AfriWatSan - Kenya: Highlights of Preliminary Findings

Presented by: Prof. Daniel Olago – Principal Investigator, Kenya on behalf of Team Kenya

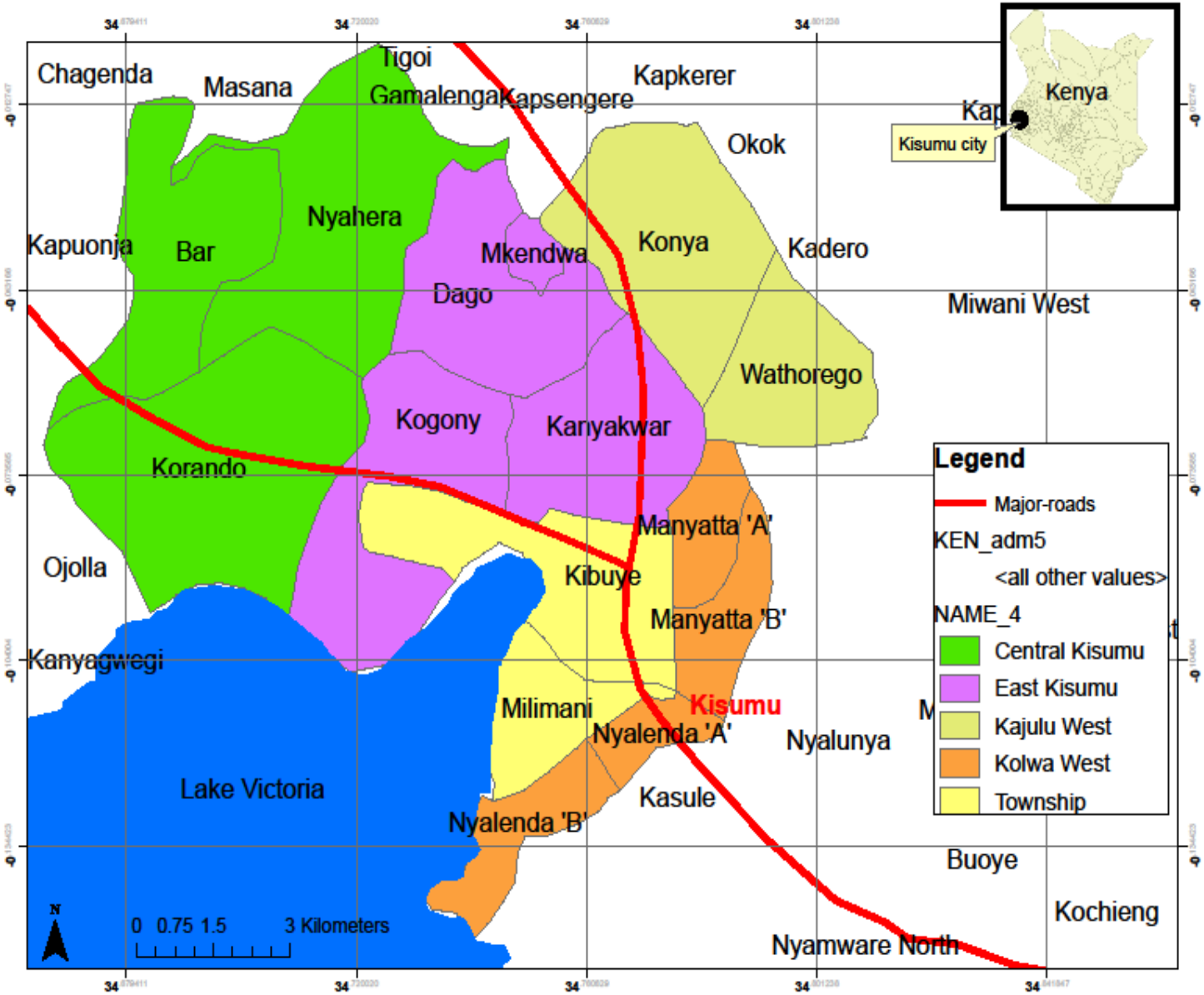
www.afriwatsan.org

3rd AfriWatSan International Consortium Meeting and Stakeholder Workshop, 10th July 2017, Kisumu Kenya

