



**Université Cheikh Anta Diop
de Dakar**

LUX - MEA - LEX

Makerere University

University of Nairobi



UCL

**Assessing the sustainability of low-cost, on-site
water supply and sanitation systems in urban Sub-
Saharan Africa: AfriWatSan www.afriwatsan.org**

GQ2019 Liege, Session S06




AfriWatSan



UK aid
from the British people

**THE
ROYAL
SOCIETY**

The Royal Society – DFID Africa Capacity Building Initiative

An aerial photograph of a densely populated urban area, likely Kibera in Nairobi, Kenya. The image shows a mix of informal settlements with small, closely packed buildings and some green spaces. A prominent road or path runs through the center of the area. The overall scene is a complex urban landscape.

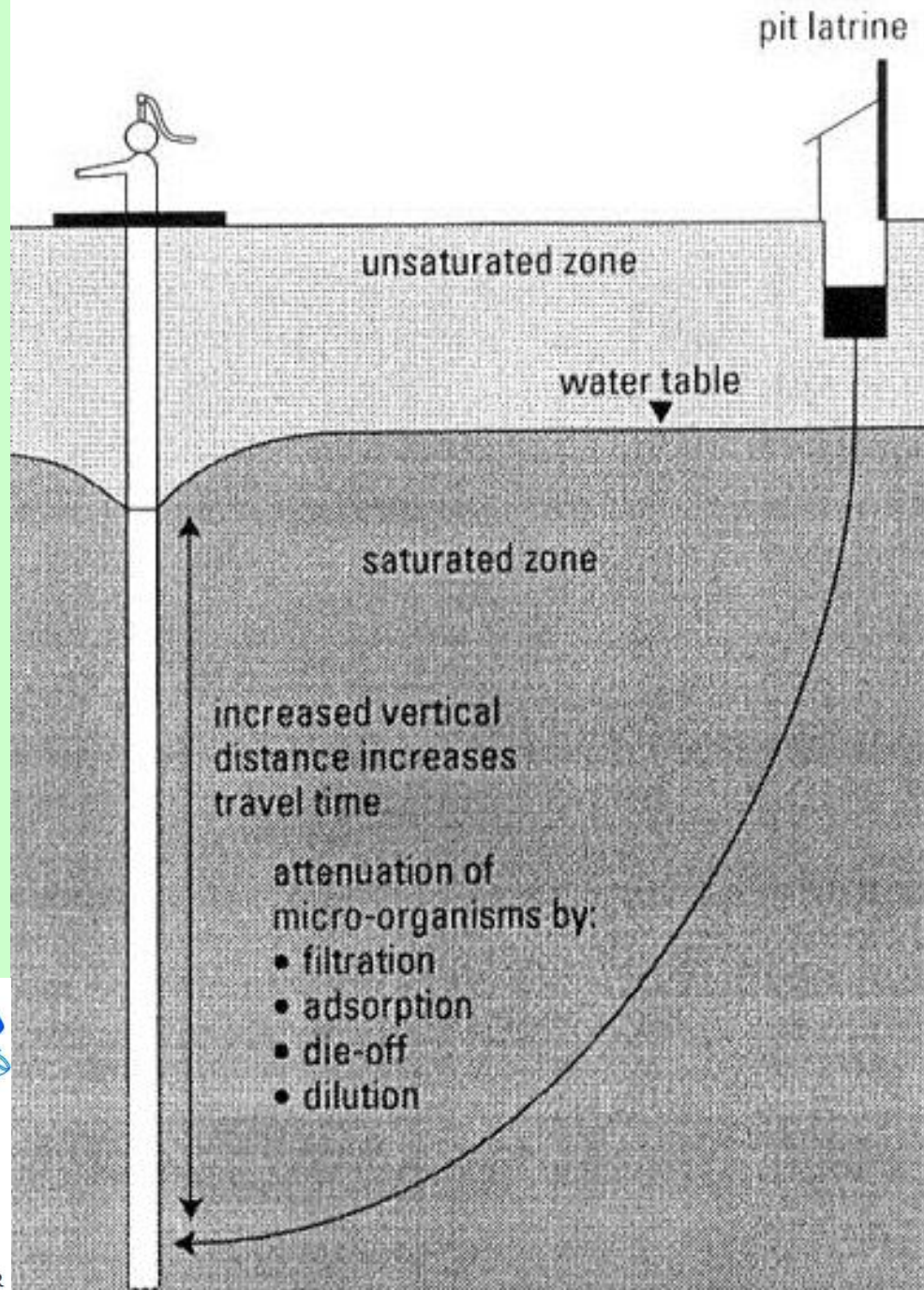
**in African towns and cities realising UN
SDG 6 - *universal and equitable access to
safe and affordable drinking water,
sanitation and hygiene by 2030* - depends
on sustaining low-cost, on-site water
supply and sanitation facilities**

