

A Catchment based approach to the protection of the quality and quantity of groundwater resources: experiences from Uganda



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9 to 12 September 2019**

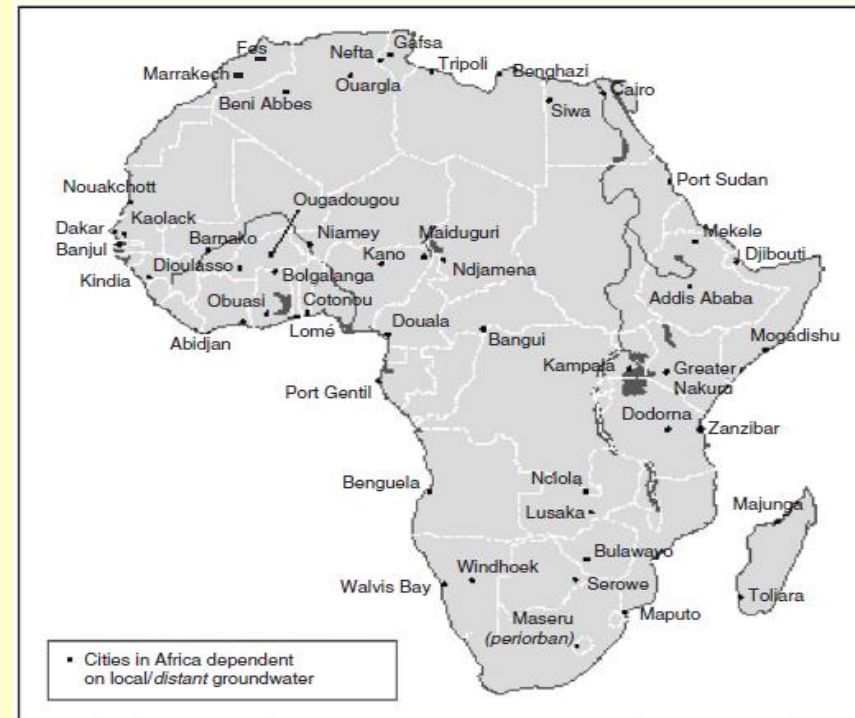
**Special thanks to the organisers for the
invitation and financial support to attend this
conference**

Outline

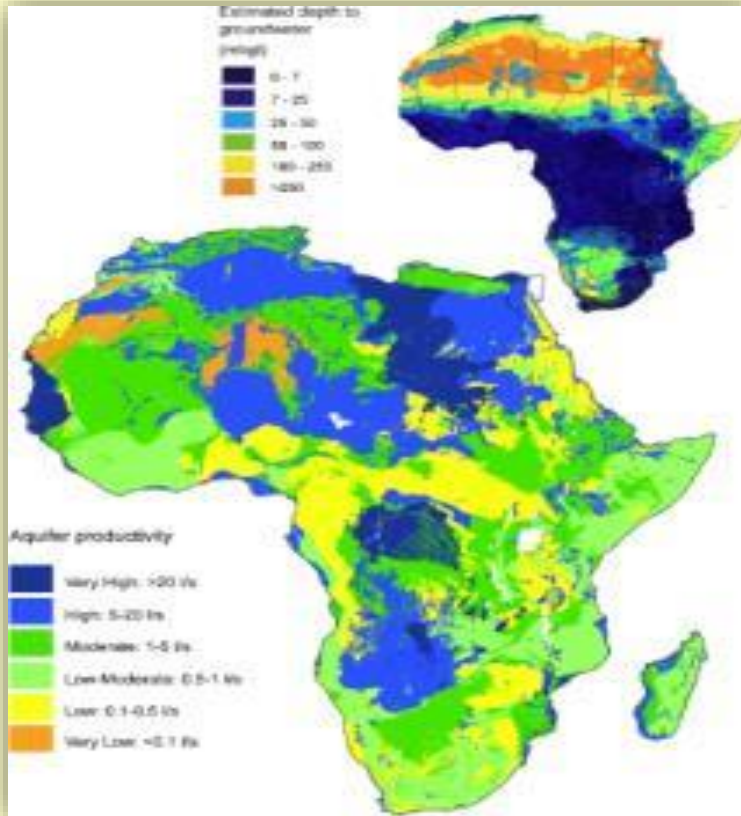
- Groundwater resources in Africa - **current and future perspectives**
- Groundwater challenges in the rural-urban interface in Africa
- Addressing groundwater quality and quantity issues through a catchment based approach- **rationale and experiences from Uganda**
- Summing it up- **conclusions**

