Optimizing Water Infrastructure for Climate Adaptation and Mitigation

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Sering Jallow

Director, Water & Sanitation Department

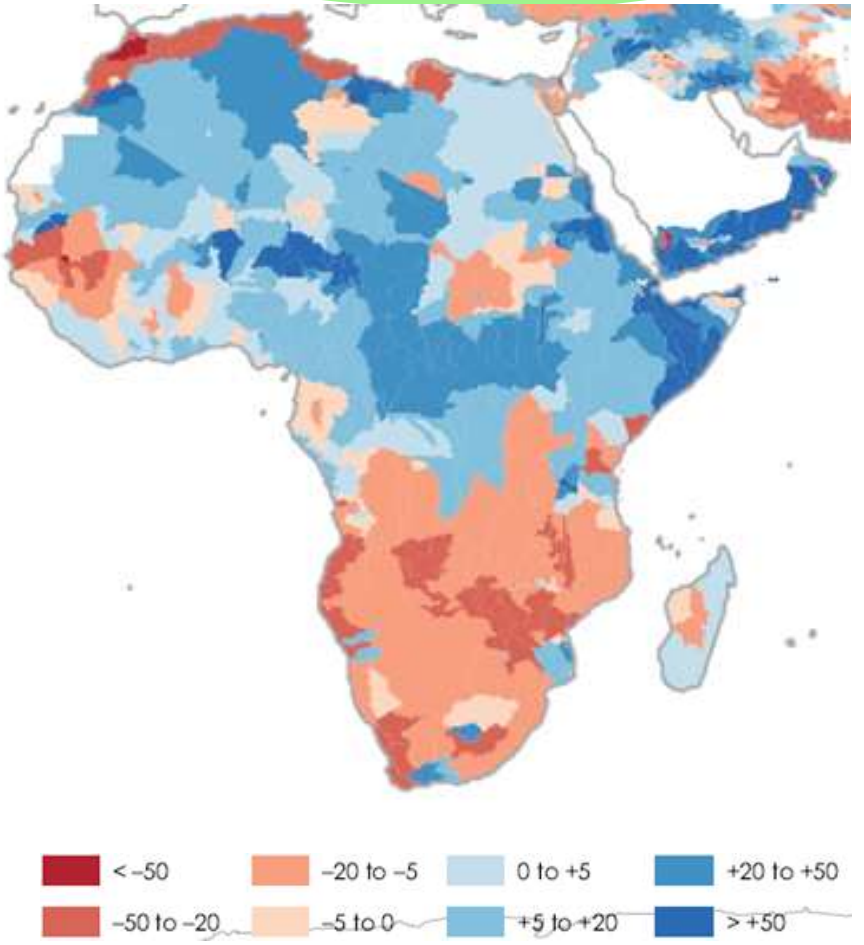
& African Water Facility

Impacts of Climate Change on Water

Small changes in temperature will lead to:

- Increased variability - more **severe**, **intense**, **prolonged** droughts and floods
- Changes in groundwater recharge
- Impacts on water quality
- Hydropower opportunities and threats
- Loss in production, infrastructure and increased poverty
- Exacerbated malnutrition

Projected Percent Change in Runoff for 2030 at the Catchment Level



Impacts of Climate Change on Water (cont.)

- Increased disaster vulnerability (floods, droughts and health related issues)
- Urban challenges (e.g. urban floods, rapid population growth due to migration caused by climate change)
- Increased dependence on food aid
- Mega-deltas especially affected due to large populations and high exposure to sea level rise, storm surges and river flooding

Poorer nations and communities who are least responsible for global warming will be disproportionately affected

Climate Impacts: Regions at High Risk

Floods & Droughts

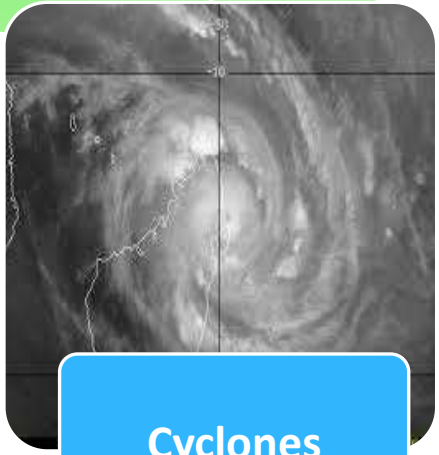
Kenya, Eritrea, Somalia, Eastern Sudan, Ethiopia, Northern Angola

Droughts

Botswana, Namibia, Southern Angola, Morocco, Northern Algeria, Tunisia, Northern Libya

