

A Systems Approach to Sustainable Water Resources Management in Africa

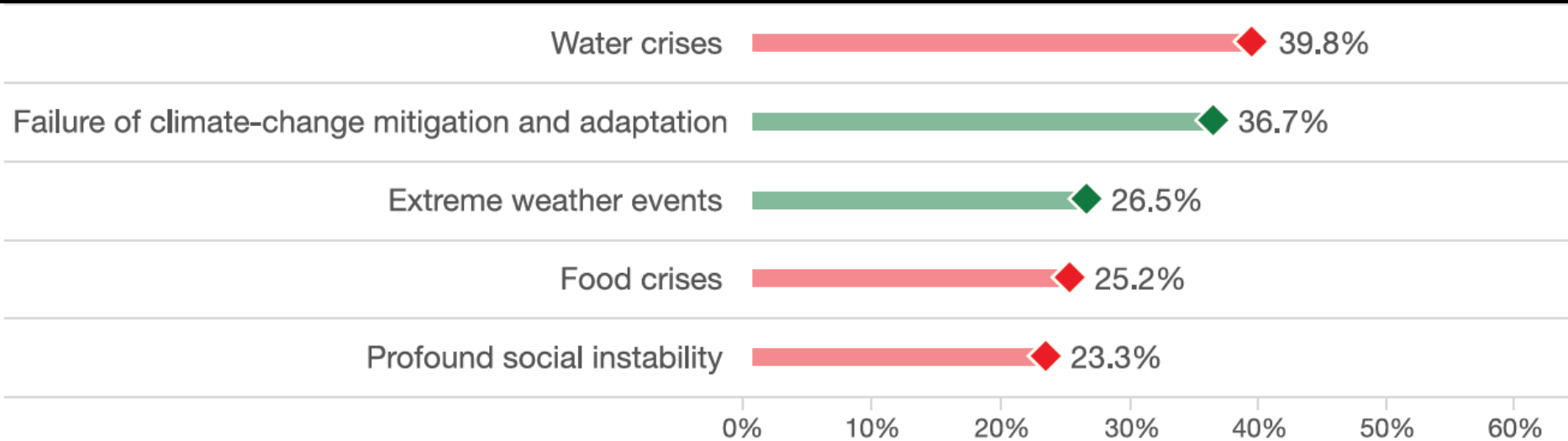


Dr. Akiça Bahri

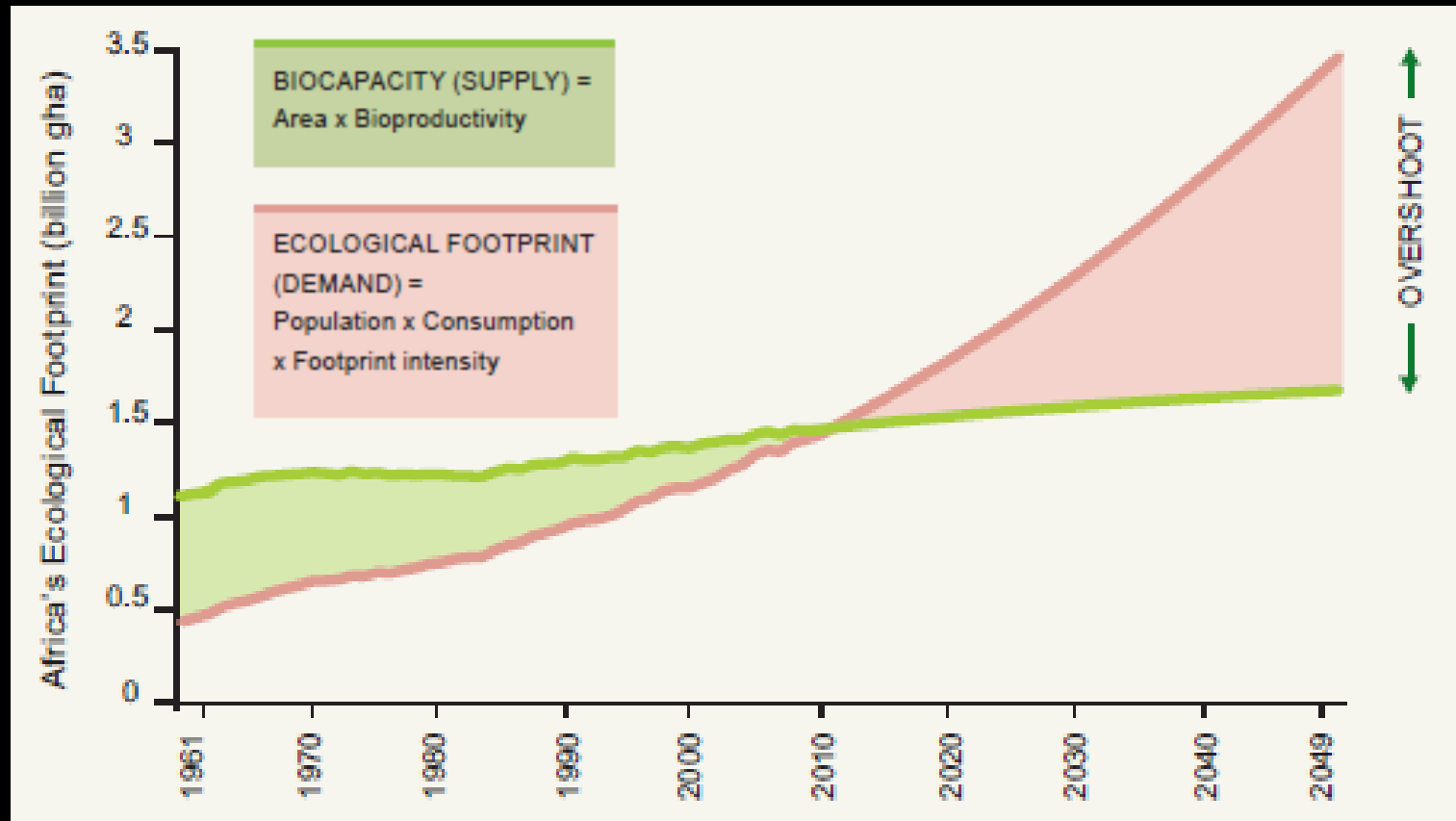
**National Agricultural Institute of Tunisia
Science Centre World Summit 2017 (SCWS2017)
Systems Thinking for Sustainability**

