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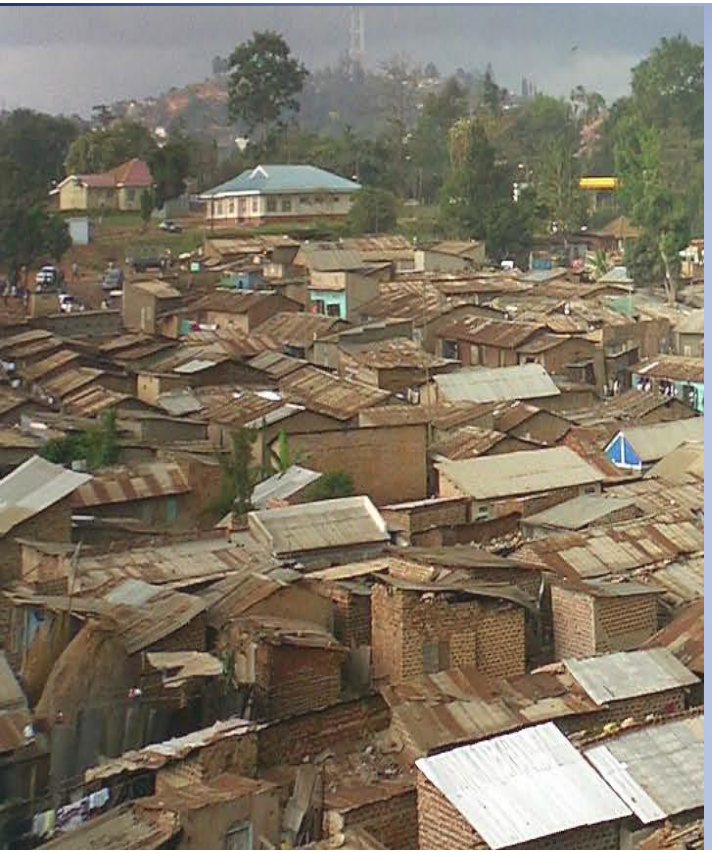

Groundwater supply for the urban poor in peri urban areas

By

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Project Partners:

LUCSUS
Lund University Centre for Sustainablity Studies

SIWI

Drift
Dutch Research Institute for Transitions

CONTENT

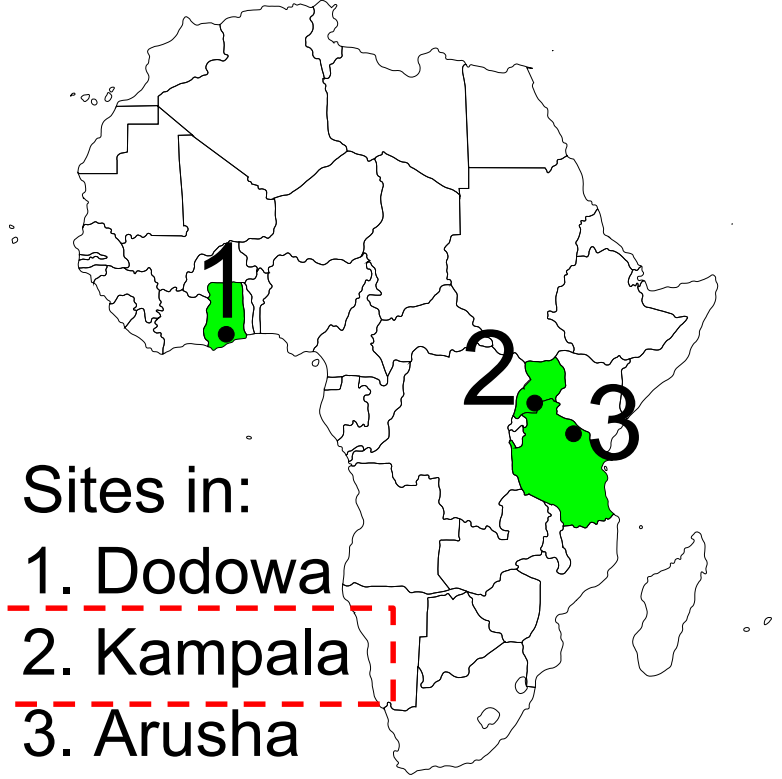
- Introduction, problem and study area description
- Introducing the aquifers
- The groundwater system and water quality
- Predominant form of groundwater use
- Legislative framework
- Self Management
- Preliminary conclusions

INTRODUCTION

T-GROUP

*"Experimenting with practical **T**ransition **Gro**undwater management strategies for the **U**rban **P**oor in Sub-Saharan Africa"*

Aims to improve access to safe water in poor peri-urban areas using Transition Management (TM) approach



What changes are required to make transition towards sustainable groundwater management in urban SSA?

