



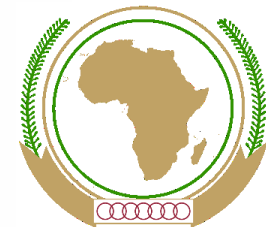
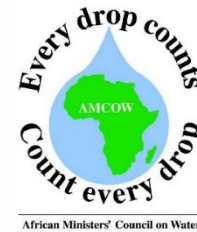
Document from the 7<sup>th</sup> Africa Water Week, held in Libreville, Gabon, 29 October – 2 November 2018



A knowledge asset of the African Ministers' Council on Water

*This material is shared as a learning resource to promote awareness and good practice in the provision, use and management of water resources for sustainable social and economic development and maintenance of African ecosystems.*

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# GROUNDWATER'S CONTRIBUTION TO WATER SECURITY IN AFRICA

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Dr Kirsty Upton on behalf of UPGro

Acknowledgements:

International Association of Hydrogeologists

Africa Groundwater Network

GRIPP

Rural Water Supply Network



7<sup>th</sup> Africa Water Week  
Libreville, Gabon  
October 2018

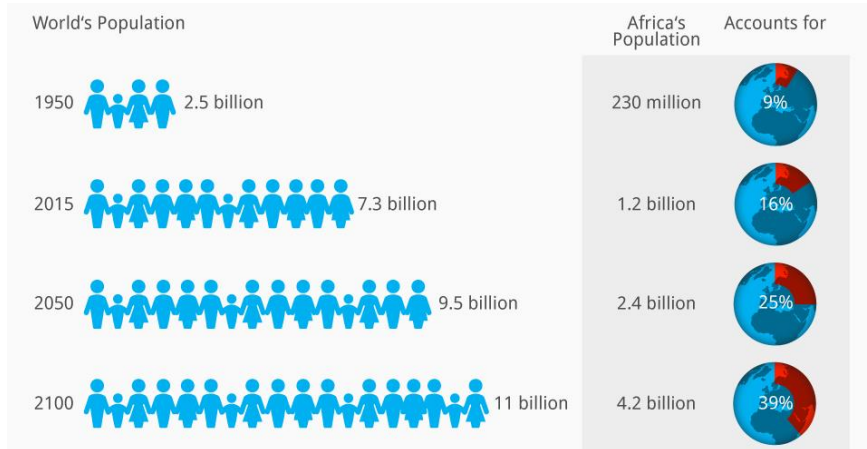


# Water Security

“...the availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies”

Grey and Sadoff (2007) Water Policy 9: 545–571

# Water Security



Source: UNICEF/Statista



Source: NASA

# UPGro: Unlocking the Potential of Groundwater for the poor

## BRAVE

Building understanding of climate variability into planning of groundwater supplies from low storage aquifers in Africa



## Gro For Good

Groundwater Risk Management for Growth and Development



## GroFutures

Groundwater Futures in Sub-Saharan Africa



## Hidden Crisis

Unravelling current failures for future success in rural groundwater supply



HIDDEN CRISIS

## T-GroUP

Experimenting with practical transition groundwater management strategies for the urban poor in Sub-Saharan Africa

