British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Gateway to the Earth

A hidden crisis

unravelling current failures for future success in rural water supply

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Michael Owor, Helen Bonsor, Seifu Kebede, Vincent Casey, Evance Mwathunga, Richard Carter, Geoffrey Chavula, Francis Musinguzi, Peter Cook, Roger Calow, Naomi Oates, Dick Fenner.

UPGro Unlocking the Potential of Groundwater for the Poor

Lessons from UPGro catalyst grant….

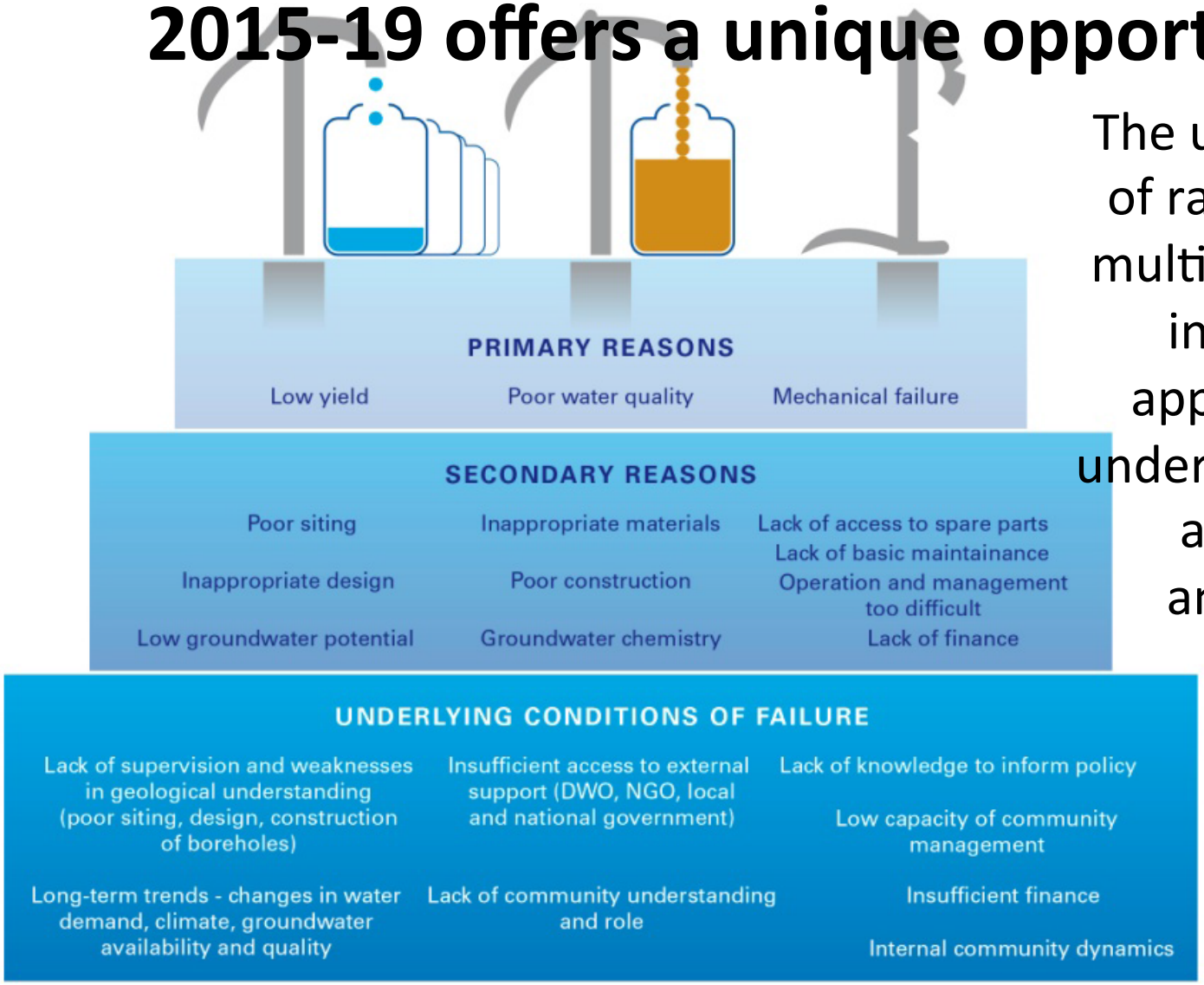
Next steps?

