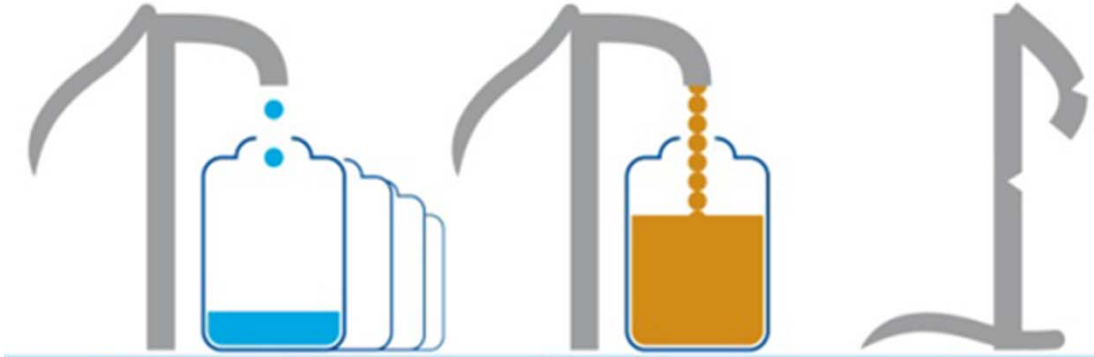
British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Gateway to the Earth

Rural water supply functionality



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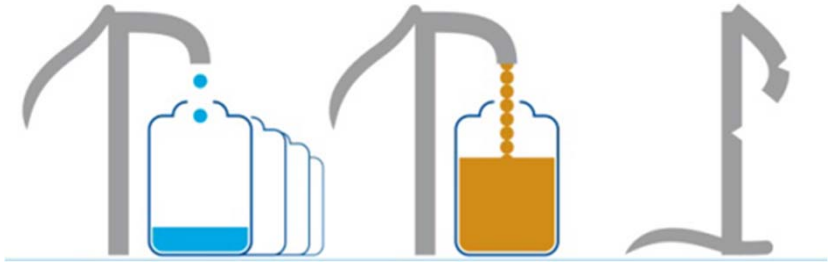
The University Of Sheffield. · University of Malawi · Addis Ababa University · Flinders University · University of Cambridge · WaterAid · ODI · unicef for every child

UPGro Unlocking the Potential of Groundwater for the Poor

Funded by: NERC Science of the Environment · ESRC Economic & Social Research Council · UKaid from the British people

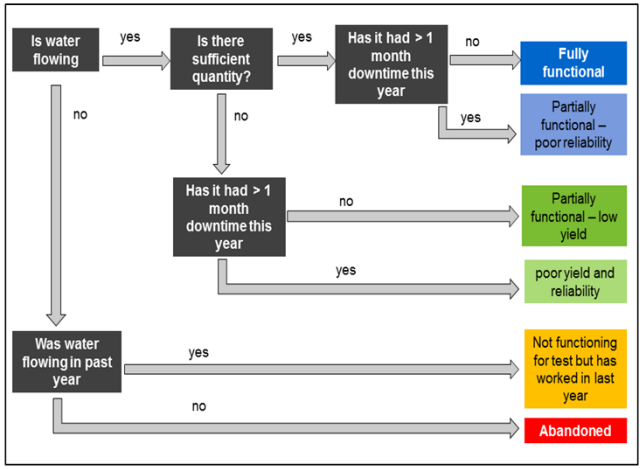
Survey 2 forensic assessments



What are the physical factors underlying hand pump functionality?

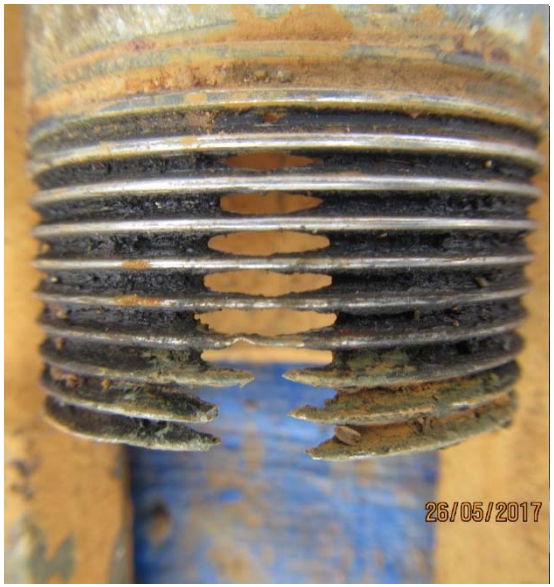
Survey 2 forensic assessments

- Forensic assessments of 150 boreholes:
  - Sanitary & engineering survey (IM2 & Afridev)
    - Pumping test
      - Water chemistry
        - CCTV survey
          - Questionnaires (reliability, downtime, quantity, quality).



