Building climate resilience in WASH, the technology side

1. Evidences in climate resilience of WASH technologies
    - BGS-ODI-AAU El Nino project
    - UNICEF Real-time Monitoring
2. WASH in MDG- three characteristics
    - Climate resilience
    - Functionality levels (MDG vs SDG)
    - Regional disparity
3. Building resilience (CR WASH)
    - Highland environments
    - Lowland environments
    - Vulnerability maps-WHO-ADD/MWIE
    - Vulnerability maps- vulnerable aquifers

UP Gro

Unlocking the Potential of Groundwater for the Poor

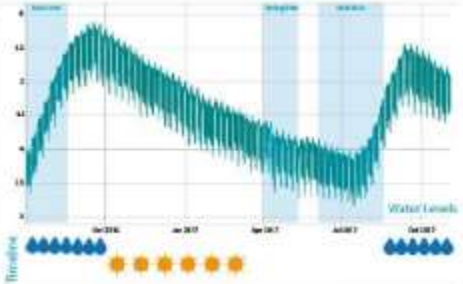
WaterAid

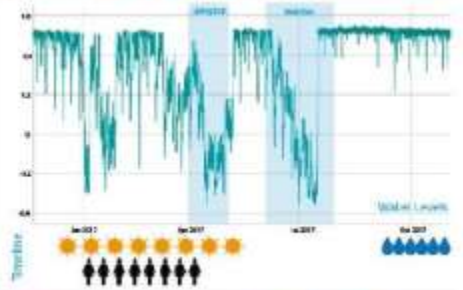
unicef

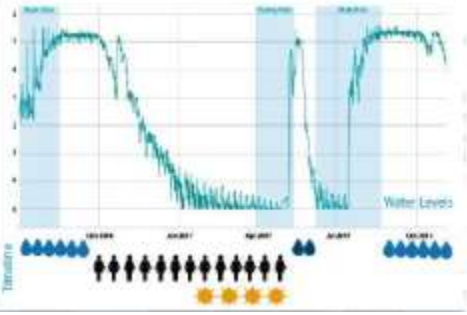
World Health Organization

Contact: SeifuKebede@yahoo.com; amm@bgs.ac.uk,

