

Sustaining urban groundwater-fed water supplies and sanitation systems in Africa: case study of Lukaya, Uganda

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Increasing and sustaining access to low-cost urban water supplies and sanitation systems in towns and cities of low-income countries depends upon the conjunctive use of the shallow subsurface for both the supply of safe water and receptacle of faecal wastes (e.g. pit latrines, septic tanks). As part of a three-country, town-city-megacity study under the *AfriWatSan* consortium, we present a situational analysis of the water and sanitation conditions for Lukaya, a town in southwestern Uganda with a population of 25 000 that is dependent upon shallow groundwater for its water supply.. Lukaya experiences a seasonally humid climate with bimodal rainfall and is drained by a regional wetland (River Katonga) that overlies a buried river channel.. Metasedimentary and cratonic rocks are overlain by unconsolidated weathered rock (saprolite) and shallow alluvial and lacustrine sediments. Groundwater levels are shallow (up to 0.5 mbgl) and well yields are typically low ($0.5-1.5 \text{ m}^3\text{h}^{-1}$) with the exception of a production borehole installed in an area with shallow alluvial, lacustrine and possibly fluvial sediments. The yields in distributed handpump wells are highly variable leading to both inconsistent performance and intermittency in supply despite rising water demand. Sanitation facilities comprise pit latrines that are often flooded due to shallow water tables and for which coverage is unassessed but expected to be low. Further, these facilities are proximate to water sources and often emptied into surrounding wetlands increasing associated health risks. Access to water sources is limited and demand is high, with most households being separated from these sources by distances >3 km and having to wait for >30 minutes for their turn to replenish supplies. The background groundwater quality is largely fresh ($<1,000$ mg/l TDS) of Ca-Mg and $\text{HCO}_3\text{-SO}_4$ types but in some cases it may have undesirably high total iron concentrations. Key water and sanitation issues that need to be addressed include: (1) water sources (e.g. insufficient sources and storage, low coverage, inadequate groundwater survey methods which are proximate to sanitation sources); (2) water quality (e.g. turbidity problems, chemical treatment costs); and (3) water and sanitation management (e.g. composition of water boards, dormant water and sanitation committees, sanitary waste discharge to surrounding wetlands, poor maintenance of infrastructure).