**Tokyo, Japan
15-17 November, 2017**

The top five global risks of highest concern for the next 10 years

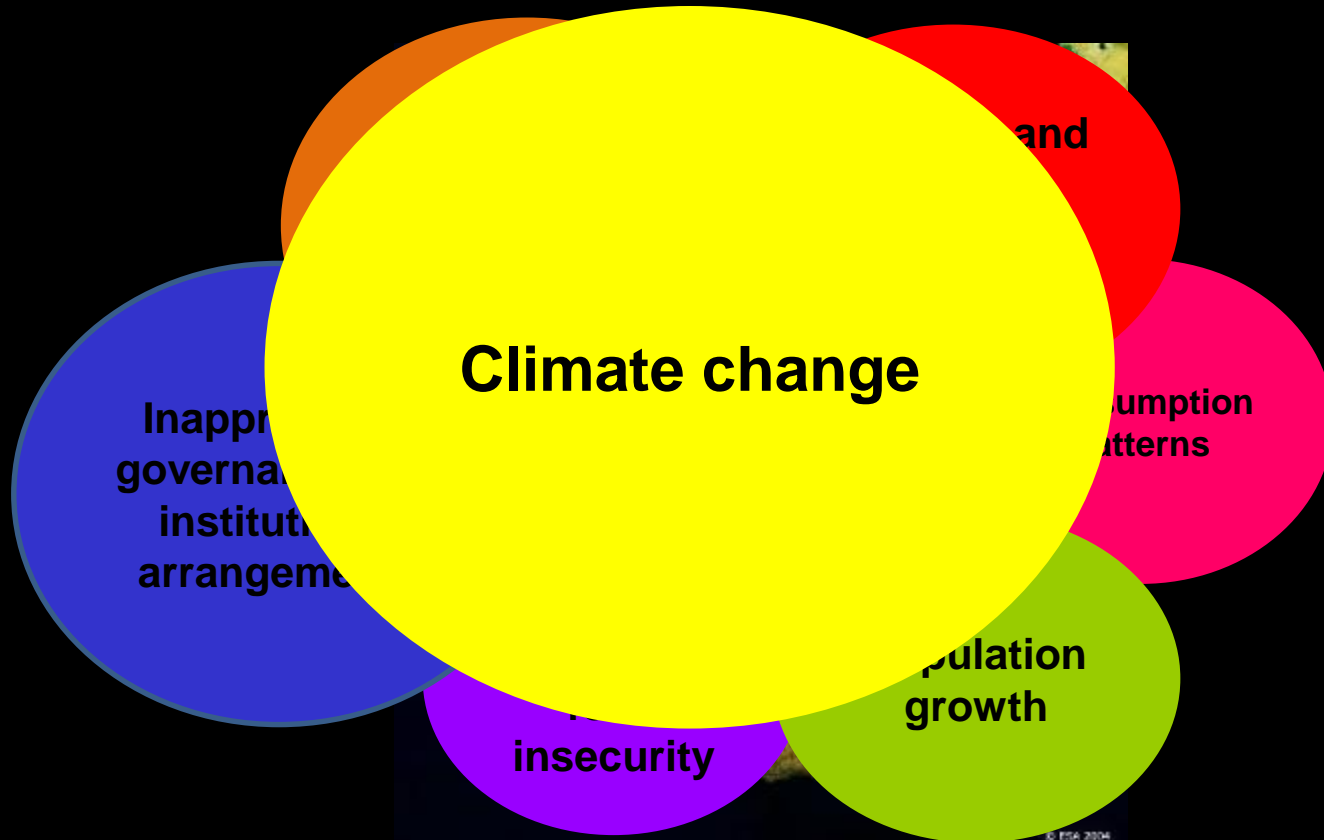


Factors driving Africa's ecological footprint and biocapacity



Threats to Sustainability

Threats to water resources



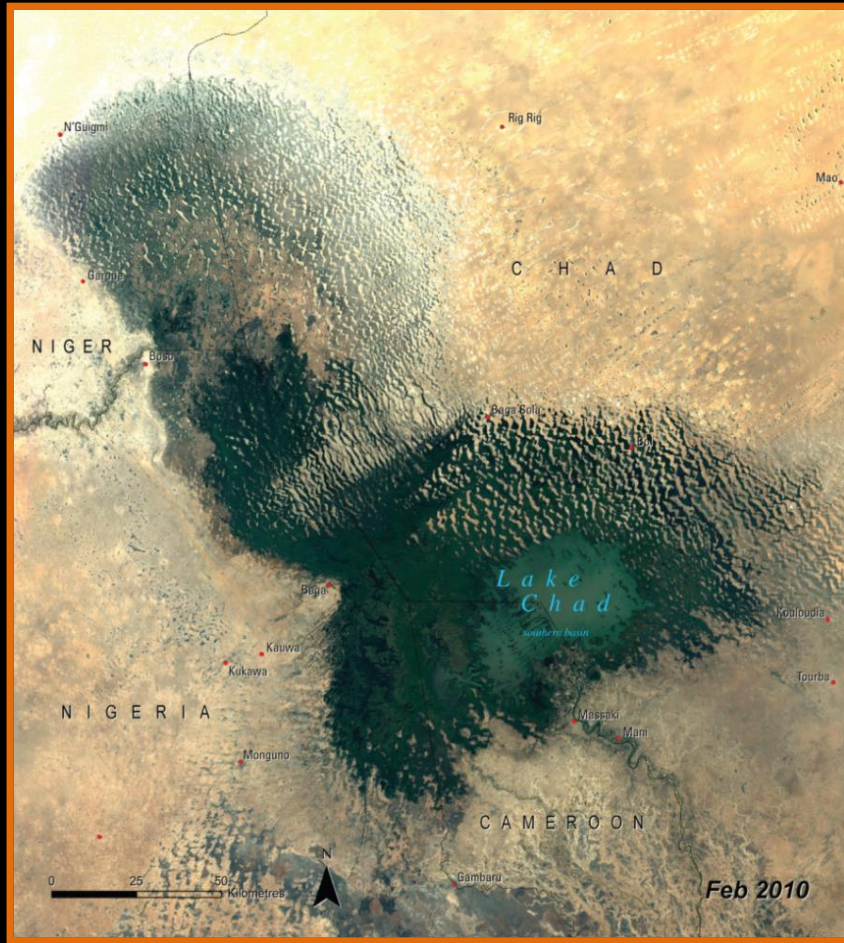
Africa in 2050

+ 2°C



- 💧 Sea level rise of 60-70 cm
- 💧 More severe, intense, prolonged droughts and floods
- 💧 -15 to 20% across all crops
- 💧 + 1% Land aridity
- 💧 -5 to 20% rainfall
- 💧 Impacts on water quality
- 💧 Biodiversity loss (81-97%) of African species
- 💧 Loss in production, infrastructure and increased poverty
- 💧 Exacerbated malnutrition