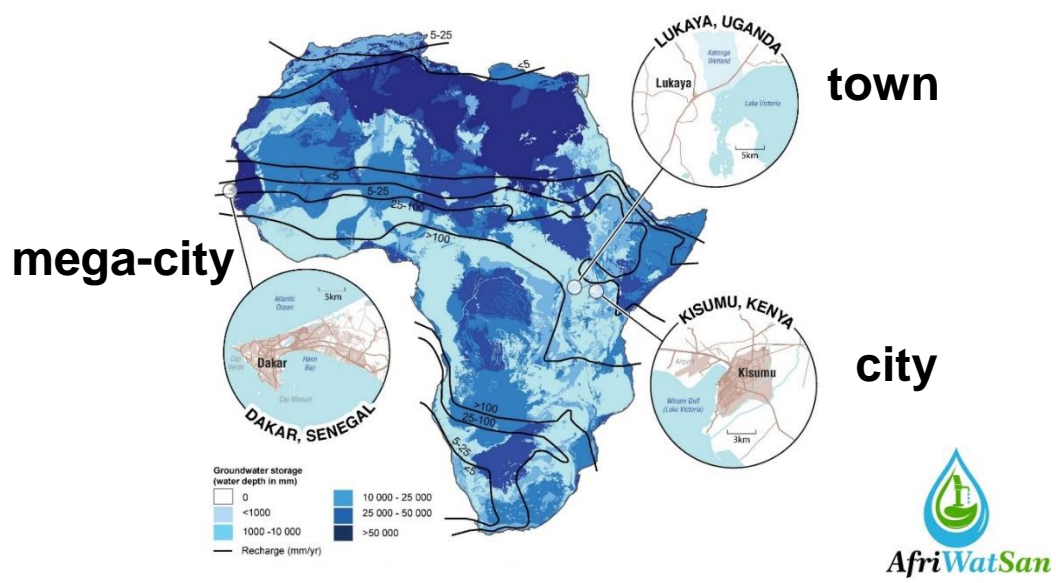
Kibera, Nairobi (Kenya)

research challenge:

- How to sustain conjunctive use of the subsurface for on-site water supply and sanitation facilities?

research partners:





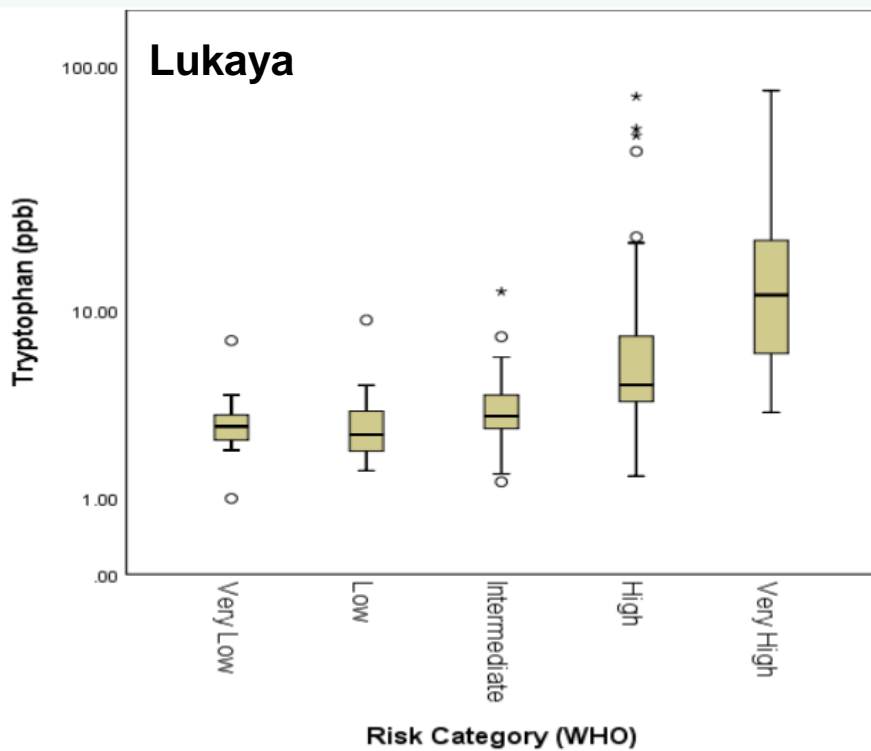
- **aligned surveys & monitoring protocols across 3 urban observatories**