1. Evidences from El Nino 2015/2016







Pre-existing water insecurity

Hand dug wells dried first

Springs, depending on the environment dried faster

Shallow wells, when available were resilient

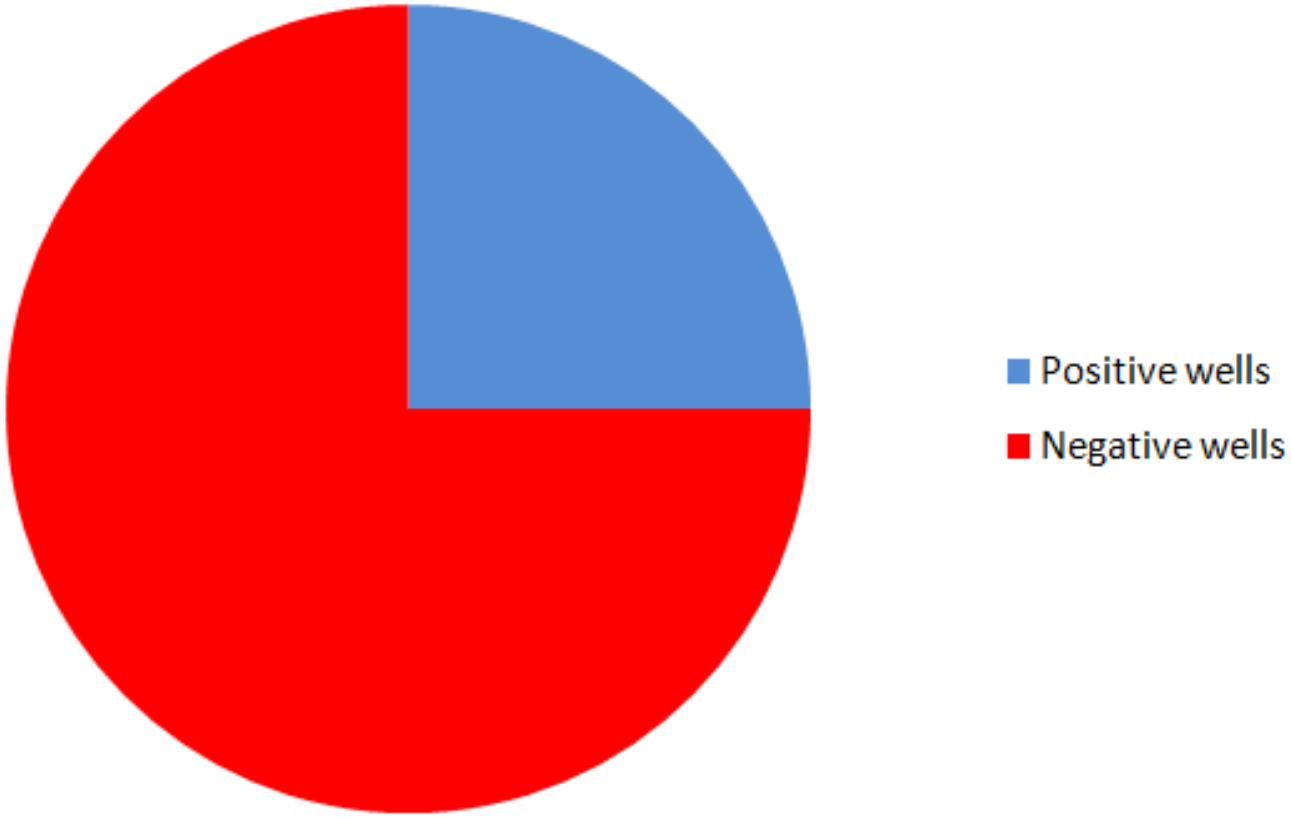
Longer queues around BHs

Dried up springs may not recover at all once the hazard is gone

1. Evidences UNICEF real-time monitoring

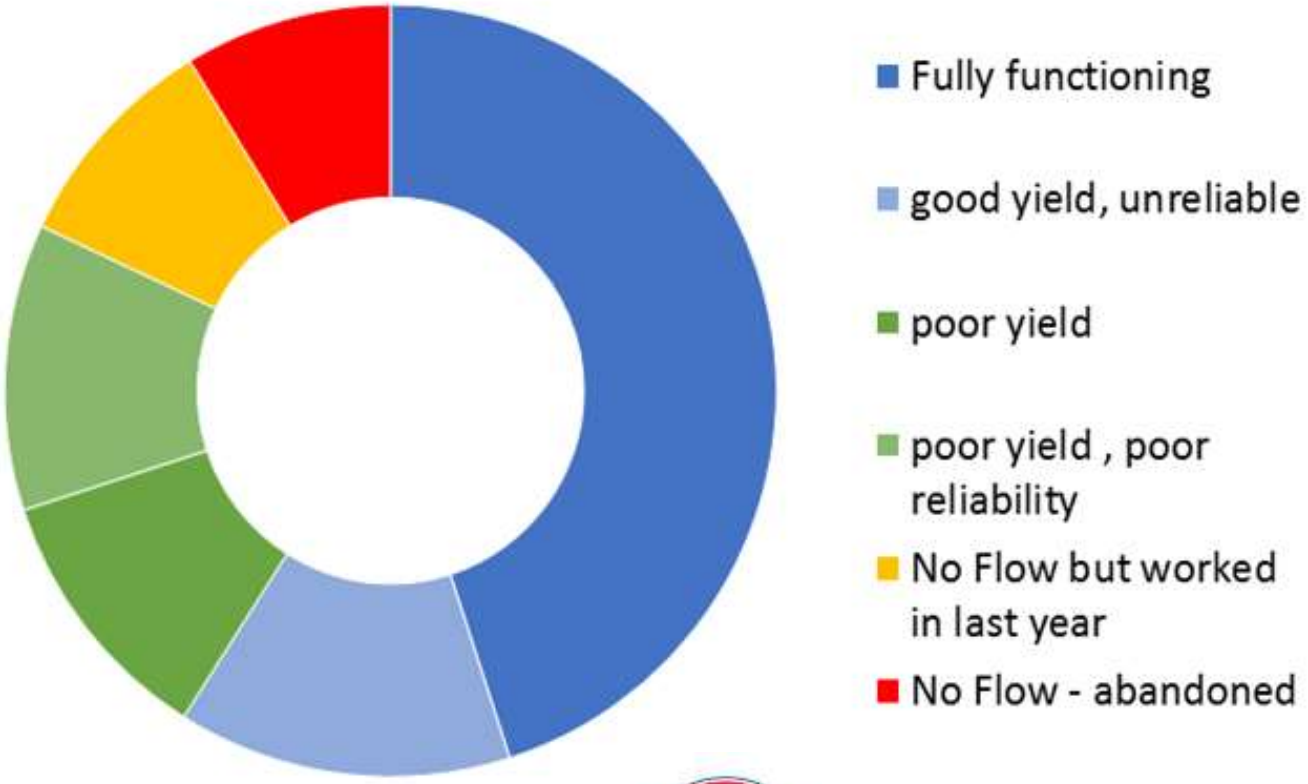
- Monitoring the El Nino impact on rural water schemes in affected woredas show
  - A number of schemes failed during the drought
  - Path to failure is complex [pumps, yield decline, no water, silting up

2.MDG WASH characteristics- success rate in arid environments



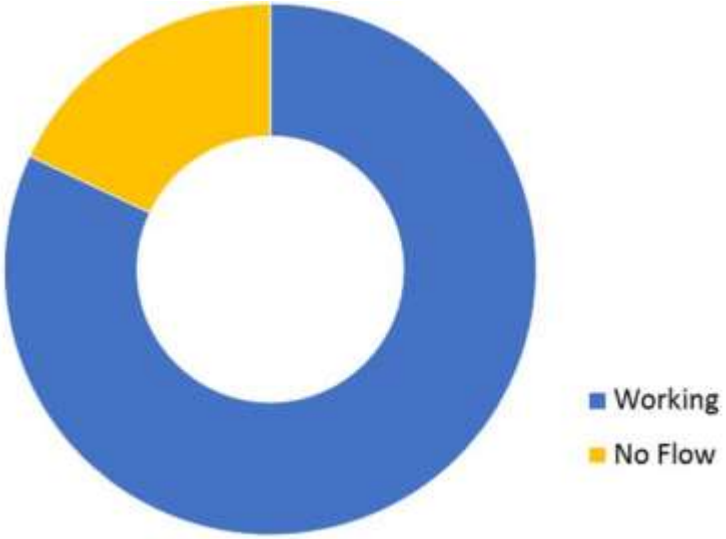
Source: Hydrogeology national experts personal communication