Sea level rise

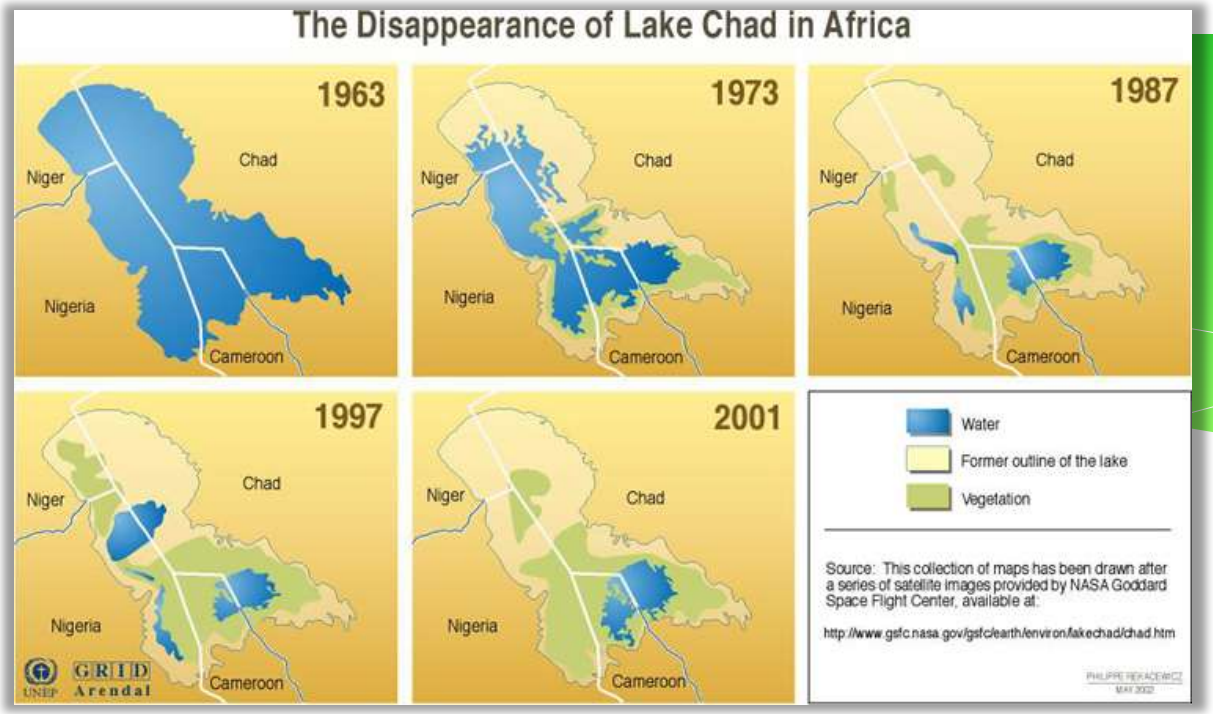
Benin, Cameroon, Cote d'Ivoire, Eritrea, Djibouti, Gambia, Guinea-Bissau, Ghana, Kenya, Liberia, Nigeria Senegal, Sierra Leone, Tanzania, Togo



Cyclones

Comoros, Madagascar, Mauritius, Mozambique

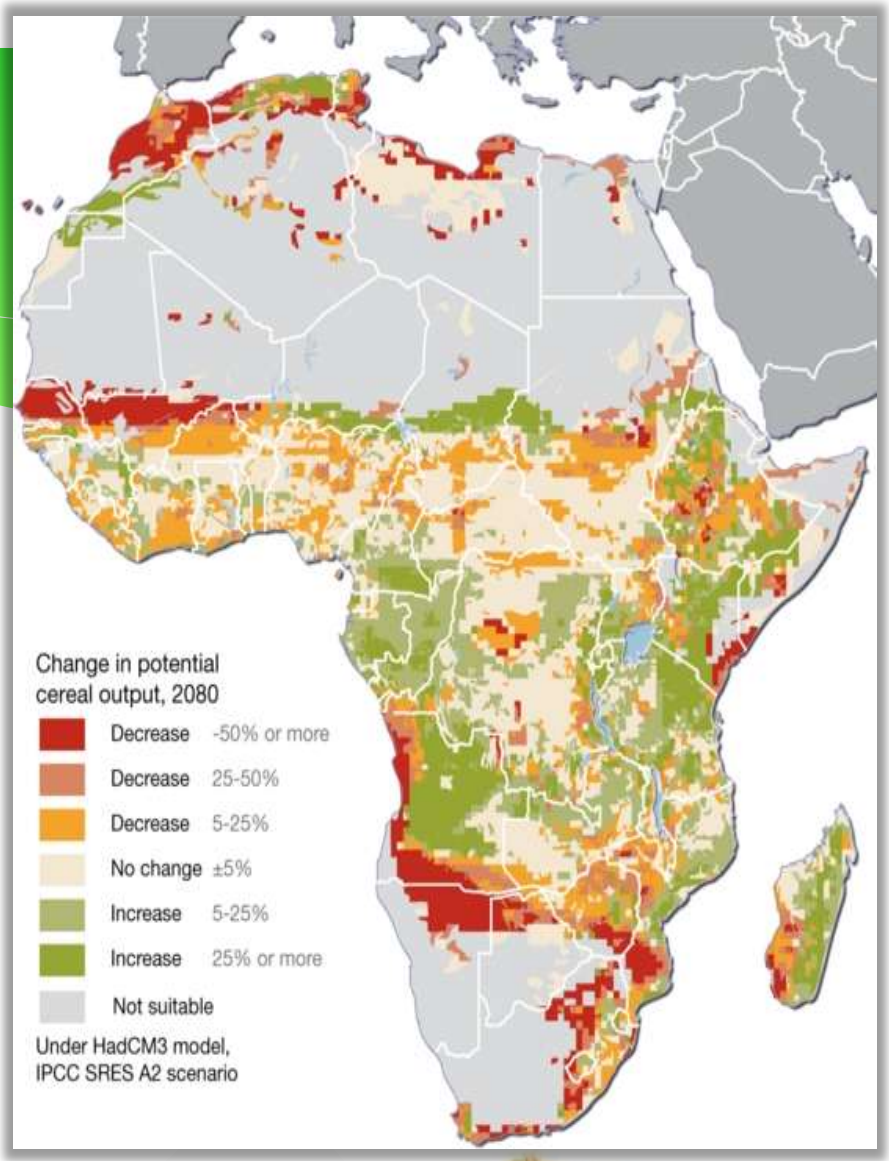
Source: In ***Climate change and Africa: a Review.*** African Development Bank. November 2010