Deconstruct pump

Pump component condition



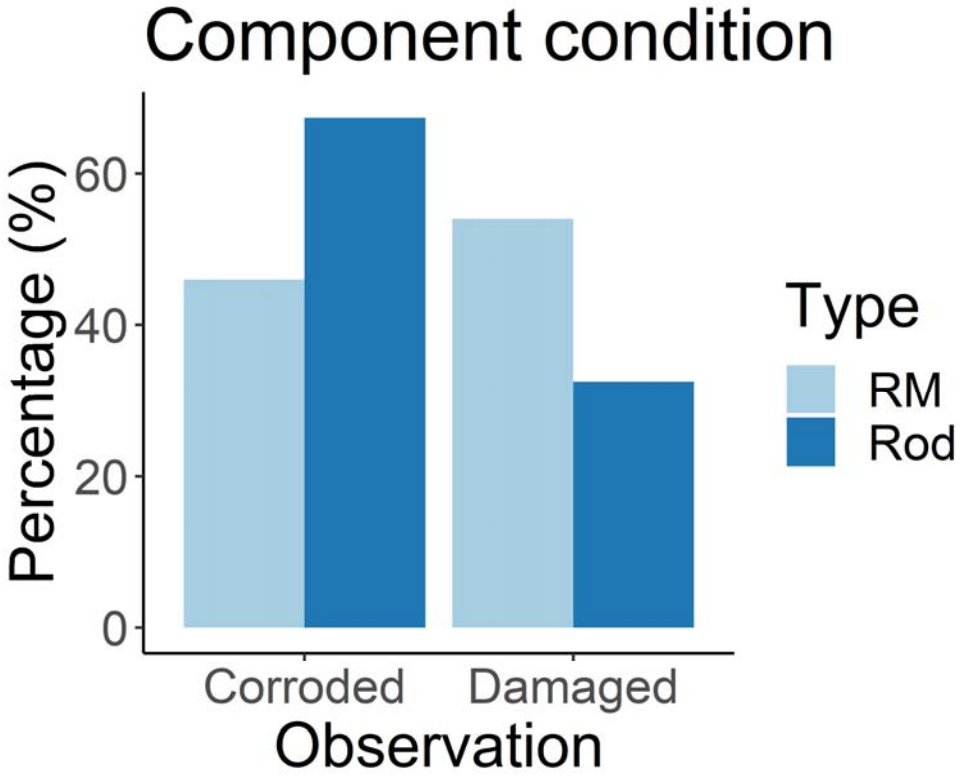
Pump component condition

Issues with India Mk 2 corrosion.

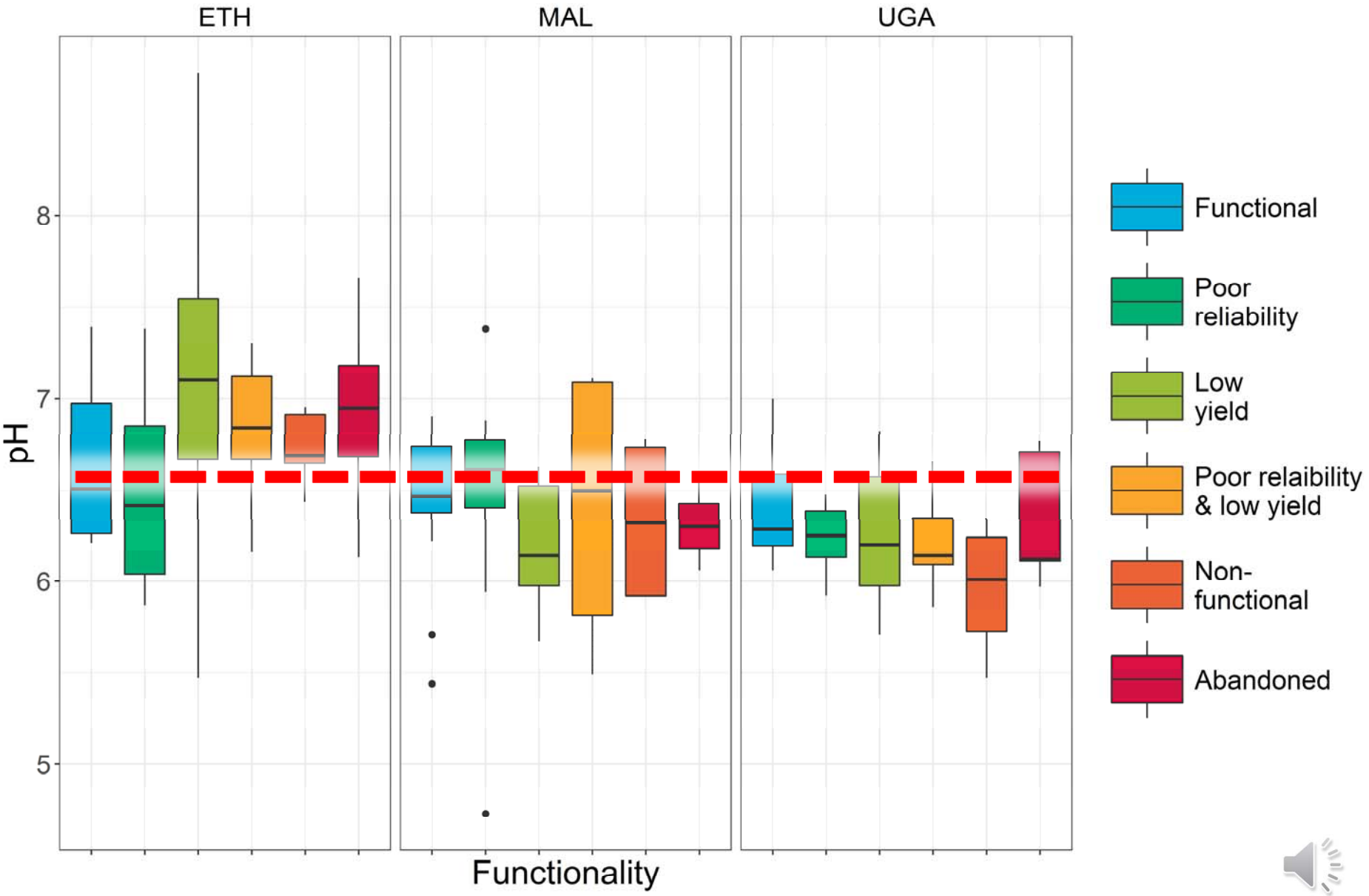
In Uganda, corrosion affects:

- 80% Rods
- 60% RM

Need to maintain and replace rising main and rods.



Groundwater corrosivity



Pump component condition

IMk2:

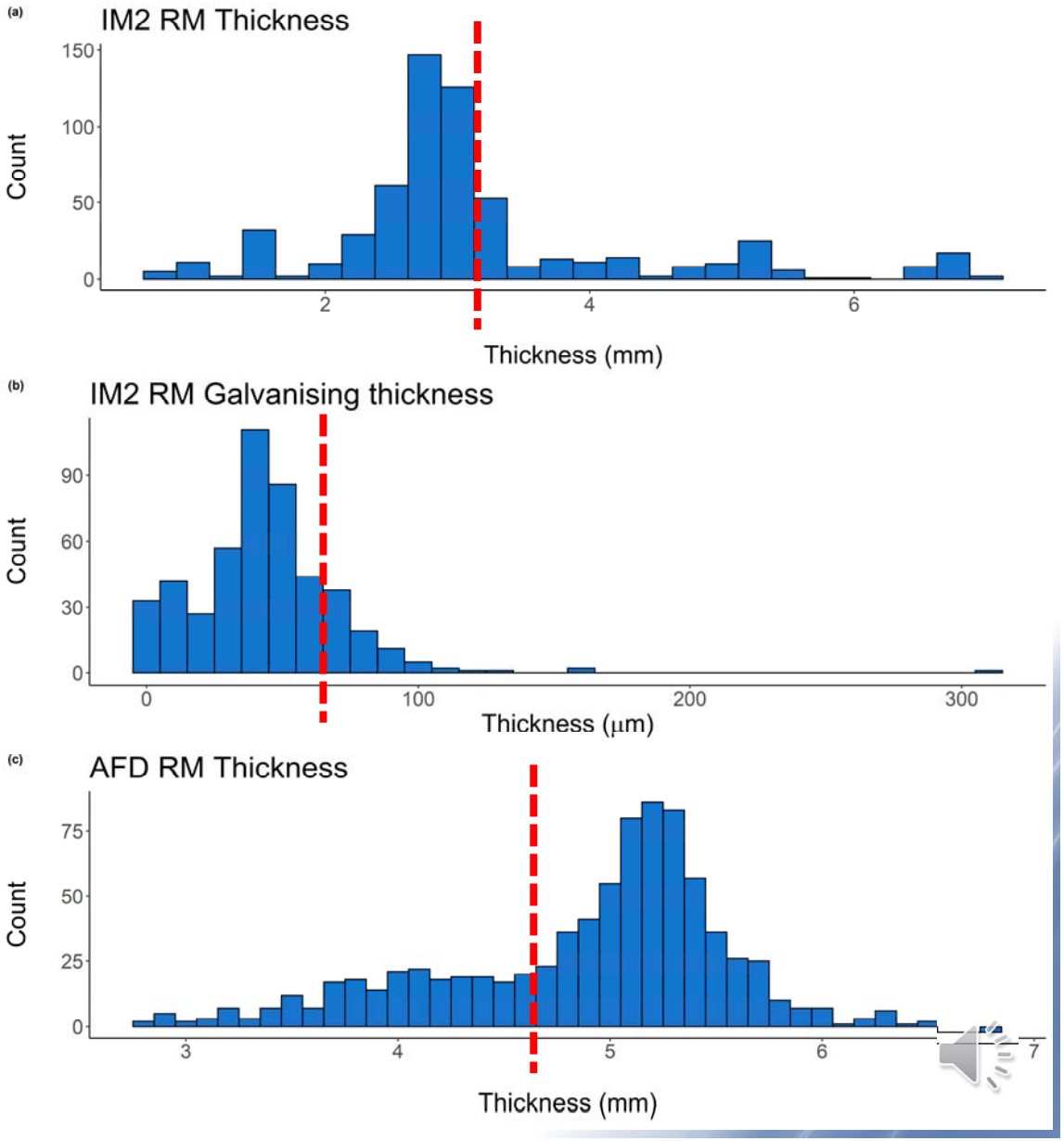
>60% below spec thickness (3.2 mm)