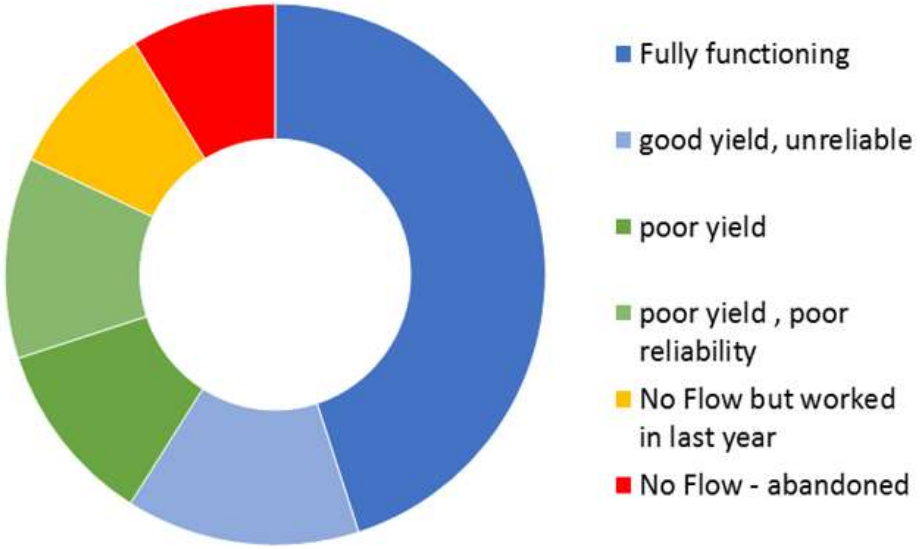
2.MDG WASH characteristics -functionality

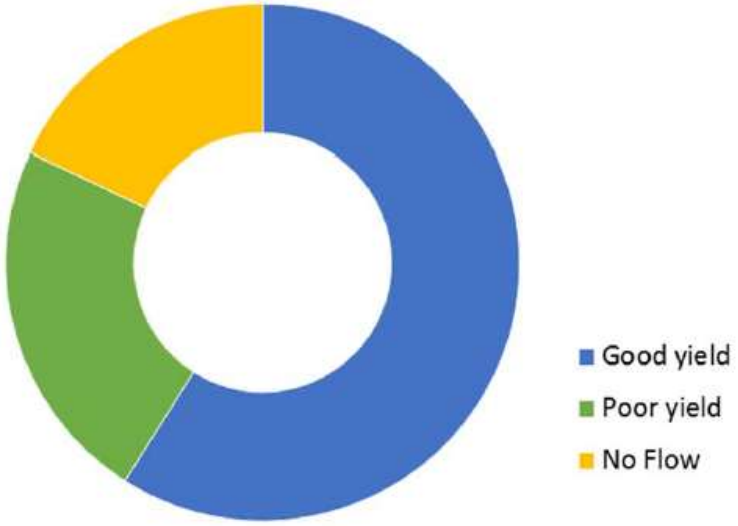


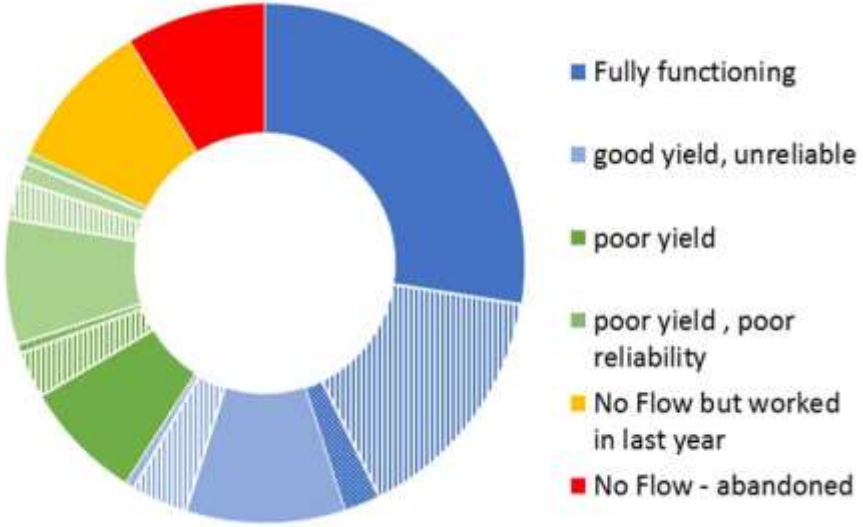
Source: BGS, Upgro Program, Hidden Crisis Project report