Groundwater resources in Africa

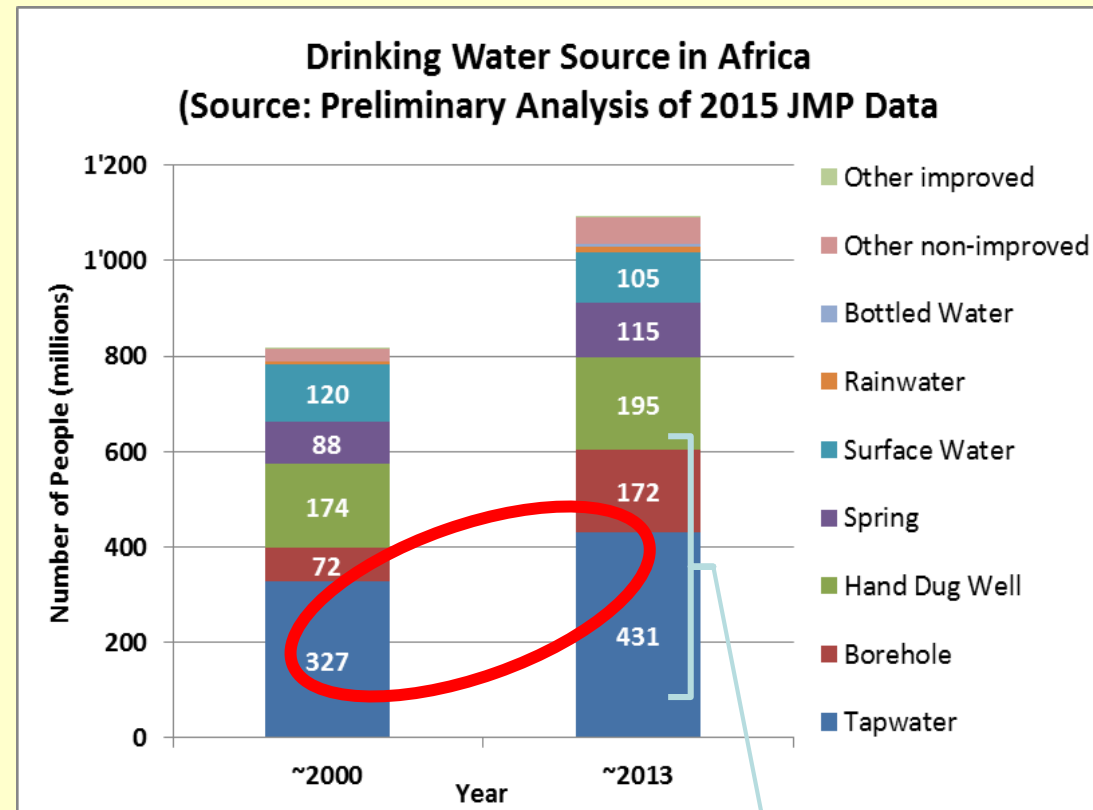
- **75 %** of the African population dependant on groundwater for basic water supply
- Groundwater used for other activities (**irrigation, livestock watering, urban and industrial development etc**)
- Groundwater demands are increasing with:
 - **Population increase**
 - **Climate change**
 - **Need to combat growing food insecurity**



Groundwater Potential and use in Africa



Groundwater potential



Growth in groundwater use

Groundwater!!

Source of domestic water supply



Source of water for large and small scale irrigation



Source of water for livestock



Source of support to development and livelihoods



Market and investment opportunities/innovations/Jobs for rural youth and entrepreneurs



Supporting rapid development and industrialization



Income generation, household food security



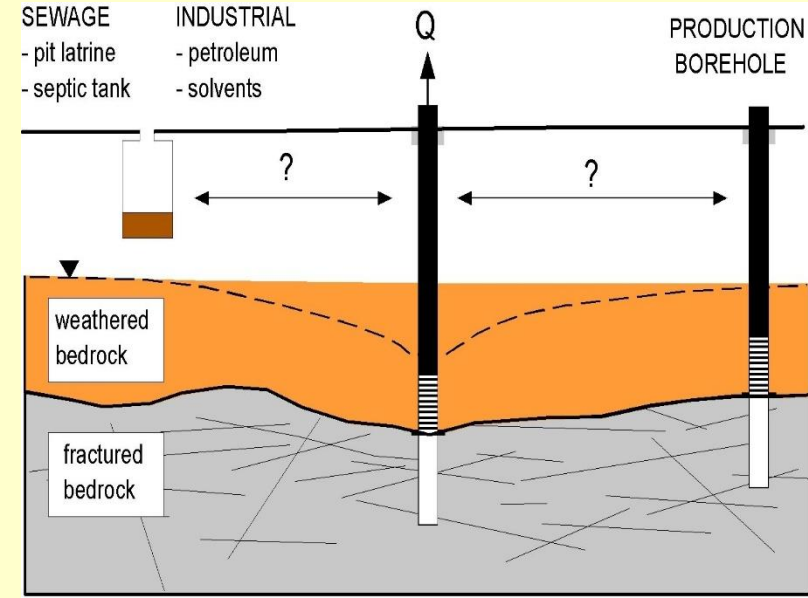
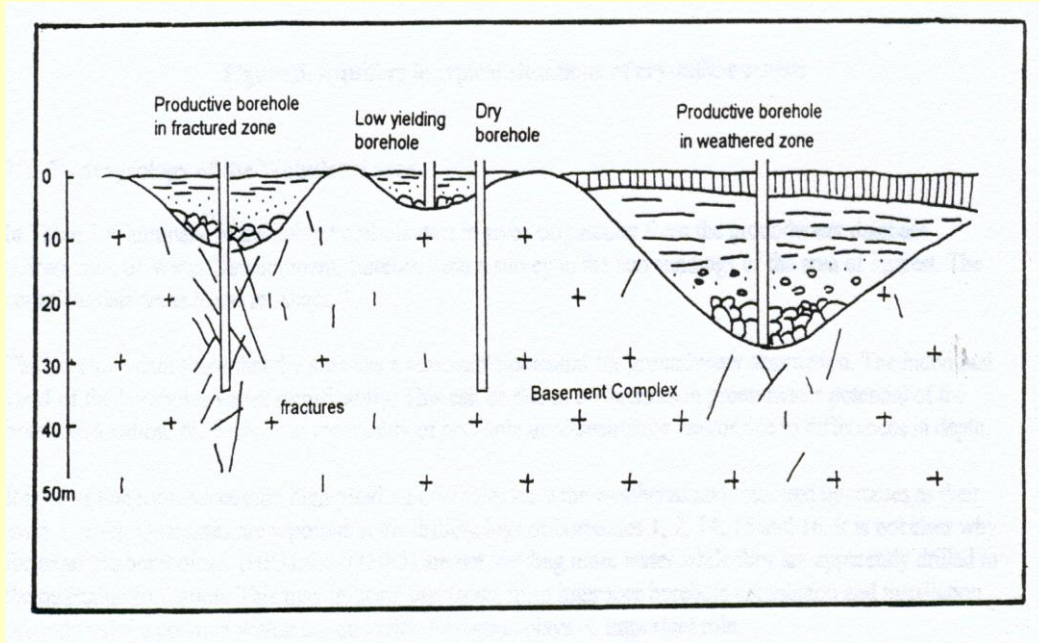
Meeting the Sustainable Development Goals in Africa