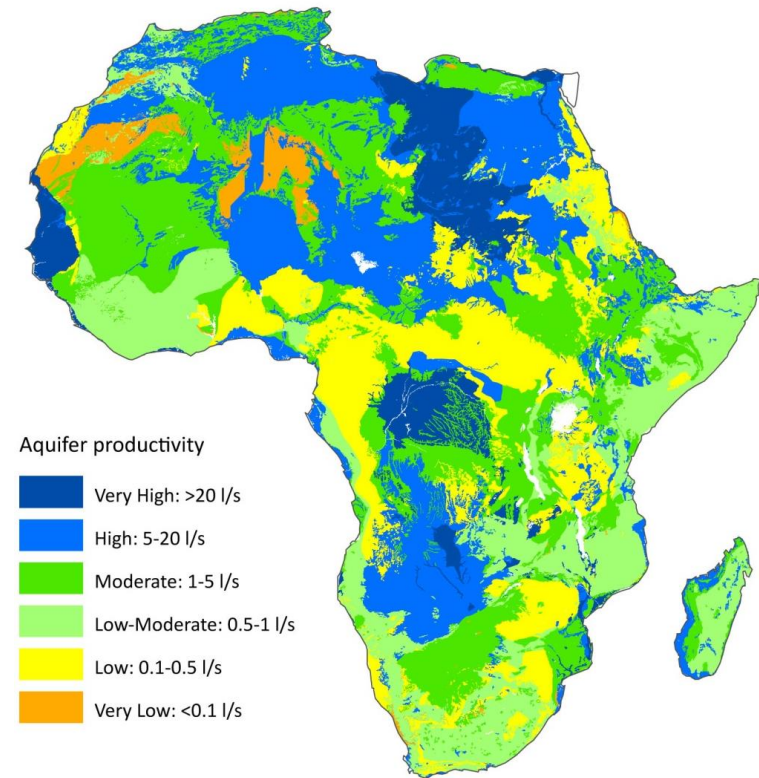
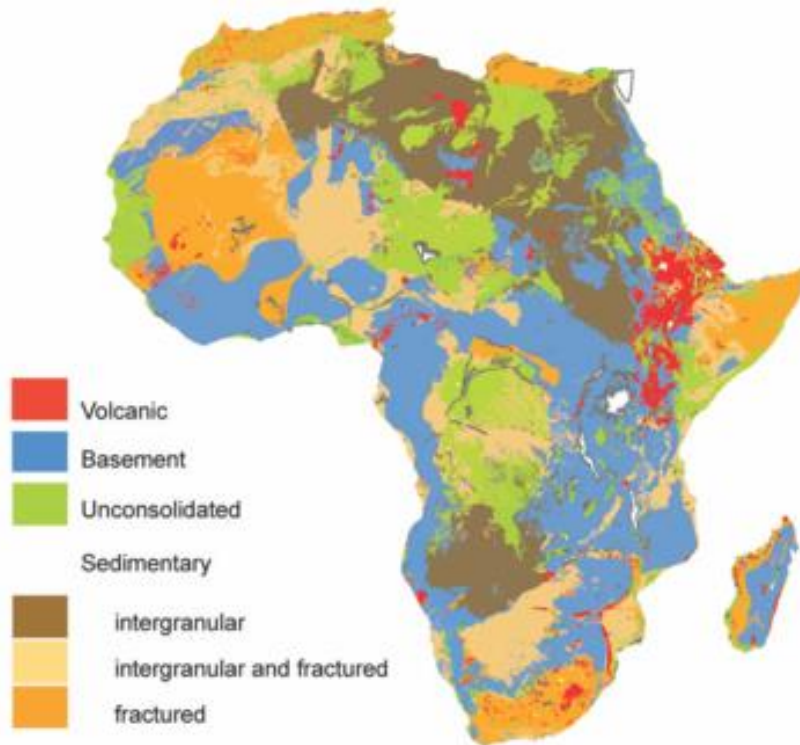


UPGro is funded by:



# Water Security: the Role of Groundwater

Universal and equitable access



British Geological Survey © NERC 2011. All rights reserved.  
Boundaries of surficial geology of Africa, courtesy of the U.S. Geological Survey.

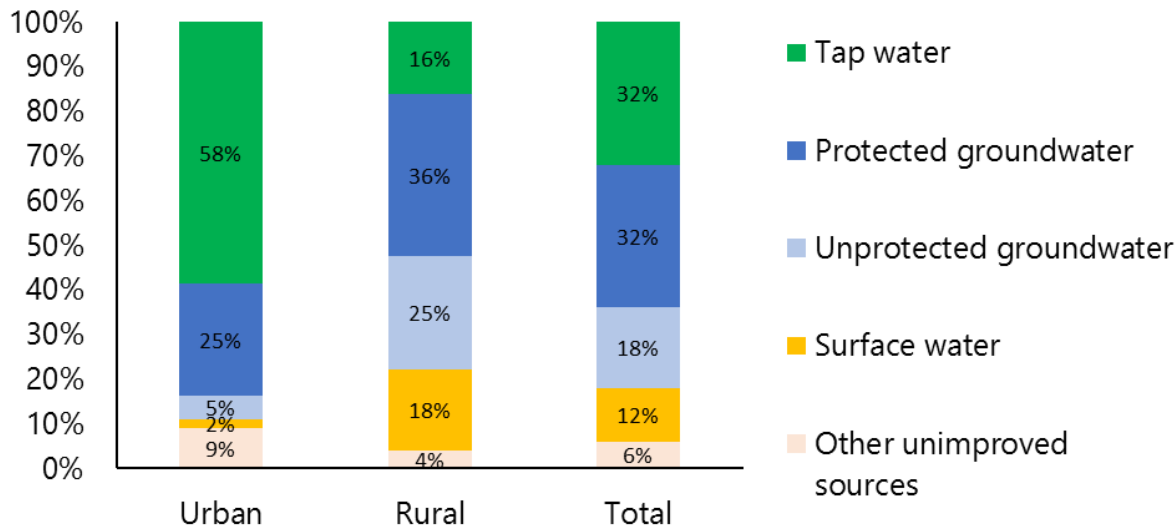


# Water Security: the Role of Groundwater

A hidden resource...