2. Groundwater in MDG
SDG VS MDG definitions changes in coverage



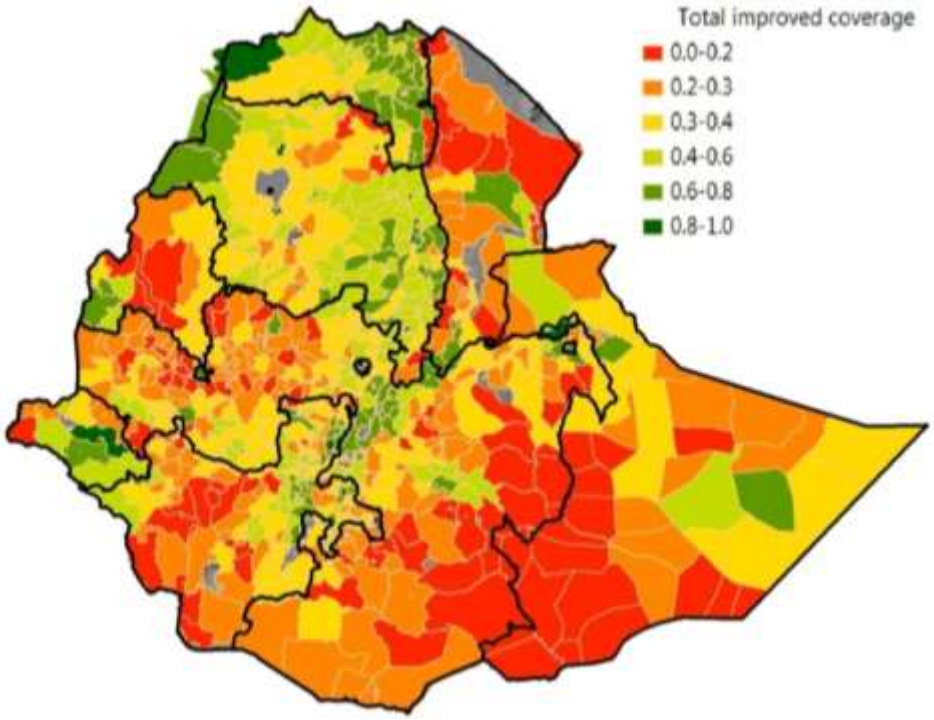


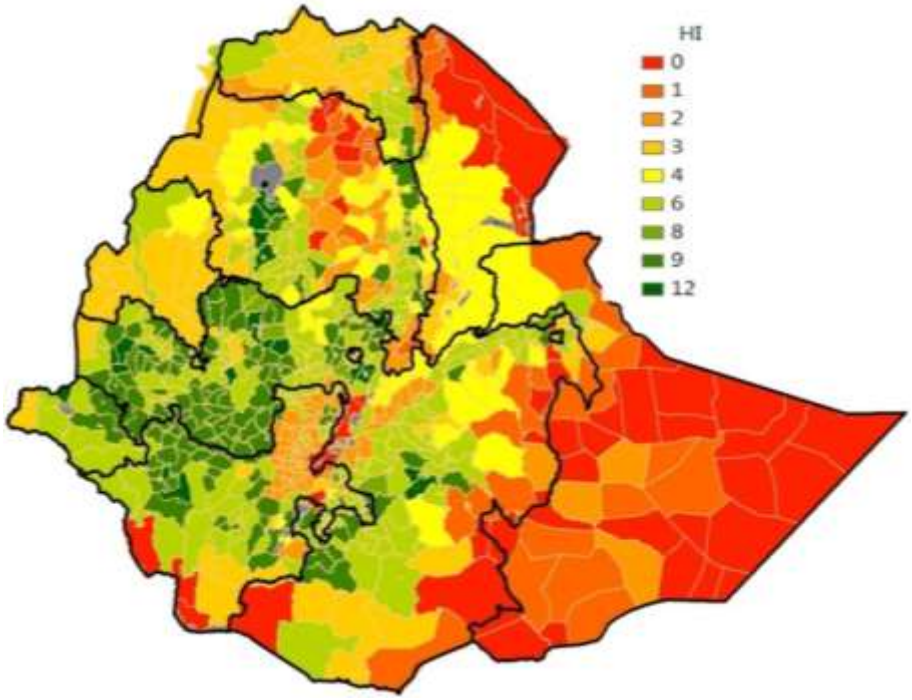




2 .MDG WASH characteristics

Difficult hydrogeology environment fall behind in WASH coverage





Source: ODI-AAU report for WB, 2017 [from contribution to WASH sector diagnostics report]

3a. Building resilience in highland environments

How to build resilience in highland environments

Using climate screening tools

Resilient low end technologies could be built using appropriate sitting, balancing demand and supply and protecting hazards

3a. How to building resilience in water schemes in highland environments

Siting environment-geology tool

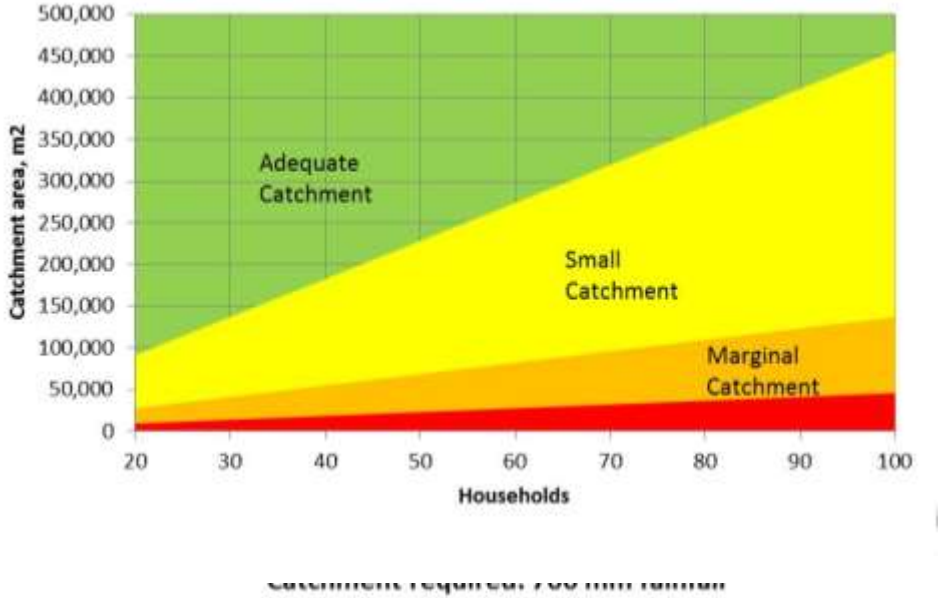
Morphology: gentle slope undulating; slope break when hard

