British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Gateway to the Earth

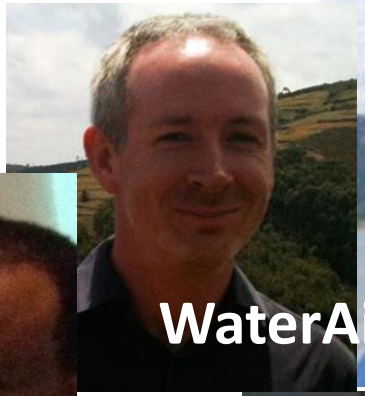
Examining the functionality of rural water supplies

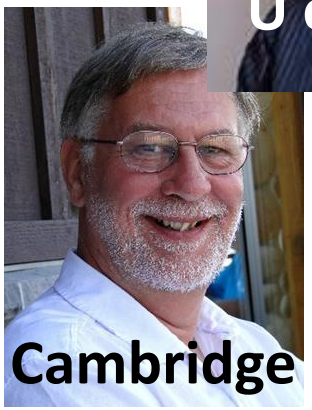
UP Gro
Unlocking the Potential of Groundwater for the Poor

Alan MacDonald & Helen Bonsor

An interdisciplinary team

BGS





ODI

Unlocking the Potential of Groundwater for the Poor

UPGro is a seven-year international research programme (2013-2020) focused on improving the evidence base around groundwater availability and management in Sub-Saharan Africa (SSA) to enable developing countries and partners in SSA to use groundwater in a sustainable way in order to benefit the poor.

The UPGro Programme has two phases.

The **Catalyst Phase** (2013-2015) comprised 15 one-year projects, undertaken in 14 countries.

The **Consortium Phase** (2015-2019) comprises five projects working across nine countries.