Lake Chad, in 1972 and 15 years later in 1987 - almost gone due to poor management and Climate variability and change.

Impact on Agriculture

- Changes in pests, diseases, growing seasons, land-use
- Temperature-induced crop yield losses of up to **16%** per **1° C**
- Overall reductions of up to **22%** across **5** crops
- By 2020, yields from rain-fed agriculture could be **50%** less in some countries, affecting food security and exacerbating malnutrition



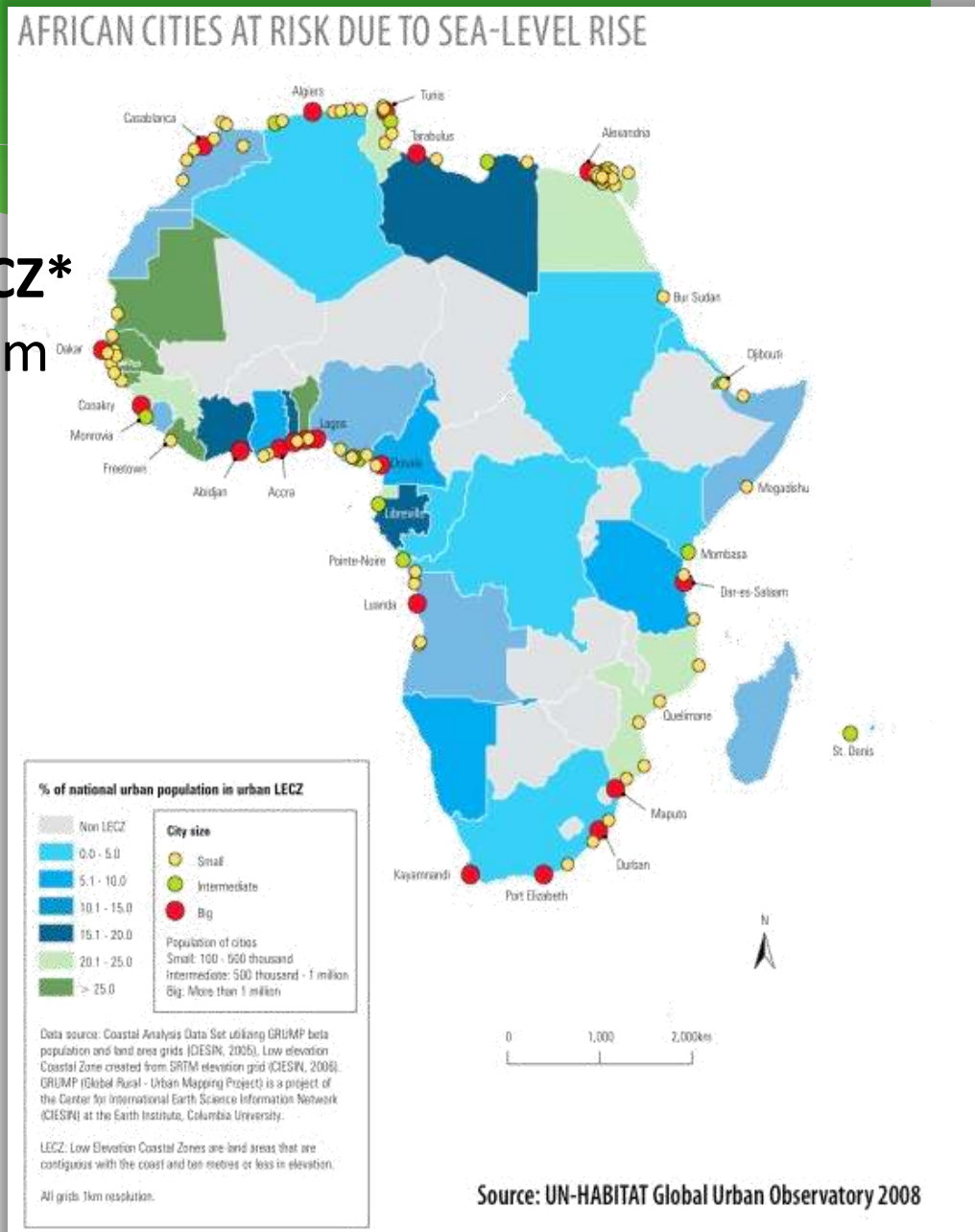
Impact on Coastal Zone and Marine Resources