Outcrop: Light colored, friable, sugary texture

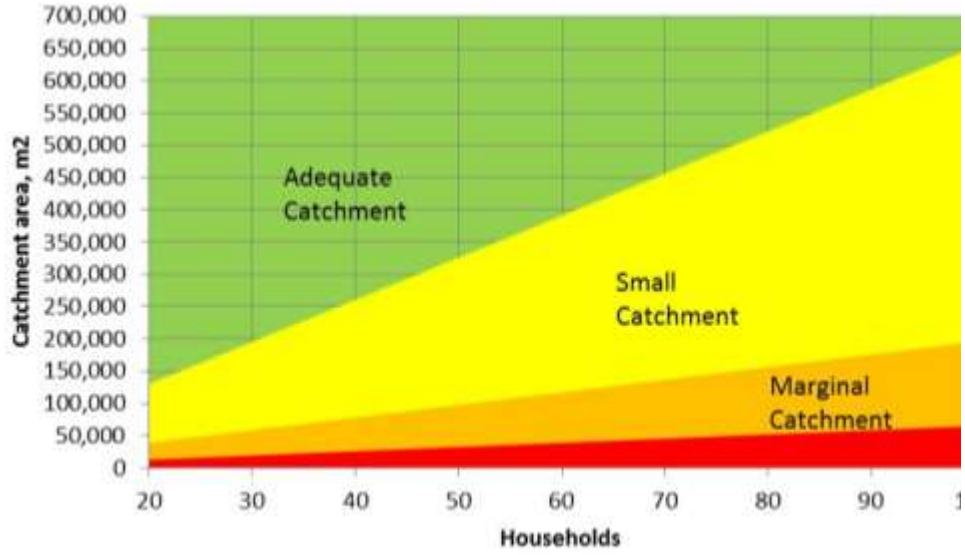
Water schemes implication

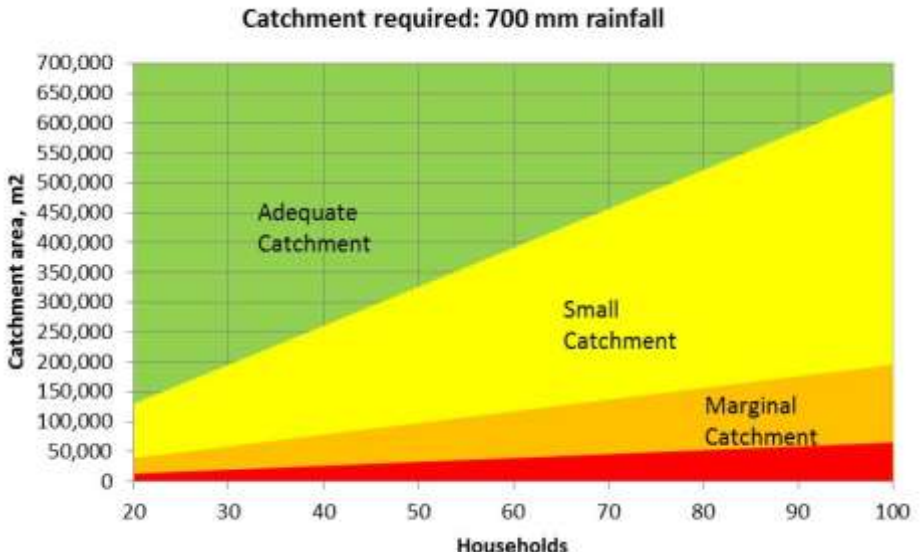
- Low yield but sustainable;
- Diffuse springs;
- Low water level fluctuation between wet and dry periods;
- High storage but low permeability (release to well);
- Springs generally diffuse discharge type;
- When deeply weathered is poor water bearing formation;
- Water quality is generally good may contain high F;
- Water level least vulnerable to rainfall variation
- Dispersion of ashes lead to sedimentation in well bottom– periodic dredging of sediment needed,
- Optional lining required in the top part

3a. How to build resilience in water schemes in highland environments with low end techs