>55% below GI spec (70 mm) (Uganda >90%)

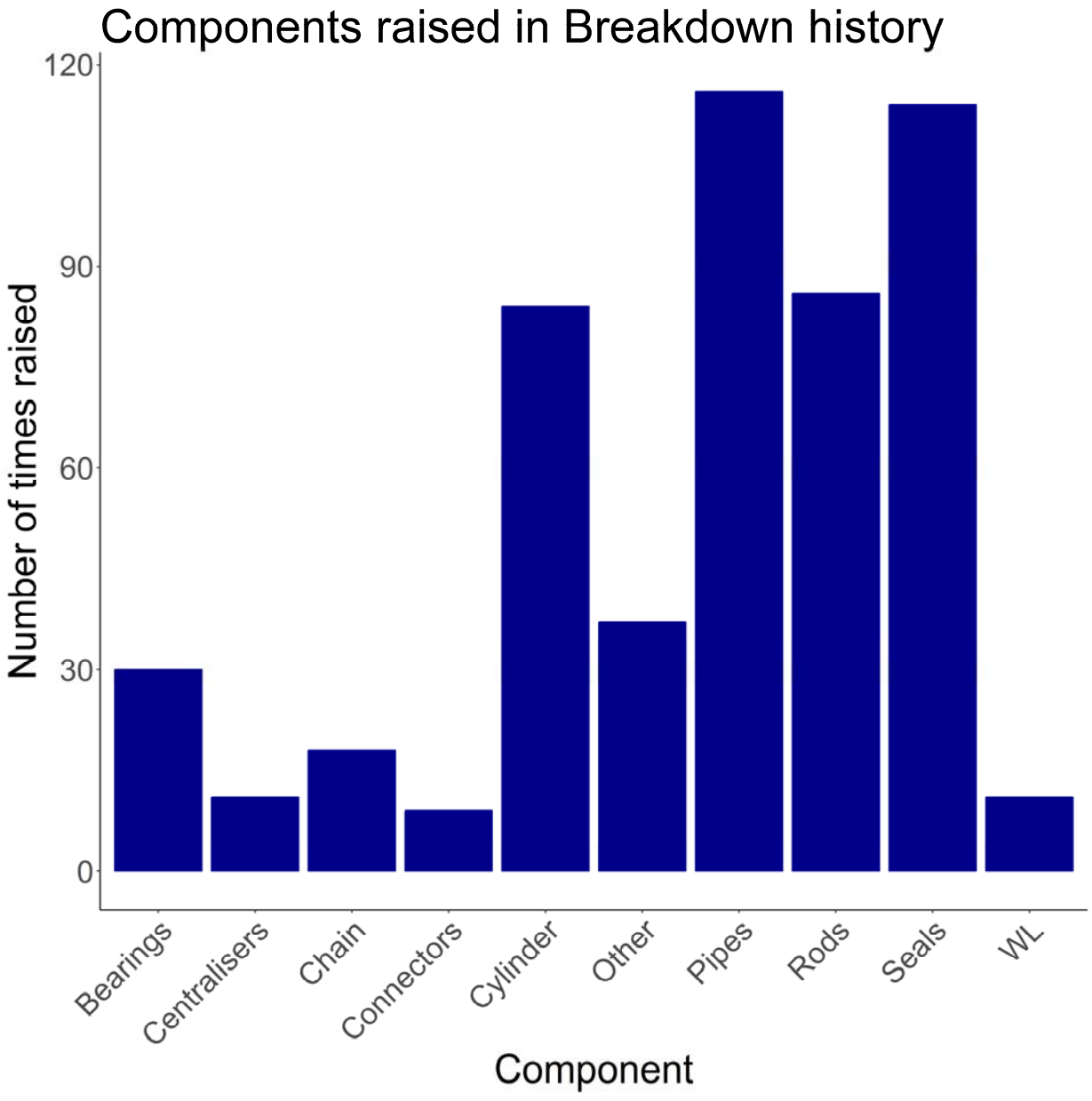
Afridev

<30% below spec thickness (4.7 mm)

What about material and component standards?