We need to:

- examine the roles, responsibilities and capabilities of the several levels of government;
- look at the relationship between community management and wider governance and institutional arrangements;
- look harder at the role of the private sector;
- investigate more sites: *our field sample was inevitably small and biased;*
- look at seasonal and time factors; *both technical and social investigations were "snapshots";*
- continue to think conceptually about the science, philosophy and logic of cause and effect;

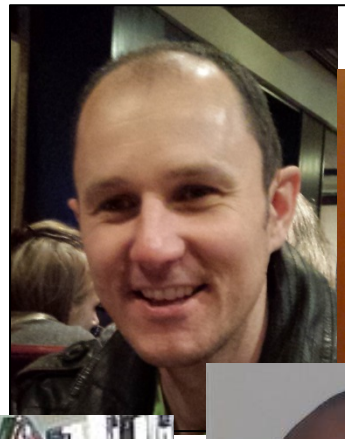
Fortunately we have an opportunity to do these, and to extend to Malawi and Ethiopia in the full UPGRo Consortium Grant

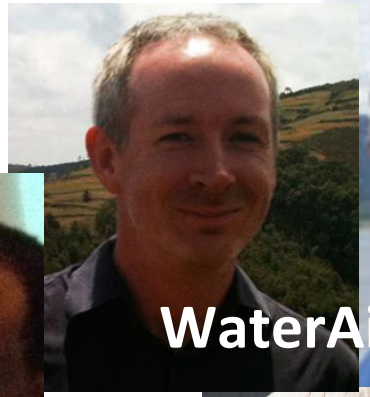
UPGro Consortium research grant 2015-19 offers a unique opportunity

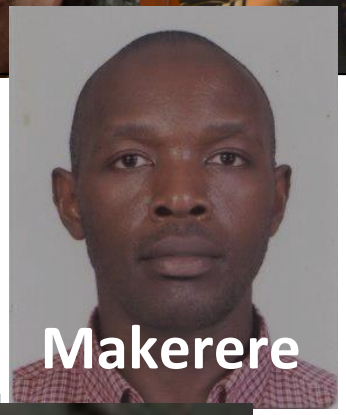


The underlying causes of rapid failure … are multifaceted, but with interdisciplinary approaches can be understood, diagnosed, and ultimately anticipated and mitigated

