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PAPER

Preliminary Investigation of Water Hardness in Polpithigama Divisional Secretariat in Kurunegala District

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A frequent complaint of the inhabitants (primarily, farmers) of Polpithigama Divisional Secretariat in Kurunegala District, is the increasing hardness in dug wells and tube wells and as a result new wells are dug in search of water without hardness. Besides, a chronic kidney disease has been rapidly spreading among people within the last decade.

A preliminary study was carried out to determine the ground water quality of the study area using dug-wells located in Mahawa, Siyambalangamuwa area. Sampling wells were chosen across an elevation gradient that extends from hills towards the paddy fields. Samples were taken from the surface of water and from the bottom of the well. Samples of groundwater in triplicate were collected into polypropylene bottles (rinsed with 10% nitric acid, followed by de-ionized water) from dug wells used by the villagers for drinking and domestic use. Immediately after measuring the pH of the water samples, 1 ml of concentrated HNO₃ (0.1% v/v) was added to the sample bottle for preservation and they were brought to the laboratory. Calcium hardness, total hardness (Ca²⁺ and Mg²⁺) and other ions (PO₄³⁻, SO₄²⁻, NO₃⁻, CO₃²⁻) in water samples were measured. Ca²⁺ and total hardness were measured using EDTA titration. PO₄³⁻, SO₄²⁻, NO₃⁻ contents were measured colorimetrically using spectrophotometer. An acid titration was used to determine the CO₃²⁻.

Total hardness (as CaCO₃) of water (n=20) ranged 150-420 ppm and Ca²⁺ hardness ranged 110-390 ppm. PO₄³⁻ and SO₄²⁻ contents of the samples ranged between 1 - 22.4 ppm and 12.5-605 ppm respectively. CO₃²⁻ was ranged 24-492 ppm and NO₃⁻ was ranged 1 - 6 ppm. Hardness of bottom layer of water in the wells was significantly higher than that of the surface water samples. These levels exceed WHO prescribed values for drinking water. Results substantiate the general complaint by the villagers in the study area that the quality of water is unacceptable for drinking. A potential cause of increasing groundwater hardness may be due to accumulating ions in the water from increasing amounts of inorganic ions leached into groundwater from agrochemicals used abundantly in this area.