...but at least 50% of the total population in Africa use groundwater for drinking

Estimates of access to drinking water sources in SSA from 2015 JMP Country files.



Source: UPGro (2017)



# Water Security: the Role of Groundwater

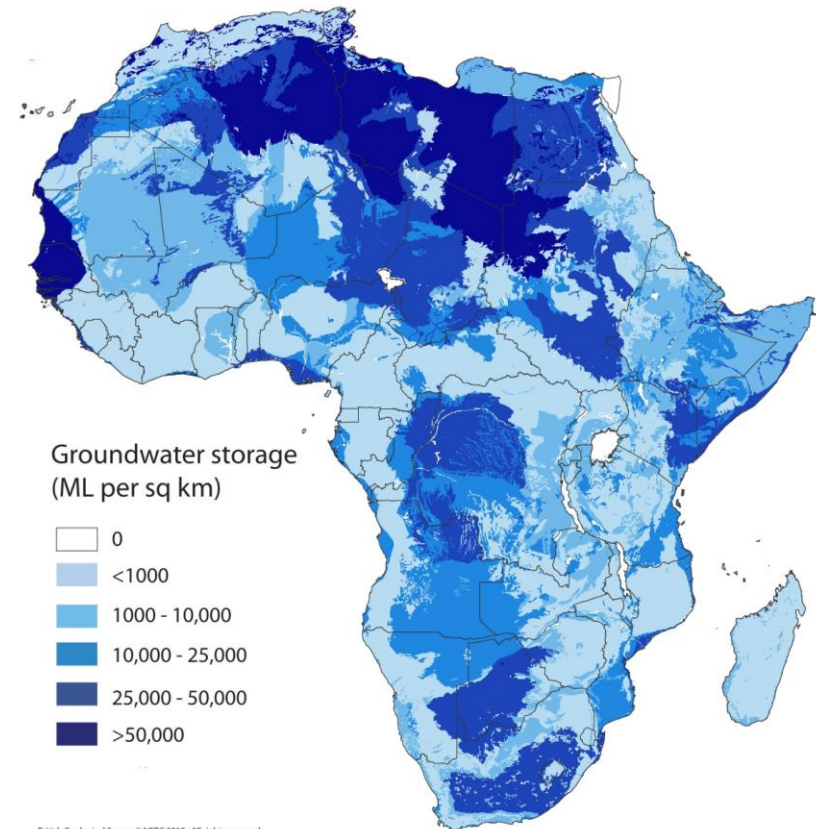
## Resilience

Storage > 0.5 million km<sup>3</sup>

Dominated by N. African basins and not all storage is renewable

But still 20x more than volume of water stored in lakes and reservoirs

Storage provides a buffer against climate variability



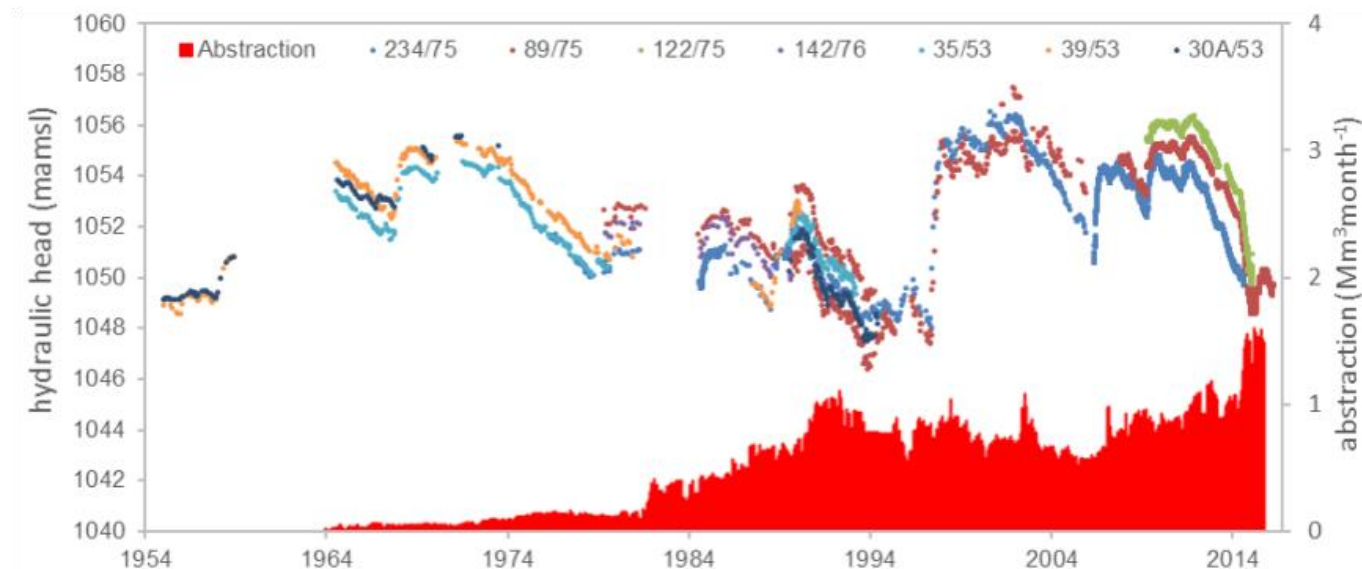
British Geological Survey © NERC 2010. All rights reserved.  
Surficial geology of Africa, courtesy of the U.S. Geological Survey.  
Country boundaries sourced from ArcWorld © 1995-2010 Esri. All rights Reserved



