Pit Latrines & their Impact on Groundwater in Small Towns in Uganda
A case of Bugiri Town Council

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Background/ Rationale

Despite the abundance of surface water in Uganda (18% of the land area) over 70% of the rural population including small towns relies almost exclusively on groundwater for portable water supply. As a result, provision of safe water to rural communities in Uganda has depended primarily upon the construction of wells and protection of spring discharge. Particular attention has recently been directed at developing the shallow – well aquifer since the formation is less costly and recent study has found it to be more productive than deeper, bedrock aquifer. The promotion of Pit Latrines has traditionally been done with very little knowledge of its impact on the quality of groundwater in Uganda. The presence of poorly designed pit latrines as well as poor and inadequate groundwater protection has led to contamination of spring water and shallow water wells in Bugiri Town Council leading to out break of water bone diseases especially diarrhoea and typhoid.

Incomplete pit latrine hole with water

Filled pit latrine also with water

Borehole in the neighbourhood

Objectives of the Study

The objectives of the study were:
1) To identify and quantify risks for springs and shallow wells (boreholes) water contamination with faecal bacteria in Bugiri Town Council
2) To propose appropriate community based interventions to improve groundwater protection in Bugiri Town Council and other small towns in Uganda

Methodology

A cross – sectional water quality analysis using water samples from 5 springs and 10 shallow wells (Boreholes) was carried out between September and November, 2007. The samples were randomly selected and analyzed for indicators of faecal contamination: total coliforms and faecal streptococci. The laboratory analyses were carried out in the Public Health and Environmental Engineering Laboratory of the Department of Civil Engineering, Faculty of Technology, Makerere University. The study was conducted in Bugiri Town Council and was chosen because of the number of cases reported of water in pit latrines for a long time.

Health centres

A total of ten health centres (Clinics & dispensaries) were visited to identify cases of waterborne diseases putting more emphasis on diarrhoea and typhoid. Health workers were asked about patient responses and their recommendations to improve the situation.

Results

The bacterial quality of groundwater drawn from 15 sites (10 shallow wells and 5 springs) indicated that 40% (6 sites) of the water samples analyzed had strains of faecal bacterial counts. The microbiological analysis for water samples from the 5 springs 40% (2 sites) confirmed the presence of faecal bacteria. It was also found that over 80% of new latrines dug get filled up with water at between 10-20 metres deep before their completion (i.e. 30 metres). Correlation between water quality and the out break of water bone diseases focusing on diarrhoea and typhoid was made by visiting 10 health centres located in the Bugiri town council. It was confirmed that 60% of the health centres visited had at least 5 cases of diarrhoea per month among children below five years. The 40% of health centres had less than 3 cases of diarrhoea per month among children below five years. The presence of the bacterial strains in analyzed water points exposes their users to short and long term health risks. Over 9o% cases of typhoid was more reported one health centre because of the availability of efficient laboratory equipments and proper recording procedures.

Table 1, presents the levels of bacterial indicator organisms in water from springs and shallow boreholes studied.
2 springs were contaminated with faecal indicator bacteria.

Water source	Total coliform (cfu/100ml)	Faecal Streptococci (cfu/100ml)
WHO Standards	0/100ml	0/100ml
B_1	1650	0
S_1	2900	1350
B_2	5050	0
S_2	4300	0
B_3	2450	1200
S_3	2950	0
B_4	5400	1500
S_4	1750	0
B_5	3750	0
S_5	5700	2200
B_6	4000	0
B_7	4450	2100
B_8	3450	1100
B_9	2950	0
B_{10}	4500	0

B= Borehole
S= Spring

Table 2

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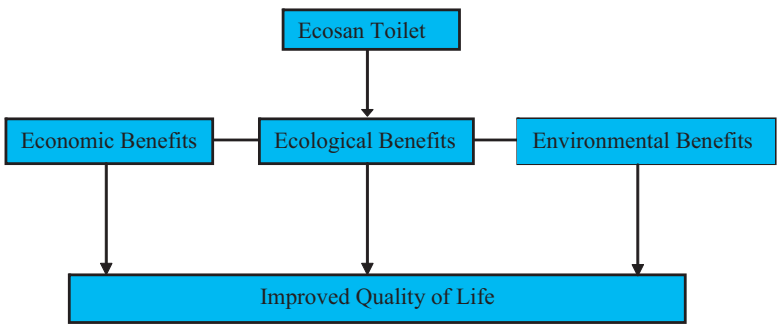
Health Centres	Month 1	Month 2	Month 3
H1	30	21	22
H2	11	20	13
H3	24	25	15
H4	19	20	11
H5	37	34	36
H6	34	21	08
H7	24	29	23
H8	18	11	02
H9	09	08	05
H10	10	04	04

Groundwater protection through Ecosan Technology



Discussion

Although the study was conducted in the dry season, occasional rainstorms were encountered. This could explain the high bacteria counts recorded in some springs and shallow boreholes. Because shallow wells are easy to construct, government is promoting access to water using shallow water wells putting vulnerable communities at risk of getting water borne diseases.

Surveillance of water quality to ensure microbiological and chemical safety is a vital public health function especially in small towns in developing countries.

Sanitary inspection is an important tool in assessing risks of the bacteria contamination of springs and wells. Pit latrines are the major waste facilities in these areas.
In Uganda, sub surface infiltration has been demonstrated to coincide with heavy rainfall.

Conclusion

a) Pit latrines are the key determinants to groundwater contamination in Bugiri town council.
b) Groundwater with faecal bacteria has led to the outbreak of water-borne diseases (diarrhea and typhoid).
c) The capacity of health facilities is very limited to handle cases of these outbreaks thereby requiring capacity building.
d) Ecosan Toilet Technology could reverse the trend if coupled with appropriate awareness and local institutional capacity building.

Key Risks Observed

a) Pit latrines are filled with water at the level of 5-10 metres deep putting pressure on available land for more latrines.
b) Construction of a new pit latrine is frequently done by households and yet it is very expensive for a person living below the poverty-line ($1 a day).
c) Surface water collects upstream of springs and diversion ditch above the spring absence or non-functional.
d) There are other water pollution sources such as solid wastes, stagnant water, animal waste, e.tc.

"We spend alot of money constructing pit latrines. We just need your help and let us hope you will just do that."

- Mzee Dauson Nyende
Chairman Elders' Council