Water, Energy and Food Security Nexus to Cope with the Climate Change

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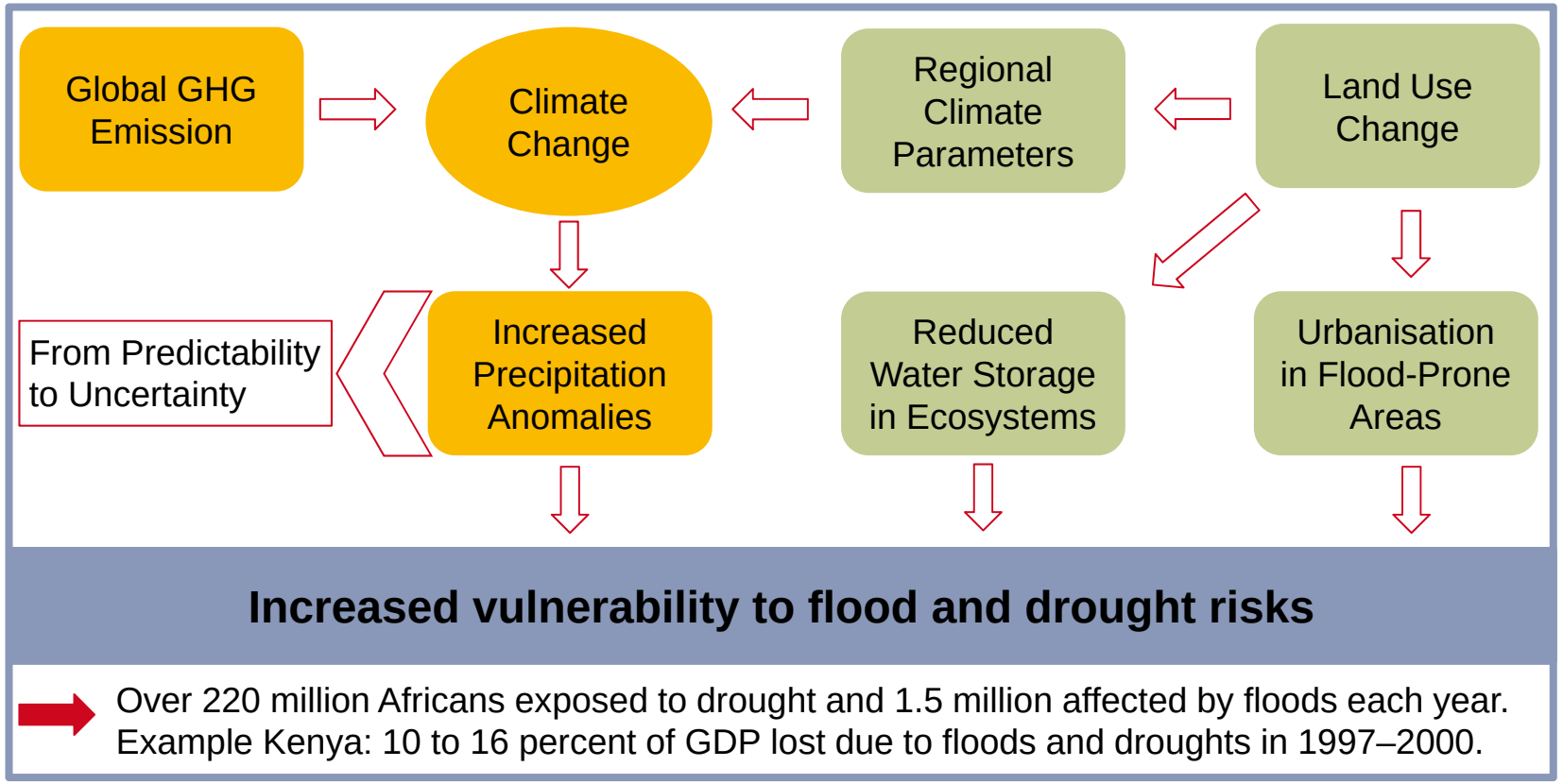
Flood and drought are growing obstacles to development in Africa



Need for increasing flood and drought risk resilience

Current status: flood and drought risk management is insufficient, even under current conditions