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

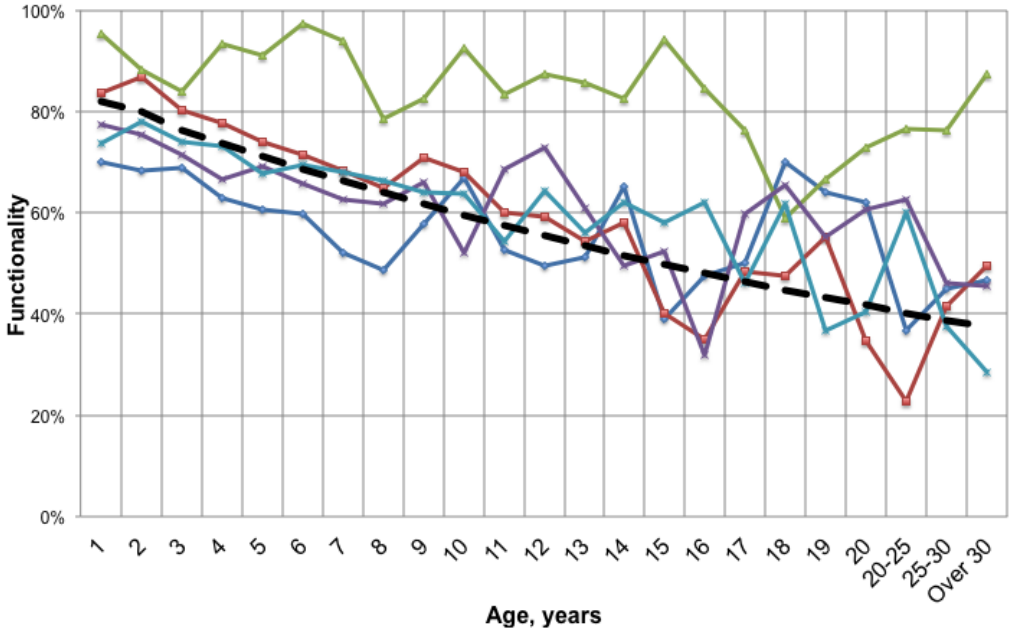
Hidden Crisis

Unravelling current failures for future success in rural groundwater supply

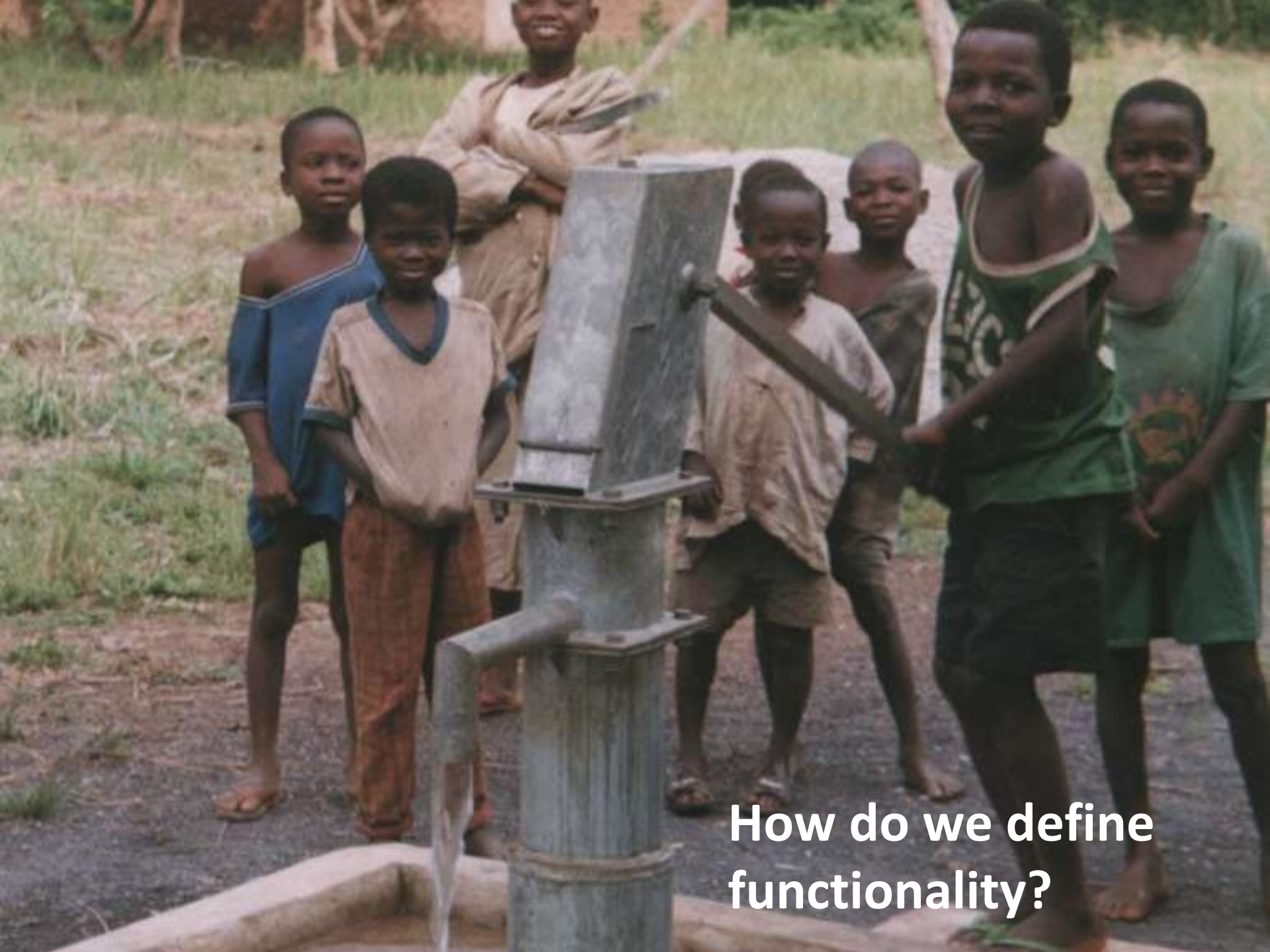
T-GroUP

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

Why look at functionality?



- Surveys consistently suggest 20 – 40% non functional
- Many of the benefits of improved access to water are lost
- Cumulative cost estimated to be $1.2b
- Often hidden – focus on coverage.


How do we define functionality?

Common practice

Examined 111 studies…

1. don’t define (majority)
2. Binary: working /not working
3. More complex definitions – e.g. partial working
4. Tiered definitions
5. Broad sustainability assessment
6. Assessed against standard

Key points for best practice

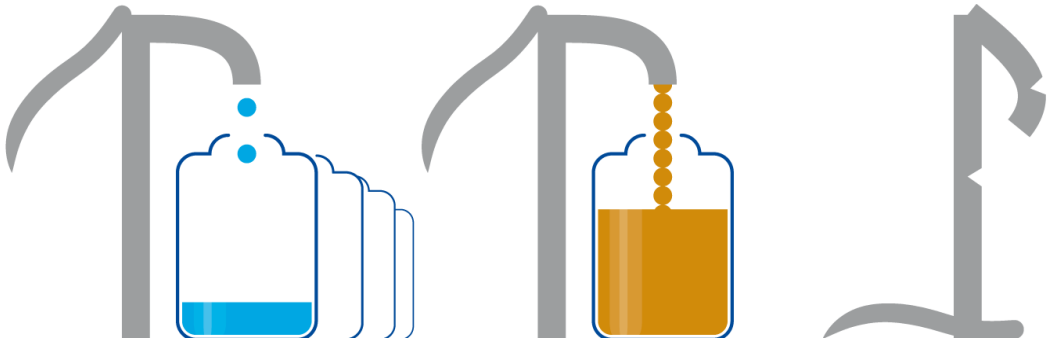
- Measure against an explicit standard and population
- Measure separately from the users' experience
- Allow for tiered assessments
- Distinguish between a snapshot and temporal

Is it practicable ??