LAKE CHAD'S VARIABILITY

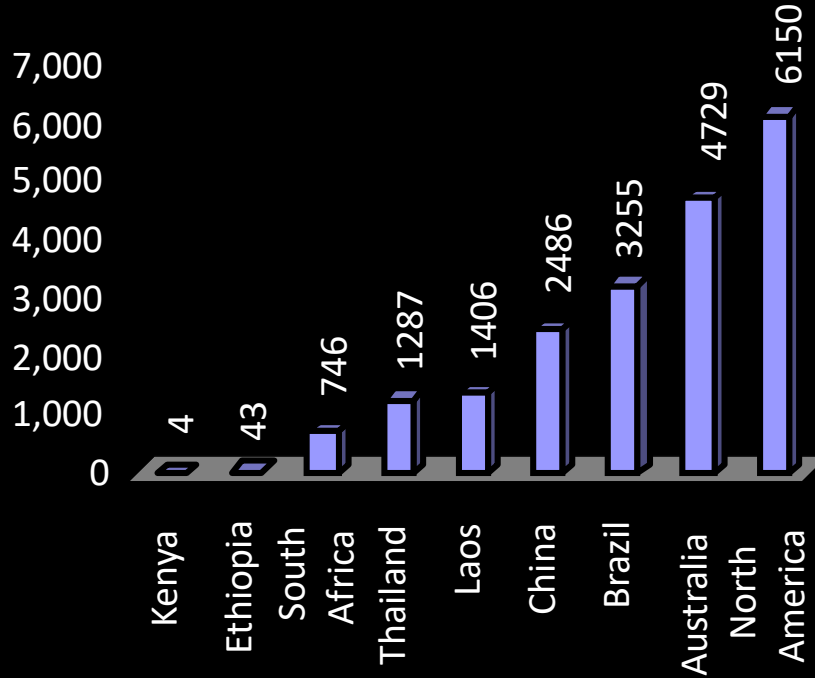


While Lake Chad's surface area fluctuates considerably with the seasonal rains, these dry-season images of Lake Chad show the long-term trend since the 1960s

Changes in rainfall during this period have been a major factor as has diversion for irrigation

Water storage mitigates variability and change

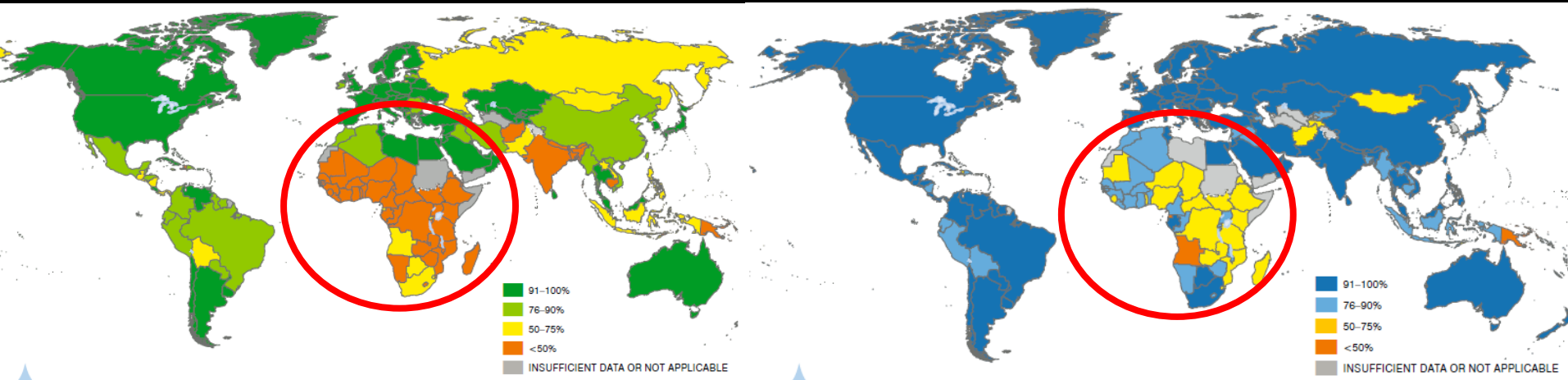
Low per capita storage (m^3/capita)



World Bank (2003)

- Low level of water withdrawal: 3.8% of water resources developed (for water supply, irrigation and hydropower use)
- Limited ability to cope with runoff variability affects economies and GDP
- Increased storage (of all types) & spatial redistribution of benefits needed for meaningful development

Proportion of population using improved sanitation facilities (%) (left) Proportion of population using improved drinking water sources (%) (right) in 2015