.. GW is key in contributing to achievement of most of the SDGs especially SDG6

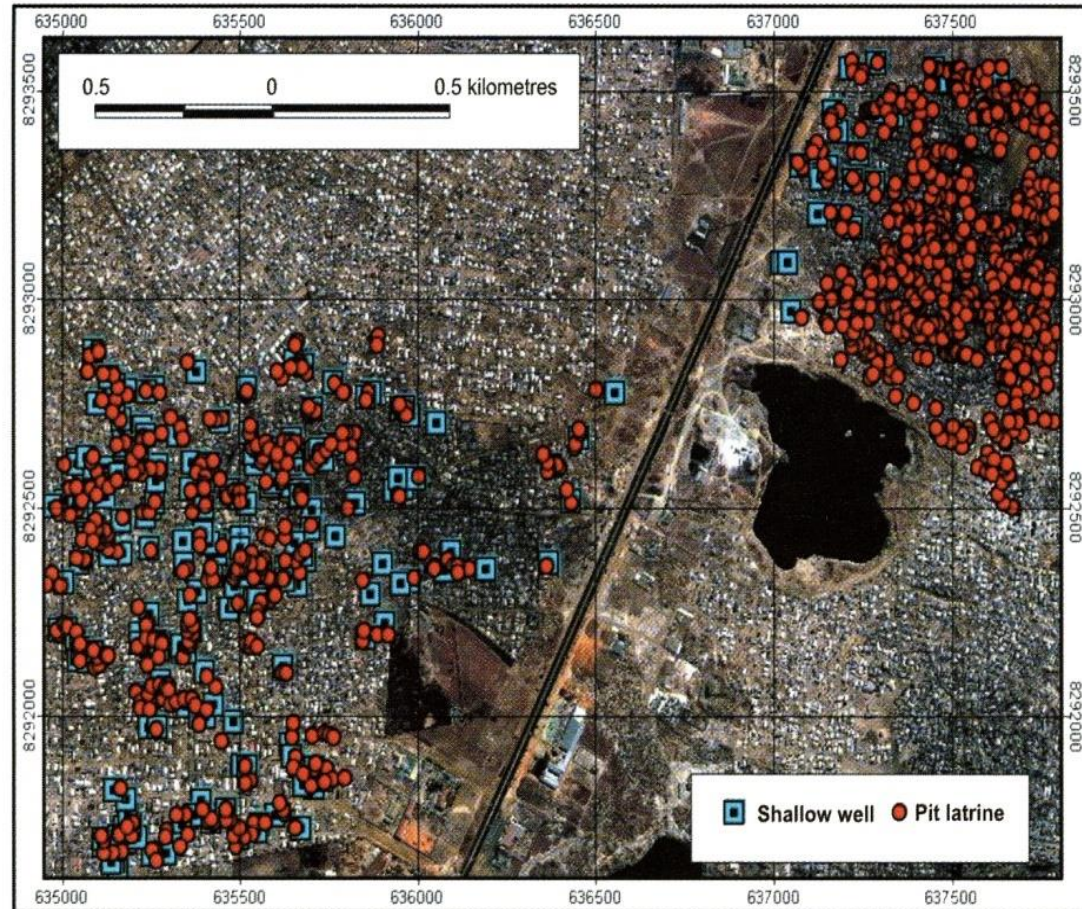
Groundwater challenges in the rural –urban interface in Africa

Knowledge of the resource base and its characteristics



- **Limited knowledge** of groundwater resources (**separation** distances between wells, and between wells and sources of pollution, pollutant travel times, sustainability of groundwater development etc)
- **Disconnect** between groundwater research and groundwater practice

Pollution of groundwater



Groundwater pollution in Lusaka City, Zambia (adopted from Nkhuwa)