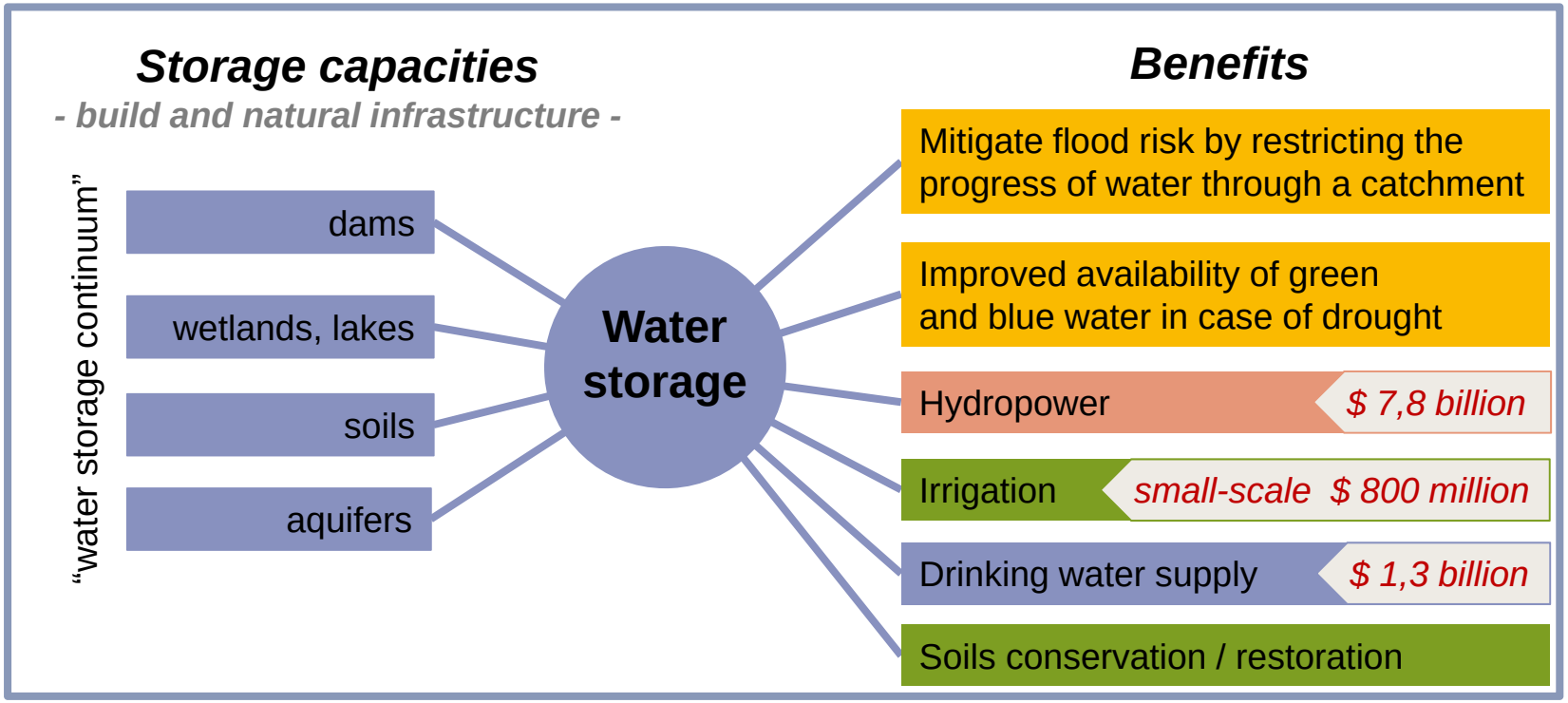
Flood Risk Management		Drought Risk Management	
Risk assessment	Hydro-meteorological stations not sufficient In some cases, poor O&M. Flood risk mapping often not available	Risk assessment	In some regions, large-scale observations and forecast systems in place (e.g. Agrhymet). But often lack of stations and assessment capacities.
Reducing likelihood of floods	Insuficient water storage infrastructure: 200 m3/pers. (6000 in North America) No large-scale implementation of natural flood management.	Hydrological drought	Insuficient water storage infrastructure In several cases, mechanisms for restricting not-prioritary water uses in case of drought not in place.
Avoid building in flood areas	Inexistant or very limited consideration of flood risk in land use and urban planning. Land use planning systems often not effective.	Agricultural drought	Limited implementation of moisture conservation techniques. Selection of drought-resilient crops remains pilots Only ca. 5 % of cultivated area are irrigated.
Emergency response	Early warning systems often not in place. Civile protection capacities too limited.	Emergency response	Until now, food crisis management remains the main focus of drought-related measures in Africa (in particular, food aid).