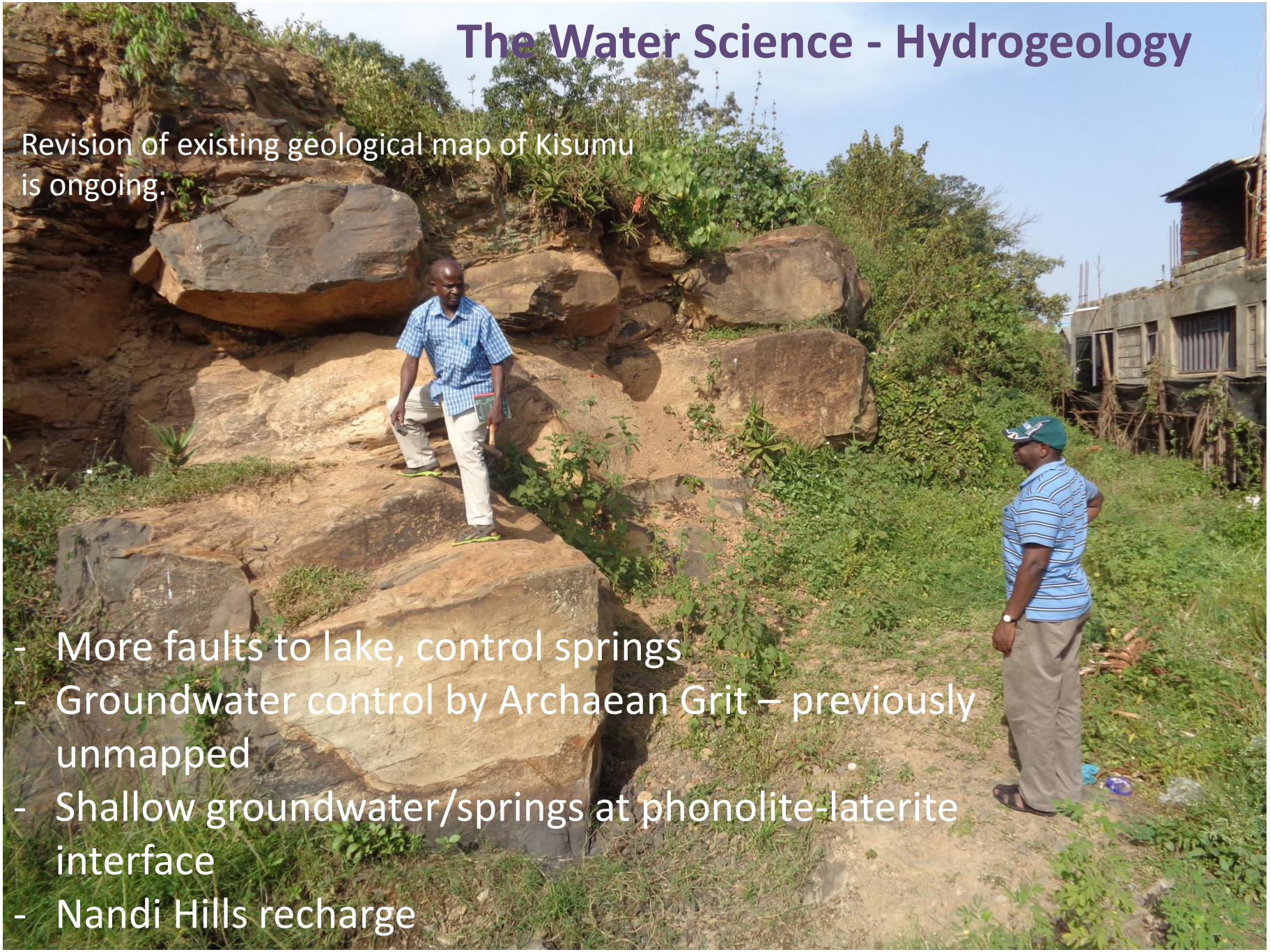
Presentation Outline

- Introduction to the study sites
- The water science
- Sanitation
- Climate extremes vs water supply
- Health
- Capacity strengthening
- Conclusion

The Study Area



The Water Science - Hydrogeology



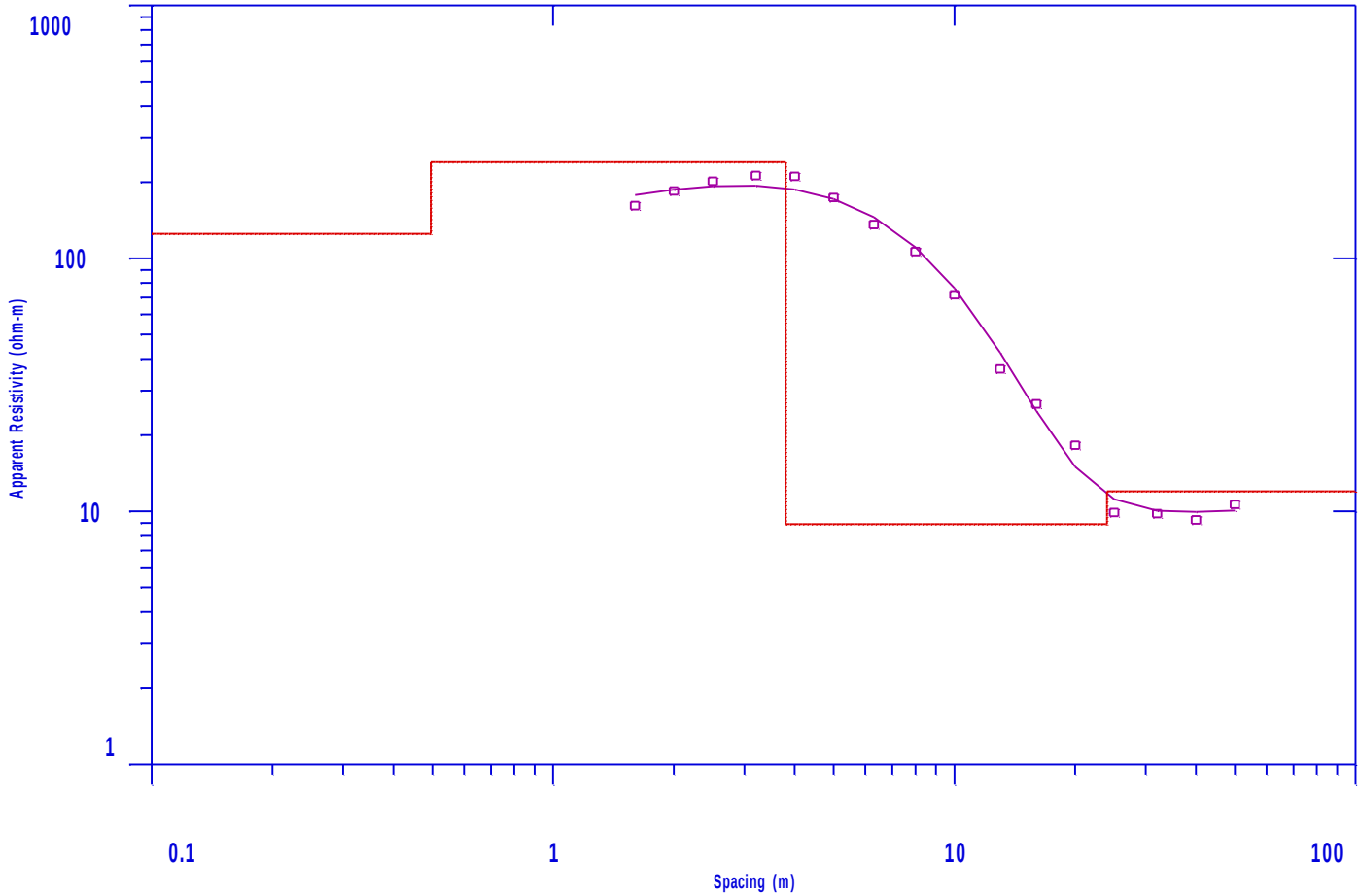
Revision of existing geological map of Kisumu is ongoing.