Working definitions

HPB functionality An assessment of how a handpump equipped borehole compares to a standard design criteria for quantity [and quality]* at a given moment in time.

HPB performance an assessment of how successfully a hand pumped equipped borehole functions over time.



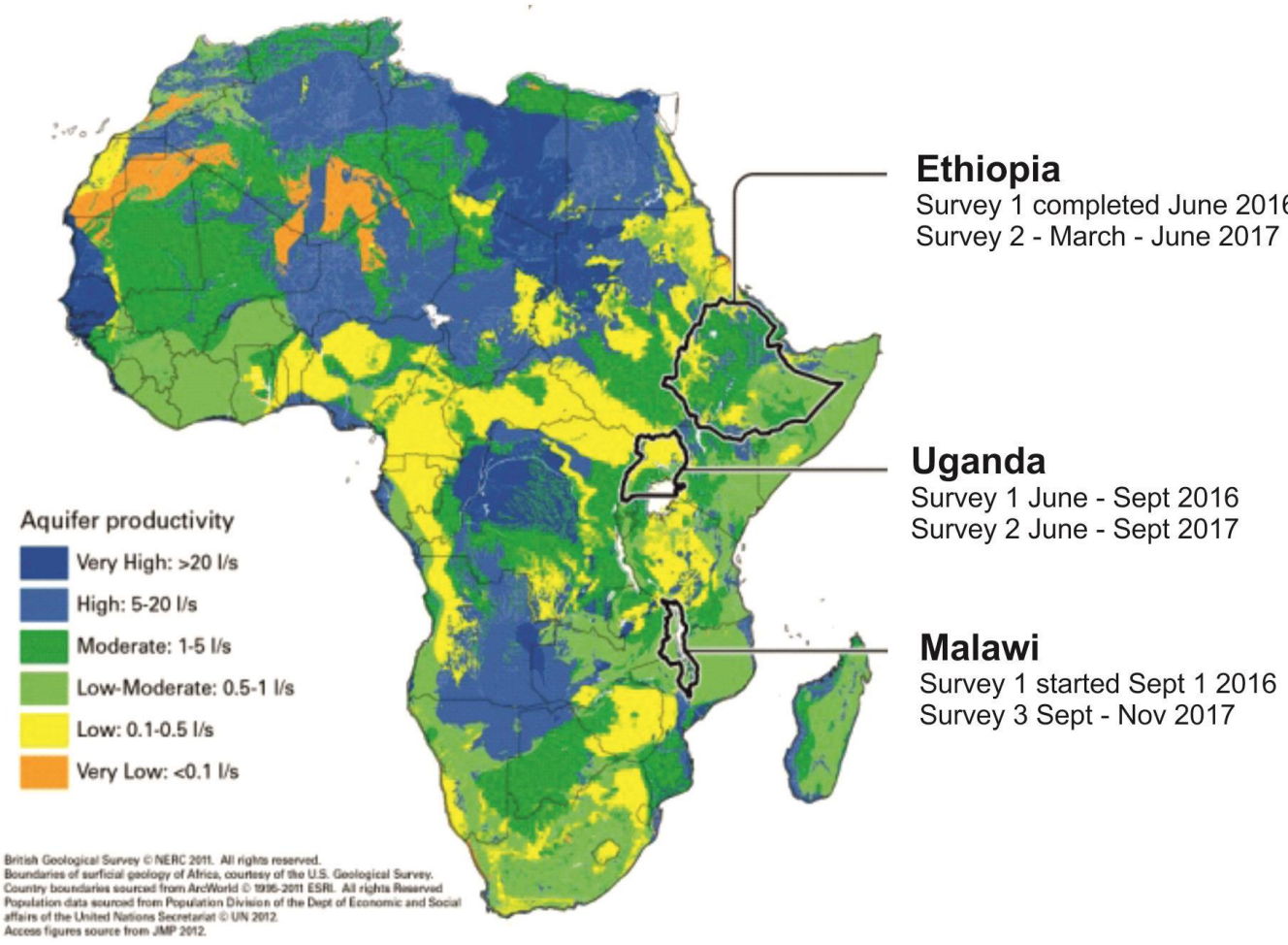
Testing the definitions

Developed broad survey method

Two stage random stratified sampling method

Apply to 200 WPs in Uganda, Ethiopia and Malawi