Key levers to flood and drought management in energy and agriculture

ENERGY	AGRICULTURE
Drought resilience of energy generation: cooling water, hydropower Consider flood and drought risk in the design and operation of **hydropower dams**. **Improved cooking energy** for health and environmental impacts : reduced deforestation and land degradation	**Increased water-holding capacity of soils** through improved cultivation techniques **Soil conservation,** for example with water-spreading weirs **Develop irrigation**, in particular for smal-holder farmers **Selecting drought-resilient crops** **Diversification** of rural activities

Nexus solutions are needed to achieve co-benefits for drought and flood management, energy generation and food security

Nexus solutions: multi-purpose water storage is key to mitigate water resource variability

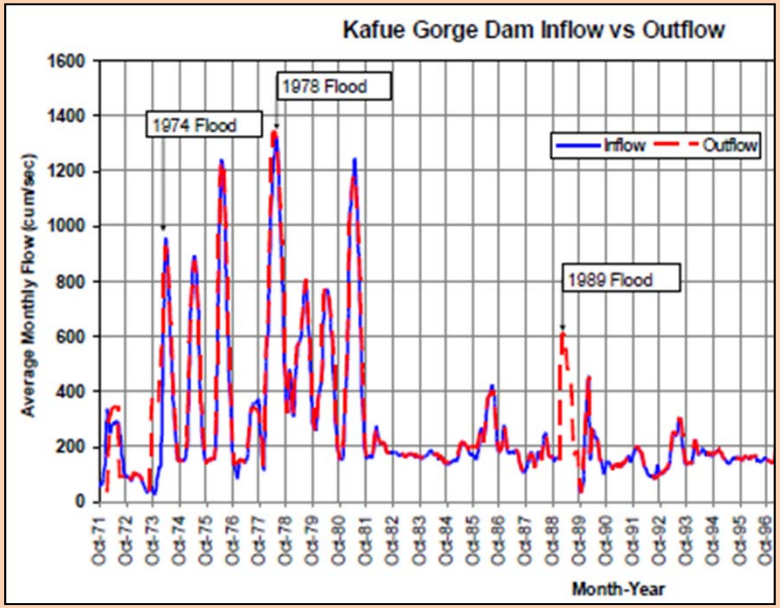


Africa cannot afford to ignore the potential for synergies between the different uses of water storage.

Water storage includes infrastructure measures

Example: dams management in the Zambezi River Basin

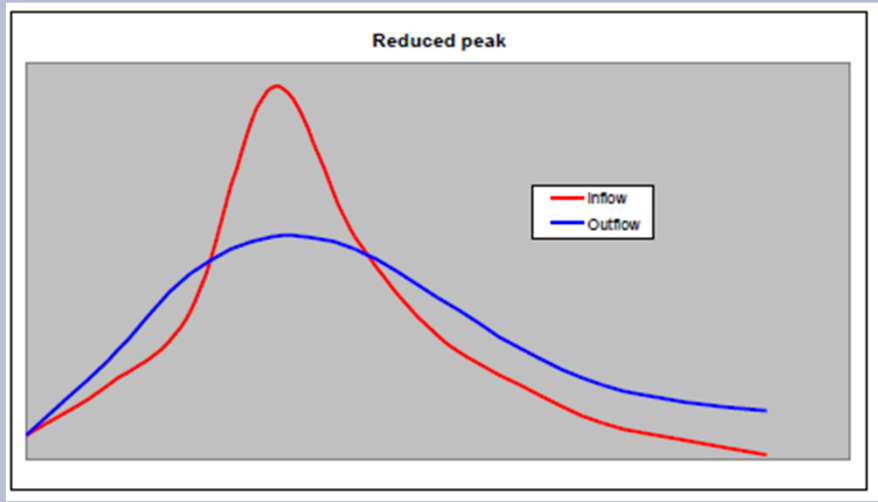
Current situation



Dam management aims at optimizing power generation and dam safety.
Dam operation is not used for mitigating flood risk.

Scenario: release management to reduce peak flow

Review operating rules for multi-purpose management and synchronisation of existing dams

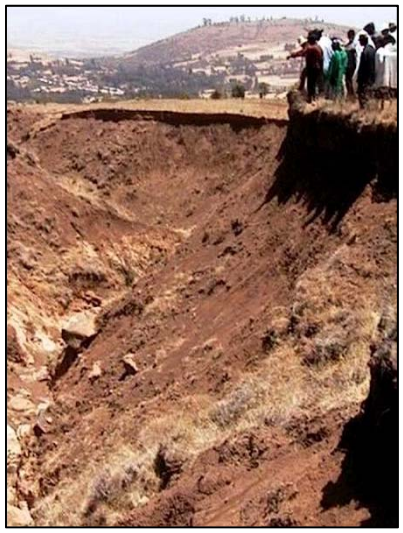


The existing dams can only be used to manage small- and medium-sized floods

The existing infrastructure failed to cope with large floods.
Need for additional water storage infrastructure.

Sustainable land and water management is part of the water storage approach

Example GIZ project in Ethiopia



Severe gully erosion around Boda

Participatory planning and implementation of water and soil conservation techniques: contour bunds, trenches, check dams, reforestation, etc.