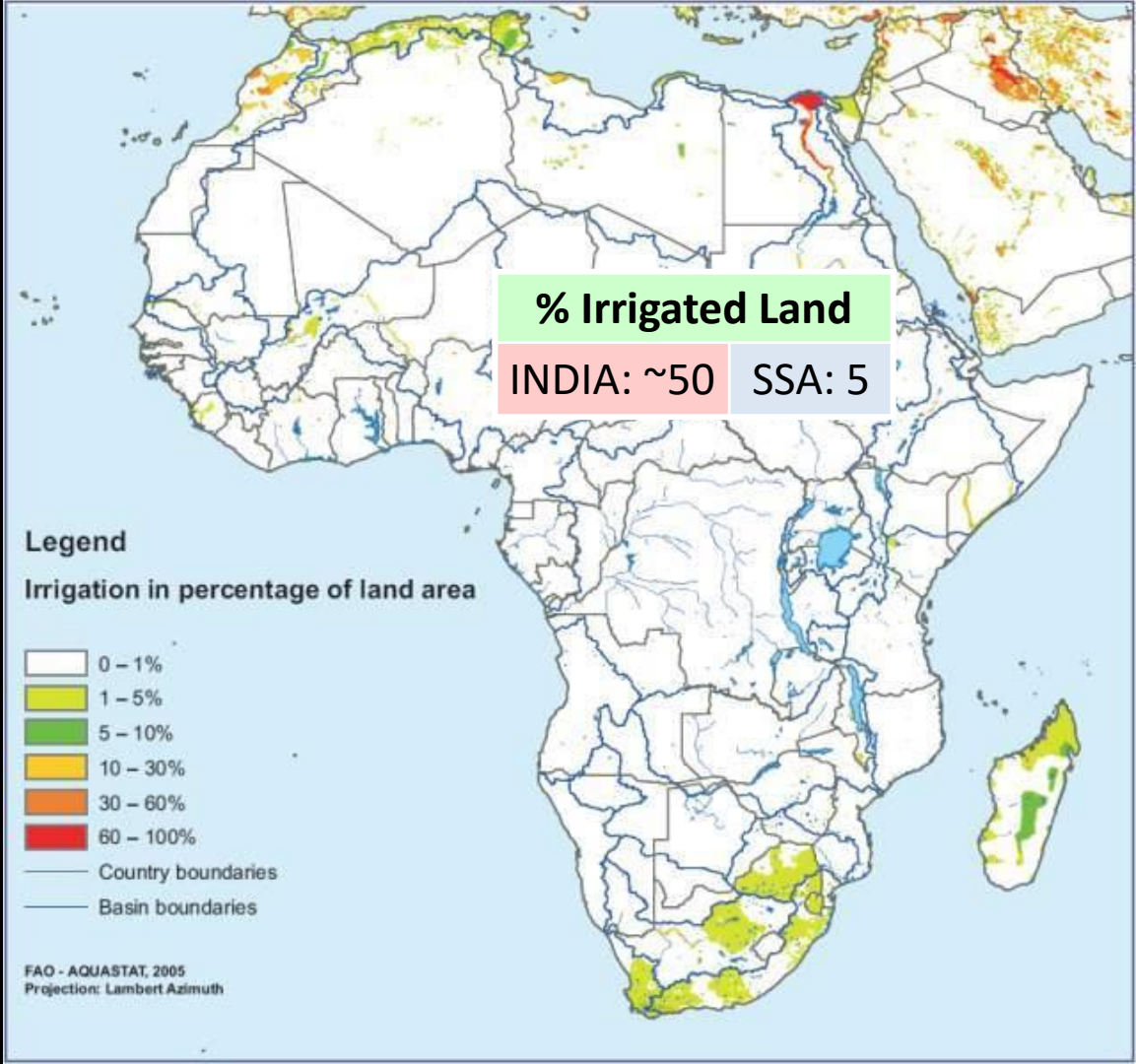


**Irrigation potential
developed:**

**Egypt, Morocco, South
Africa > 75%**

**Botswana, Sudan,
Zimbabwe,
Madagascar, Mali,
Malawi, Uganda 50-
75%**

Rest < 50%



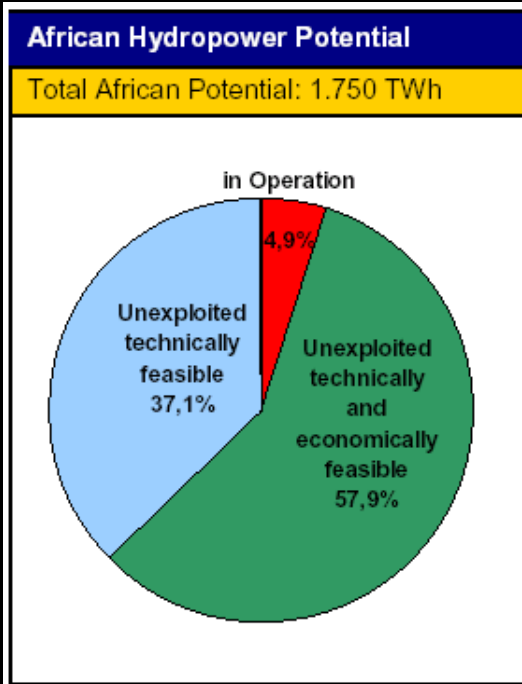
Informal Water Economies

- 💧 Rainfed and irrigated agriculture remains the main source of employment - >50% in SSA – and holds great promise for future growth and job creation