# Water Security: the Role of Groundwater

## Resilience

**Record of groundwater levels and abstraction from Makutapora Wellfield, Tanzania from 1954 to present.**



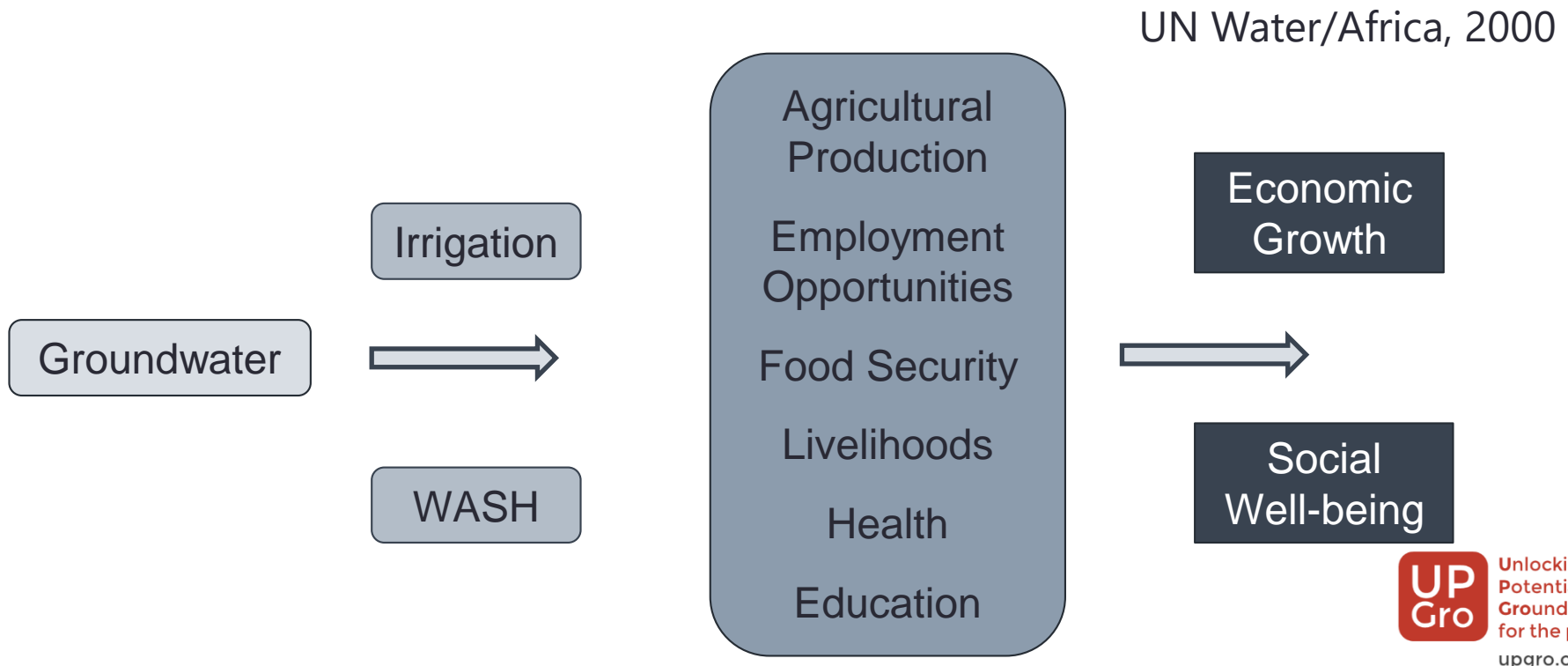
Recharge occurs episodically in response to large rainfall events

Intense rainfall events are likely to happen more often under climate change

# Water security: National Growth and Poverty Reduction

Africa Water Vision:

“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.”