A leading interdisciplinary team

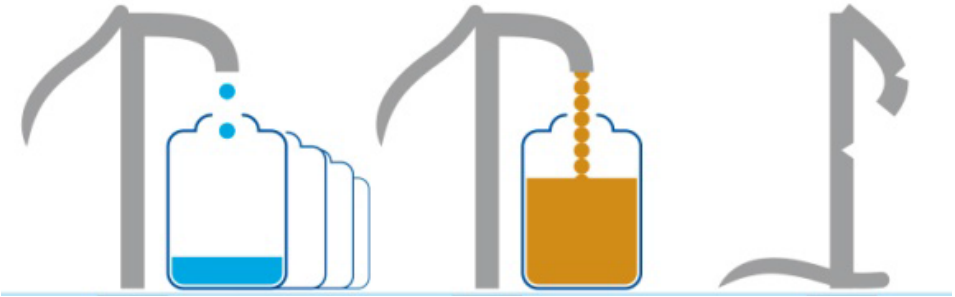


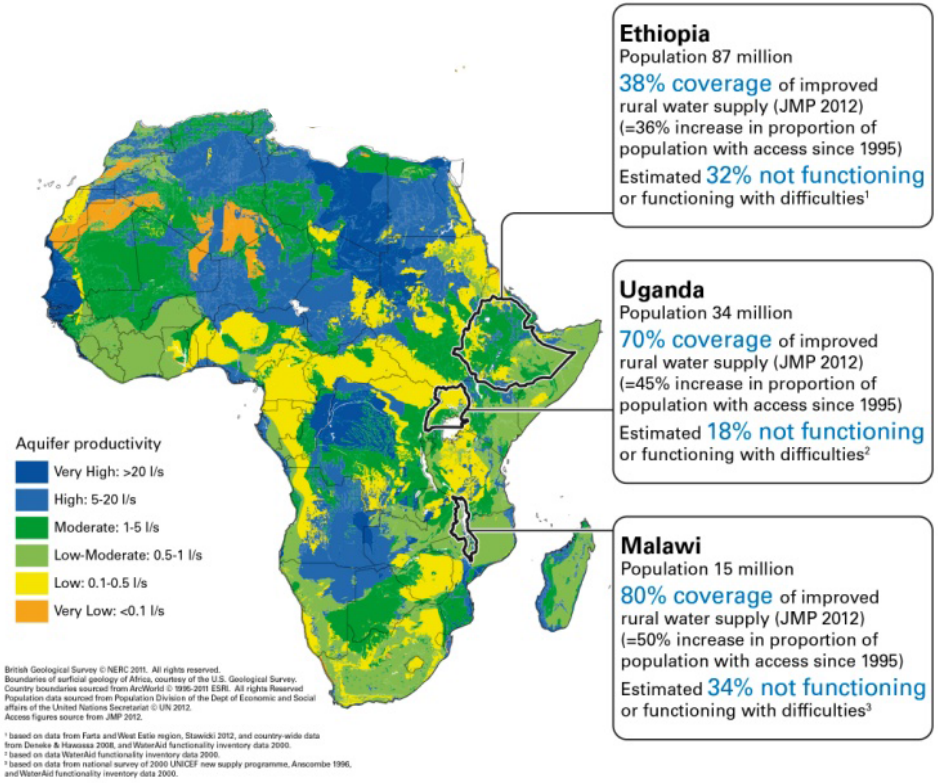




Our research objectives

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





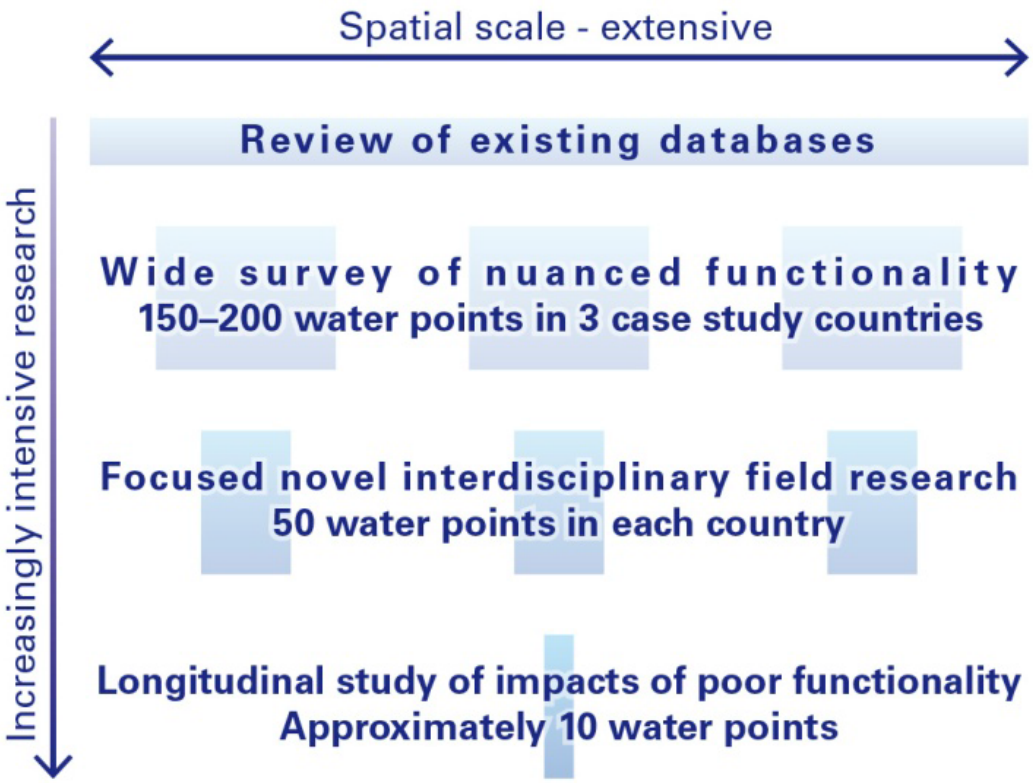
Ethiopia
Population 87 million
38% coverage of improved rural water supply (JMP 2012)
(=36% increase in proportion of population with access since 1995)
Estimated 32% not functioning or functioning with difficulties[1]