Functionality of water points & governance arrangements



Methods

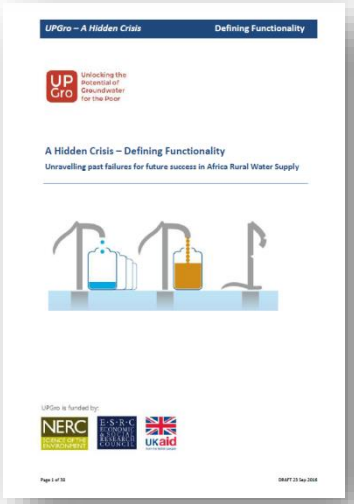
- 30 minute stroke test
- Water chemistry
- TTCs
- Leakage test
- Questions on downtime in the past year
- Questions about perceived service level

Rapid governance survey

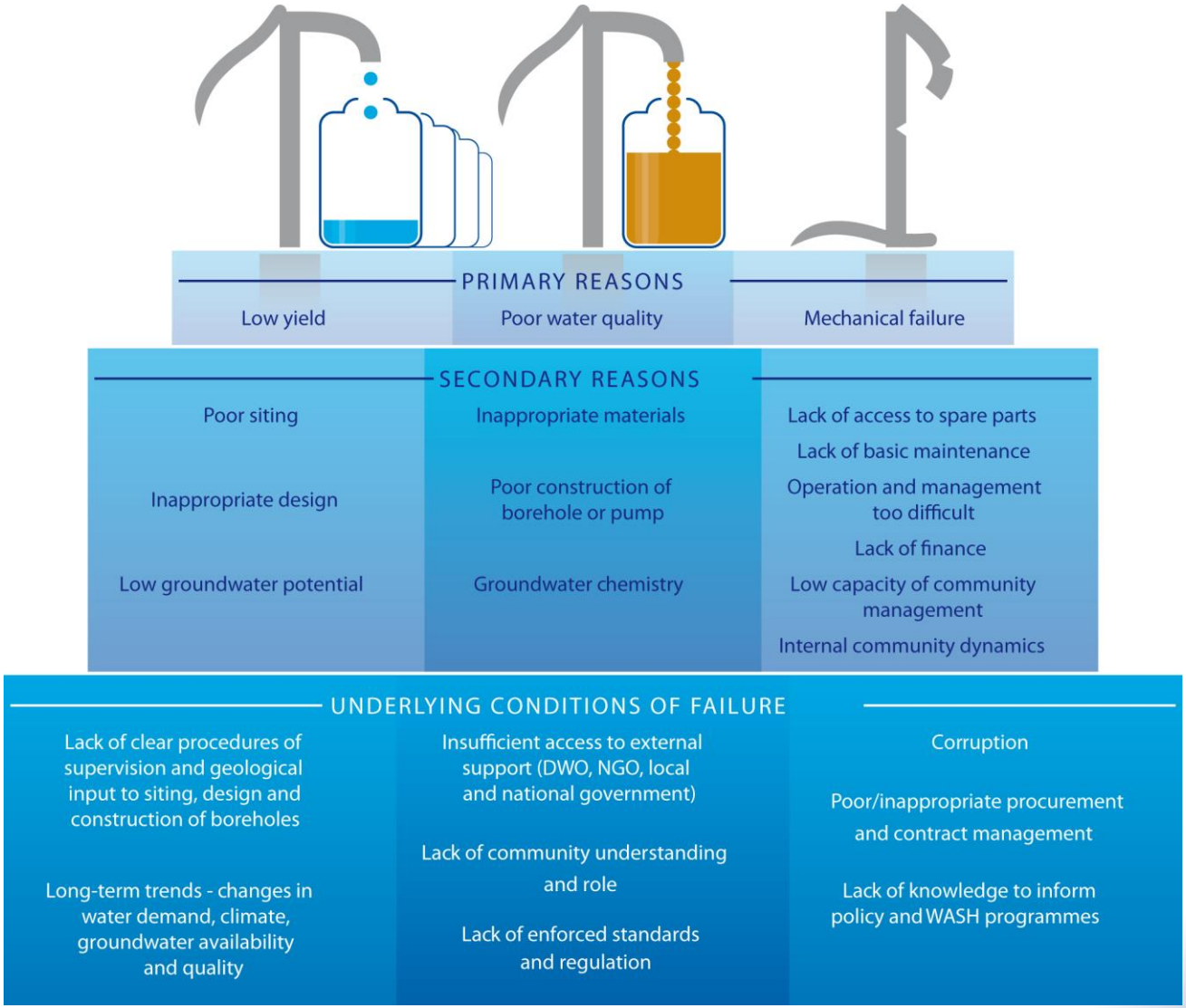
- Meta data
- 10 questions on functionality of the water committee
- Questions on the general governance of water point
- Repeat questions on the user perception