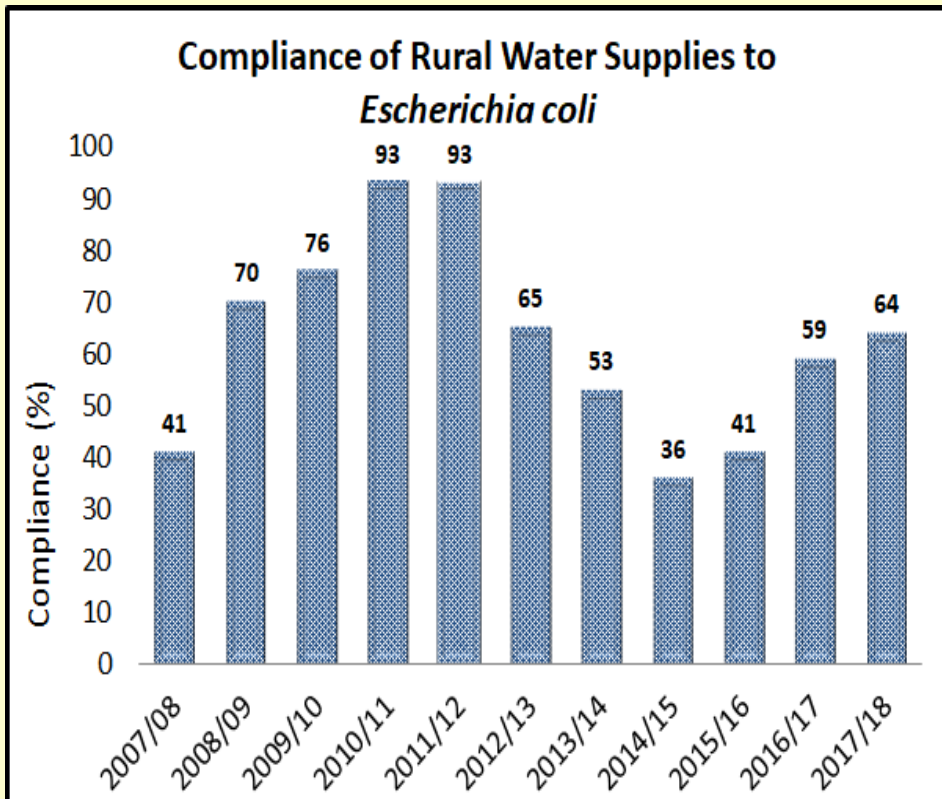
Groundwater aquifers that supply many African cities (large or small) are often heavily polluted (e.g. Dakar, Abidjan, Lagos, Accra, Lomé, Lusaka, Nairobi, Addis Ababa, Kampala)

Diverse pollution sources



Water quality of rural water supplies in Uganda

Rural Water Supply Trends

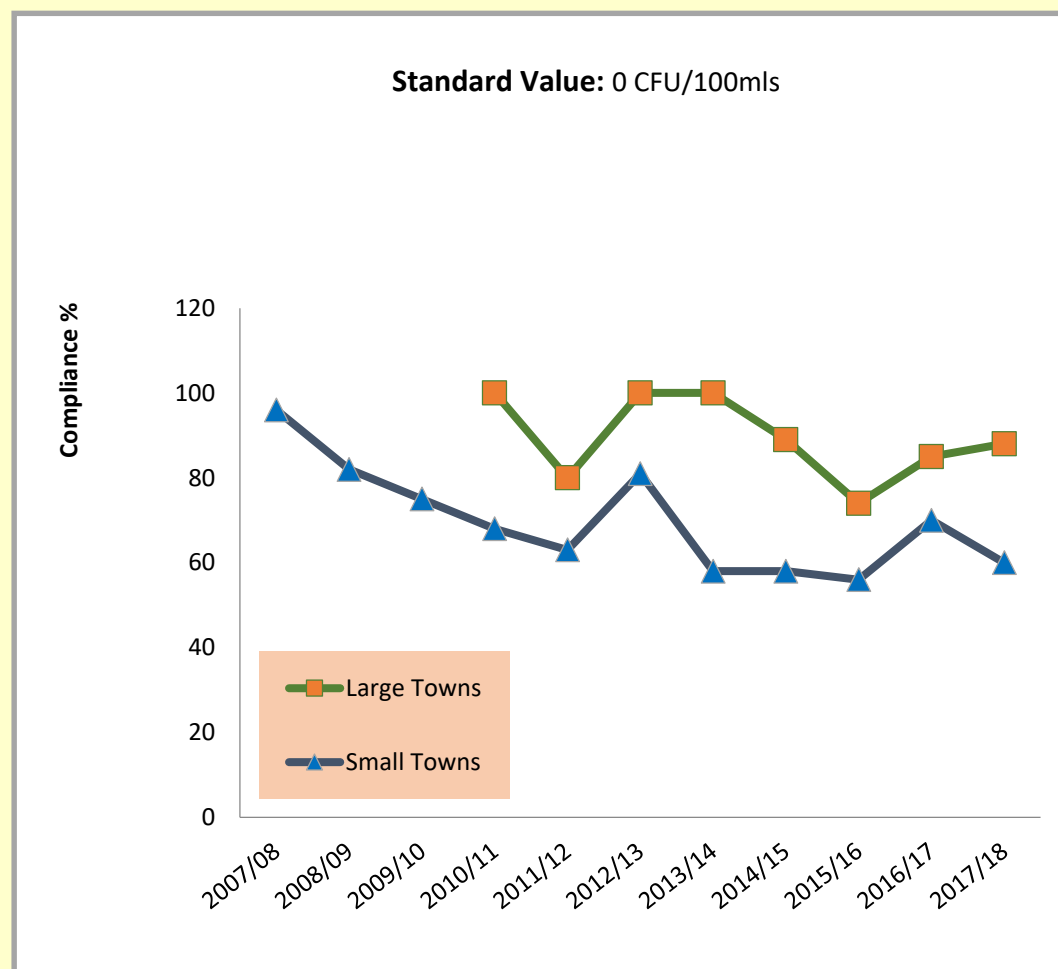


Factors affecting rural water quality

- Technologies that supply consistently poor quality water
- Poor storage methods
- Poor sanitation and Hygiene
- Poor Operation and Maintenance
- Poor Siting
- Poor water quality due to natural factors