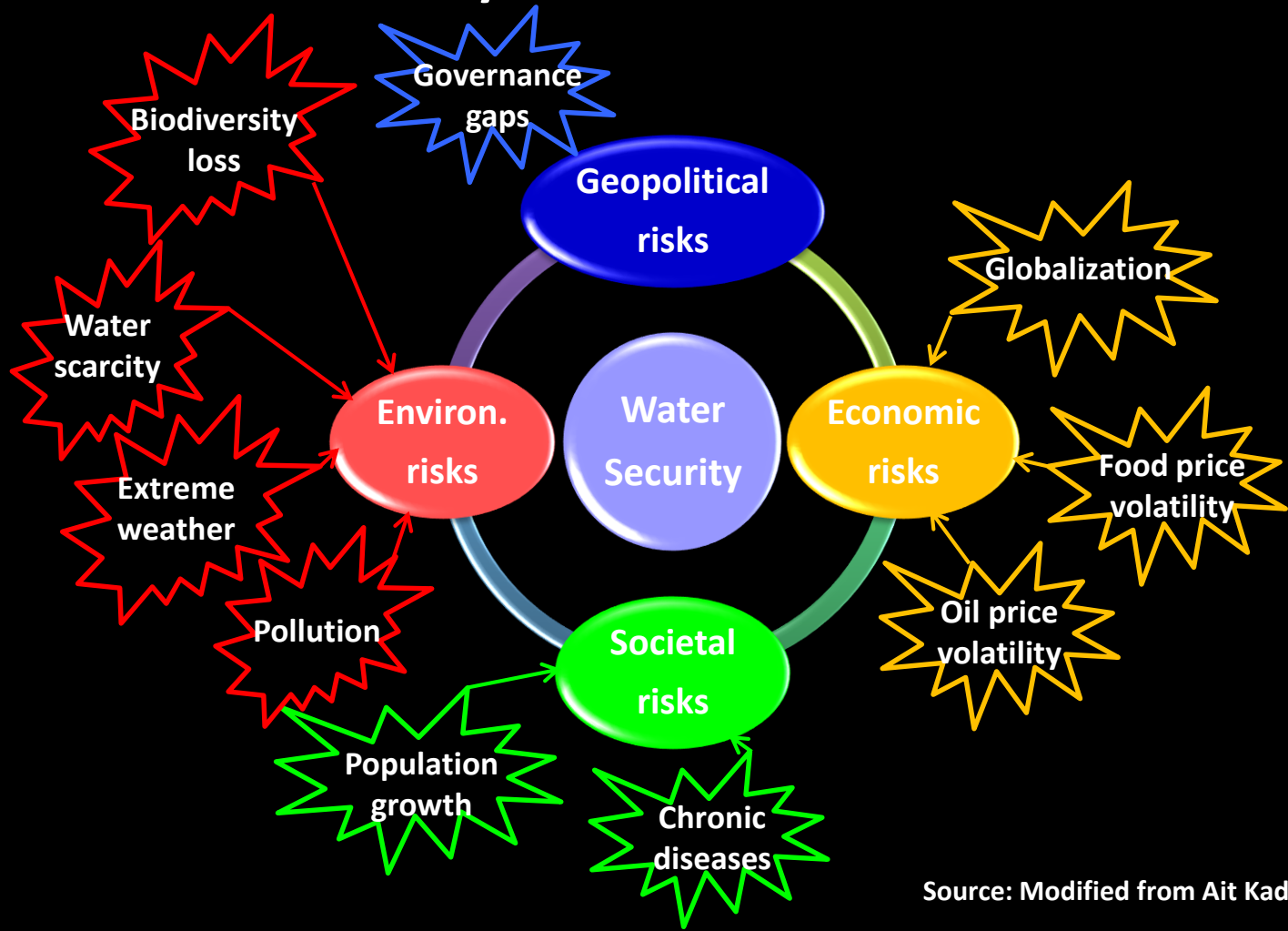


💧 Women make up more than half of the farmers, produce 90% of the continent's food, and comprise 70% of the agricultural workforce

Signific



Water Security and Interconnected Risks



The Africa Water Vision for 2025

Endorsed by the African Ministers of Water Resources and other stakeholders at the 2nd World Water Forum in May 2000

“An Africa where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation, and the environment.”



Drinking Water:
75% access by 2015
95% access by 2025



Sanitation
70% access by 2015
95% by 2025



Irrigation
100% increase by 2025

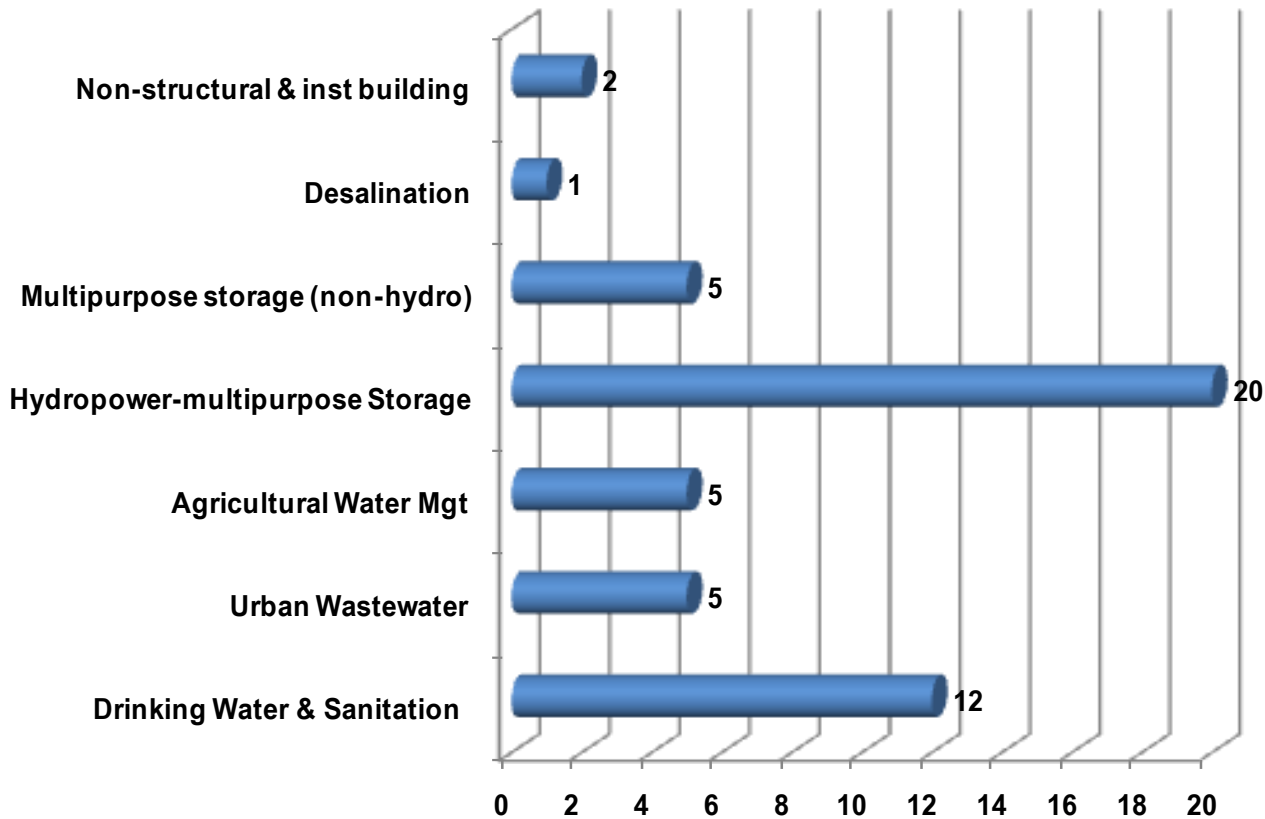


Hydropower
10% of potential by 2015
25% by 2025

- Conservation and restoration of environment: Implemented in 100% of countries by 2025
- Development of national policies and comprehensive institutional reform: 100% of countries by 2025
- ...

Investments needed for implementing the Africa Water Vision 2025

50 bn US\$ p.a. over 20+ yrs



SDG6 reflective of whole SDG framework



Sustainable water management: A Systems Approach

Interdisciplinary

Applying the knowledge and skills from different academic disciplines or subjects that are normally regarded as distinct, to the same task or project

A Dictionary of Environment and Conservation. Chris Park. Oxford University Press, 2007. *Oxford Reference Online.* Oxford University Press

Integrated

Promotes coordinated development and management of water, land, and related resources, in order to not only maximize economic and social welfare, but also ensure equity and sustainability

A Dictionary of Geography. Susan Mayhew. Oxford University Press, 2009. *Oxford Reference Online.* Oxford University Press

Holistic

Takes into account interrelations between people, the environment and ecosystems

A Dictionary of Environment and Conservation. Chris Park. Oxford University Press, 2007. *Oxford Reference Online.* Oxford University Press