- More faults to lake, control springs
- Groundwater control by Archaean Grit – previously unmapped
- Shallow groundwater/springs at phonolite-laterite interface
- Nandi Hills recharge

Monitoring Sites for Climate and Groundwater Levels

- VES geophysical profiling conducted in fifteen site within the observatory
- Nine sites to be selected for piezometer construction and installation of data loggers in August/September 2017
- To measure variations in groundwater level
- Weather station to be installed at 3 sites
- KIWASCO, WRA and LBDA to be key partners

Kudho Primary School



LAYER	RESISTIVITY	THICKNESS	DEPTH	ELEVATION	INTERPRETATION
1	125	0.5	0.5	2002	Moist soils
2	240	3.3	3.8	2000	Lateritic
3	8.9	20.2	24	1980	Weathered laterite: water bearing
4	12				Highly weathered phonolites

The Water Science – Chemical Water Quality

Monthly physical- chemical data aquisation carried out from December 2016 to June 201

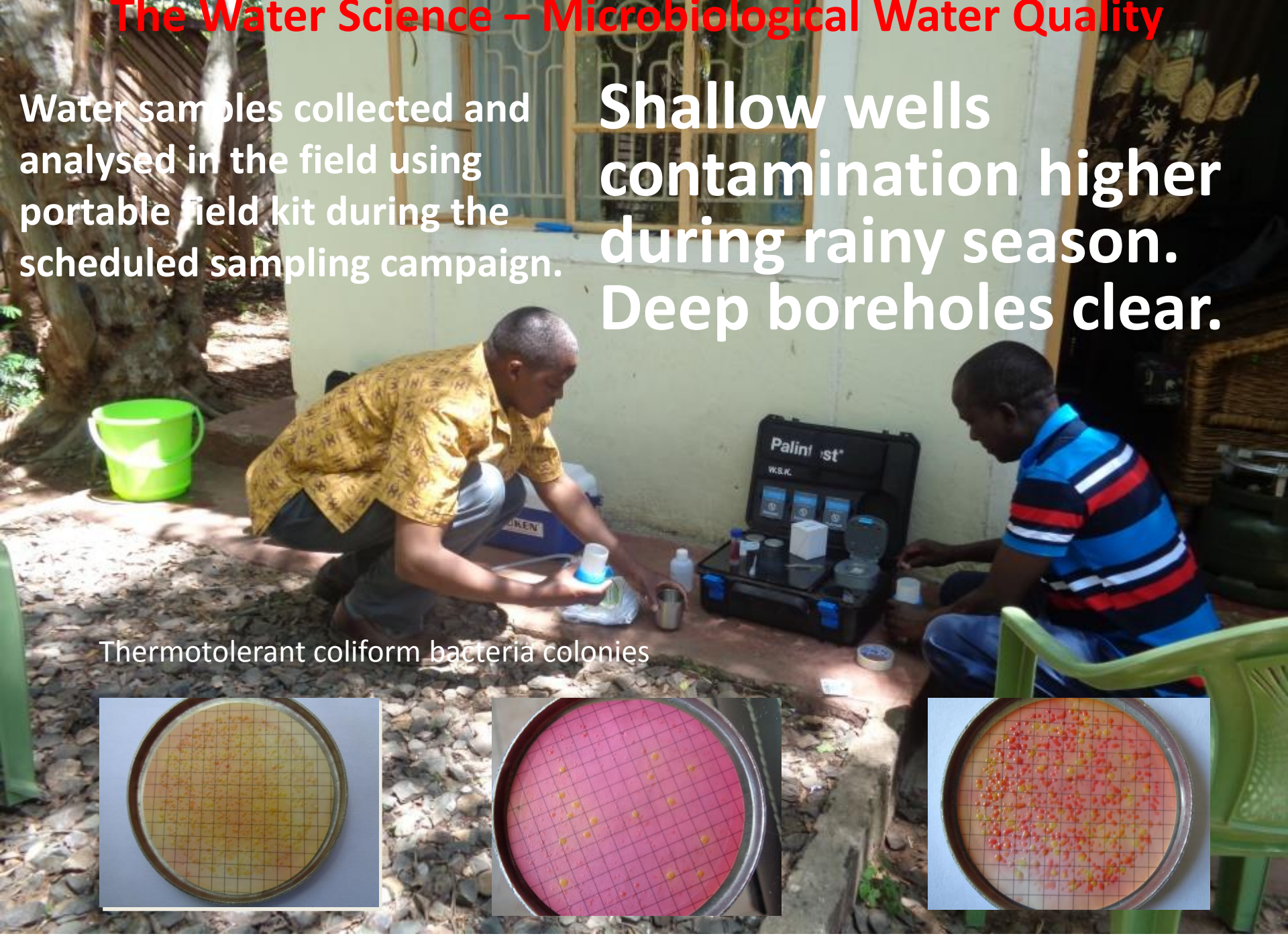
22 sites - surface water (R. Nyamasaria/Kib Lake Victoria), springs (Kudho, Kogweno, Kosinda, Asengo and Kokelo), shallow wells (Nyahera, Lower Kotetni, Upper Otonglo, Mbeme and Kibos) and boreholes (Kokelo, Wandiege and Korumba)