African Cities at Risk

- 19 big cities (1 million +) in **LECZ***
- **Mombasa**: 17% city below 0.3m
- **Banjul**: most below 1m
- **Egypt**: 2 million people below 0.5m
- **Abidjan**, **Lagos** at high risk

Marine Resources at Risk

- **22** of 33 coastal countries "**highly vulnerable**" to CC impacts on fisheries are in Africa



Impact on Hydropower

Increased incidents of drought may impact region's power sector

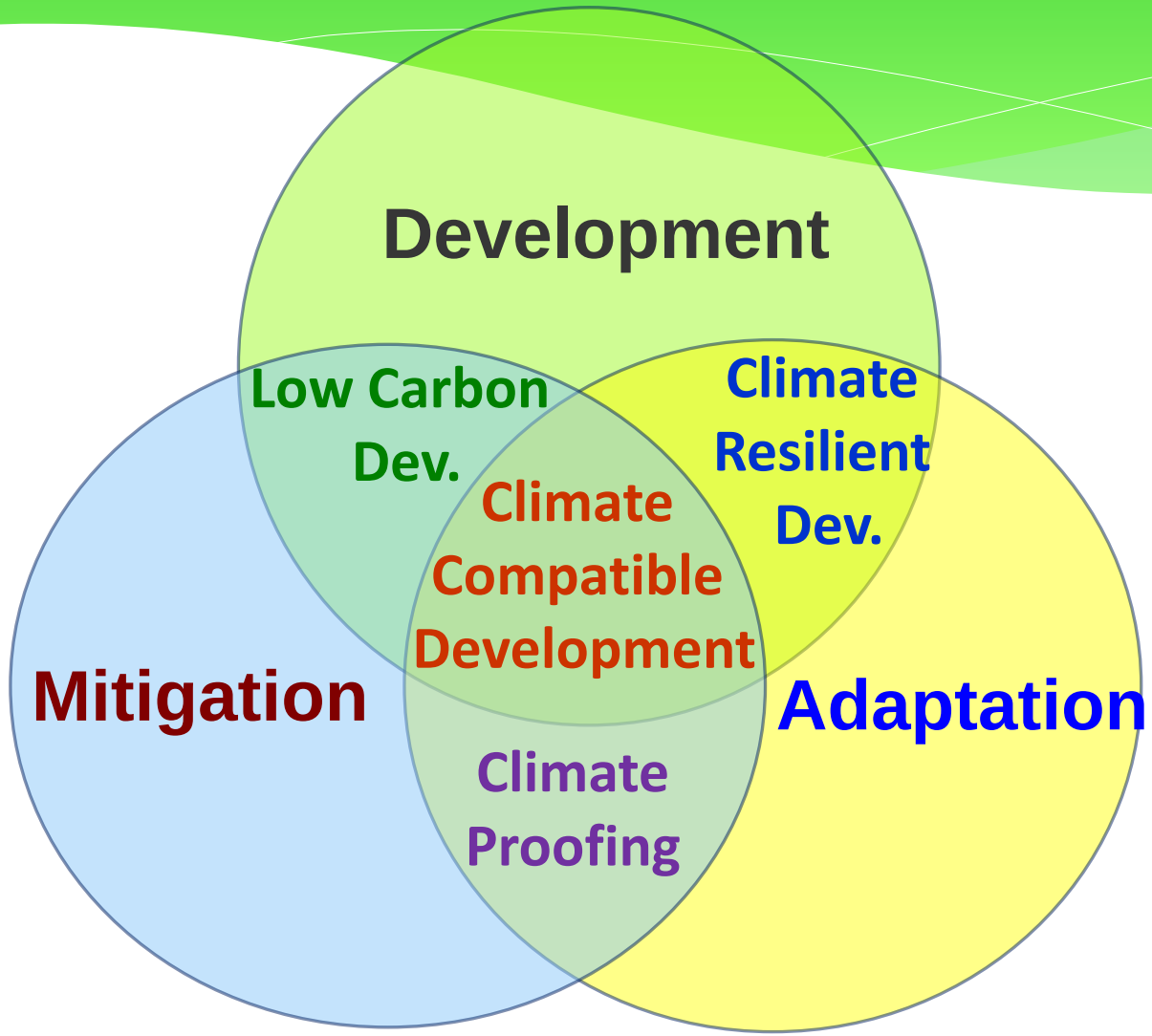
For example

- Hydroelectric generating capacity dropped by half in Uganda following Lake Victoria's nearly 2 meter drop in water levels
- Kenya, Tanzania and Ethiopia were also affected by drought-related power shortages
- The countries had to turn to costly thermal generators to ease the supply deficit