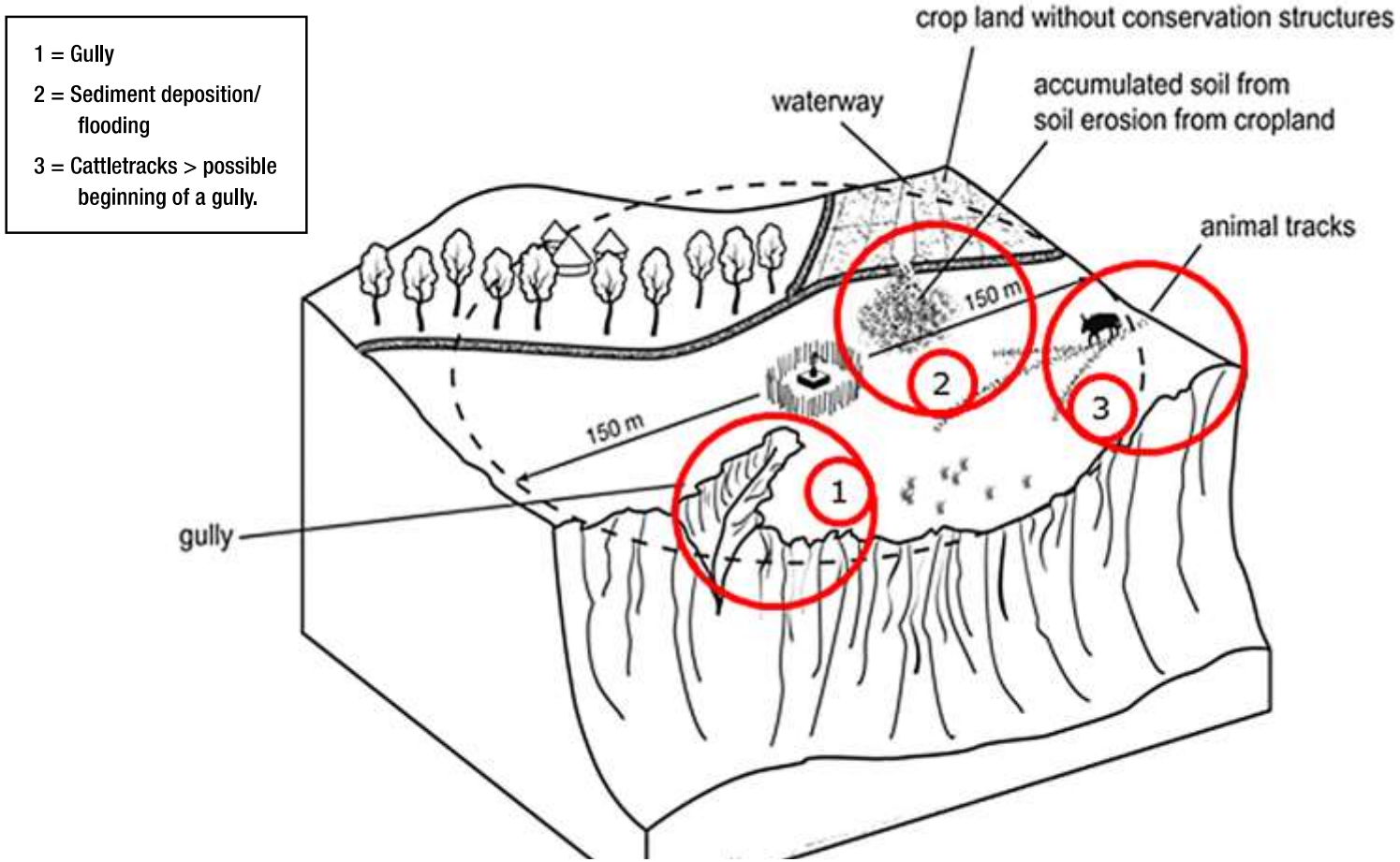
Balancing demand and supply through eg catchment sizing tool