Results

- Finished Ethiopia and Uganda, Malawi ongoing
- 3 – 4 sites per day
- Quality difficult + expensive
- Preliminary analysis shows:
  - Value of random sampling
  - Preference for performance over functionality
  - Many partially functioning
- Analysis workshop in November 2016
- Refined definitions and methods
- Input to new SWA global standard



Stage 2: investigate *causes* …

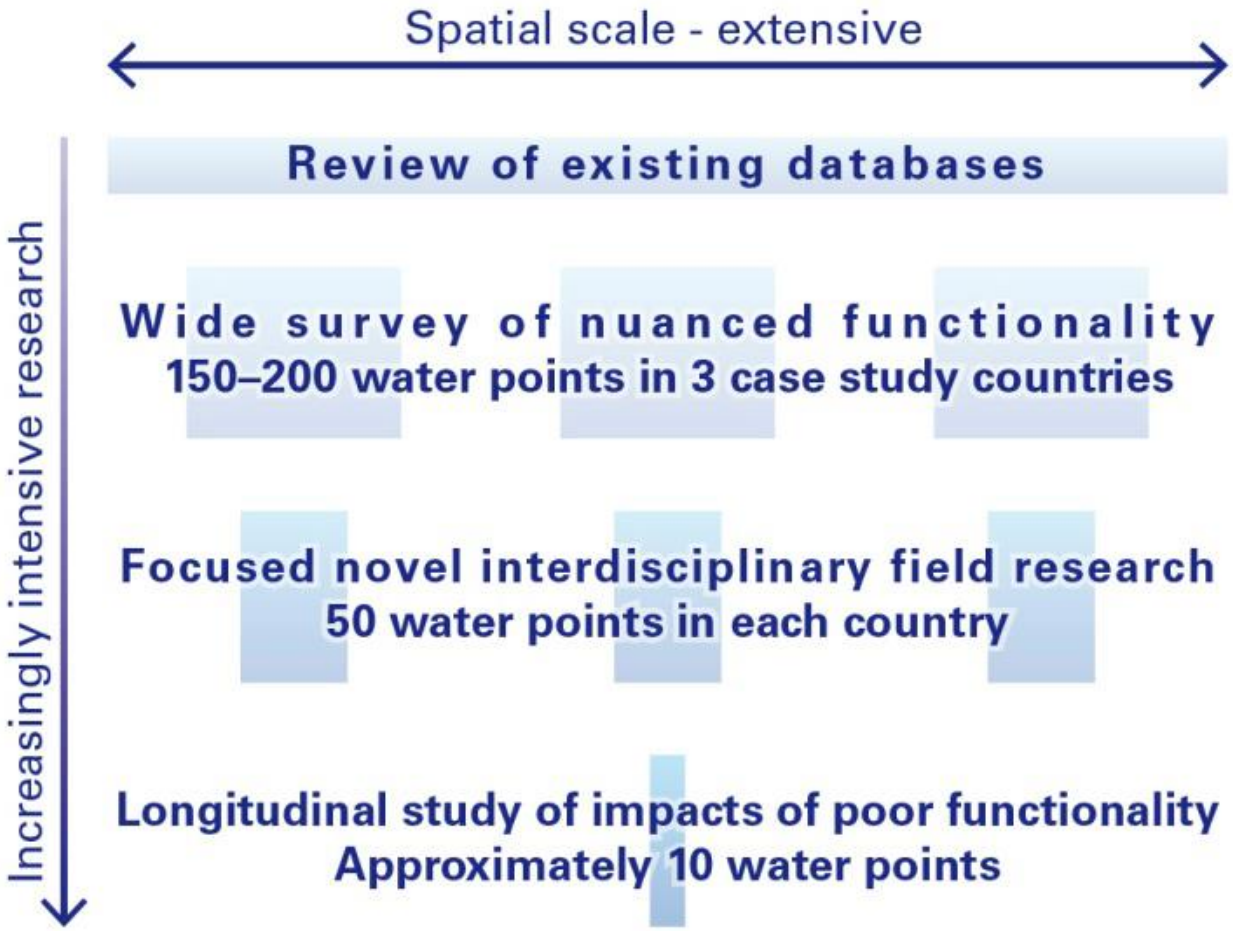


Summary

- Definitions matter !
- Be clear about what is being measured
- Detailed research: from anecdote to evidence
- Good statistics are just the start of the process
- Look out for reports/ papers/workshops