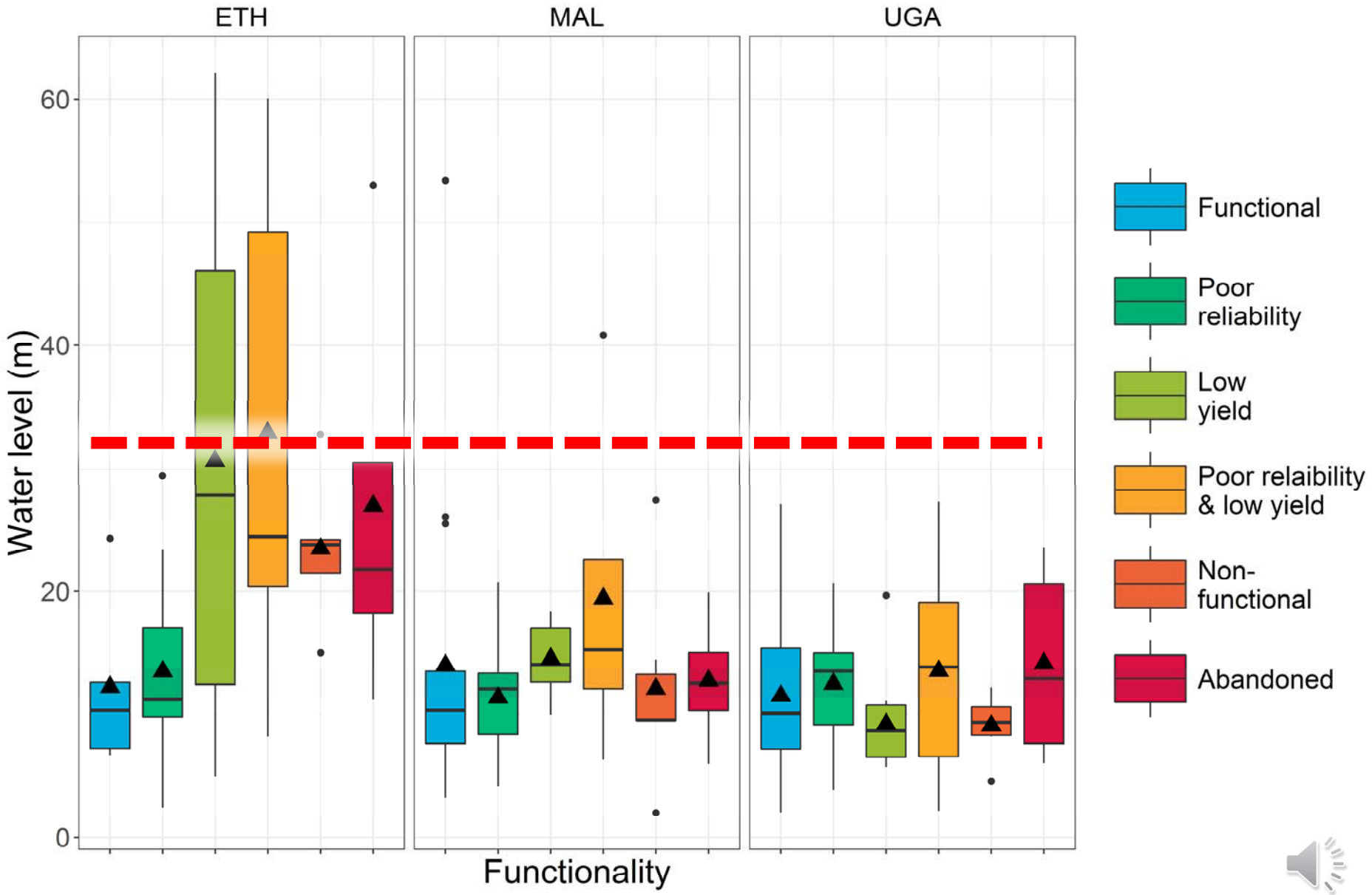


Other pump components

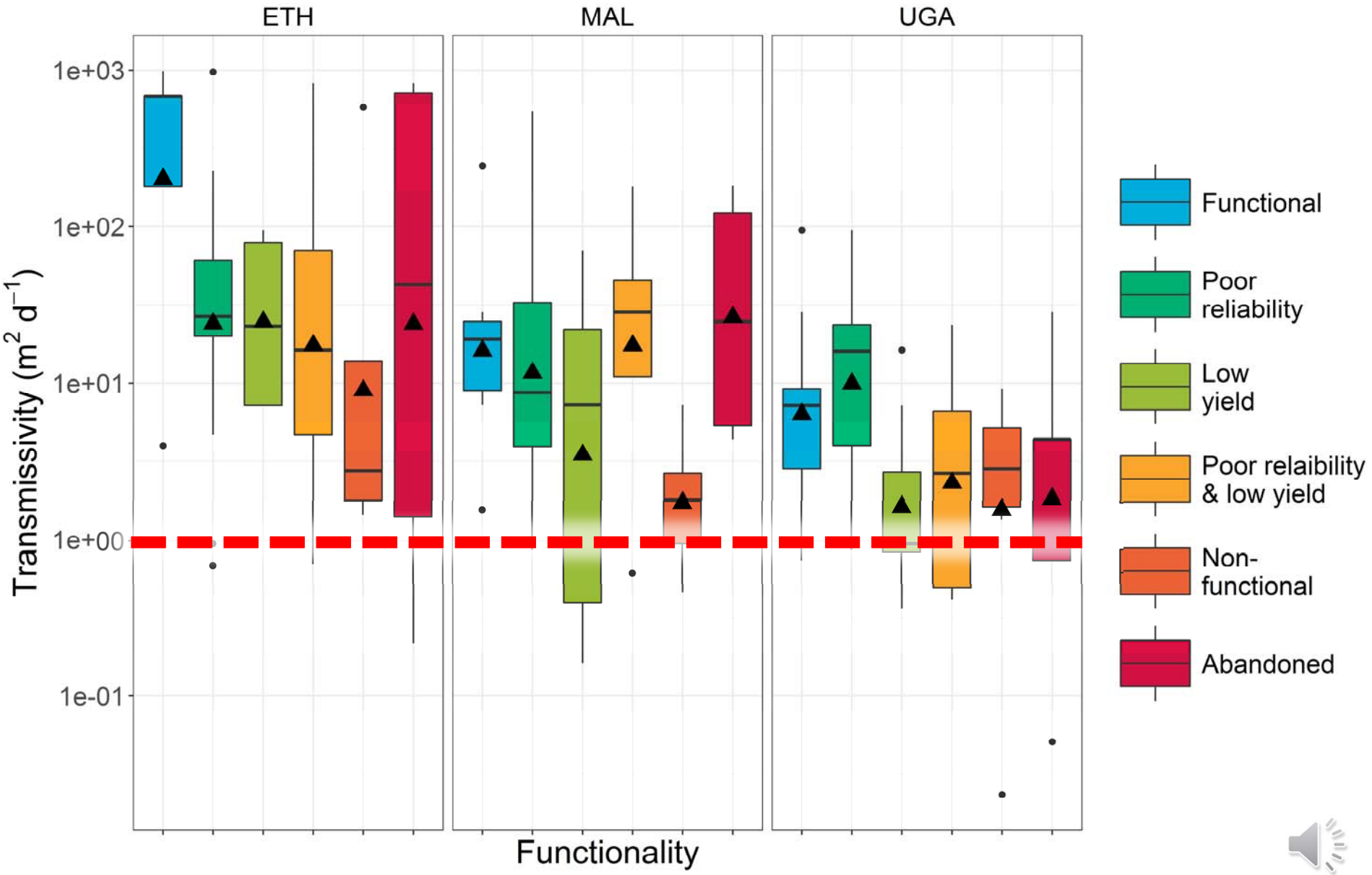


Water level and aquifer yield