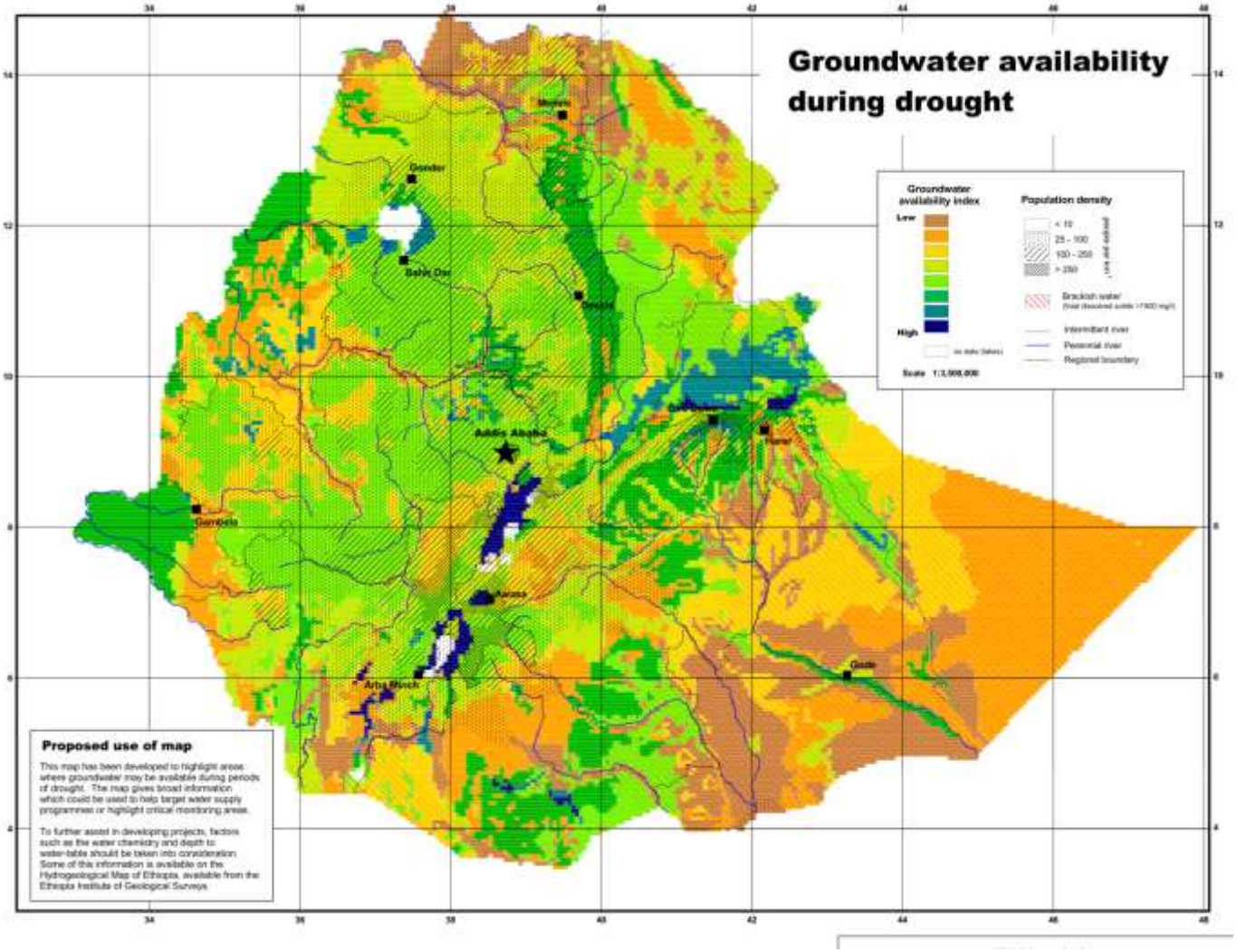


3a. How to building resilience in water schemes in highland environments

Protecting the source



3b. Where do vulnerable aquifers occur?