Water quality of urban water supplies in Uganda

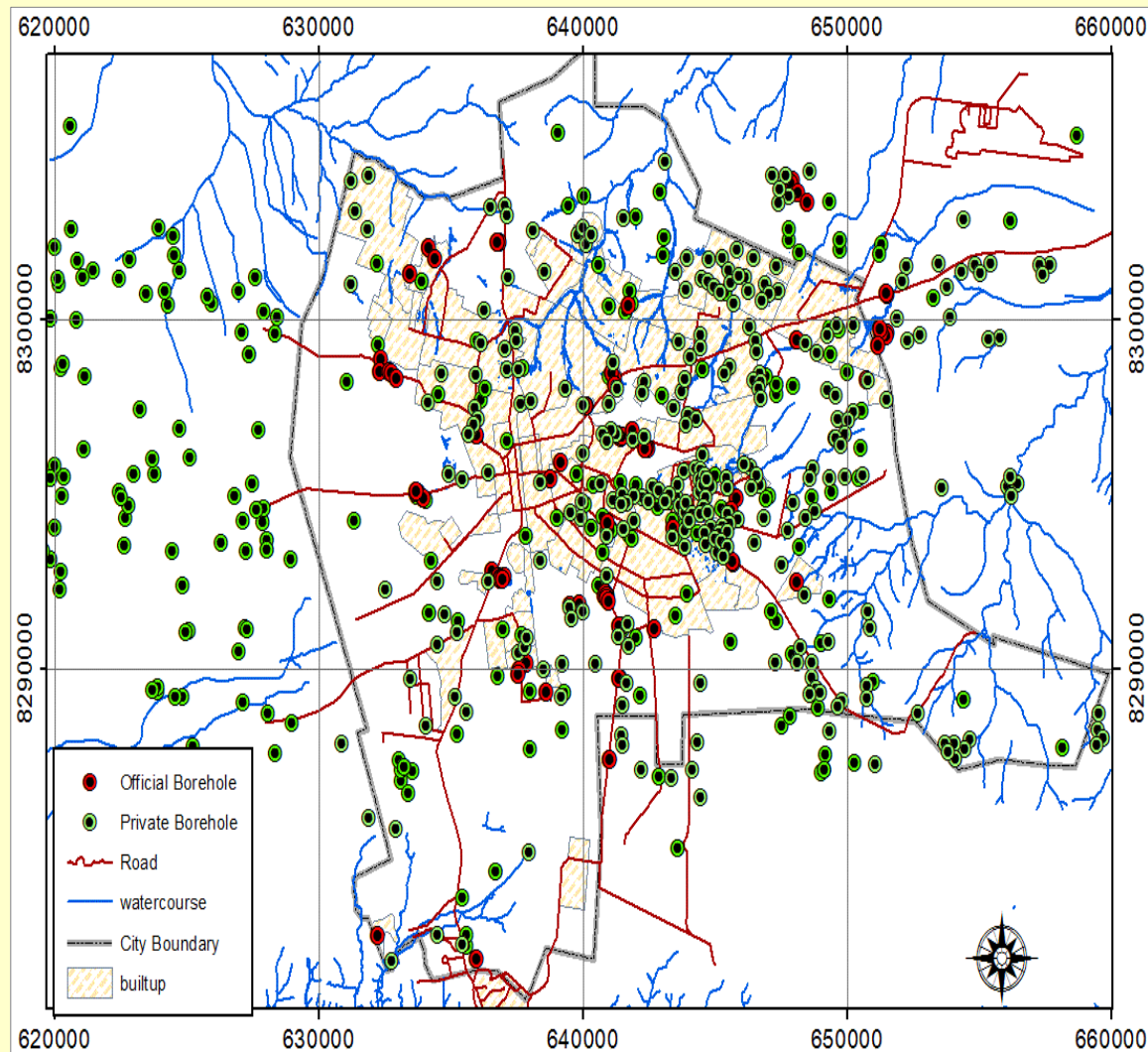
- ❑ A total of 356 samples collected in 2018
 - ❑ 158 Large towns with **87%** compliance
 - ❑ 198 Small towns with **60%** compliance
- ❑ Deterioration in Small town's water supply quality continued



Compliance of Urban Water Supplies to Escherichia coli

Regulation and governance (possible groundwater over-abstraction)