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 to provide authoritative evidence about functionality.

Our research objectives

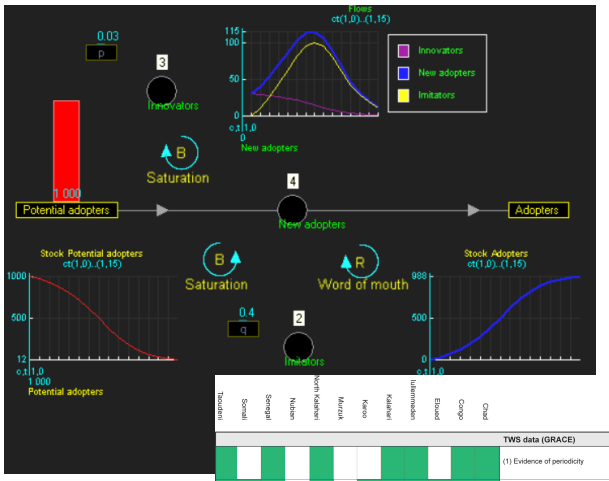


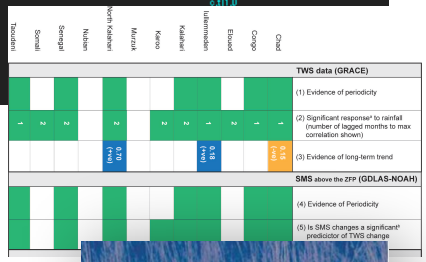
Objective 3: To unravel the multifaceted factors governing source failure and success through detailed novel interdisciplinary science

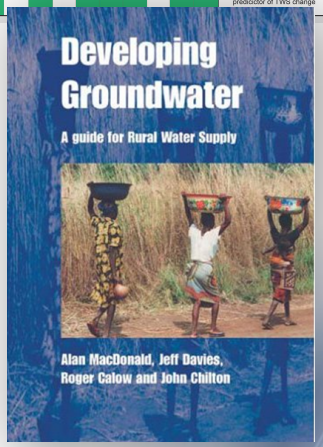
Analysis

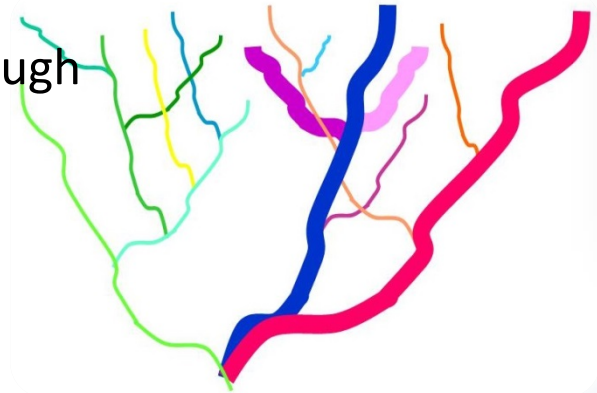
Objective 5: To develop a dynamic approach for building resilience into future rural water supply