Some resilient aquifer regions in exposed areas

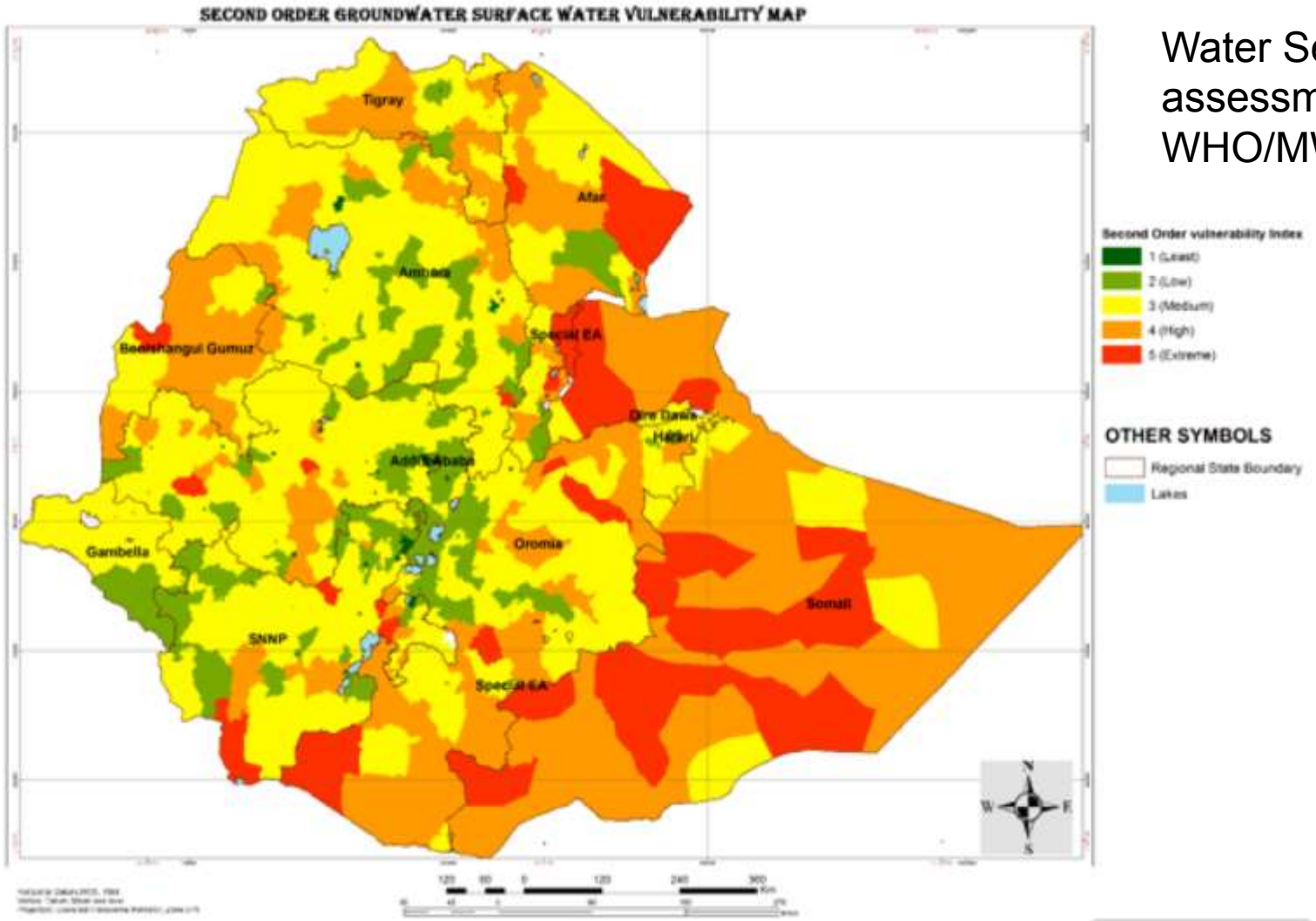
Eg. The Lowlands of Northern Somali

The Afar region

Eastern Amhara lowlands

Contact: amm@bgs.ac.uk

3b. Where do vulnerable schemes and people live/exist?



Water Sector VA assessment
WHO/MWIE

World Health Organization

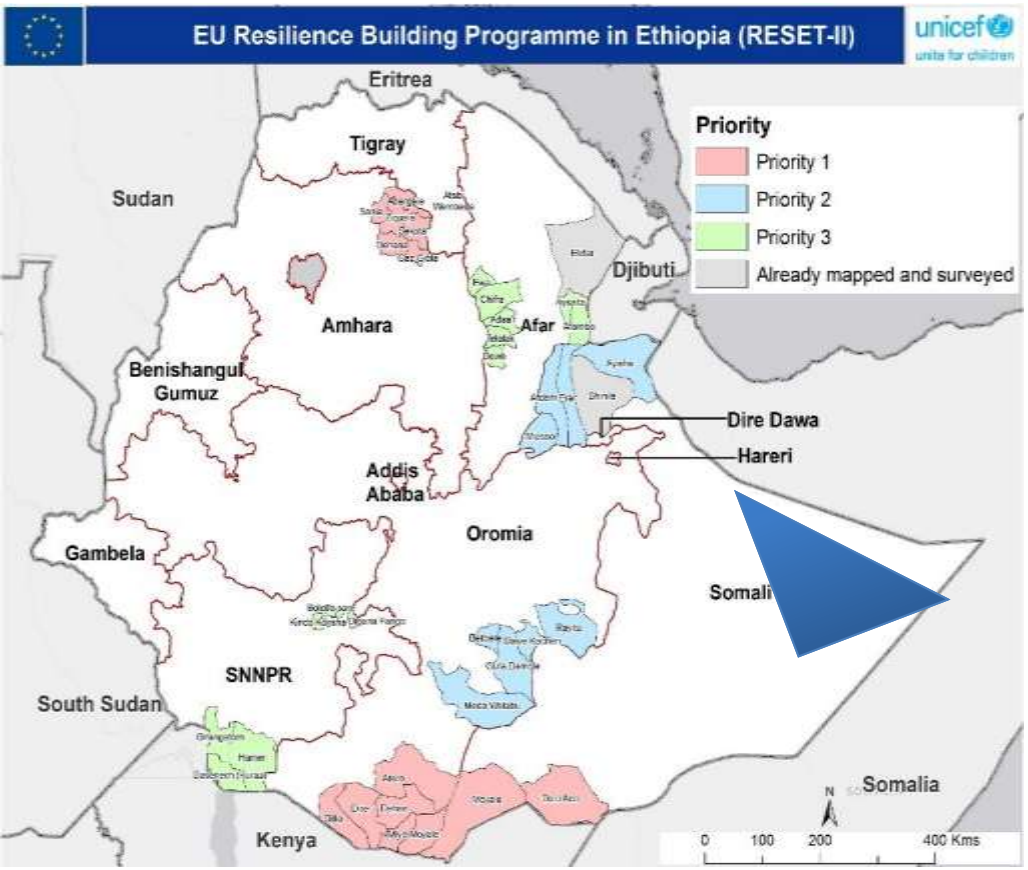
3b. Building resilience in arid environments

Conventional schemes-HDWs, Springs, shallow wells served on spot are less feasible in arid environments

Deep wells with reticulated schemes appears promising. Some successful schemes already in place

NB: Not all arid areas are amenable for deep well drilling, eg. higher grounds in south Omo, higher grounds in Borena

3b. Building resilience in arid environments



UNICEF commissioned Groundwater Exploration districts

USGS Groundwater exploration area-Somali region

Deep groundwater exploration and Devt

From hydrogeology to hydrogeology+

-Integrating 'Integrated Groundwater investigation' with Decision Support Tool

-What is in Integrated groundwater Investigation/mapping

- Remote Sensing

-Water Point inventory

-Field geology mapping

-Field Hydrogeology mapping

-Field Geophysics survey [VES, ERT, Passive Seismic-USGS]

-Integrated groundwater recharge Estimation

-Water Quality and Isotopes

-Modeling in some cases

-New technologies [eg GPR for water table mapping]

Messages

- Building resilience in highland environments could be feasible through use climate screening tools; no guarantee to increase service level though
- Deep BHs supplied through reticulated schemes are feasible in arid lowlands, not all arid lowlands are amenable for deep well drilling
- The various maps could be used in sequencing what to do where?

Thank You