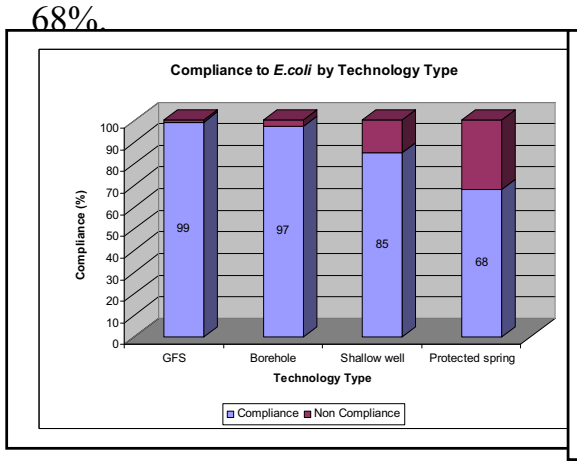
Vulnerability of Shallow Aquifers to Pollution, the Ugandan Case

Introduction

The national sanitation coverage for Uganda stood at 59% and water coverage in the rural area stood at 63% in June 2007. Low cost technology options for water supply (protected springs and shallow wells) constitute 54.3% of the technologies used for groundwater abstraction. These cheap water supply technologies are preferred as they lead to quick increases in water supply coverage (MWE, 2007). Several studies however, undertaken between 1994 and 2007 have shown that protected springs and shallow wells are vulnerable to pollution (RUWASA, 1994; MWLE, 2002, 2003; MWE, 2007).

Water Quality Variation with Technology Type

In 2006, water quality data on *E.coli* from 13 districts in Uganda and 429 improved drinking water sources from different source types; Gravity Flow Schemes (GFS), 273; Deep Boreholes (79); Protected springs (20) and 57 shallow wells were assessed for compliance to National Water Quality guidelines (MAC for *E.coli* is 50 no./100ml) for untreated drinking water. The analysis results depicted in the figure below showed that samples from GFS were least contaminated compared to other source types. Protected springs were the most contaminated showing compliance to guidelines of only 68%.

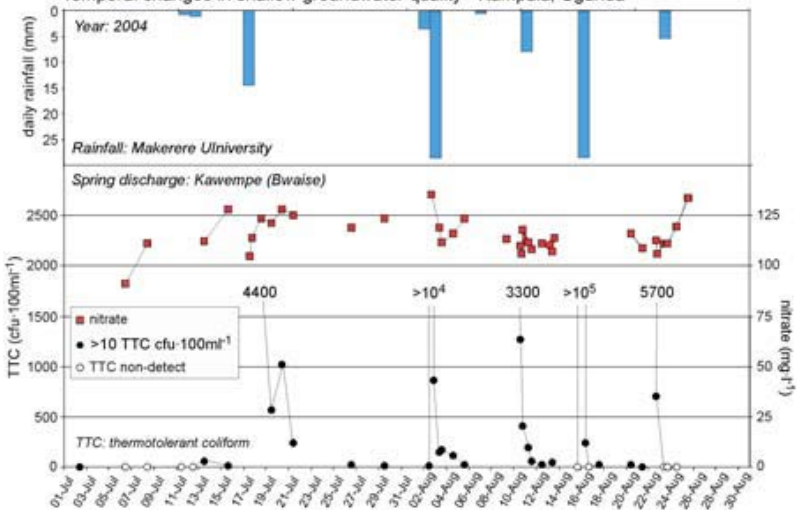


Reasons cited for poor water quality include:

- poor source location;
- poor construction/ poor maintenance;
- seasonal variability;
- poor sanitary conditions

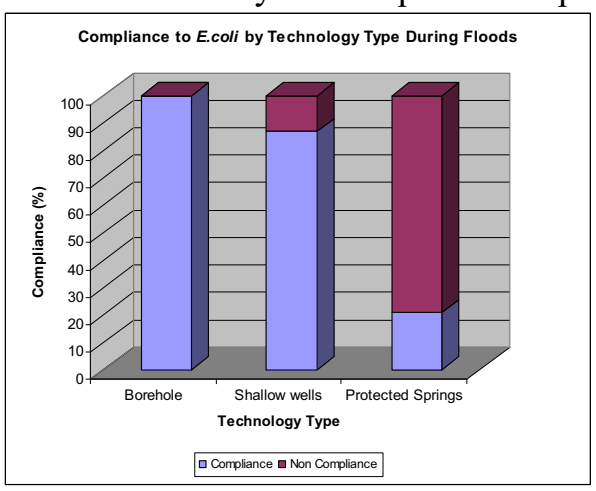
Water Quality of Shallow groundwater during the Wet Season