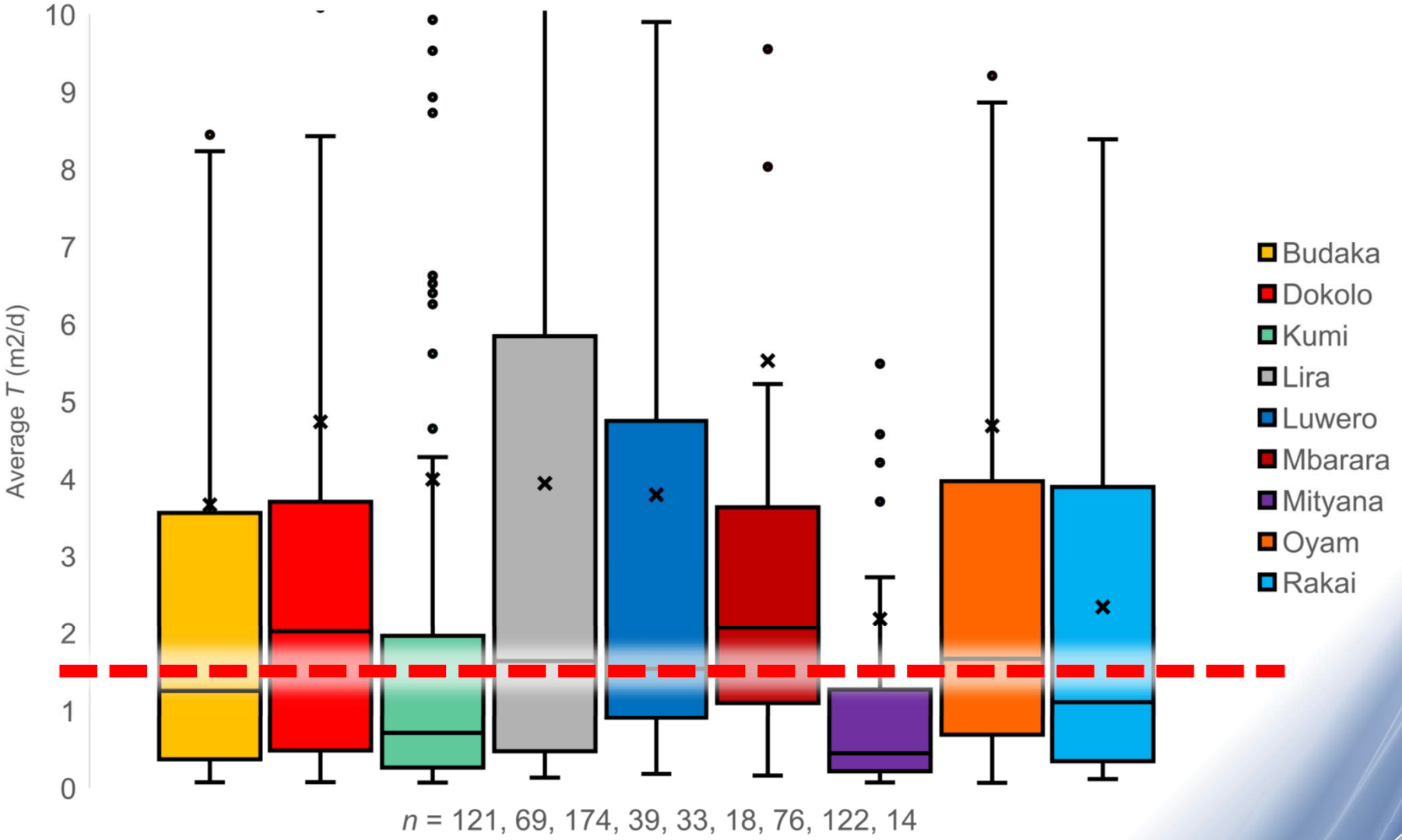
Water level


ETH
MAL
UGA
60
40
20
0
Water level (m)
Functionality
Functional
Poor reliability
Low yield
Poor relaibility & low yield