Generally potable; nitrate in shallow wells (Kodiaga); high turbidity springs (Kudho); Some F, Fe

The Water Science – Microbiological Water Quality

Water samples collected and analysed in the field using portable field kit during the scheduled sampling campaign.

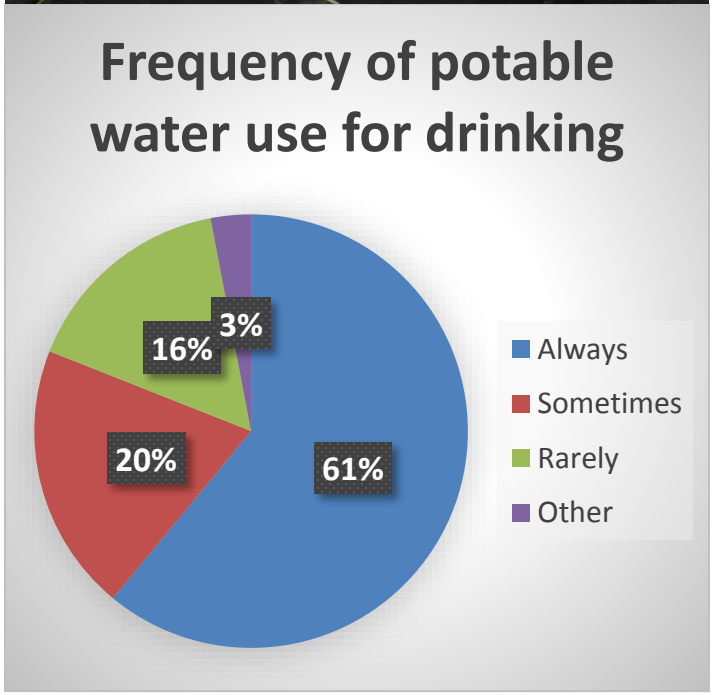
Shallow wells contamination higher during rainy season. Deep boreholes clear.