- Adaptive interdisciplinary learning
- Multiple analysis tools
- Novel use of system dynamics modelling
- Develop a framework for building resilience into water supply
- Deliver research findings through our multiple pathways



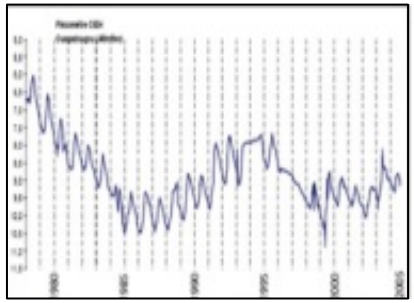


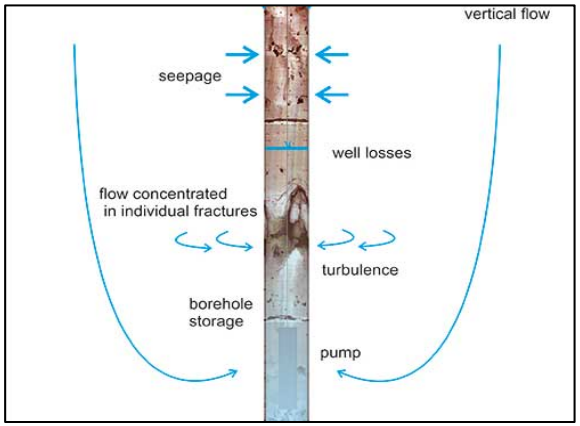


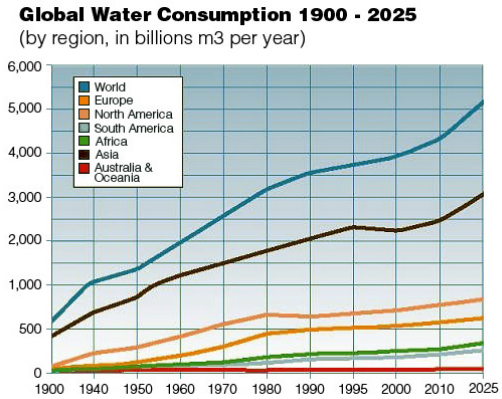


Trajectories

Objective 4: To examine and forecast trajectories and trends: targeted longitudinal studies, gw/rainfall monitoring, scenario building (recharge, water demand); novel modelling

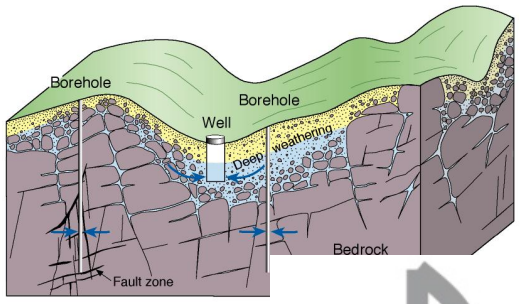






Major research outcomes

Furthering conceptualisation of technical/socio/ natural aspects of water-people relationships



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.