« It is recognized that water problems cannot be solved by quick technical solutions; solutions to water problems require the consideration of cultural, educational, communication and scientific aspects. Given the increasing political recognition of the importance of water, it is in the area of sustainable freshwater management that a major contribution to avoid/solve water-related problems, including future conflicts, can be found. »

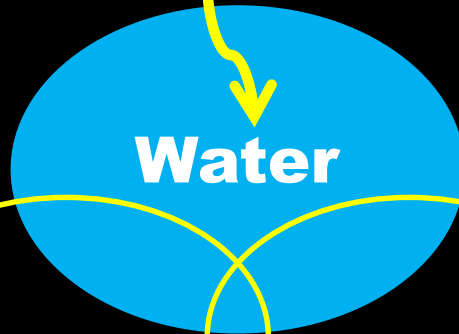
Key sustainability dimensions in water and resource management



Source: Adapted from SEI, 2017

Multiple use water services

integrating domestic water, irrigation, fisheries, fisheries, livestock, industries – provide income, nutrition and health benefits, and improve water productivity

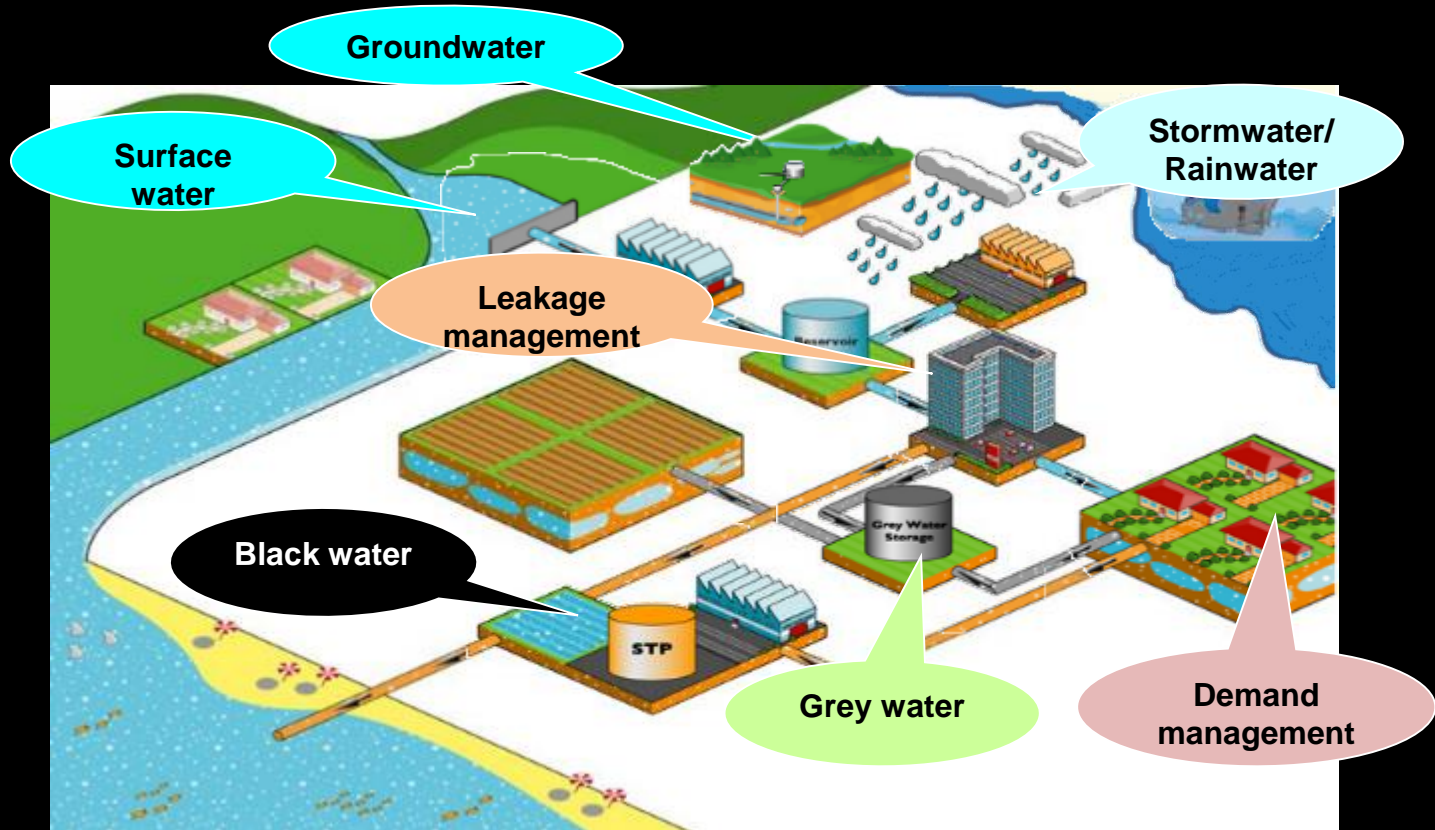


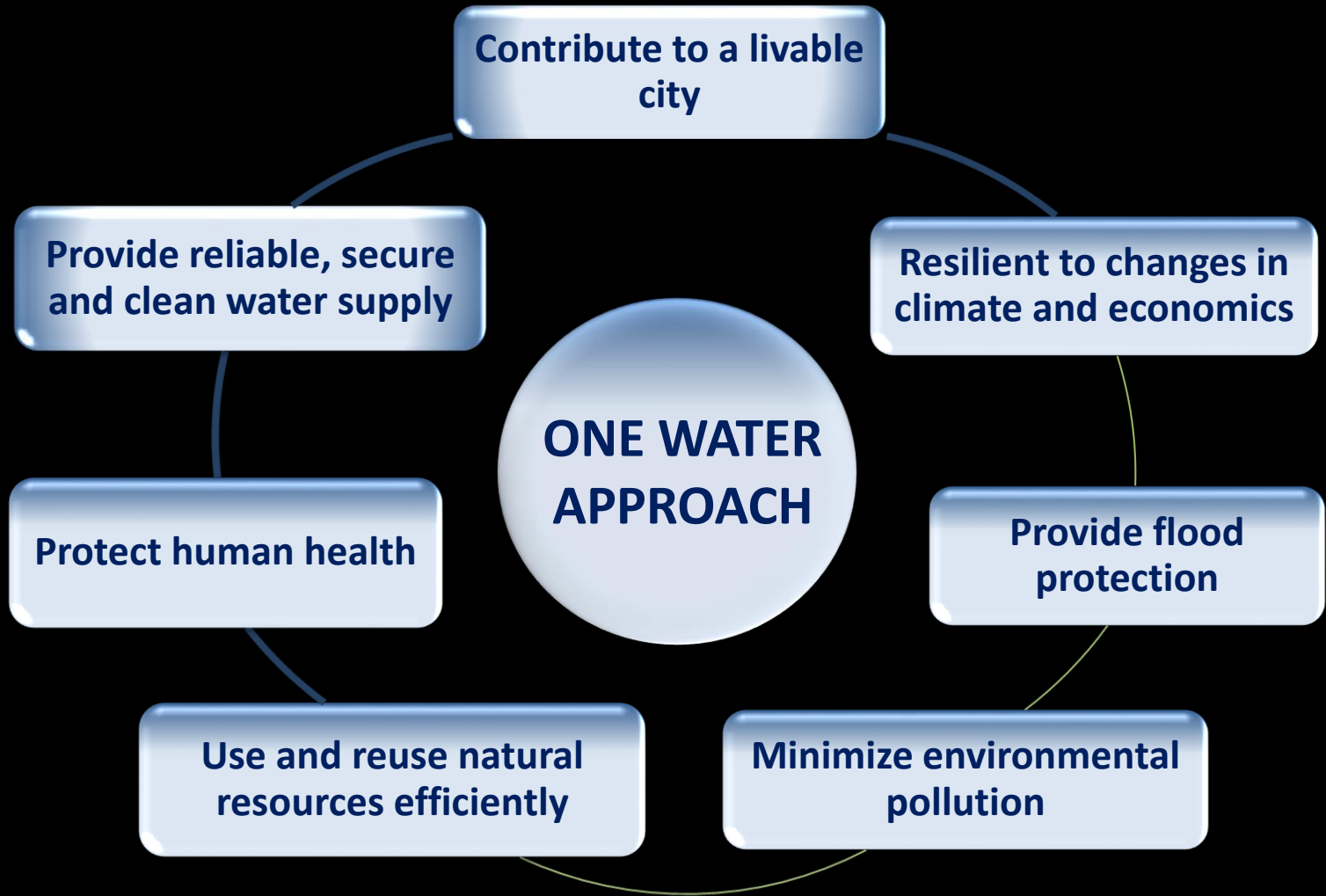
Add support programs for hygiene, sanitation or nutrition for enhanced health benefits

Increase food security and income through additional support for crops, livestock and business for improved livelihood