Country	Date	Contract Duration	Emergency Capacity (MW)	Percentage total installed capacity (%)	Estimated annual cost as % GDP	Drought Related?
Rwanda	2005	2 years	15	48.4	**1.84**	Yes
Uganda	2006	2 years	100	41.7	**3.29**	Yes
Tanzania	2006	2 years	180	20.4	**0.96**	Yes
Kenya	2006	1 year	100	8.3	**1.45**	Yes

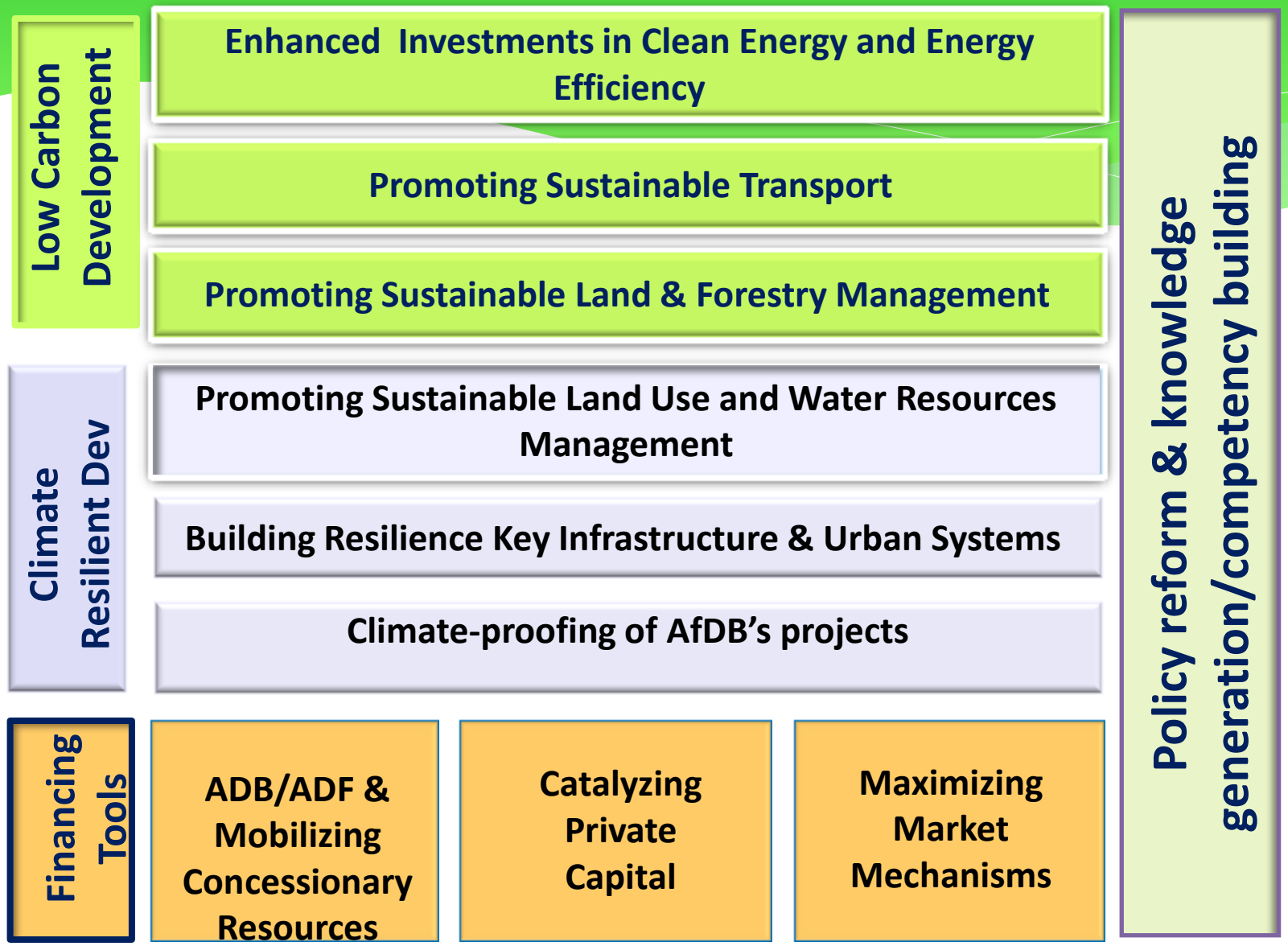
Large Scale Hydropower, Renewable Energy and Adaptation to Climate Change, 2009

Climate change interventions must be rooted in development, aligned with mitigation & adaptation



Source: Catalyst, 2009

AfDB's Climate Change Intervention & Instruments



What the African Development Bank is Doing

❑ POLICIES / INSTITUTIONAL ARRANGEMENTS

- IWRM policy (2000, under review)
- Clean Energy Investment Framework (2008)
- Climate Risk Management and Adaptation Strategy (2008)
- Agriculture Sector Strategy (2010)
- Urban Development Strategy (2010)
- Capacity Development Strategy (2010)
- Climate Change Action Plan 2011-2015 (2011)
- Energy Sector Policy/ Energy Sector Strategy (2011)
- Climate Change Coordination Committee (CCCC) (2011)
  - Departments: Quality Assurance & Results; Energy, Environment & CC; Transport & ICT; Private Sector; Water & Sanitation; and Agriculture & Agro-Industry