# Groundwater's Contribution to Water Security

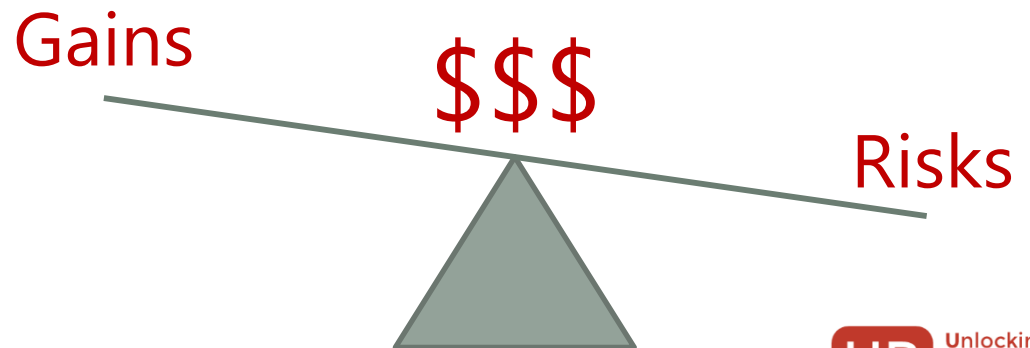
Water security contributes to socio-economic development but is a challenge

Groundwater has an important role to play



What next?

- Rural Water Supply
- Urban Water Supply
- Irrigation



# Groundwater Investment: Gains and Risks

## Socially Inclusive and Sustainable Rural Water Services



Community handpump boreholes

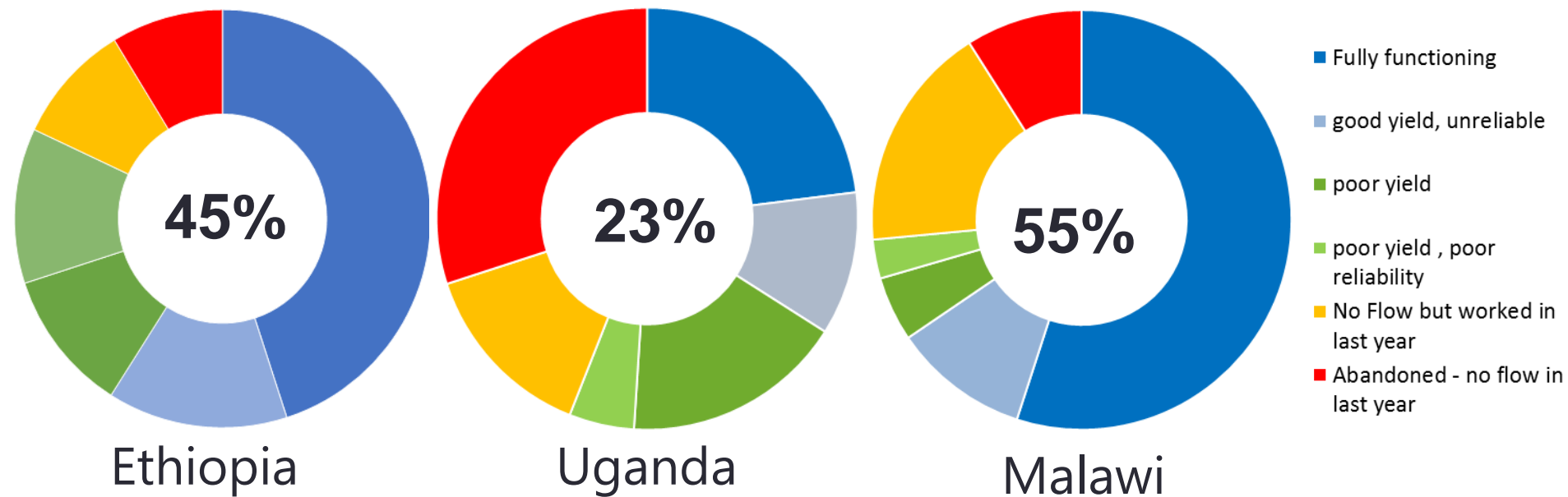
Benefits of water access on health, education & livelihoods

BUT issues with functionality of water points



# Groundwater Investment: Gains and Risks

## Socially Inclusive and Sustainable Rural Water Services



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## Socially Inclusive and Sustainable Rural Water Services