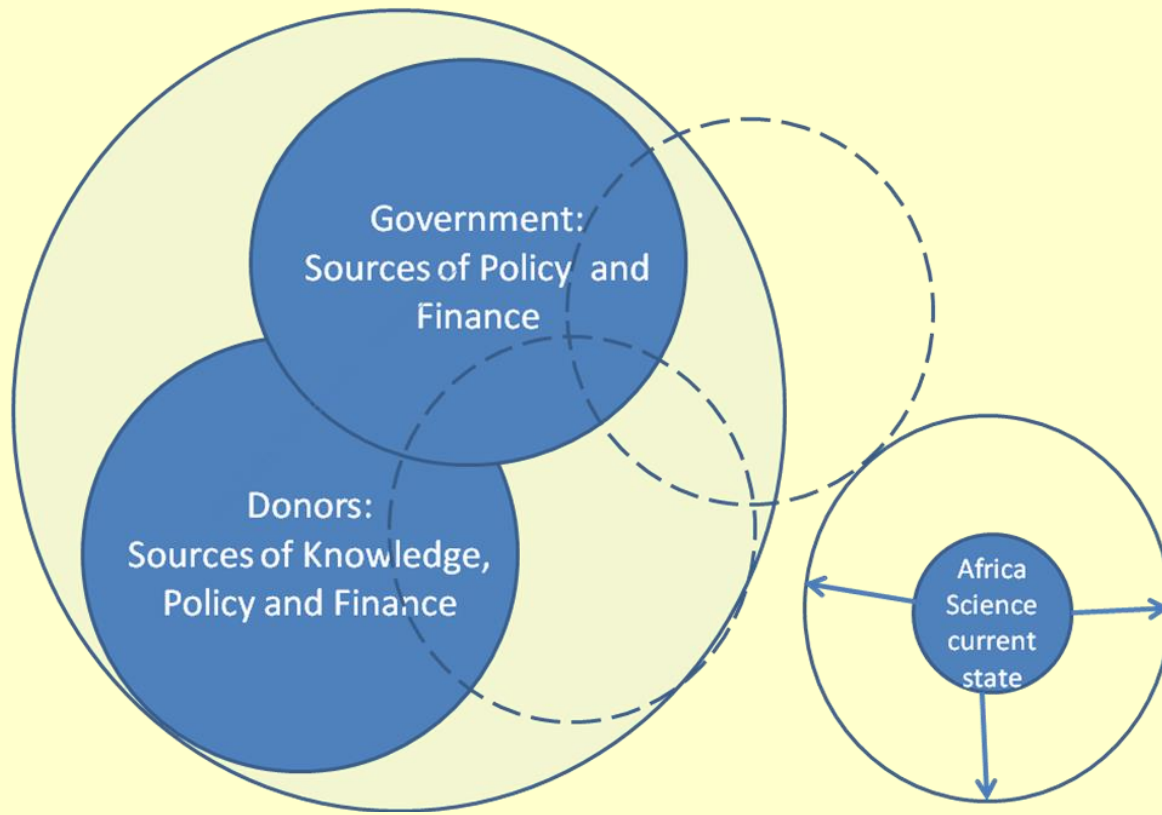
- A hidden revolution in groundwater development in an unprepared Africa
- Allocation, regulation and governance of groundwater- **challenging to implement/tragedy of the commons**



Partial spread of private and public boreholes in Lusaka

Data Source: Lusaka Water & Sewerage company and Department of Water Affairs

Integrating science and policy



Limited integration

Economics and financing

- Inadequate information on the contribution of groundwater to economic and social development
- Inadequate financing for groundwater development and management

Communicating groundwater information and impacts

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'Huge' water resource exists under Africa

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By **Matt McGrath**
Science reporter, BBC World Service

Scientists say the notoriously dry continent of Africa is sitting on a vast reservoir of groundwater.

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Groundwater information yet to impact policy articulation

**Addressing groundwater quality and
quantity issues through a catchment
based approach- rationale and
experiences from Uganda**

Dealing with groundwater issues within a catchment management framework- **rationale**

- Groundwater is part of hydrologic cycle- **needs a holistic approach to its management**
- In a catchment many things happen - **have a bearing on the quality and quantity of groundwater resources**
- Groundwater problems are simply too complex to remain in the hands of groundwater professionals alone- **need to take groundwater problems to the people**
- Technical solutions are not enough to address groundwater challenges – **people action is needed**
- Use the power of the people/stakeholders- **to protect groundwater quality and quantity**
- SDG principle (leave no one behind) –**let groundwater not be left behind in the discourse on SDGs (make the invisible visible)**