→357 municipalities have implemented catchment management plans
→50,000 households changed practices
→77,000 hectares of land rehabilitated
→79,000 hectares of forest maintained

→ Improved water infiltration in soils, increased soil moisture, rise in groundwater level (use for drinking water)
→ reduced erosion and sedimentation of hydropower and irrigation dams

Result of water and soil conservation activities in Amhara region

Reduced impact of precipitation variability on crop yeald

Paradigm shift
for improved flood and drought risk management

From	To
Focus on minimizing the impacts	Focus on minimizing the incidence
Need for water storage in each sector	Need for integated water storage concept
Tackle water storage issues at project level	Tackle water storage as part of all sector strategies
Single-purpose dams	Consider flood risk in the design and operation of dams
Incentivate sector performance	Incentivate benefit sharing

→ Intesectoral process or institution to take the lead

Thank you for your attention

More information:

GIZ-funded IWMI website *Re-Thinking water storage in Africa*: http://africastorage-cc.iwmi.org/

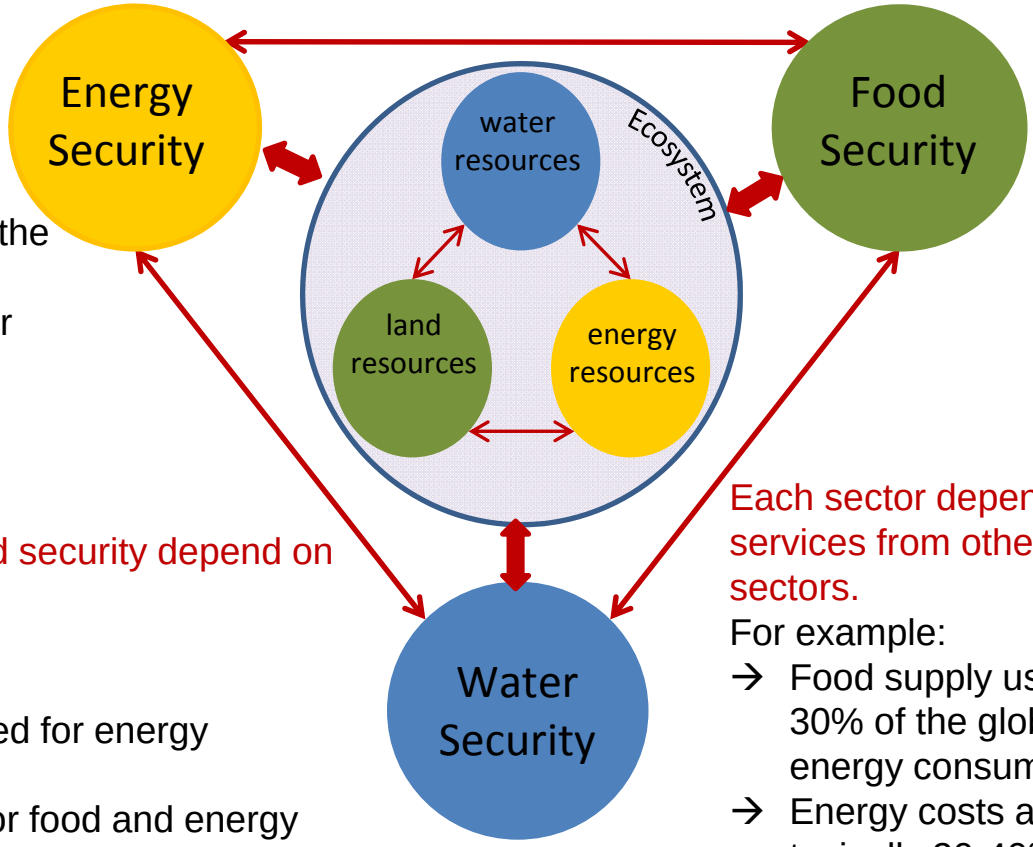
Nexus Resource Platform: http://www.water-energy-food.org

Agricultural water management: http://agriwaterpedia.info

Key Bottleneck: Water, Energy and Land Resources

As part of the ecosystem, water, land and energy resources are interconnected.

For example:
- → land use change has major impact on the water cycle
- → condition of the soils depends on water availability
- → water flows are source of energy (hydropower)



Water supply, energy generation and food security depend on the same natural resources

For example:
- → 45 % of EU water withdrawals are used for energy generation
- → Land and water resources are used for food and energy crops.

Each sector depends on services from other sectors.

For example:
- → Food supply uses ca. 30% of the global energy consumption.
- → Energy costs amount typically 20-40% of water supply O&M costs.

The Nexus perspective: considering strong interconnections of key resources