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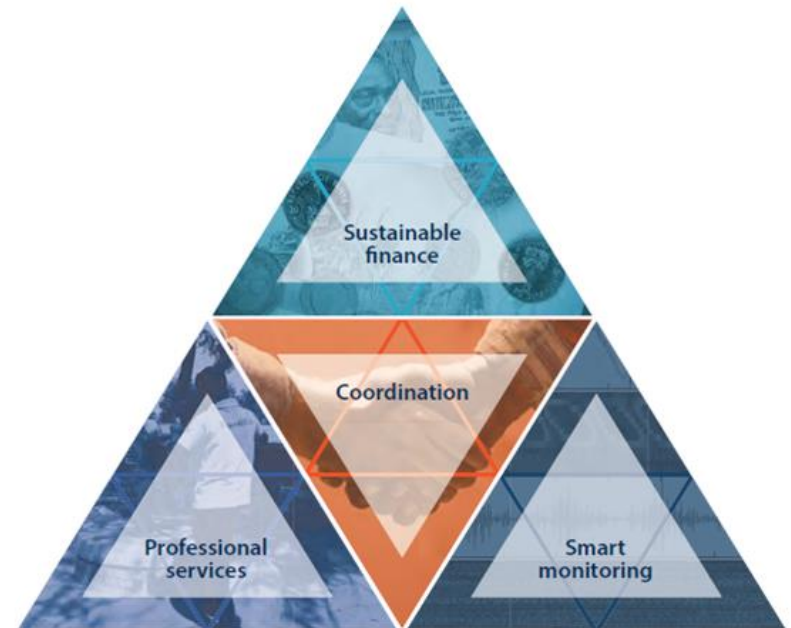
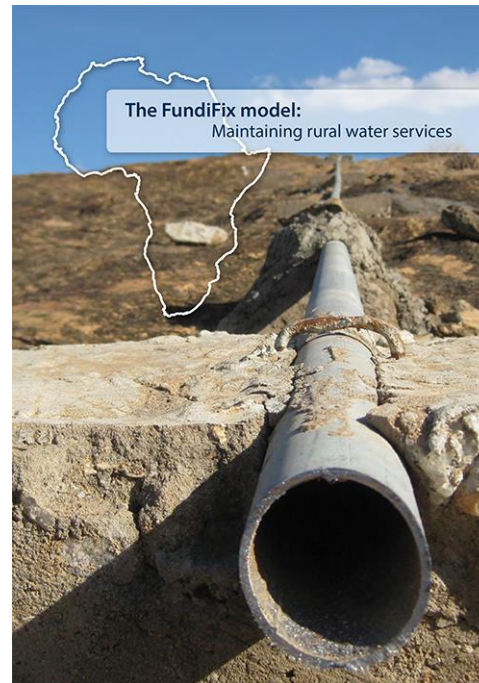
Reasons for failure are complex