Catchment based approach in Uganda



Renewable water resources

15% of Uganda is open water

3% permanent and 9.4% seasonal wetlands

Gwater resources in fractured and weathered bedrock

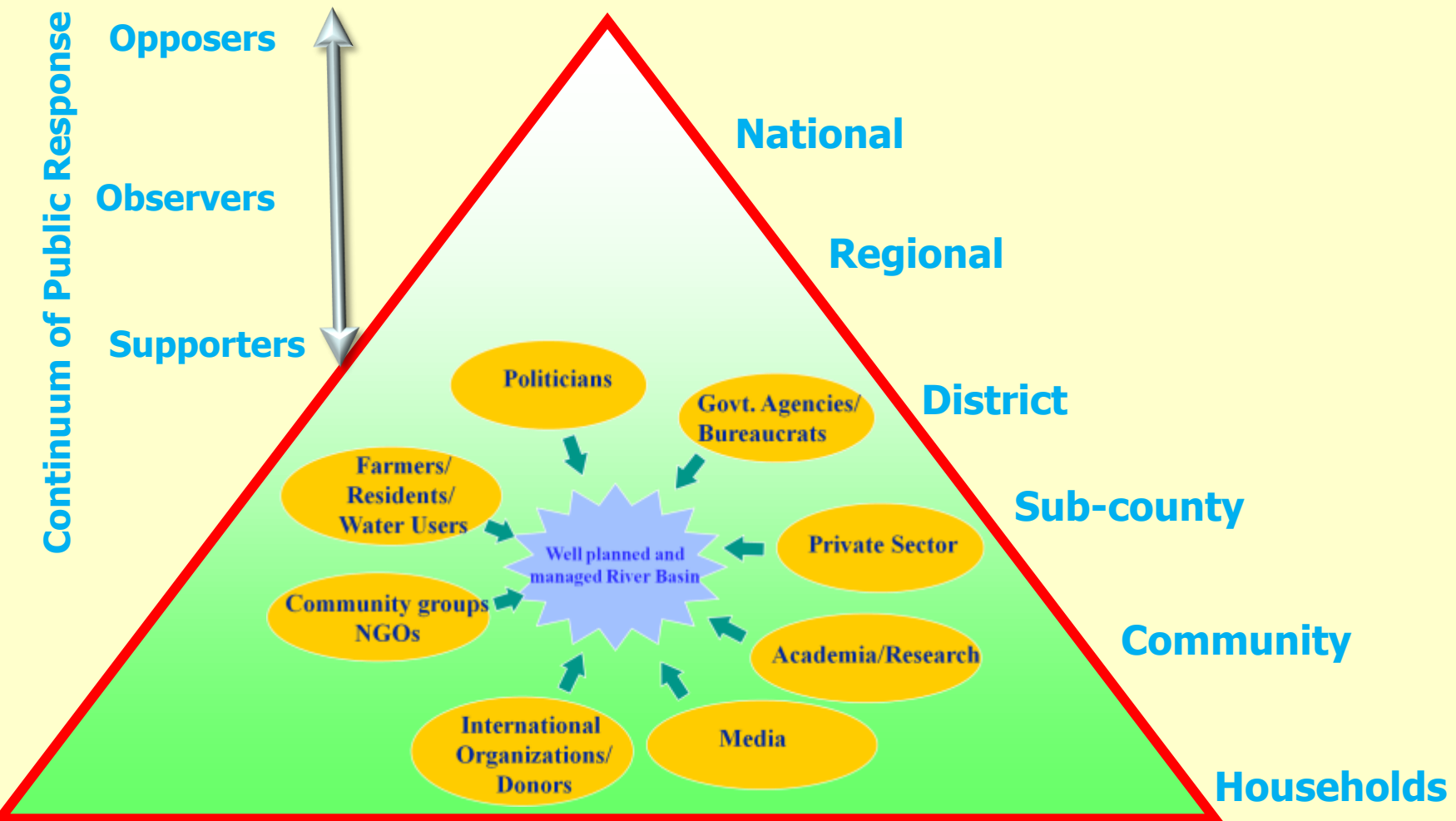
A CATCHMENT OR RIVER BASIN MANAGEMENT APPROACH

THE DEVELOPMENT CONTEXT



POWER OF STAKEHOLDERS: CATCHMENT

STAKEHOLDERS ARE MANY...



Preparation of a Catchment Plan

Shared decision making supported by facts and sound analysis

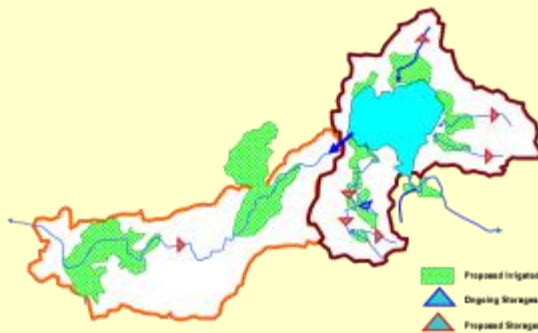
Decisions→

Stakeholder Identification
 Understanding Basin Issues/Problems
 (Pt. A – where now?)
 Shared vision for future potential
 (Pt. Bs – where could the Basin be?)
 Selection of development options
 (getting from A to B)
 Agreement on Basin Development Plan
 Investment Facilitation/Implementation/Supervision
 Consensus on Additional Needs