UP Gro Unlocking the Potential of Groundwater for the Poor

Partners and pathway to impact

To see tools for problem diagnosis adopted

To present clear evidence and see it disseminated

To contribute to practices that can effect change

Approach

WaterAid and partners are integral to the research

Make use of existing in country channels

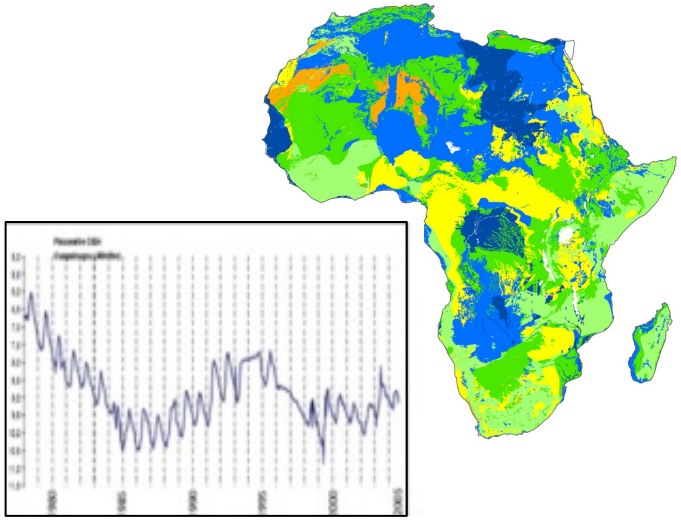
UNICEF, WSP, RWSN and IAH all involved.

Link to other initiatives

Develop the voice of the rural communities

Play a major role within wider UPGro community

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

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

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

Quantitative maps of groundwater resources in Africa

A M MacDonald[1], H C Bonsor[1], B É Ó Dochartaigh[1] and R G Taylor[2]

nature climate change — LETTERS

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

Richard G. Taylor[1]*, Martin C. Todd[2], Lister Kongola[3], Louise Maurice[4], Emmanuel Nahozya[3], Hosea Sanga[3] and Alan M. MacDonald[4]

WaterAid

How will the research be delivered ?

- Achievable – well supported cols and dedicated management
- 2 UK based post docs, 6 based in Africa
- Significant capacity building
- Interdisciplinary process – with adaptive learning approach
- Leveraging £160k of support

UPGRO Secretariat

Champions & Committees
Training
Research Excellence
Health and Safety
Gender Equality
Policy Engagment
Development uptake
Knowledge Broker Liason

Individuals (and committees where appropriate) from within the project team with specific consortium wide responsibilities

Consortium Management Unit
PI Prof Alan MacDonald
coPI Prof Frances Cleaver
Project Manager Helen Bonsor

Main management unit including a part time dedicated project manager

Project Management
CoI Addis Ababa University
CoI Mekere University
CoI WaterAid
CoI ODI
CoI University of Flinders
CoI University of Cambridge
CoI University of Malawi

CoIs providing overall steer to direction of project in targeted workshops and virtual meetings and also managing specific activites within workpackages

Project advisory Group
chaired by John Chilton IAH
UNICEF Peter Harvey
WSP - Dominick de Waal
...2-4 others

A project advisory group set up to provide overall steer to the project, and build in a solid connection with key stakeholders

Project Support
Finance officer
Web team
Data management officer
Communications officer

Project support staff for the project from BGS and generally provided free to the project

Summary

The *Hidden Crisis* is real – ongoing consequences

The issue requires innovative, interdisciplinary research on natural and social science

We have assembled a world class interdisciplinary team to address the issue

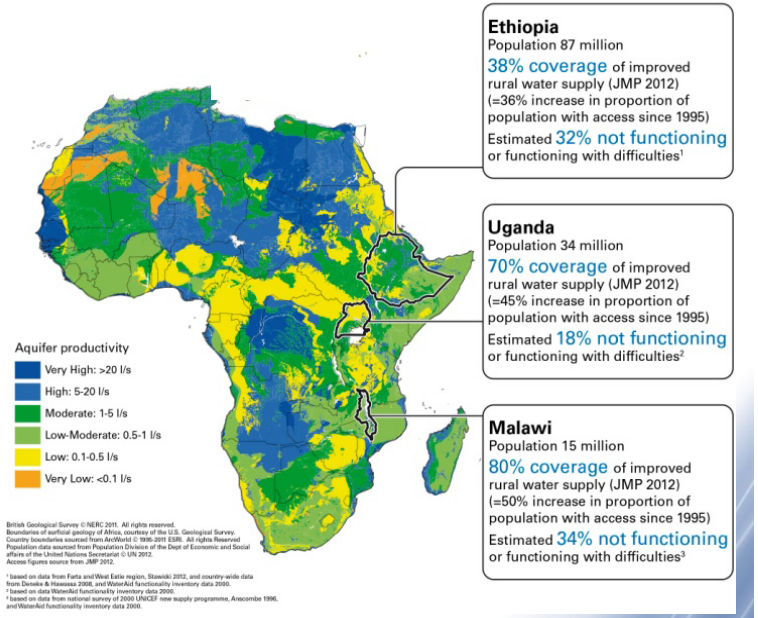
We have developed the tools, methods and analysis to move **from anecdote to evidence**