Impacts felt most strongly along lines of gender, health & wealth



# Groundwater Investment: Gains and Risks

## Socially Inclusive and Sustainable Rural Water Services



# Groundwater Investment: Gains and Risks

## Urban Groundwater Security

Proportion of population with piped supply decreased between 1990-2010

Water obtained from multiple sources



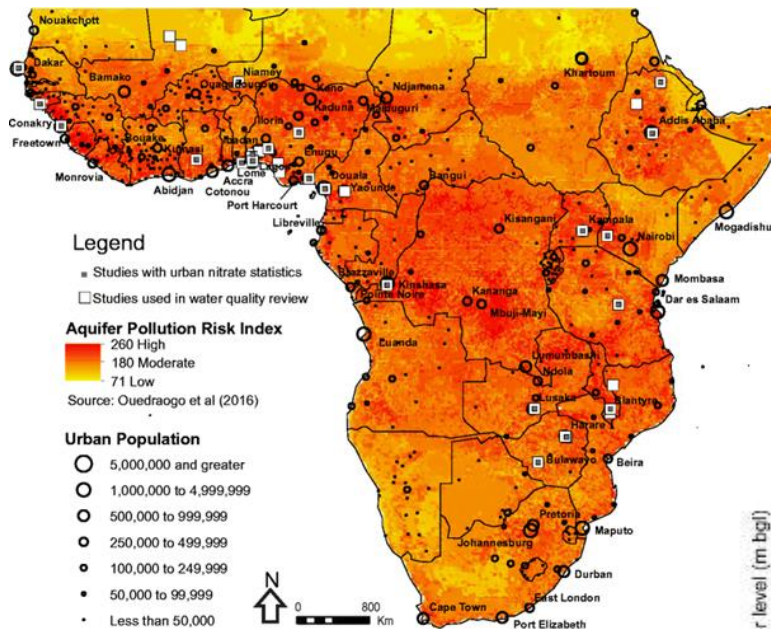
Private supply increasing but unequal

# Groundwater Investment: Gains and Risks

## Urban Groundwater Security

### Co-location of on-site sanitation and water supplies in Lusaka, Zambia

Pollution Risk Map for SSA



Source: Lapworth et al., 2017 after Ouedraogo et al., 2016



Septic Tanks  
Boreholes



Source: Nkhuwa et al., 2015

### Groundwater level hydrograph for a water well in Nairobi



Source: Foster & Tuinhof, 2005



# Groundwater Investment: Gains and Risks

## Urban Groundwater Security

Strategic  
development

Governance  
capacity

Monitoring

Collaborative approaches to  
urban water management



# Groundwater Investment: Gains and Risks

## Irrigation



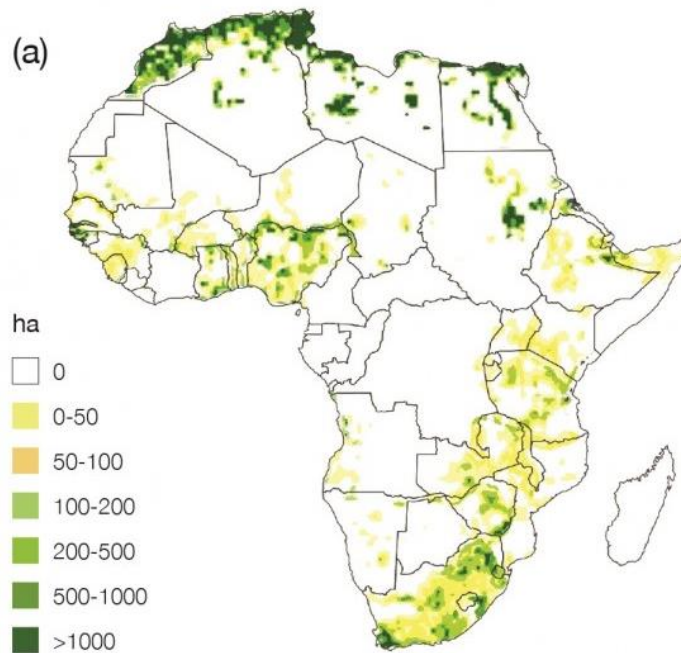
Benefits of groundwater irrigation: agricultural production, livelihoods, food security

Motorised pumps increase agricultural productivity allowing investment in improved seeds, higher value crops, and inputs such as fertilizers

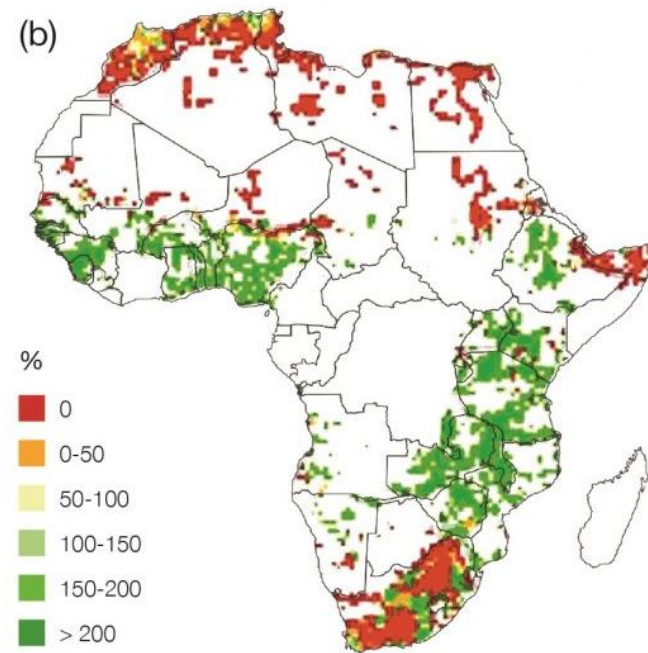
# Groundwater Investment: Gains and Risks

## Irrigation

Actual area irrigated with groundwater  
in 2005 expressed in ha. per cell



Groundwater irrigation potential for the year  
2000 expressed as the percentage of the area  
irrigated with groundwater in 2006