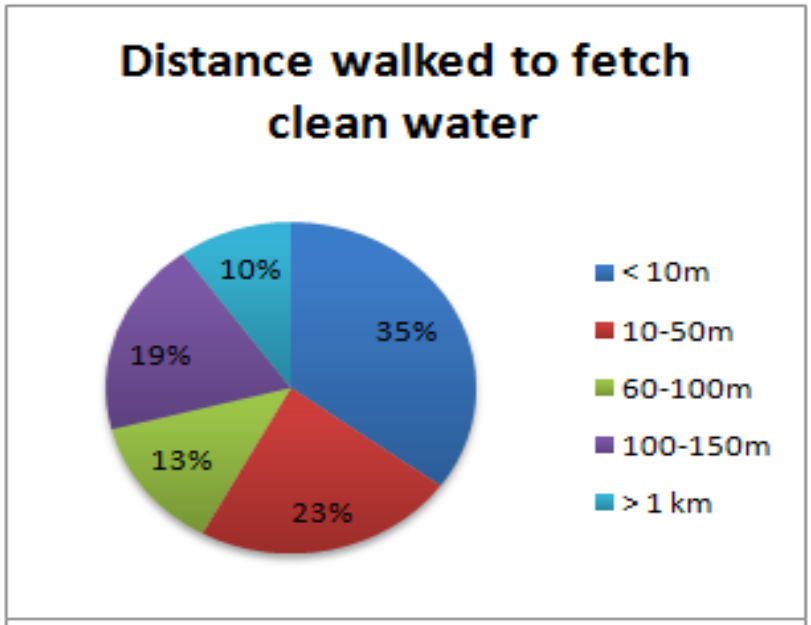


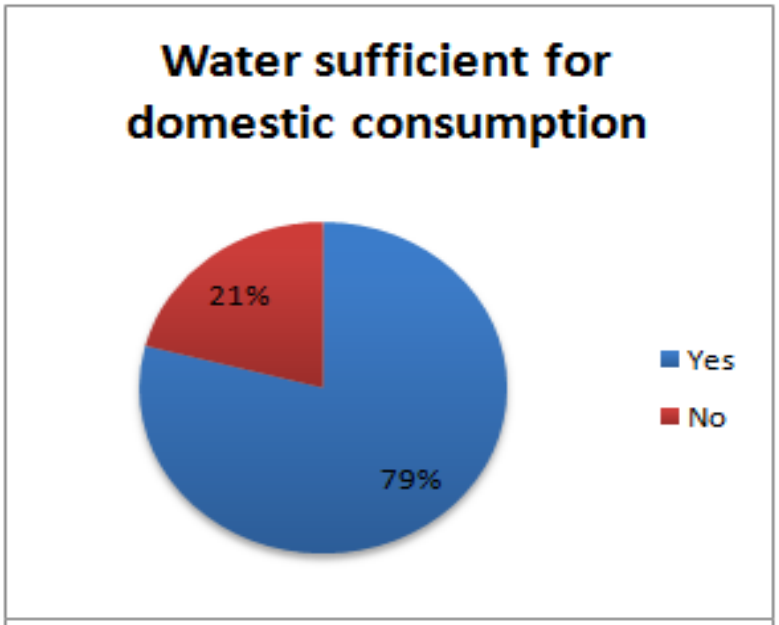
Thermotolerant coliform bacteria colonies

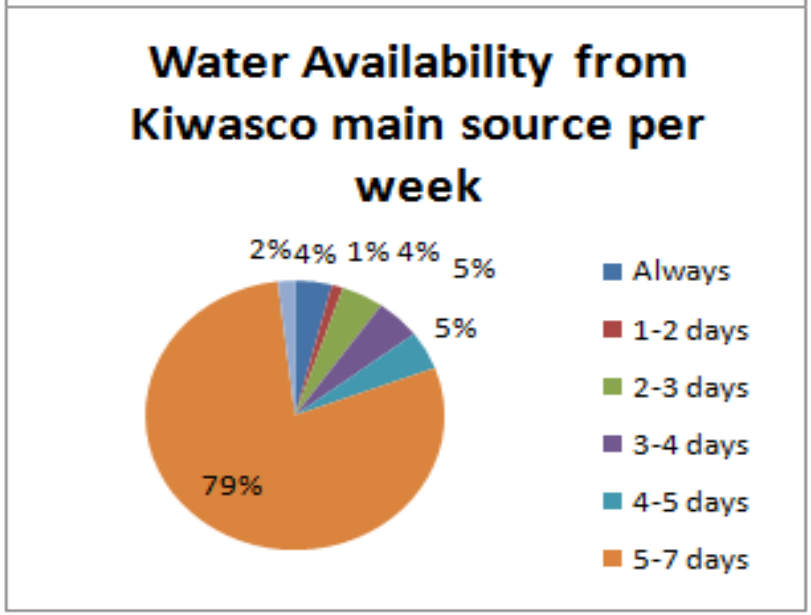
Climate Extremes and Water Supply in Informal Settlements

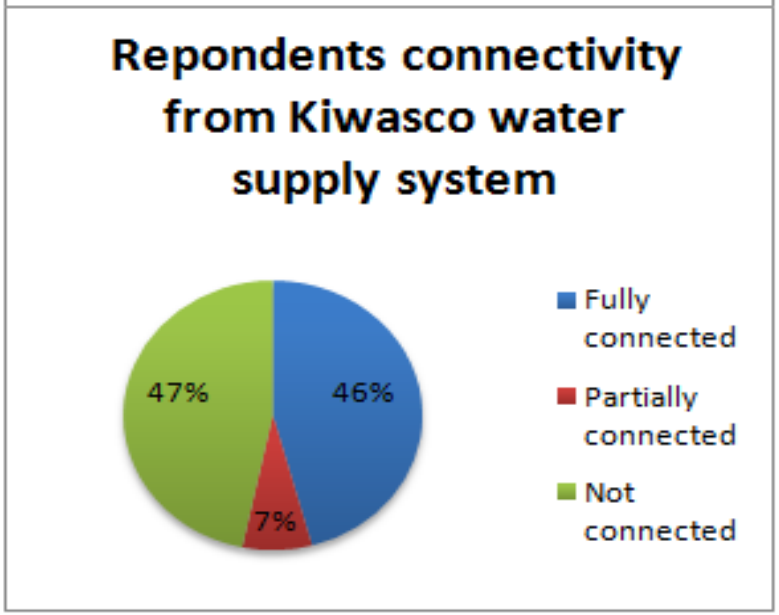
- KIWASCO piped water main source of drinking water
- During flooding the water may contain suspended matter due to damages to pipes
- 25% of the respondents stated the water source for Kiwasco was not reliable especially during dry spells and heavy rains
- 42% say that they have suffered from typhoid and 16% have suffered from cholera because of the consumption of piped water during rainy season