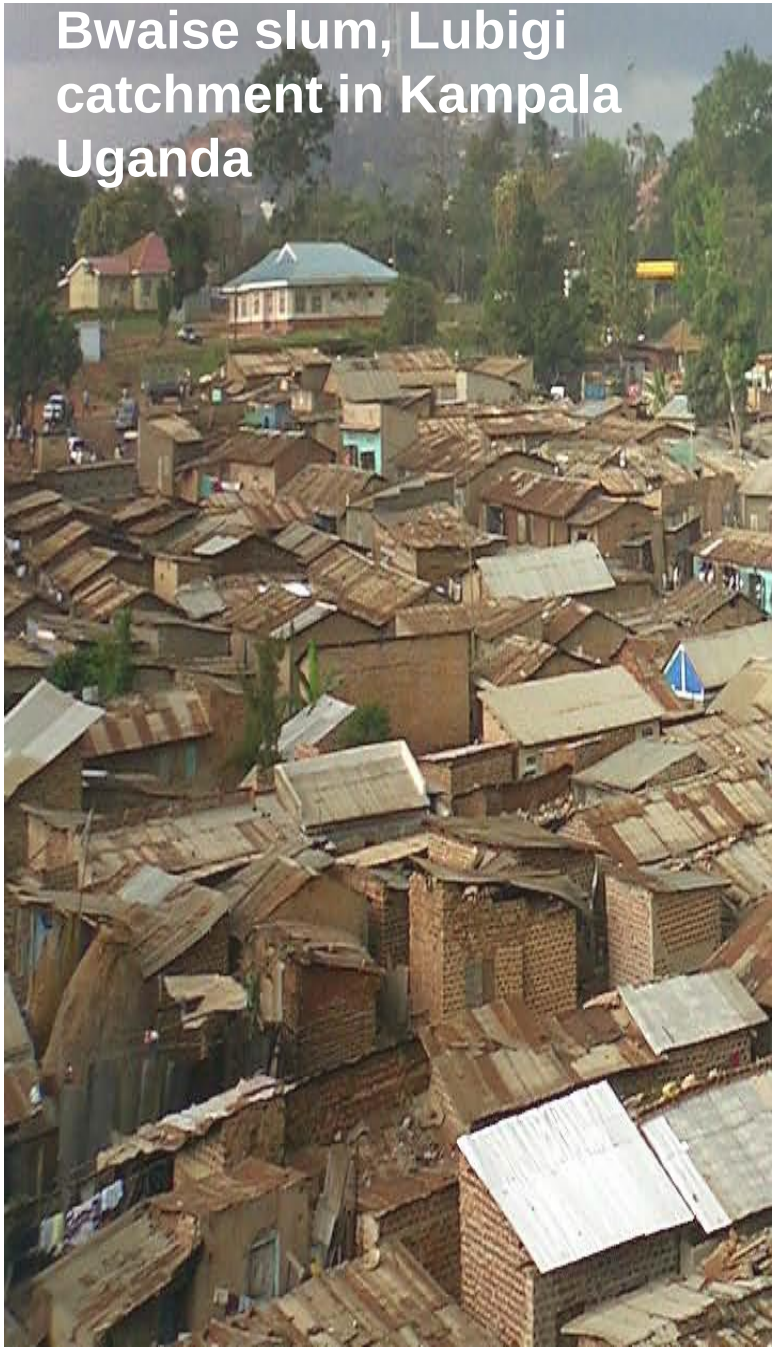
RQ1: Relations between 'below-ground' and 'above-ground' systems (systems analysis)?

RQ2: Can TM be a suitable model for groundwater management and governance in urban SSA?