Thank You

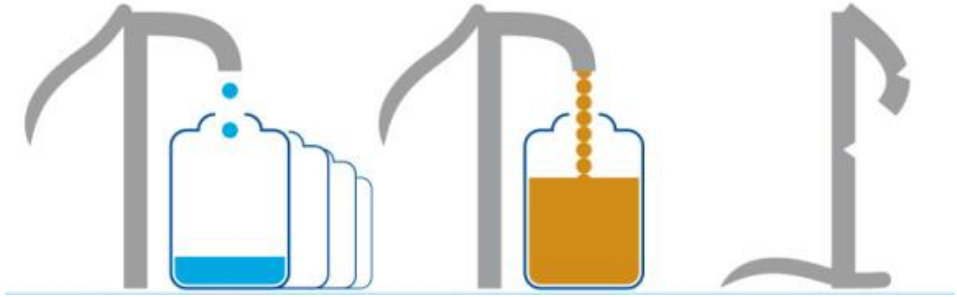
A field approach



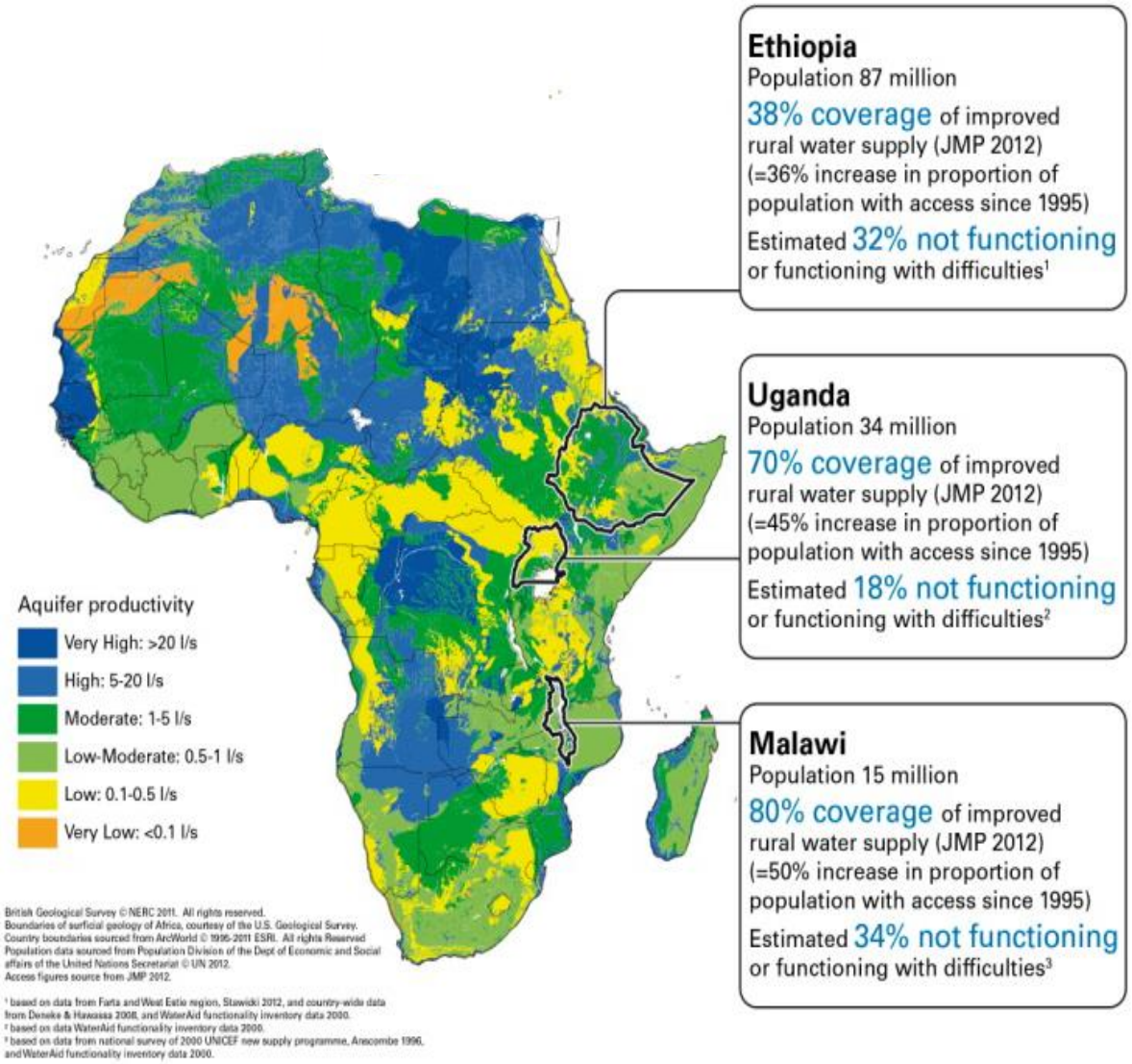
Our research objectives

Objective 1: To develop more comprehensive definitions of the functionality of water points and governance arrangements.