Trialling real-time monitoring of faecal contamination

- Tryptophan-Like Fluorescence (TLF) emitted by *E. coli* quantified using field fluorimeters
- evaluated against standard culture methods for TTCs and *E. coli*

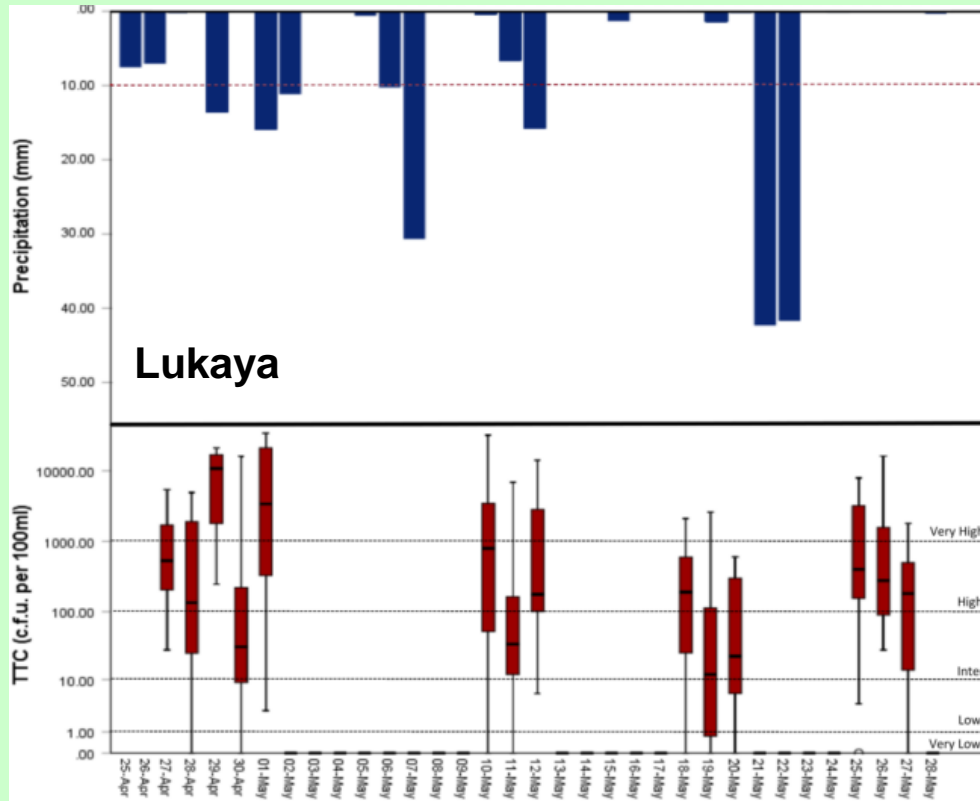
=> **Wed. AM session S05a (Sorensen et al.)**



***AfriWatSan* observatories: faecal bacteria counts observed to rise in shallow wells after heavy rain events (> 10 mm/day)**

- faecal particles trace rapid infiltration pathways (macropores)
- consistent with rapid responses observed from piezometry