The Problem

- Poor peri-urban settings or slums are growing in urban cities in SSA:
  - High population density
  - Informal settlements = slums
  - Lack of formal services

- Complex social, institutional, financial and environmental conditions making dependence on groundwater a challenge
  - Affordability
  - Pollution
  - Sustainability
  - Use and management



The Transitional Management (TM) Approach

- **TM** approach embraces complexity and challenges in slums by finding new and collaboratively ways of managing groundwater

- TM process, a promising tool:
  - Seeks collaborative ways of managing groundwater
  - Learning alliances
  - Multi-level perspective approach.
  - Small scale demonstrations to show the promise in making the transition towards near self management

Phase 1:

Understanding the system above and below ground

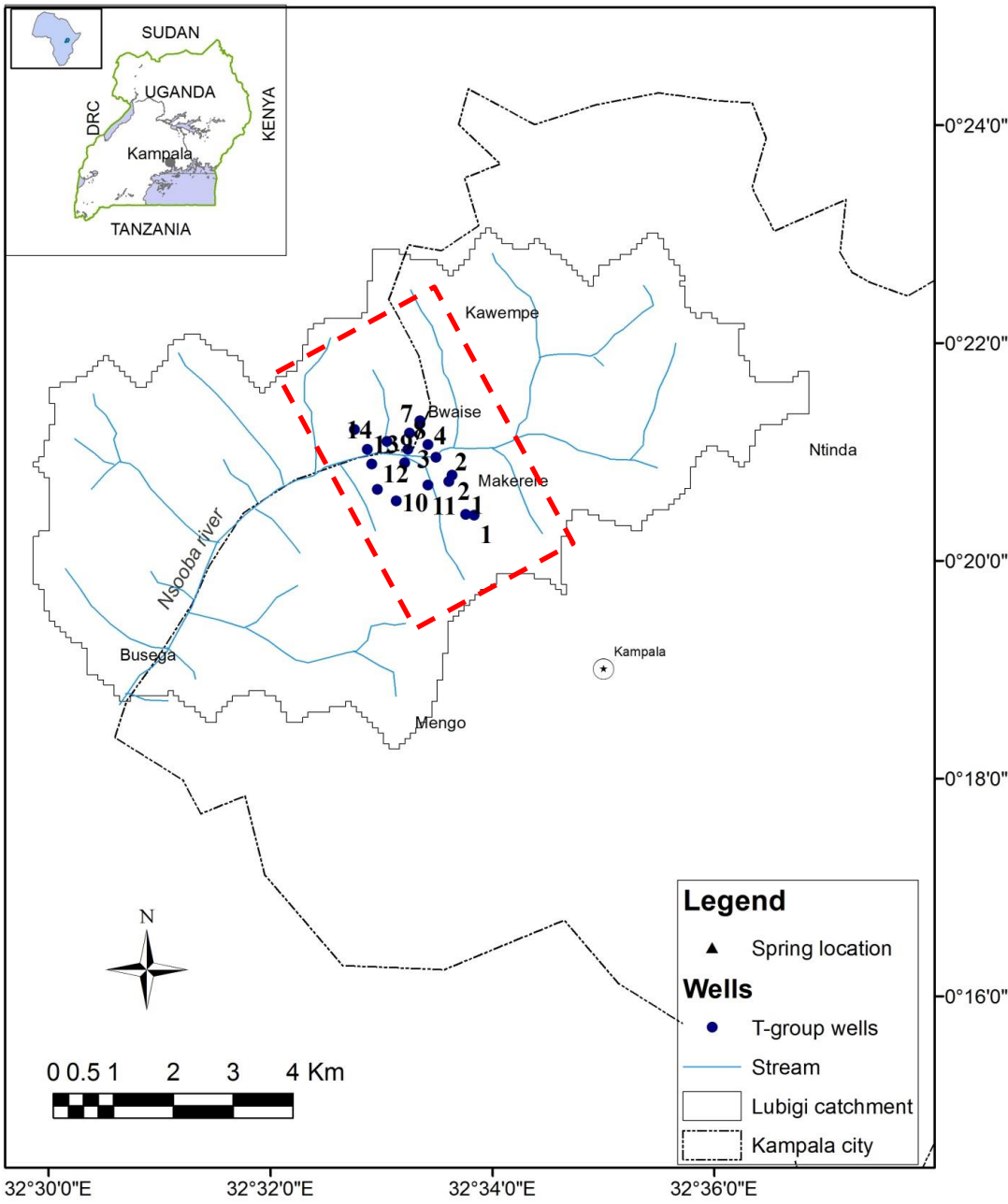
- Socio-economic
- Governance
- **Hydrogeology/ groundwater system**
  - Geophysical investigations
  - Drilling of piezometers
  - Soil sampling and analysis
  - Slug tests – MLU software
  - Water level monitoring – Pressure transducers
  - Water quality (Hydrochemistry)