Non-functional
Abandoned

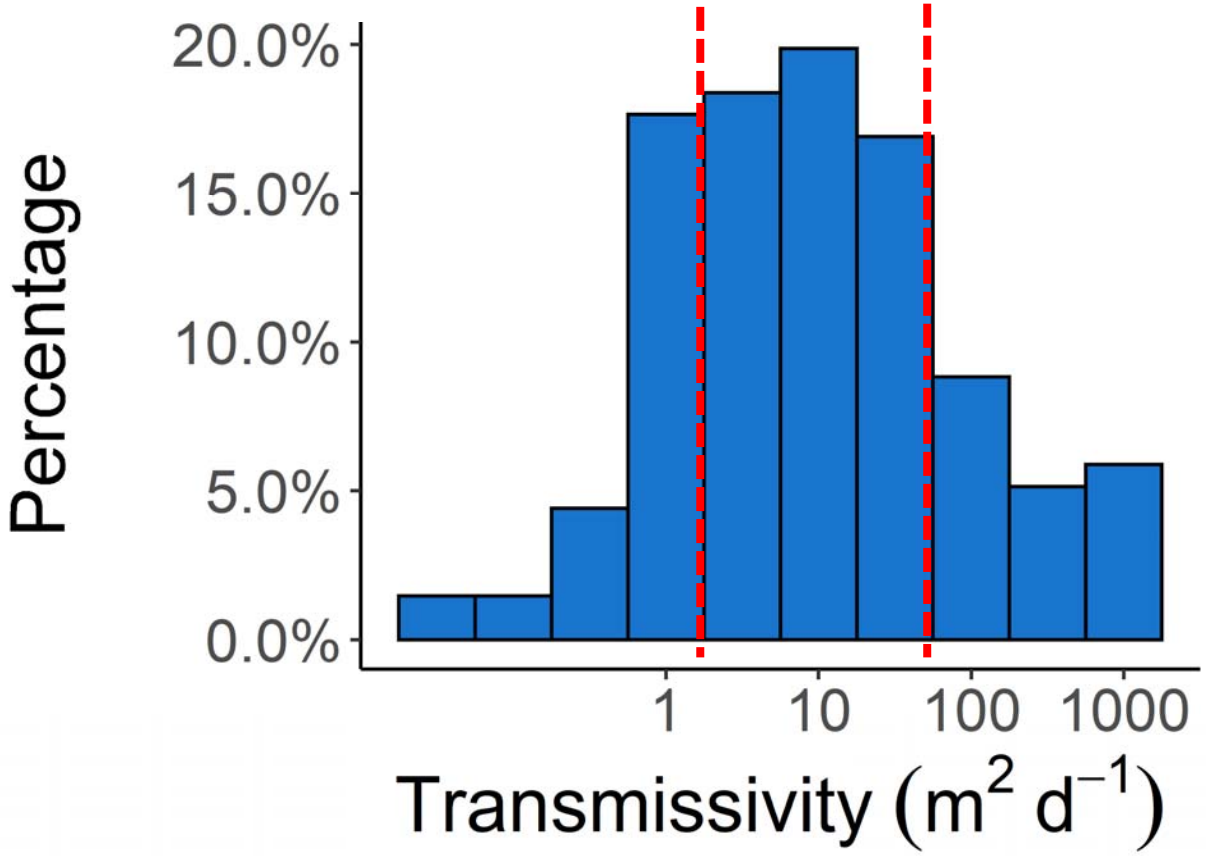
Aquifer yield



Uganda *T* (m^2/d) - District



What size of pump?



