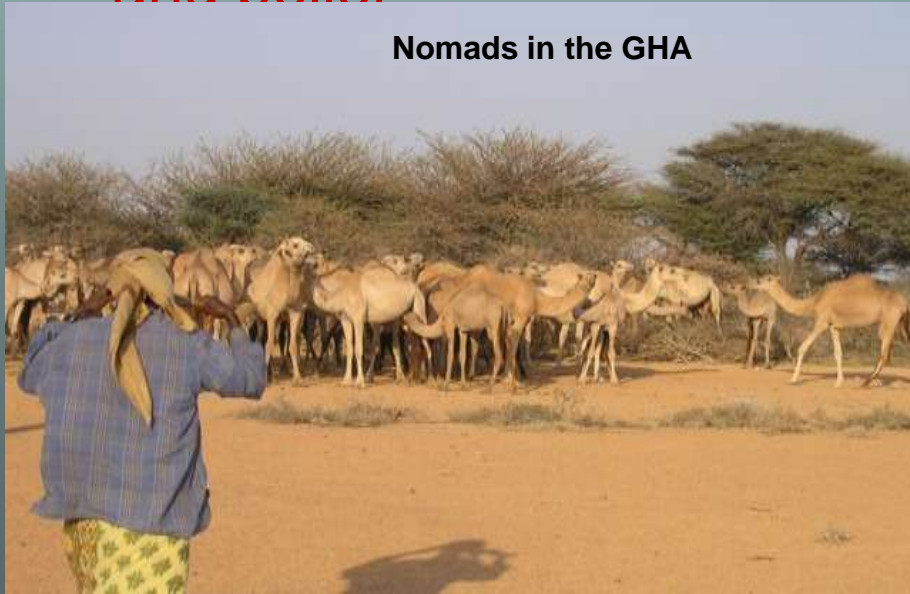


Appropriate and timely risk communication is critical for effective adaptation & DRM

(high confidence)

- Explicit **characterization of uncertainty and complexity** strengthens risk communication.
- Effective risk communication requires **exchanging, sharing, and integrating knowledge** about climate-related risks among all stakeholder groups.
- Among individual stakeholders and groups, **perceptions of risk** are driven by **psychological and cultural factors, values, and belief**

Nomads in the GHA



Inequalities influence local coping and adaptive capacity, & pose challenges to DRM & adaptation

(high agreement, robust evidence)

- These inequalities reflect **socioeconomic, demographic, and health-related differences** and differences in access to **livelihoods and entitlements.**

A woman from East Sudan



A woman carrying
Barely-Souss-Morocco



Nomads in Central Sudan



Risk sharing and transfer mechanisms **can increase resilience to climate extremes** at local, national, and international scales

- Insurance and other forms of risk transfer are linked to DRR& CC adaptation by providing **means to finance relief, recovery of livelihoods, and reconstruction, reducing vulnerability & providing knowledge and incentives for reducing risk.**
- Uptake of formal risk sharing and transfer mechanisms is **unequally distributed across regions and hazards**



Attention should be given to the temporal & spatial dynamics of vulnerability & exposure

(high agreement, medium evidence)

- given that the design & implementation of adaptation & DRM strategies can **reduce risk in the short term**, but may increase vulnerability & exposure **over the longer term**- For instance, dyke systems can reduce hazard exposure by offering **immediate protection**, but also encourage settlement patterns that may **increase risk in the long-term**.



A road is turned into virtual river amid rising flood waters. (Photo courtesy of Haziq Ariffin) 26/1/2011



Vehicles float on a rising sea of flood water along Siteen Road. (Photo courtesy of Sarah Qamar) 26/1/2011

Low-regrets measures (LRMs) for current DRM are entry points for addressing projected trends in **exposure & vulnerability, (*high agreement, medium evidence*).**

- **LRM have the potential to offer benefits now and lay the foundation for addressing projected changes**
- Many of these LRMs produce co-benefits, help address other development goals, such as **improvements in livelihoods, human well-being, and biodiversity & help minimize the scope for maladaptation.**



Closer integration of DRM & Adaptation, along with the incorporation of both into local, national, & international development policies & practices, will provide benefits at all scales

(high agreement, medium evidence)

Small Dam in Souss S. Morocco



Thanks

for more information

<http://www.ipcc.ch/>