Phase 2:

TM Arena meeting and TM experiments

Kampala study area

- Kawempe Division
  - North western boundary of Kampala city
- Lubigi catchment (65 Km^2)
  - peri-urban slum area
  - High population density (1000 people/km^2)
  - Elevation ~ 1200 masl
- 6 Urban poor Parishes
  - Bwaise II
  - Bwaise III
  - Makerere II
  - Kasubi - Kawaala
  - Kazo-Nabweru



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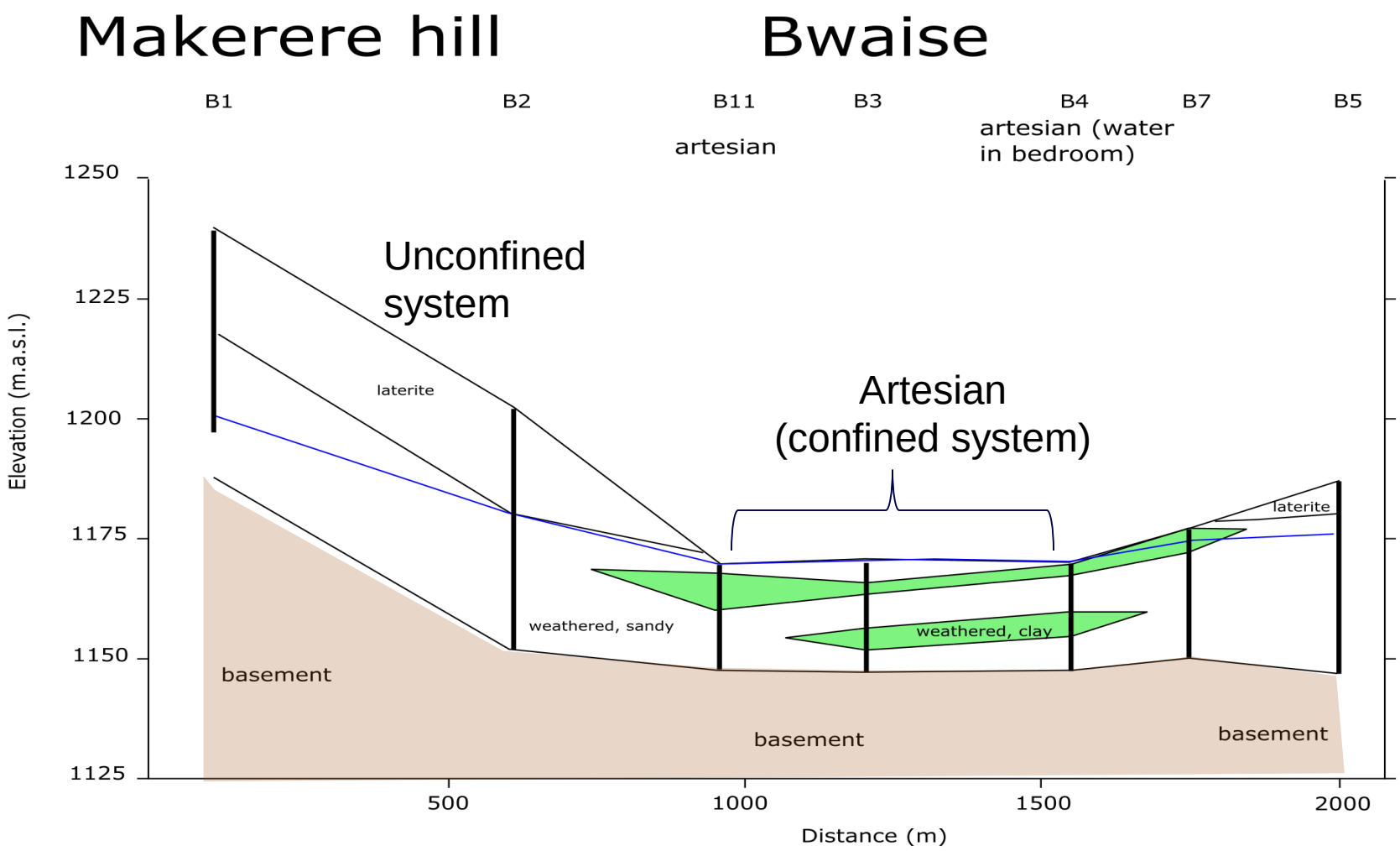
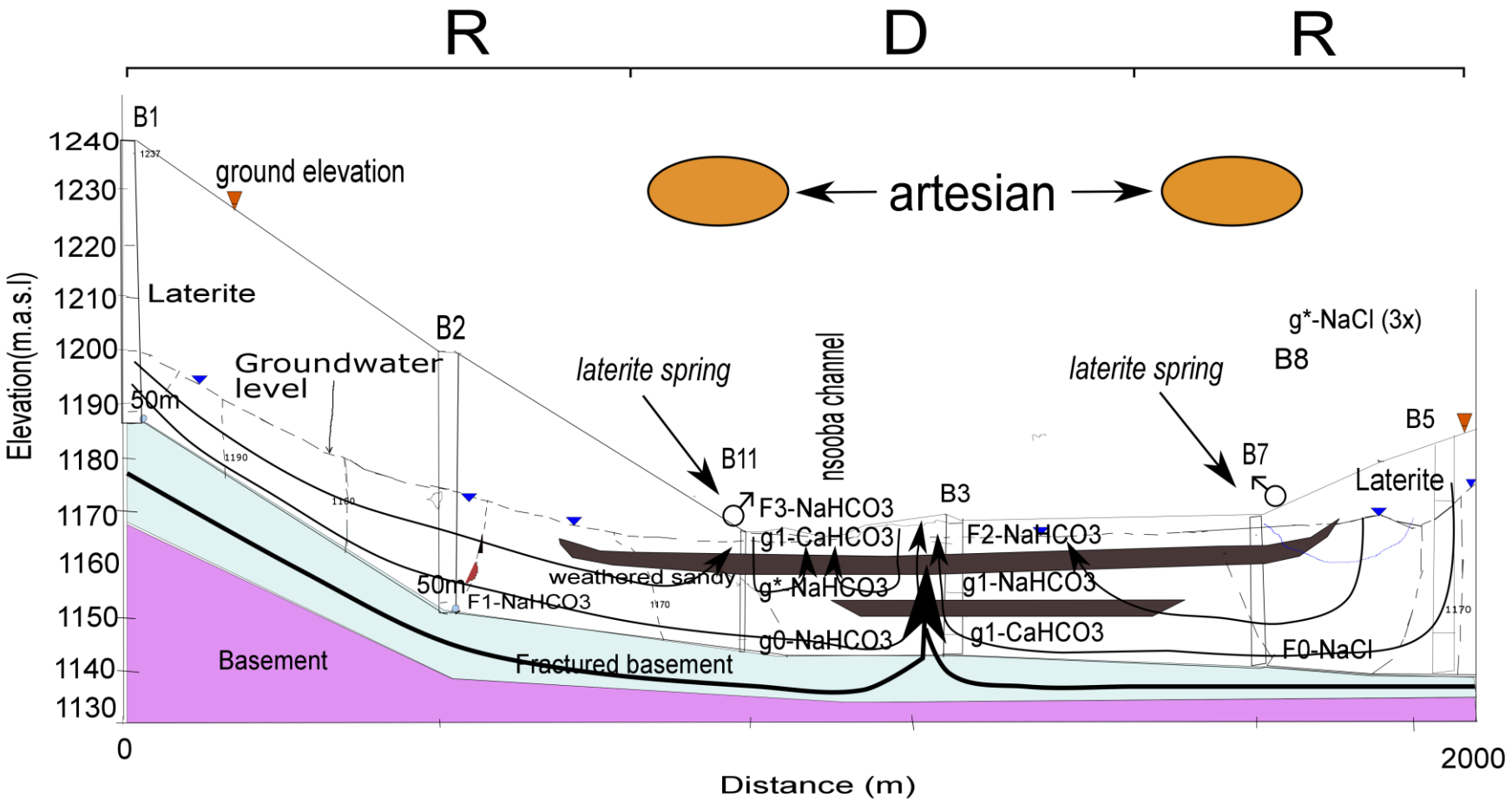
The Monitoring network