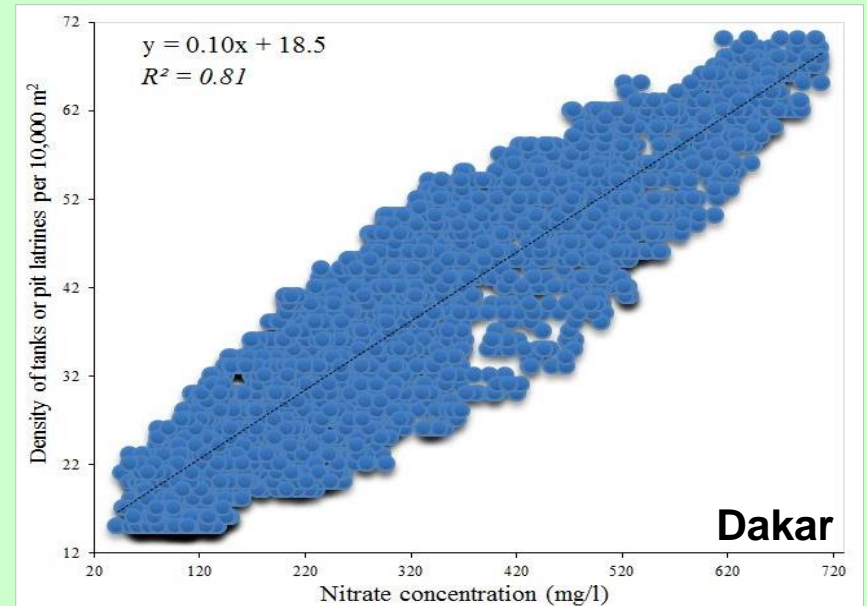
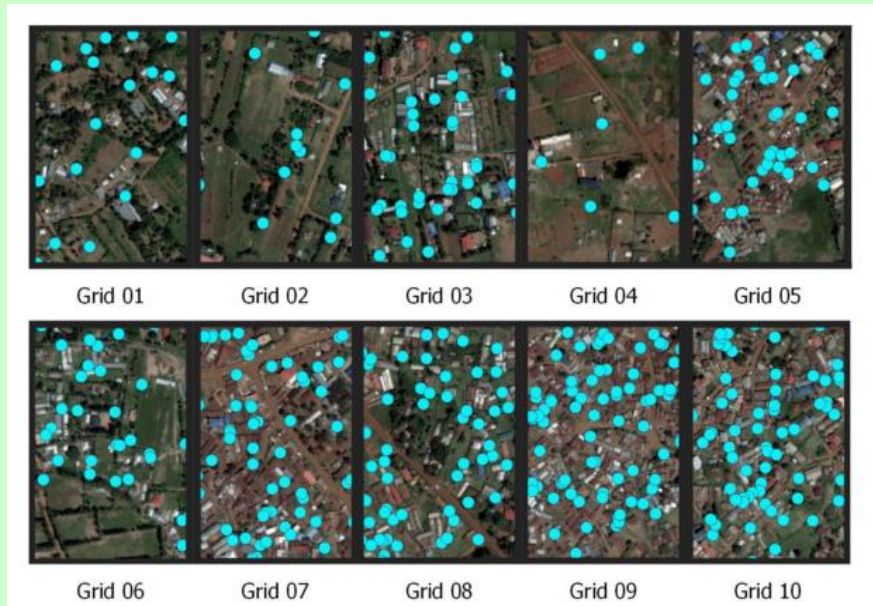
=> see this session S06 (Cisse Faye et al.)



***AfriWatSan* observatories: magnitude of faecal contamination not well explained WHO sanitary risk scores**

AfriWatSan observatories: mapped on-site sanitation densities correlated to nitrate concentrations in groundwater

- optical satellite imagery used, supported by ground surveys



=> see poster 312 today (Diaw et al.)

- provides empirical measure of an aquifer's ability to attenuate faecal loading using WHO nitrate guideline of 50 mg/L:
 - 7 pit latrines per ha (weathered crystalline rock - Kisumu)
 - 24 septic tanks per ha (Quaternary sands - Dakar)

Faecal contamination of shallow groundwater sources in slums of African cities is probable but not inevitable.



Can research inform a vision of people sustaining the quality and quantity of their groundwater “commons” for multiple purposes? Scale?

– Elinor Ostrom’s “design principles”

Summary:

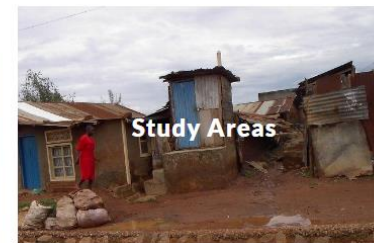
- 1. network of urban groundwater observatories established in a ‘mega-city’ (Dakar, Senegal), ‘city’ (Kisumu, Kenya) and ‘town’ (Lukaya, Uganda);***
- 2. vulnerability of shallow groundwater revealed from faecal bacterial contamination following heavy rainfalls;***
- 3. ability of shallow aquifers to attenuate faecal loading from on-site sanitation shown empirically;***
- 4. knowledge of the groundwater “commons”: a pre-requisite for its sustainable use.***

www.afriwatsan.org

Sustaining low-cost, urban water supply and sanitation systems in Africa

AfriWatSan is developing the scientific evidence to inform policies and practices sustaining low-cost, on-site water supplies and sanitation systems in urban Africa and to strengthen the capacity of individuals and institutions to conduct this vital research.

AFRIWATSAN PROJECT



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LATEST RESOURCES