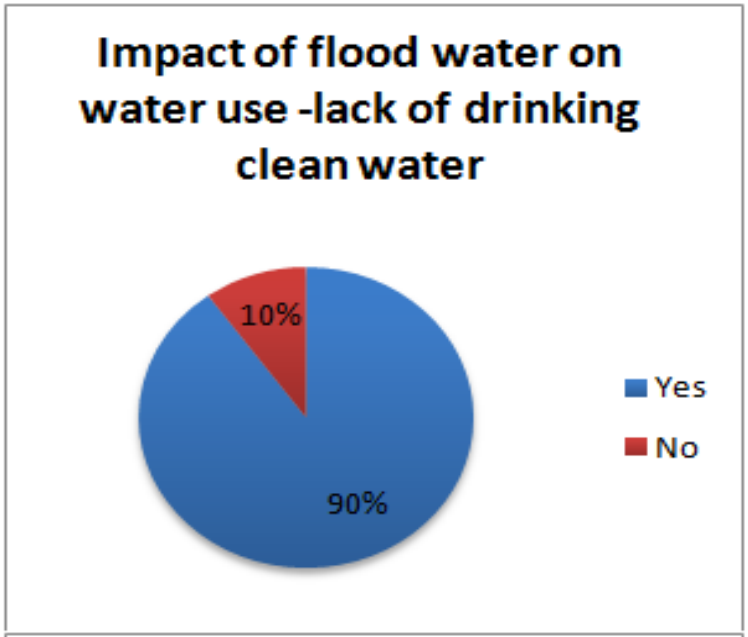


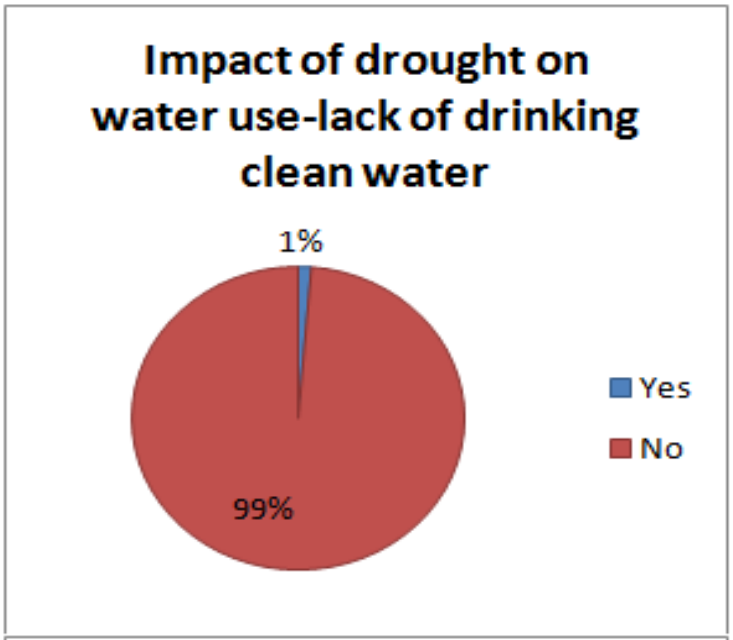

Distance walked to fetch clean water
10%
35%
19%
13%
23%
< 10m
10-50m
60-100m
100-150m
> 1 km