27 multi-level piezometers at 14 locations
Within weathered zone (25 – 50 m)

INTRODUCING THE AQUIFER (S)

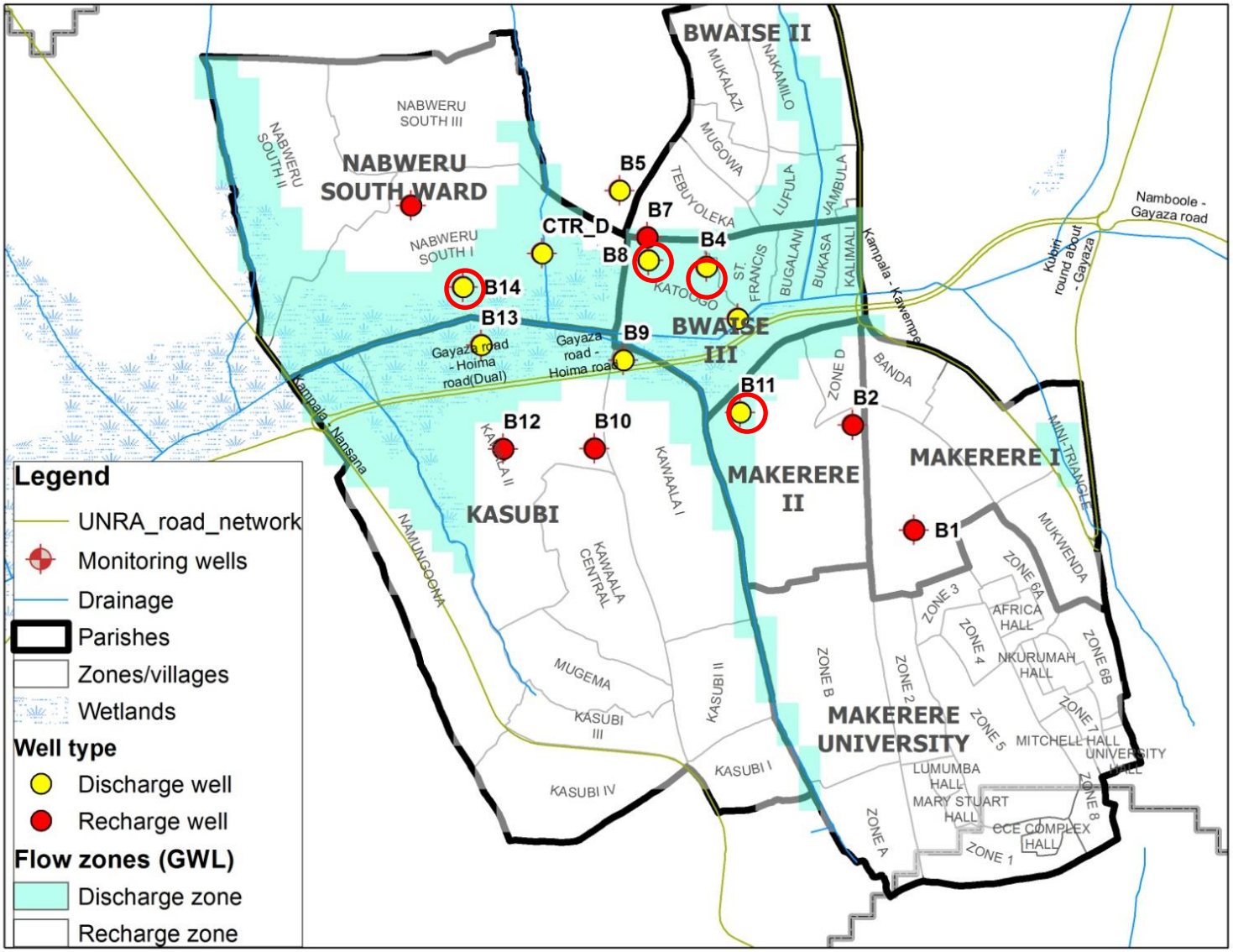


Groundwater flow system



A good aquifer underlies discharge areas capped with clay
Groundwater system development is local
Low yields K = 6.72 x 10^{-3} m/d, S = 3.91 x10^{-3} T = 6.5x10^{-1} m^2/d