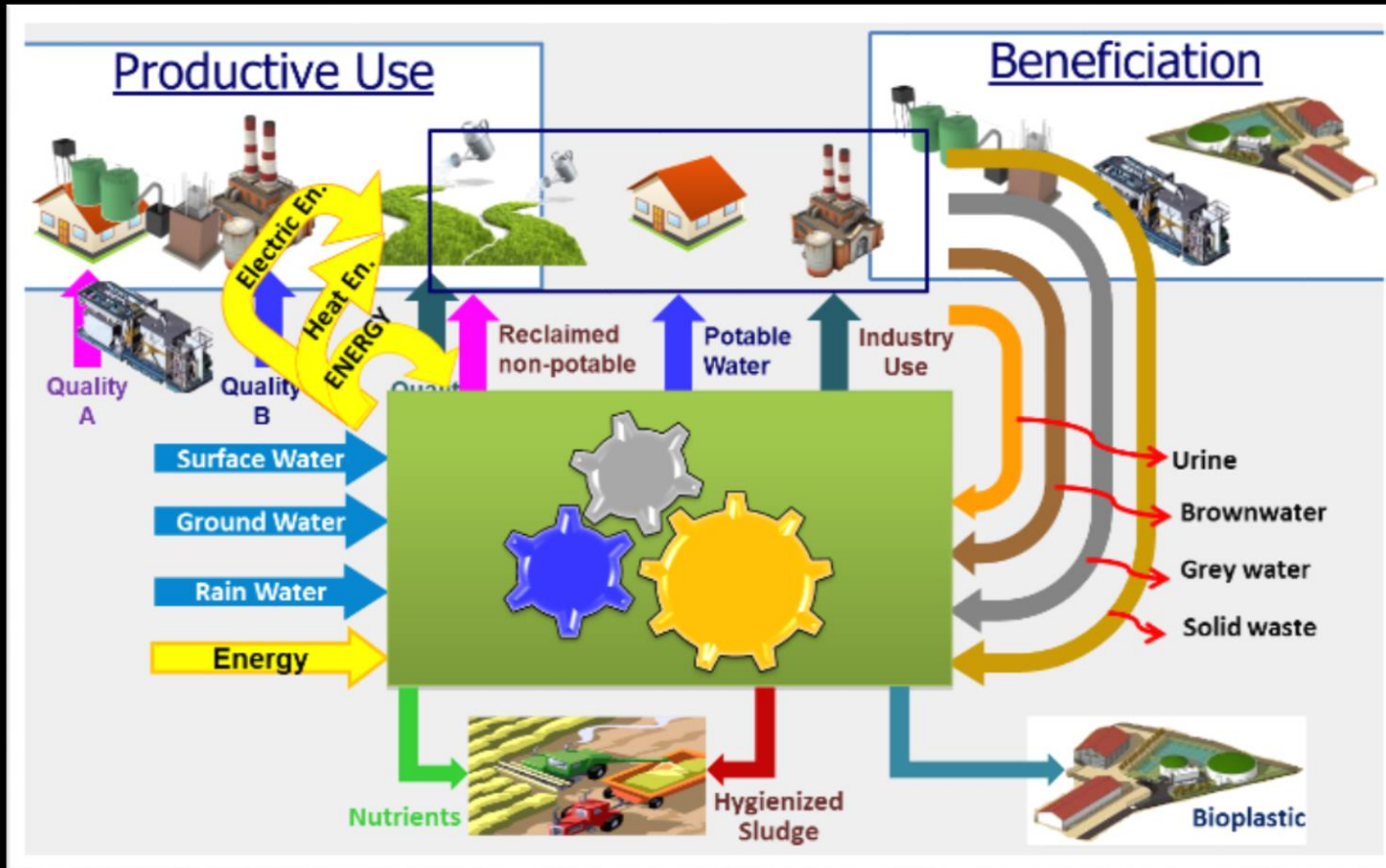


We need to have a systems perspective of the urban water cycle

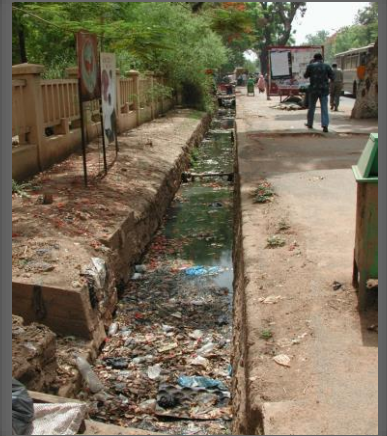
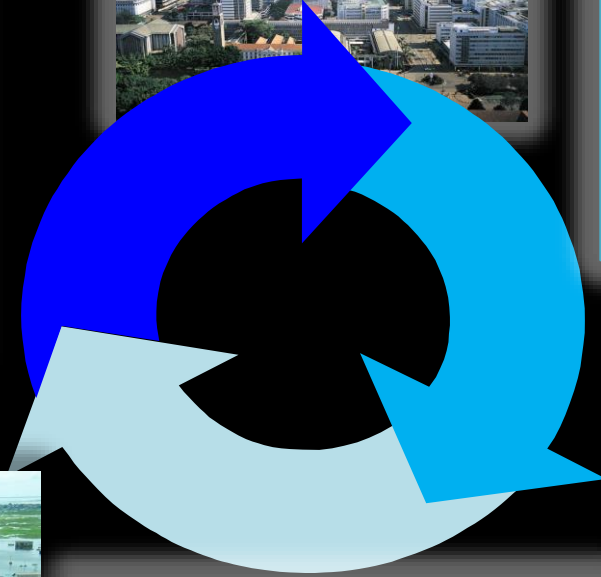




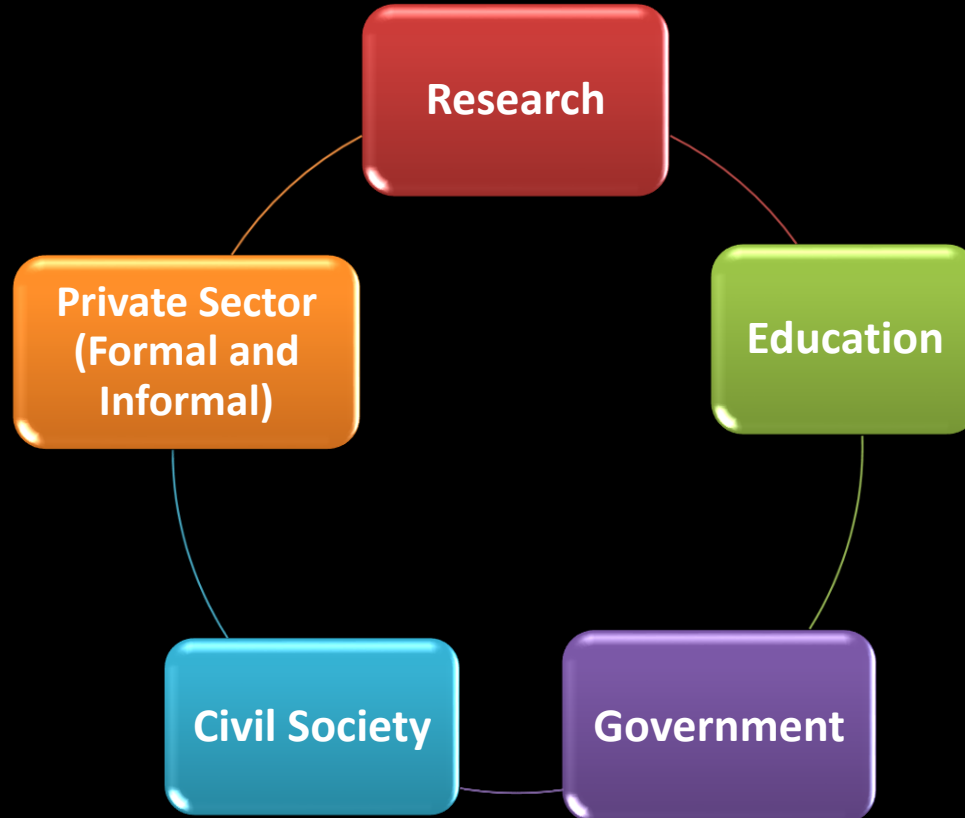
Perspective of productive use and beneficiation



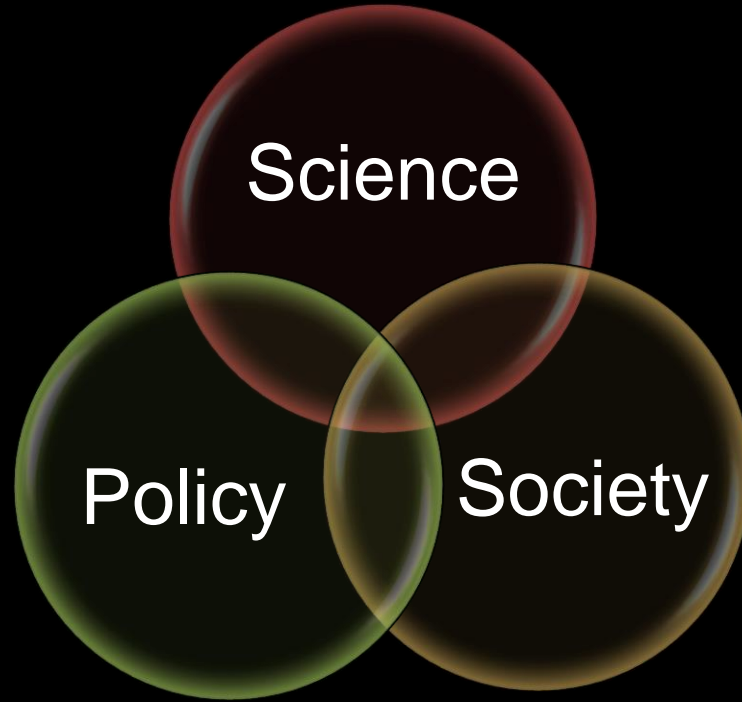
Integration of scales, sectors, sources and services



Partnerships



Science – Policy – Society Interface



Conclusions

- 💧 Need innovative methods and technologies to increase resilience of water systems to global change pressures
- 💧 Need a governance that will promote reforms, as well as new technologies and business models
- 💧 Need to engage in policy, work with practitioners, facilitate capacity building
- 💧 Need integration – across disciplines and scales for innovation
- 💧 Need systems thinking, planning and implementation to achieve sustainable and resilient solutions

Thank you