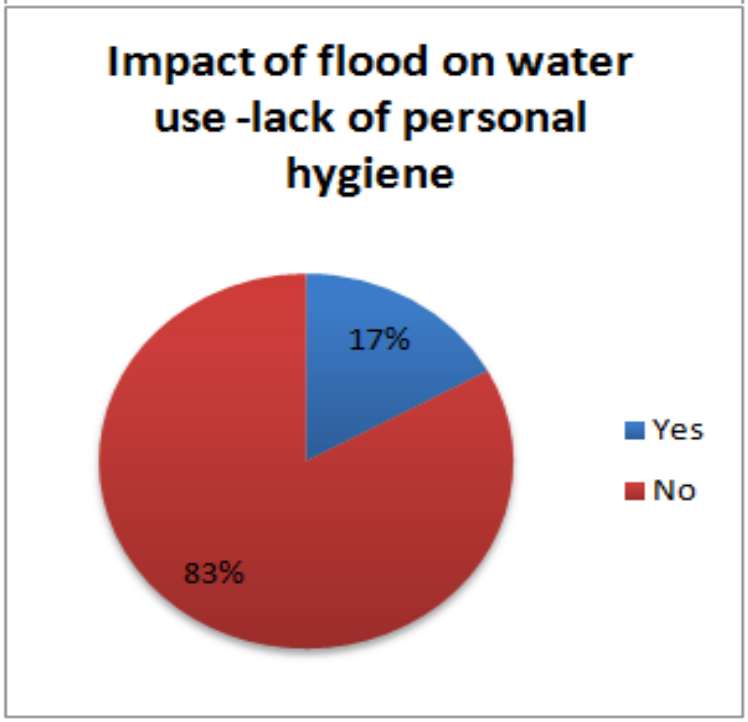

Water sufficient for domestic consumption
21%
79%
Yes
No

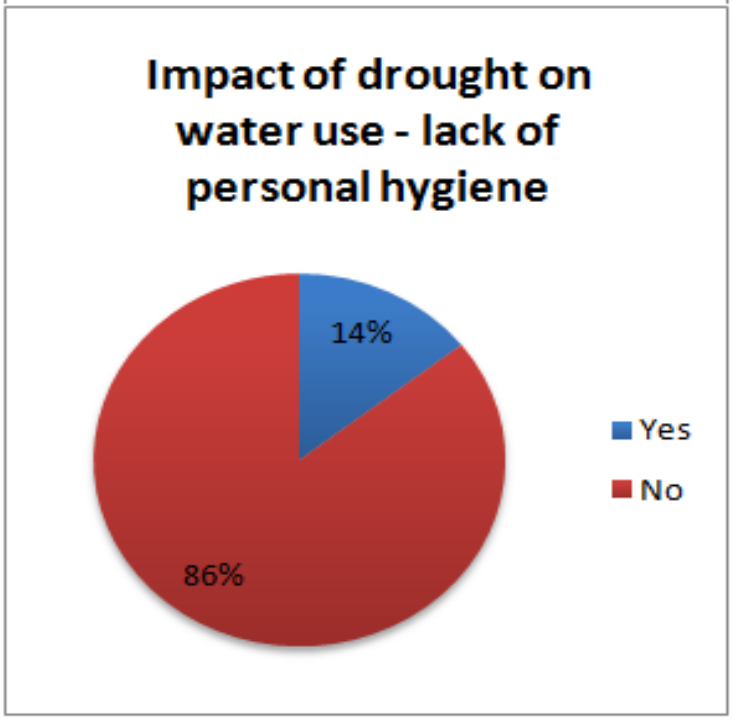

Water Availability from Kiwasco main source per week
2%
4%
1%
4%
5%
5%
79%
Always
1-2 days
2-3 days
3-4 days
4-5 days
5-7 days


Repondents connectivity from Kiwasco water supply system
47%
46%
7%
Fully connected
Partially connected
Not connected