Truly interdisciplinary with an adaptive learning approach

The work is fully aligned to UPGro's vision

Our deliverables have the potential for major scientific and development impact

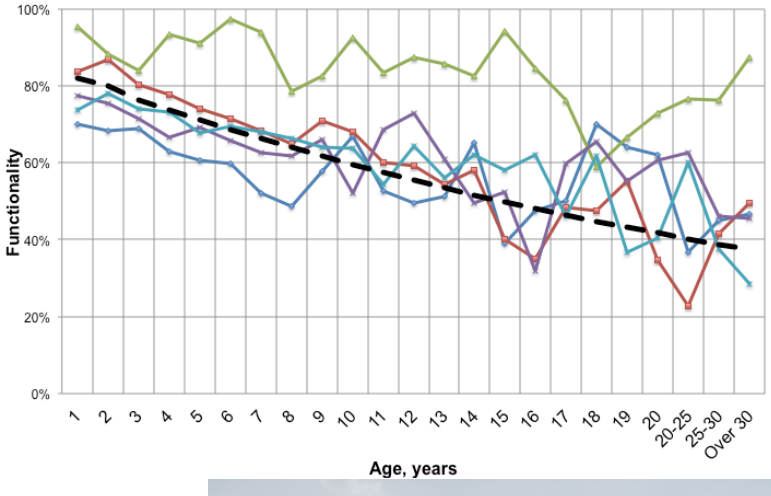
Our pathway to impact is integral to the project



UPGro Unlocking the Potential of Groundwater for the Poor

What crisis?

- There is mounting evidence that 20 – 40% of rural handpumps are non functional within 2 years.
- Therefore many of the benefits of improved access to water are lost
- Cumulative cost estimated to be $1.2b
- Often hidden – focus on coverage, few incentives, confusion over definitions,



And: there are still 300 million people without any access – and significant investment planned to meet SDGs

Individual reasons cited for failure

Engineering problems

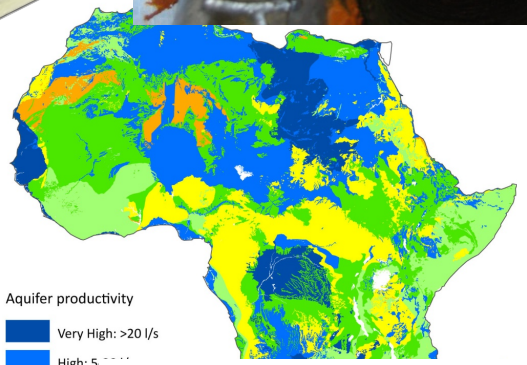
Community management

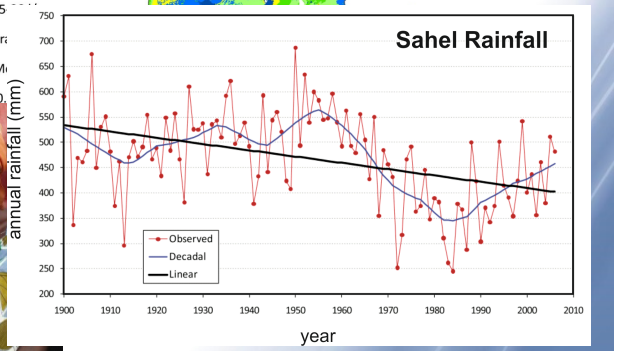
Financing, spare parts, life cycle costs

Hydrogeology

Climate change

Flawed policies





Little data/analysis on *why* sources fail – no opportunity to learn