Year 1



Our research objectives



Ethiopia
Population 87 million
38% coverage of improved rural water supply (JMP 2012)
(=36% increase in proportion of population with access since 1995)
Estimated 32% not functioning or functioning with difficulties[1]

Uganda
Population 34 million
70% coverage of improved rural water supply (JMP 2012)
(=45% increase in proportion of population with access since 1995)
Estimated 18% not functioning or functioning with difficulties[2]

Malawi
Population 15 million
80% coverage of improved rural water supply (JMP 2012)
(=50% increase in proportion of population with access since 1995)
Estimated 34% not functioning or functioning with difficulties[3]

Objective 2: to apply this new definition to 3 countries, Ethiopia, Uganda and Malawi in a statistically significant survey to provide authoritative evidence about functionality.

Why these countries?

YEAR 1

Our research objectives

Objective 3: To understand the inter-dependancies between the factors governing source failure and success through detailed interdisciplinary research of approx 50 sources in each country

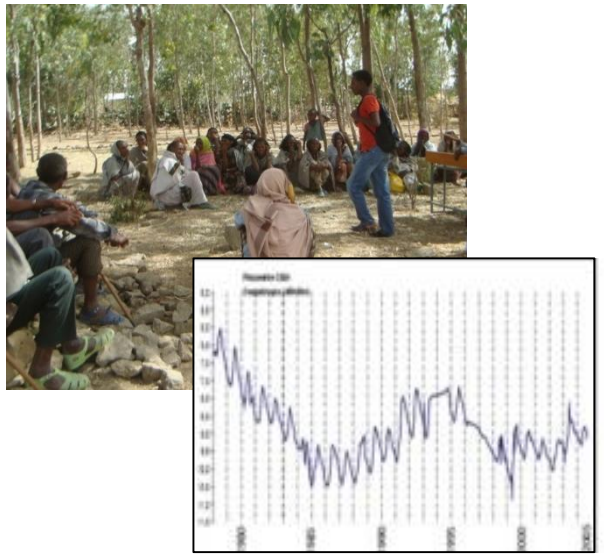
YEAR 2/3

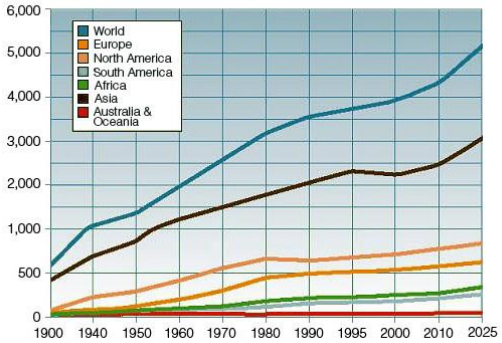
Trajectories

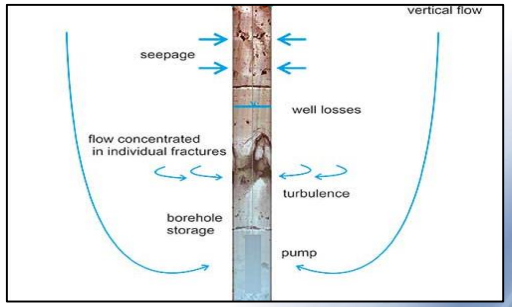
Objective 4: To examine and forecast trajectories and trends:

- Gw level and rainfall monitoring,
- scenario building (recharge, water demand and demographics);
- novel modelling of source behaviour
- Model aggregate impact of functionality trajectories on WASH coverage

YEARS 2 - 4





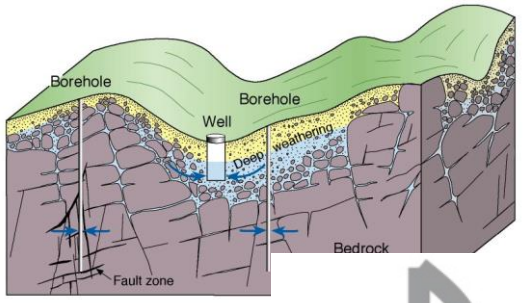


Analysis

Objective 5: To develop an approach for building resilience into future rural water supply

YEARS 3 -4

Major research outcomes



A step change in the understanding of borehole functionality and its implication for WASH coverage figures

Deep understanding on the viability of the community management model for WASH

Quantitative evidence of groundwater storage, flow and recharge for key hydrogeological environments

Analysis of the contribution of environmental change to water supply functionality

An authoritative analysis of the main predictors of borehole functionality

Defendable forecasts of future functionality and therefore RWS coverage given plausible future trajectories.

