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Analysis of groundwater used in areas beyond the National Water Board distribution network in Ratnapura

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Groundwater is the main source of drinking water in selected areas in Ratnapura where municipal water is not accessible. In a majority of households, it is consumed without any treatment. Waterborne diseases such as dysentery and typhoid fever may spread as a result of microbial pathogens. Chemical contaminants may also result in kidney-related issues. The present study was conducted to evaluate the quality of groundwater in three Grama Niladhari divisions around Ratnapura urban area. Amuwala, Kahengama South and Gonakumbura divisions were selected, and twenty wells were sampled from each division for three months as replicates. Measured parameters included total Coliforms, *Escherichia coli*, color, turbidity, pH, electrical conductivity, chloride, total alkalinity, total hardness, total iron, sulfate and total dissolved solids (TDS). One-sample t-test was performed at a 5% level of significance to assess the deviation of each parameter from Sri Lanka water quality standards. The results revealed that all water sources in the study were microbiologically contaminated throughout the sampling period. All of the physical and chemical water quality parameters were within the limits of Sri Lanka Standards (SLS) 614: 2013 except the pH level which was below the SLS requirement. The turbidity level was statistically significant at the SLS median value in Kahengama and Gonakumbura. Since the presence of *E. coli* bacteria indicates potential fecal contamination in the water, public awareness programmes are needed to educate consumers on the importance of consuming boiled water. The low pH issue can also be resolved by using pH adjusting water filters. The municipal distribution lines have to be extended further permitting access to disinfected potable water to a greater number of consumers.

	Amuwala GND	Kahengama South GND	Gonakumbura GND	SLS 614:2013 Limits
Total Coliforms (per 100 ml)	193.0 ± 71.6	86.4 ± 76.8	214.2 ± 150.1	<10
<i>E. coli</i> (per 100 ml)	112.8 ± 55.3	45.0 ± 44.3	119.0 ± 96.5	NIL
Color (Hazen)	3.8 ± 1.7*	2.9 ± 0.6*	2.7 ± 0.5*	<15
Turbidity (NTU)	1.9 ± 1.6*	0.9 ± 0.6**	1.2 ± 1.0**	0-2
pH	5.6 ± 0.5	5.2 ± 0.3	5.4 ± 0.5	6.5 - 8.5
Electrical conductivity (µS cm ⁻¹)	62.5 ± 24.3	95.0 ± 86.0	57.0 ± 28.8	Not Specified
Chloride (mg L ⁻¹)	27.7 ± 5.5**	29.4 ± 4.4**	18.0 ± 6.0**	0-250
Total Alkalinity (mgL ⁻¹)	22.4 ± 8.6*	39.0 ± 43.4*	29.0 ± 13.8*	0-200
Total Hardness (mg L ⁻¹)	27.0 ± 7.3*	38.8 ± 40.3*	31.8 ± 12.8*	0-250
Total iron (mg L ⁻¹)	0.1 ± 0.09*	0.06 ± 0.02*	0.07 ± 0.08*	0-0.3
Sulfate (mg L ⁻¹)	6.2 ± 2.7*	5.6 ± 2.5*	3.4 ± 0.8*	0-250
TDS (mg L ⁻¹)	41.2 ± 16.1*	62.6 ± 56.7*	36.2 ± 18.4*	0-500

** statistically significant with the median at 5%

* within the acceptable range

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