❑ CLIMATE SAFEGUARD SYSTEM

- Tool for 'climate-proofing' of Bank projects

What the African Development Bank is Doing

❑INITIATIVES AND PARTNERSHIPS

- Agricultural Business Plan (about US$ 5 billion over 5 years)
  - Water Storage Enhancement: to increase water storage by 1% (8.5 BCM)
  - Agricultural Water Development: 500,000 ha irrigation development
- Water Supply & Sanitation (US$ 700 million pa)
- African Water Facility (US$ 120 million so far; US$ 230 million 2012 to 2016
- ClimDev-Africa Programme (AUC/UNECA/AfDB)
  - Support development / rehabilitation of climate data collection and monitoring systems
  - Develop institutional capacity to address challenges of CC
  - Leverage financial resources to support CC mitigation and adaptation
- Congo Basin Forest Fund (CBFF) (US$ 160 million)
  - Funds activities to reverse deforestation of the Congo Basin Forest
- Africa Carbon Support Program
  - To assist RMCs access carbon market
- Sustainable Energy Fund for Africa (SEFA)
- Africa Green Fund

How the Water Sector Contributes to MITIGATION

Water sector can contribute to GHG emission reduction through:

- Use of renewable energy for water supply and sanitation schemes: e.g. use of solar & wind energy for pumping (RWSS in Madagascar, Ethiopia & Gambia);
- Hydropower development (Morocco)
- Capturing GHG from wastewater treatment plants (Mauritius, Egypt, Tunisia, Ghana, Uganda)
- Improving energy efficiency: e.g. reducing leakage rates of water supply schemes (all UWSS) & using gravity schemes in RWSS (Ethiopia, Uganda, Tanzania, Kenya, Malawi)

MITIGATION
Water Supply and Sanitation

African Water Facility
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Mobilising Resources for Water in Africa

- Small strategic investments aimed at promoting mitigation technologies, such as:
  - Using renewable energies for water pumping (Ethiopia)
  - Recovering and reusing methane emissions from sewerage treatment plants (Ghana)
  - Strengthening local capacities to widely adopt and scale up the above interventions

Example of Energy Sector

- Sahanivotry Mini Hydro Power Plant, Madagascar
  - First CDM registered project in Madagascar
  - Generates 10% of the country's total power supply
- Buseruka Small Hydroelectric Power Project, Uganda
  - Connection to rural population
- Bujagali Hydroelectric Power Project, Uganda

- Future Bank Interventions

Inga I & II Rehabilitation project (DRC), OMVG Energy program (West Africa), Memvele Hydropower project (Cameroon), Rusomo Fall hydropower project (Brundi, Tanzania, Rwanda), Lom Pangar Hydropower project (Cameroon), Gebba Hydropower project (Ethiopia)

Addressing Climate Change Risks at Project Level

Climate Screening & Adaptation Review & Evaluation Procedures

1. **Screening** of development interventions (projects & programs)
2. **Climate risk assessment (CRA)** of initiatives likely to be at risk
3. **Adaptation / climate risk management**

Project Cycle

ADAPTATION in the Water Sector

Water Resources Management

Water Resources Information Management:

- Data, information and knowledge are necessary for understanding climate change impacts, as well as planning and designing adaptation measures.

National and Trans-boundary Water Resources Management:

- Develop strategies to achieve water security, as well as action plans to mitigate and adapt to negative impacts based on good understanding of the climate change (e.g. Support for Niger Action Plan and NAMAs)
- Regional cooperation provides the greatest opportunity for analysing and understanding the problems and designing strategies for coping with the impact of climate change and variability

WRM projects/programs should mainstream climate change risk assessment to ensure that development is appropriate, viable and sustainable in the face of climate change

ADAPTATION Trans-boundary Water Resources Management

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AWF TWRM and related project preparation interventions are addressing climate change and water security issues, through:

- **TWRM programs/projects**: Niger River; Lake Chad; Congo River, Volta River, Kayanga-Geba River; Bugesera area of Burundi/Rwanda; Songwe River of Malawi/Tanzania; and Shire Zambezi River; OMVG; OMVS; etc; Financed their establishment, building capacity, pre-investment studies

- **Regional programs/projects**: IGAD; ECCAS; SADC; ECOWAS; AUC PIDA, and Lake Victoria

ADAPTATION - Climate Proofing Water Infrastructure

Addressing intensification of existing risks:

- Enhancing water storage capacity to cope with greater rainfall variability (e.g. developing multi-purpose water infrastructure in OMVG, OMVS, NBA,)
- Upgrading urban drainage to cope with more severe/frequent floods (Yaounde, Nakuru, Harar); Wastewater treatment for reuse (Tunisia)
- Installation of early warning systems for floods and droughts

ADAPTATION - Water for Agriculture

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Mobilising Resources for Water in Africa

- Need for improved agricultural and land management practices to strengthen both productivity and resilience to climate change
- AWF is providing such support :
  - Improving control and management of on-farm water resources (Botswana)
  - Watershed protection (Kenya)
  - Piloting more productive agriculture water technologies, such as rainwater harvesting for multiple purposes (Djibouti, Rwanda).
  - Helping small-scale farmers adapt to climate change and ensure sustained agricultural-based livelihoods (Zambia, South Africa)

ADAPTATION - Agriculture

Participatory Integrated Watershed Management Project, Gambia

- 6,000 hectares of fertile lowlands became productive by provision of access and flood prevention measures
- Soil and moisture conservation measures in uplands to protect and sustain the productivity.
- Reduce the erosion of soil into lowland agricultural areas
- Crop production increased from 4,500 to 25,500 tons per year.