Source: Altchenko & Villholth, 2015



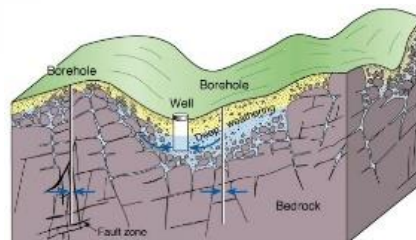
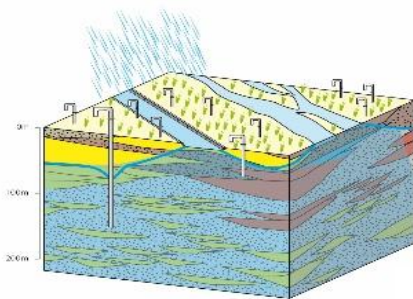
# Groundwater Investment: Overarching Risks

Inequality in terms of access

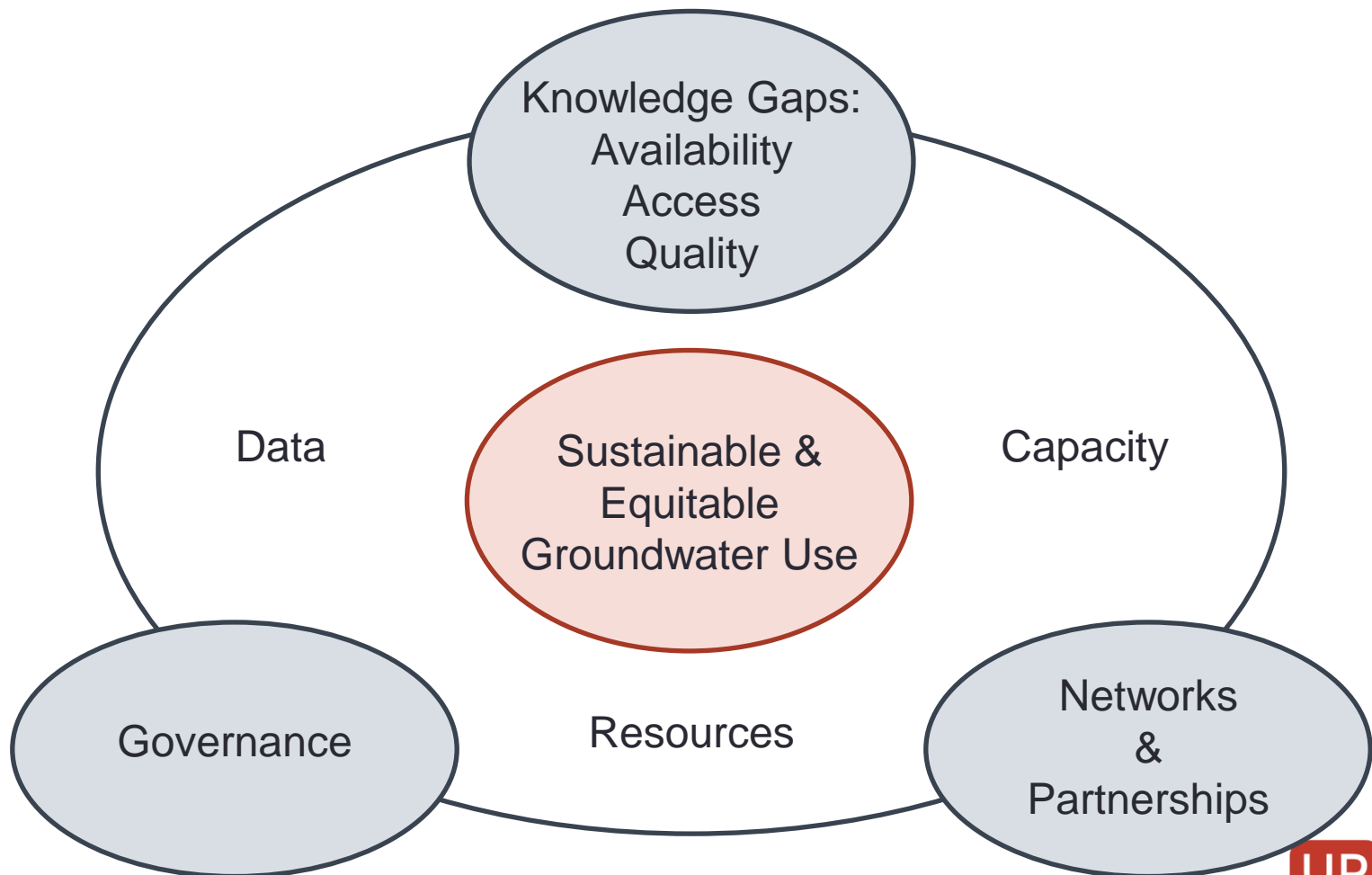


Groundwater depletion

Groundwater pollution



# Groundwater Investment: Mitigating Risks



Thank you!  
Merci!

[upgro.org](http://upgro.org)