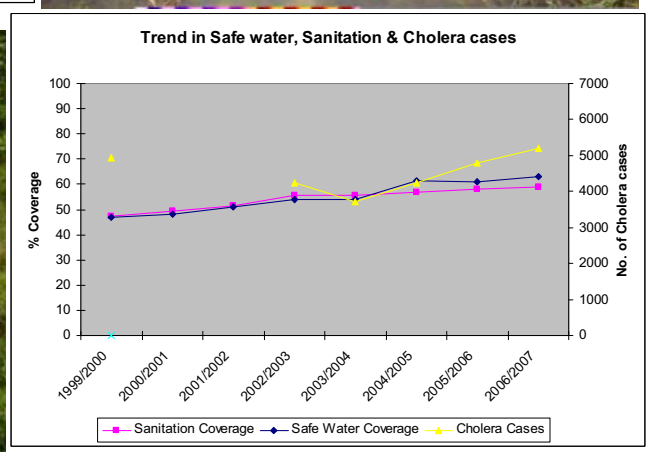
Taylor *et al*(2004) showed that there was a rapid deterioration in bacteriological quality of a protected spring, located in Bwaise, a slum area in Kampala, following heavy rainfall.



Sustainability of Shallow aquifers during Extreme Hydrological Events:The case of the 2007 Floods in Uganda

In September 2007, heavy rains in Northern and Eastern Uganda flooded several districts and affected over 300,000 people. A rapid assessment of water quality for about 50 sources which could be accessed during the flooding period indicated that only 20% of protected springs remained safe.





Six months later, a number of the districts previously affected by floods had an outbreak of cholera.

Health Impact of Poor Sanitation and Poor Water Quality

Outbreak of water borne diseases continues to occur in Uganda despite the increase in sanitation and safe water coverage. Between July 2006 and June 2007 alone, the cumulative total of cholera cases was 5,194 with 105 deaths (MoH, 2007). Trend in water, sanitation & cholera outbreaks indicates that increase in sanitation and safe water coverage, contrary to expectations, has not resulted in drastic decrease in cholera cases. Hepatitis E is a new water related disease in Uganda which broke out in November 2007 and has affected 7163 people by August 2008 and killed 114. Although outbreak of the diseases have been linked to poor sanitation and low water coverage, other factors such as domestic and personal hygiene, water storage issues and service coverage for the urban poor have to be addressed.

Conclusion

- Further research may still be required into the factors that render shallow aquifers vulnerable to pollution but it appears the soil overburden in shallow wells is not sufficient for total protection against pollution from the surface.
- The low level of initial capital investment for cheap and simple rural water supply technologies may be outweighed in the long term by other costs related to illnesses, loss of productive time or costs of interventions during outbreak of epidemics.
- To achieve the desired health impact from improved sanitation and safe water coverage, hygiene, water storage issues and the issues of sanitation and water coverage for the urban poor (city slums) have to be addressed.

Key References

1. R. Taylor, M. Miret-Gaspa, J. Tumwine, L. Mileham, R. Flynn, G. Howard, R. Kulabako (2008) Increased risk of diarrhoeal diseases from climate change – evidence from communities supplied by groundwater in Uganda In: Proceedings of The International Conference on Groundwater and Climate Change, Kampala, Uganda, 2008
2. MoH (2005) Annual Health Sector Performance Report, Financial Year 2004/2005, Ministry of Health
3. MWE (2007) Water and Sanitation Sector Performance Report, Ministry of Water and Environment
4. MWLE (2002) Draft Final Report for Shallow Well and Borehole Rehabilitation study, Ministry of Water, Lands and Environment