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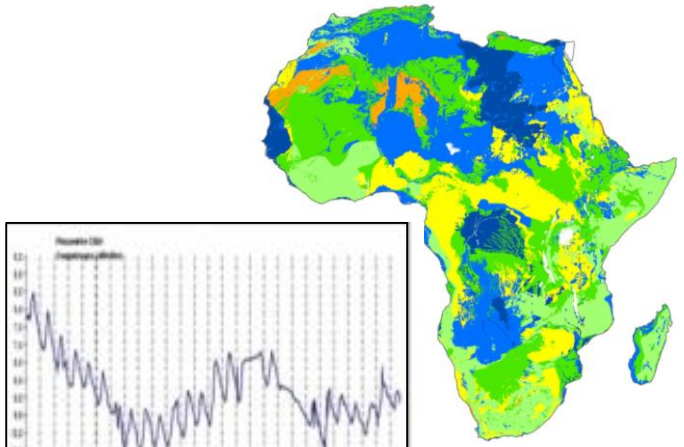
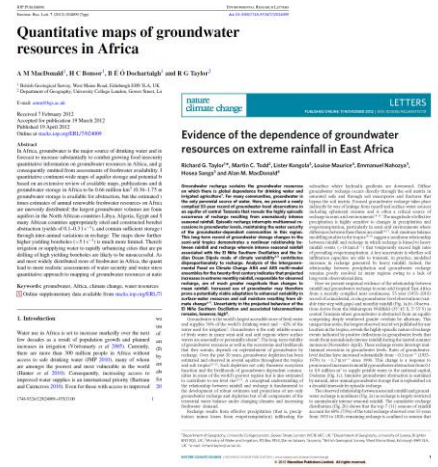
Deliverables



Unique rich datasets at different scales on water governance, groundwater flow and storage, recharge processes, functionality, impact of water access on gender dynamics.

A new robust, replicable methodology for the research community

benchmark scientific papers, + 5-10 methods or case study papers



Quantitative maps of groundwater resources in Africa

Evidence of the dependence of groundwater resources on extreme rainfall in East Africa

A team of interdisciplinary skilled researchers

A set of tools delivered through a manual, policy briefs and social media

A change in practice in the WASH community

WaterAid

Summary

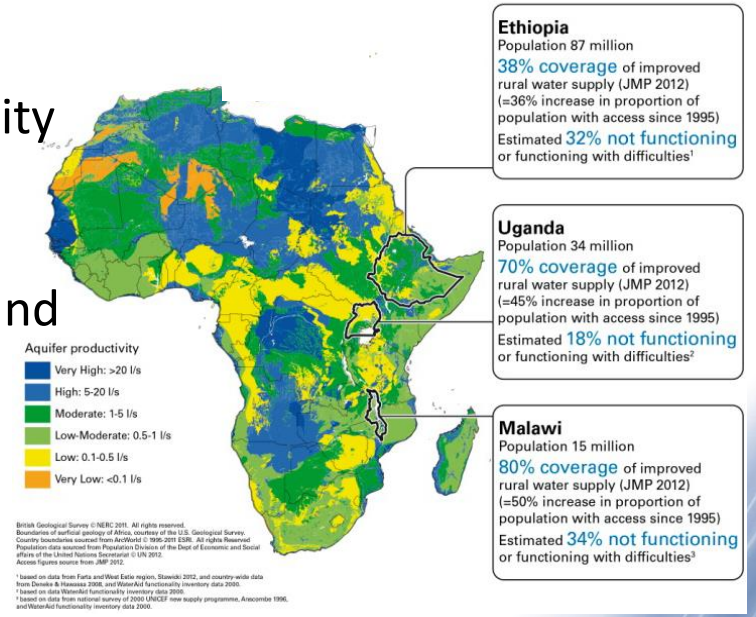
*to move **from anecdote to evidence***

Truly interdisciplinary with an adaptive learning approach

Five main objectives:

1. Define nuanced understanding of functionality
2. Apply to Uganda, Ethiopia and Malawi
3. Detailed analysis of subset in each country and a focussed longitudinal study
4. Trends and forecasts
5. Analysis –interdisciplinary approaches

Impact and delivery: Publications, book, tools, working through WaterAid and others globally and in each country



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