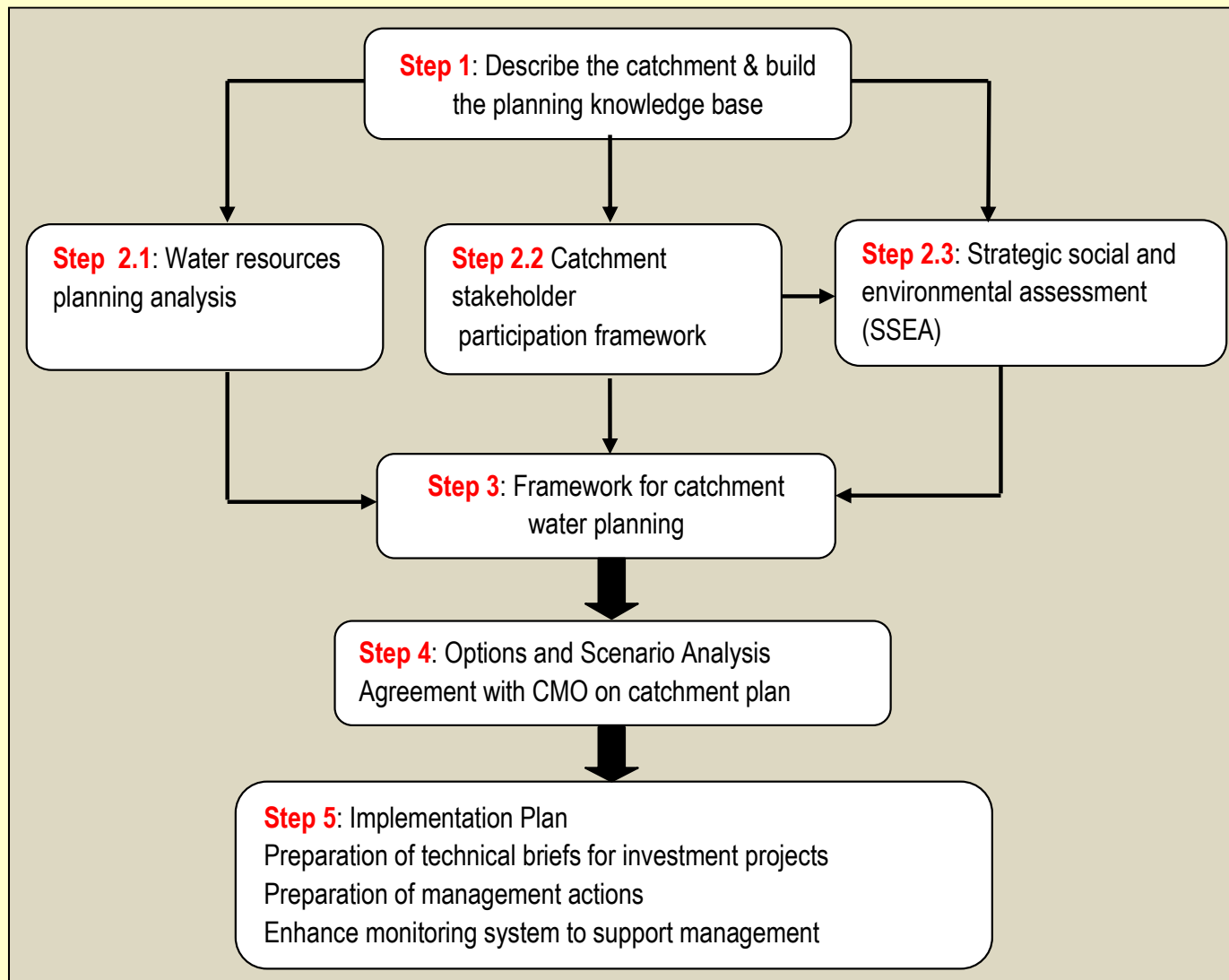
Participation
 Consultation→



Analysis→



Catchment planning guidelines



Catchments where catchment planning is ongoing



Benefits of a catchment based approach

- Enables addressing water resources challenges holistically by all stakeholders following a hydrologic cycle (**provides a basis for achieving SDG6**)
- Collective knowledge sharing and action by all stakeholders (**private sector, CSOs, academia, government etc**)
- Leveraging existing technical capacities and financial resources
- Improves awareness and enforcement of water laws and regulations
- Provides opportunity for stakeholder buy in and ownership
- Enables holistic identification of key issues and hotspot areas (recharge zones, pollution sources etc) requiring urgent action

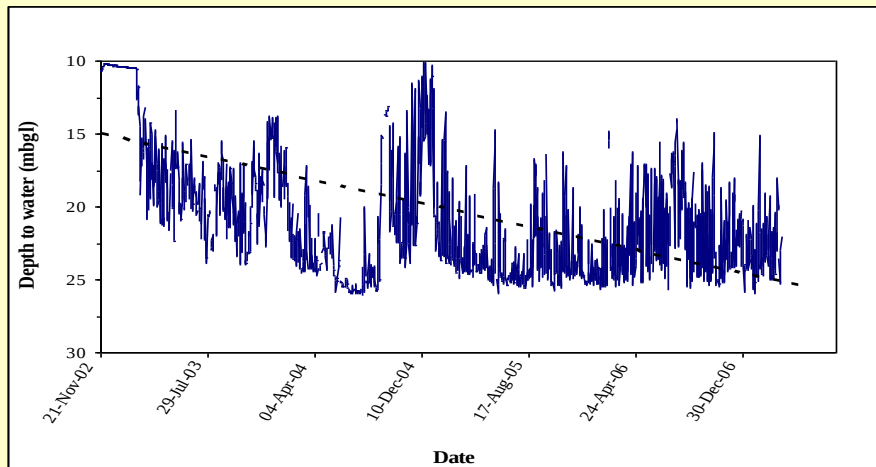
Ongoing catchment management interventions to protect the quality and quantity of groundwater in Uganda

Groundwater management actions



**Groundwater resources
assessment**

**Groundwater resources
monitoring**



**Groundwater resources
regulation/licensing**

Catchment restoration and protection



Nyakambu wetland restoration: 2013 (Left), 2014 (middle) and 2016 (Right)



Terracing of steep slopes and gully rehabilitation using sand bags in Rubaya Sub-Catchment

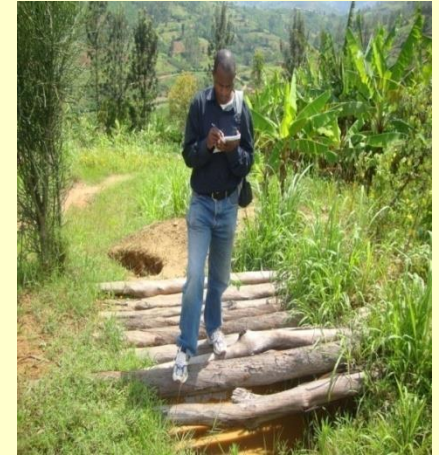


Embankment construction in Aketa dam, Lokok and Lokere catchment

Soil conservation & Agroforestry



Water Harvesting on hillsides



Summing it up

- ▶ Catchment based planning and management is one of the key ways to address groundwater quality and quantity challenges in the rural-urban interface
- ▶ In Uganda priority is being given to preparing and implementing CMPs and water source protection plans so as to protect water resources while improving people's livelihood
- ▶ Catchment based framework is key if groundwater resources are to be secured for sustainable socio-economic development