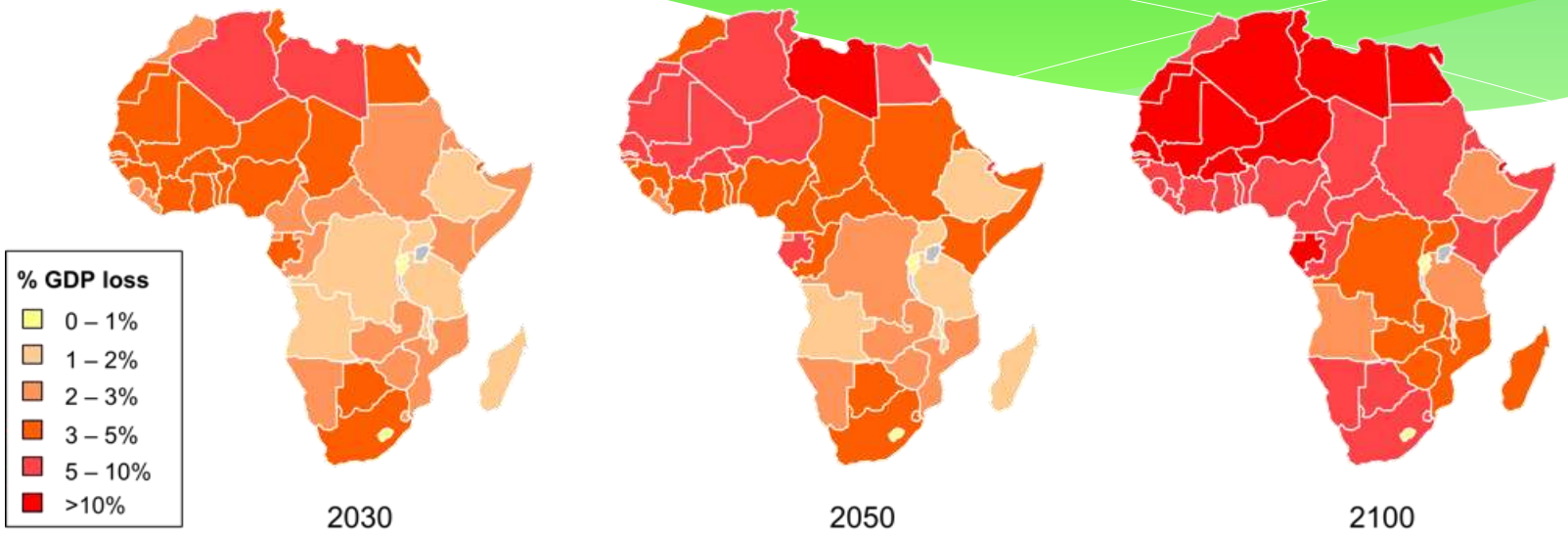
ADAPTATION - Transforming Current Systems

Addressing fundamental changes in environment, risks, etc.

- Relocation of settlement away from high risk areas
- Assisted migration & infrastructure investment in new areas
- Moving away from water-intensive agriculture/industry
- Greater agricultural investment to exploit comparative advantages
- Phasing in or out of certain economic activities
- Large infrastructure projects (e.g. large-scale desalination)
- New energy systems (e.g. to replace thermal power)

Cost of Addressing Climate Change

- Climate change could lead to economic costs of **$40 bill./yr**, equivalent to **2.7% of GDP**, in Africa by 2025