Impact of flood water on water use -lack of drinking clean water
10%
90%
Yes
No


Impact of drought on water use-lack of drinking clean water
1%
99%
Yes
No

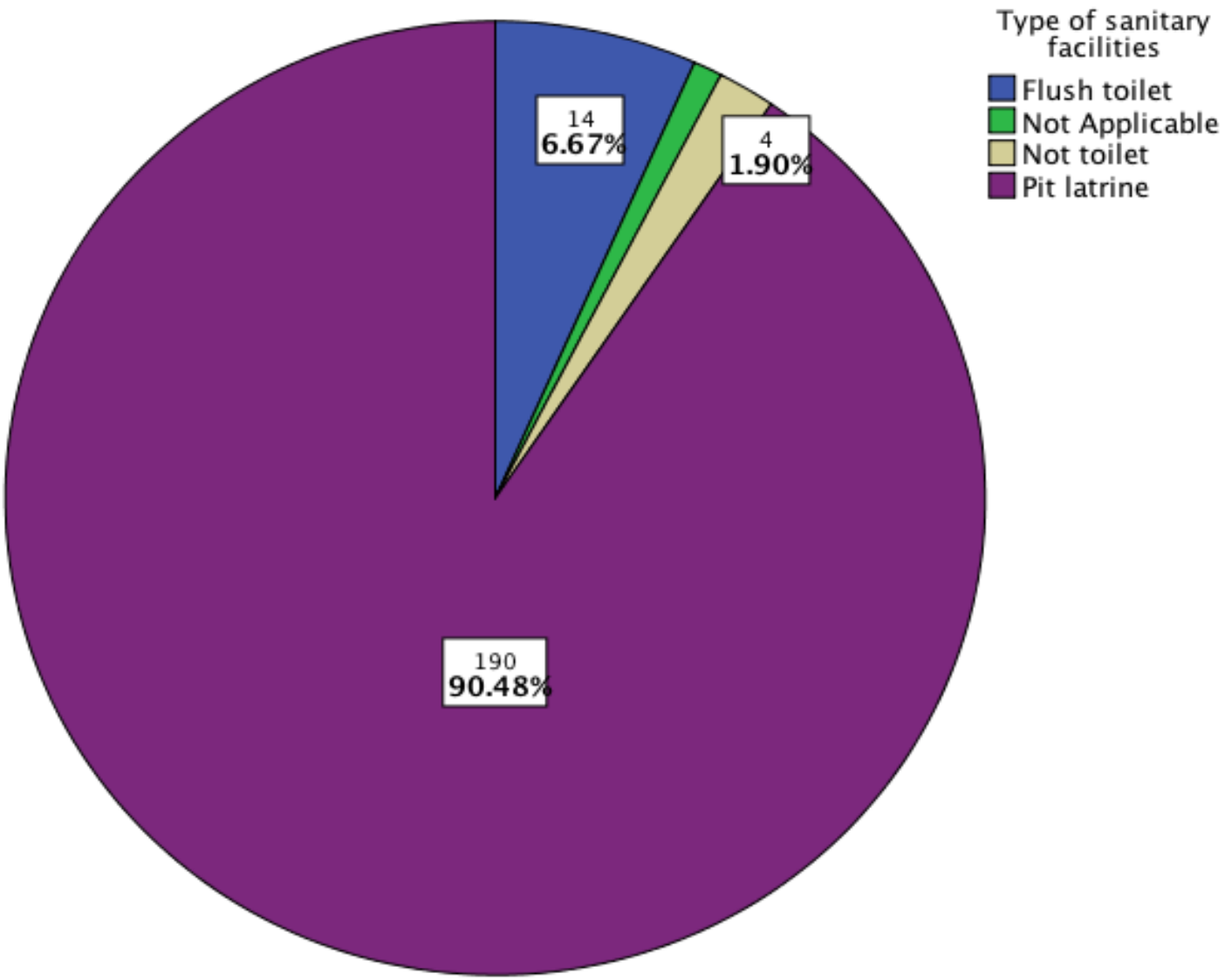

Impact of flood on water use -lack of personal hygiene
17%
83%
Yes
No


Impact of drought on water use - lack of personal hygiene
14%
86%
Yes
No

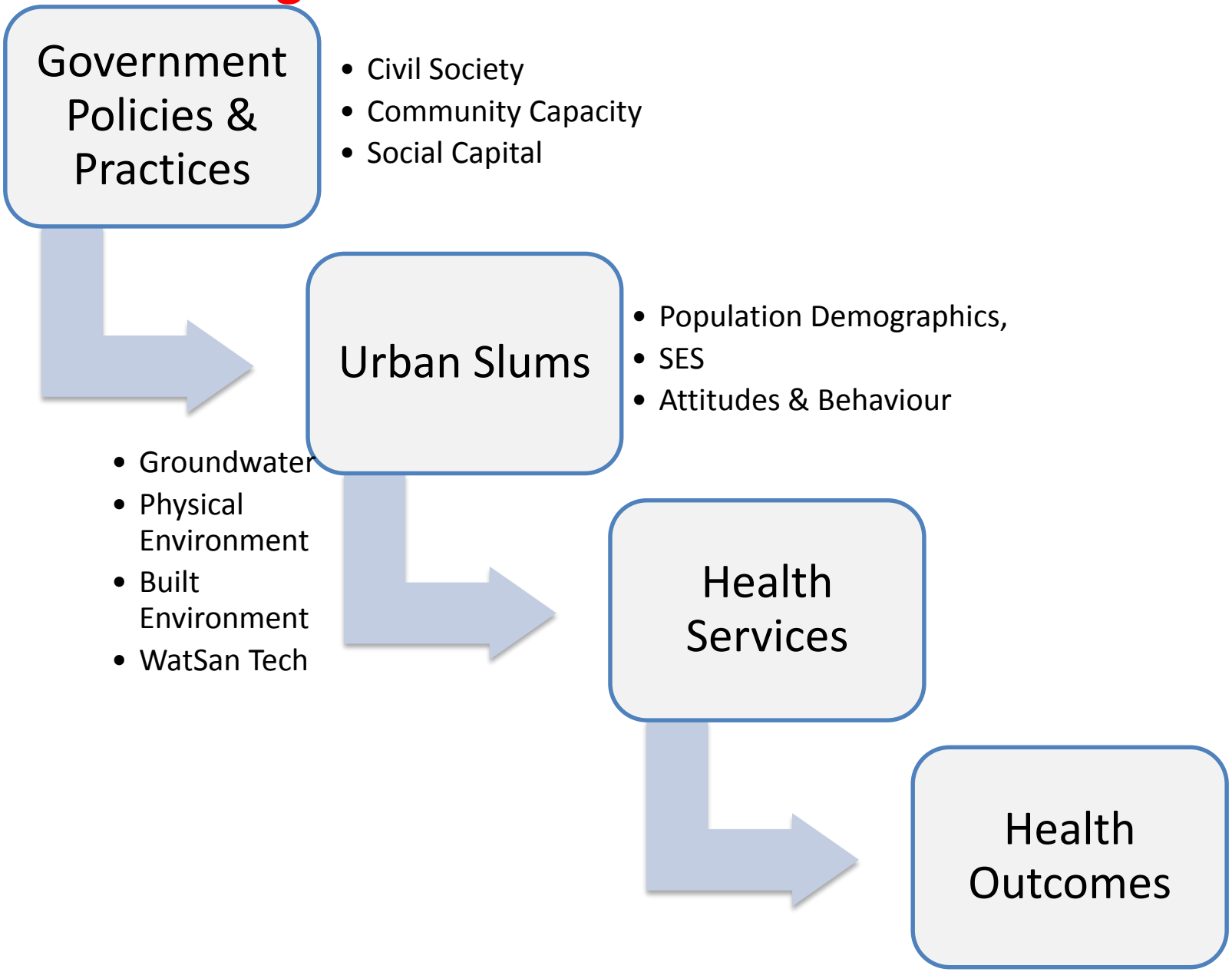
Sanitation

- To map the locations of the dug-wells and the pit latrines in Kisumu City in transect areas
- Characterise the facilities by function and technology type.
- Determining seasonal physical, chemical and biological quality of water from selected sanitation facilities
- Determining current risks and future climate risks on water and sanitation situation in Kisumu City
- Developing policy recommendation on the integration of future climate risk forplanning of water and sanitation infrastructure in Kisumu city

Sanitary facitilies in Kisumu Informal settlements



Relating Health Outcomes to Groundwater



Relating Health Outcomes to Groundwater

Kudho Primary School
Unprotected Spring

Kudho Primary School
treated water for sale

- 73% of Kisumu City population has direct water connection from KIWASCO
- the 27% not connected to piped water are mainly informal settlements and areas like Riat Hills
- 20% residents have sewer lines connections
- 12 years of no cholera outbreak in areas connected with piped water from KIWASCO

Relating Health Outcomes to Groundwater

1. To determine the health status/disease burden of the population in the study area in relation to groundwater contamination.
2. Assess the Non-Communicable disease burden associated with chemical contamination of urban ground water
3. Determine levels of select heavy metals (arsenic, cadmium, lead and mercury) in groundwater sources (springs, boreholes and wells) used for drinking water and evaluate potential health risks Assess communicable disease burden associated with microbiological contamination of urban ground water
4. To determine the levels of Antibiotics in groundwater in Kisumu, and the associated health risk
5. To analyze how health systems response to in relation to the effects of groundwater contamination.


CRC Press

Conclusion

- Work progressing well
- Geological/hydrogeological model to be completed soon
- Socio-economic analysis of household surveys to be completed soon
- Monitoring programmes to continue with installation of monitoring sites in next two months
- Sanitation and health studies to be ramped up