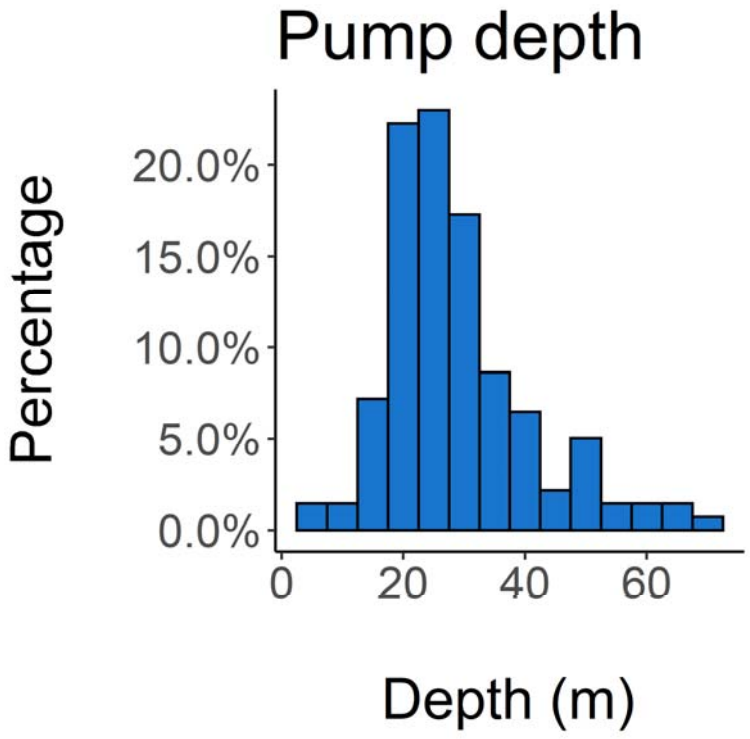
Borehole Camera

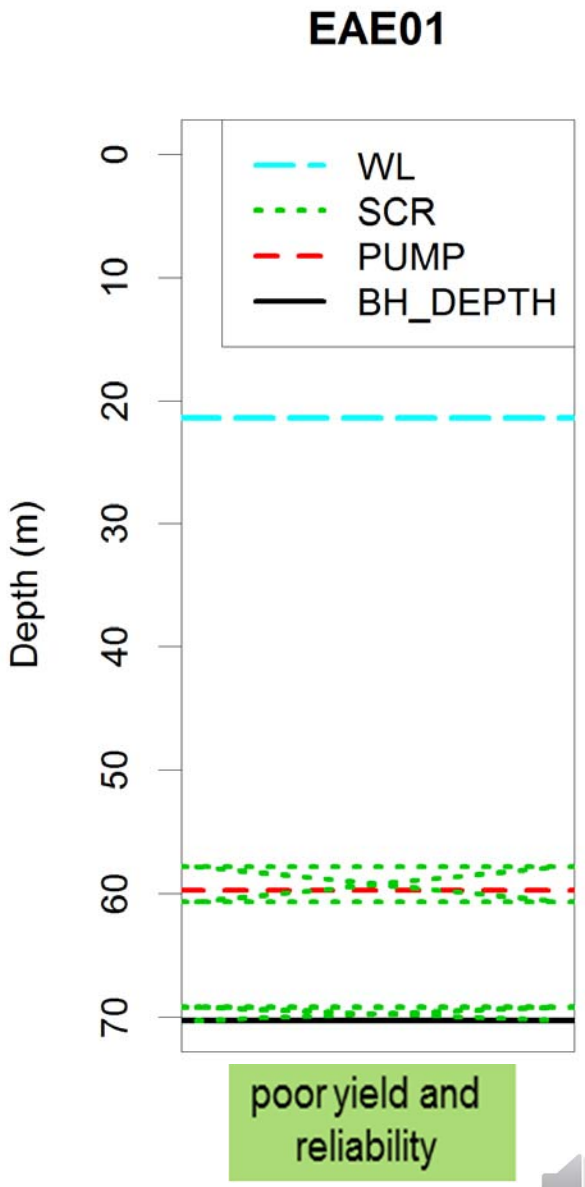
Log the construction of the borehole

Borehole construction

Pump position, screen length and position are important

Pump >40 m in 13% of sites (Ethiopia >30%)





Conclusions

- The forensic techniques helped diagnose underlying issues:
  - Deep groundwater levels
  - Corrosion of rising main and rods (IMk2)
  - Sub standard material?
  - Poor borehole construction
  - Low transmissivity (particularly for non-functional boreholes)
  - Groundwater of low pH (particularly in Uganda)
- Good News:
  - Transmissivity at most sites is enough to sustain a hand pump.
  - Our method helps identify problems and mitigation measures.
- Areas for Interventions: O&M, borehole citing, standards in construction & materials