Cost of Adaptation

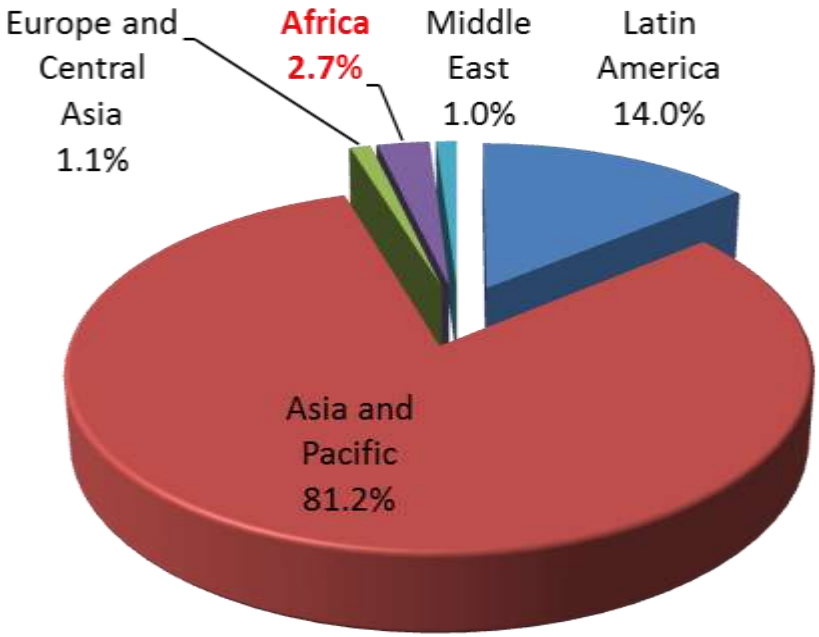
- Immediate adaptation needs for Africa are **$1-2 bill./yr** to undertake vulnerability assessment, build capacity, pilot adaptation and tackle immediate hazards. These could increase to **$3 bill./yr** by 2030.
- Cost of "climate proofing" investment is estimated to be **$12-28 bill./yr** by 2030
- Additional **$12-17 bill./yr** may be required for social protection including protection of livelihoods and health

Financing Challenge in Africa

Africa has received the **lowest** proportion of climate change financing among the developing regions.

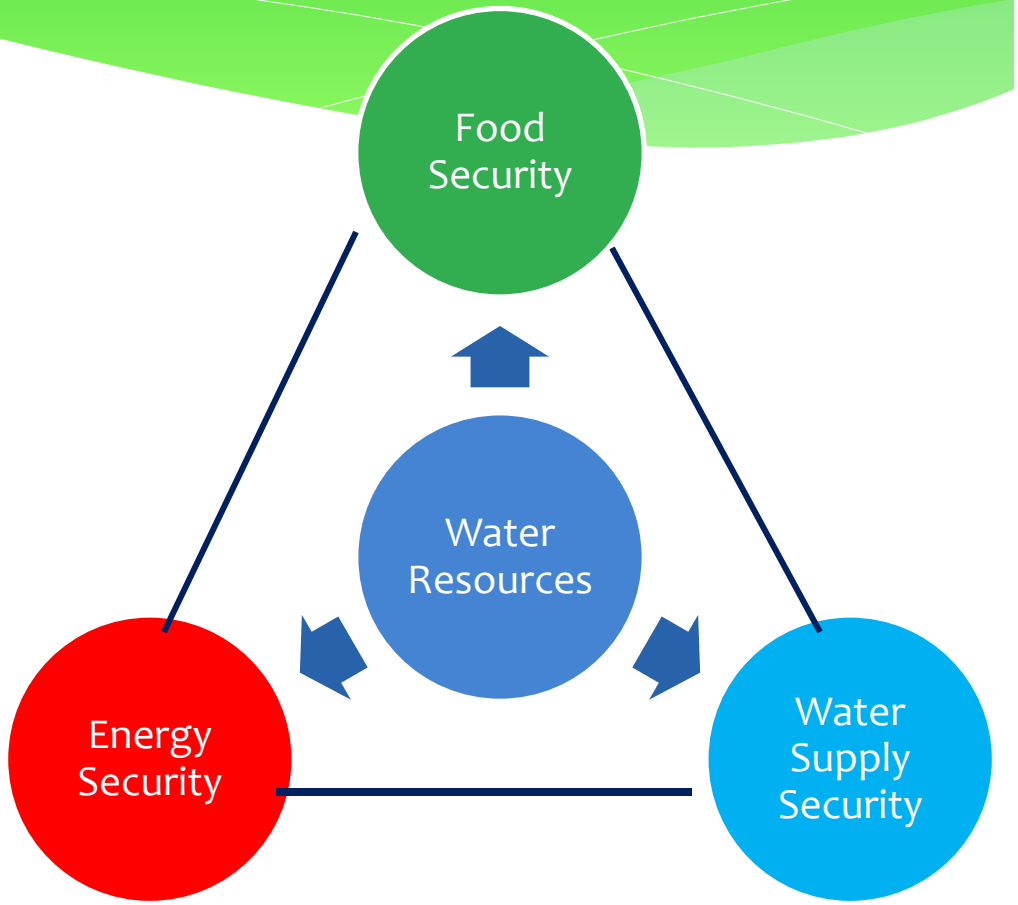
For example:

- Only 190 of total 7088 in the CDM project pipeline is hosted by Africa



Think Integration

Preparing for a resource scarce future and meeting today's water, energy and food challenges requires solutions that take into account all three sides of the water, food and energy security. And ***water*** is at the center of this nexus.



Key Messages

- Impacts of climate change already being felt - action needed now
- Poorer African nations and communities who are least responsible for global warming will be disproportionately affected
- Water should be the focus of climate change adaptation
- Africa has low access rate to global financial resources and therefore requires substantial resources and effective financing instruments
- We should collectively advocate for the provision of additional resources to poor African nations to develop and implement appropriate mitigation and adaptation
- AfDB is ready to partner with others in ensuring this

Thank you!