Discharge – Recharge zones



Artesian w
B4, B8, B11, B

Water quality

- **Shallow groundwater (Springs)**
  - Acidic (pH 4.4 – 5.5)
  - High NO_3 concentrations (30 – 150 mg/l)
  - NaNO3 & NaCl water type
  - High levels of E.Coli & Salmonella found
    - Ecoli: Dry season: 111 – 1014 CFU/100 ml
      Wet season: 8000 – 40,000 CFU/100 ml

- **Deep groundwater relatively clean**
  - Low NO_3 concentrations: 0 – 25 mg/L (Average 6 mg/l)
  - NaHCO3 and CaHCO3
  - pH: 5 – 7.5 (Average 6) – Slightly acidic
  - Low levels of pathogens.
  - Some viruses detected using DNA

PREDOMINANT FORMS OF GROUNDWATER USE

- Springs dominant form of groundwater use especially for urban poor (~ 40%).
- People boil water to disinfect it. Some children drink spring water directly
- KCCA discouraging use of springs due to microbial pollution (Diahhorea, Cholera and Typhoid)



Piped water access and cost

- 58% access piped water supply.
  - Intermittent water supply
  - Public taps personalized by landlords
  - High costs – urban poor cannot afford
  - 20 litre jerrycan = 200 Ush ~ 0.06 USD
  - 10-20% of monthly income is spent on buying water

Use of household wells limited

- Few household wells
  - High costs
  - Permit issues.
  - Availability of other sources: Springs & piped water
- Some community wells constructed by NGOs for urban poor:
  - Poor management – Ownership issues
  - Poor materials and frequent break down of boreholes

Community wells in Kawaala slum area, Kampala

LEGISLATIVE FRAMEWORK

- NWSC – public utility responsible for water service delivery in Kampala (NWSC)
  - Water abstracted from Lake Victoria
  - Pre-paid meters introduced for the urban poor

- KCCA responsible for management of springs and wells
  - Construction of wells and springs usually by NGOs with partnership with KCCA
  - KCCA discouraging use of springs for drinking due to pollution
  - KCCA promotes use of piped water from NWSC
  - Individual boreholes require permits from NWSC.

- No framework for management of private wells

Prepaid meter in Kampala (source: Kathy Eales)

General observations on water use and supply

- Piped water supply still a challenge
  - High costs – urban poor cannot afford
  - Intermittent water supply in some areas especially in dry season
  - Inadequate supply due to increasing demands – rationing, negative pressures.
  - Prepaid meters still expensive / personalized by landlords
- Communities perceive springs to be contaminated.
- Deep groundwater perceived to be clean
  - Strong desire by landlords to acquire individual household wells
  - Existing community wells broken down

SELF MANAGEMENT

- Need to provide of boreholes self-managed by the communities

- Complexities and challenges in slums
  - Do households have capacity to maintain the wells?
  - How to enforce and maintain construction standards?
  - No legal framework to promote groundwater use in slums
  - Potential costs to the wider community from the proliferation of household/community wells
  - How to introduce self-management approaches in communities

- Can the TM approach can be a good tool to introduce construction and self management of boreholes in slums?
  - Currently in process of actor selection and setting up learning alliances
  - To learn from communities if TM works or not

PRELIMINARY CONCLUSIONS

- There is fairly good groundwater potential esp in lower slopes.
- Shallow groundwater (Springs) contaminated whereas deep groundwater less contaminated
- Use of household wells limited
- Challenges in piped water supply means urban poor largely depend on contaminated springs
- Strong desire by landlords to acquire deep boreholes - Need to introduce self management of water supply using boreholes
- T-group project in process of experimenting with TM approach to introduce self-management of boreholes in the slums.

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THANK YOU FOR LISTENING

https://upgro.org/consortium/t-group/

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