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Investigation of some water quality parameters in the ground water of East and Central regions of Valigamam Zone in Jaffna Peninsula

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Jaffna peninsula relies on ground water for their entire domestic and agricultural needs due to less rainfall and not any other fresh water resources. In recent years many complaints have been received indicating that ground water is unsuitable for human consumption. Increased levels of certain ions such as calcium, nitrate in water deteriorate the quality of water and can cause serious health issues such as kidney diseases and blue baby syndrome. Thirty two water samples from domestic and agriculture wells were collected randomly from East and Central regions of Valigamam zone in Jaffna peninsula. The water quality parameters such as total dissolved solids, alkalinity, potassium, phosphate, sulfate, nitrate, calcium and magnesium were evaluated from December 2017 to March 2018. Phosphate, nitrate and sulfate were determined by multiparameter photometer using powder pillows, calcium and magnesium were determined by titration methods, total dissolved solids were determined by multiparameter and potassium by flame photometer. The results obtained were compared with the Sri Lankan standards for potable water – SLS 614:2013. It was found that about 62.5% of samples exceeded the standards (500 mg/L) in total dissolved solids. Alkalinity content of all the samples exceeded the Sri Lankan standards (400 mg/L). Sulfate content was higher in 12.5% samples compared to standard (250 mg/L). Manipay, Kopay and Inuvil areas showed high concentration in most of the ions compared to standards. These are the areas where agriculture was practiced throughout the year. High amount of calcium in ground water was observed in areas such as Kopay and Urumpirai. Calcium ions in water samples varied from 63.2 to 246.4 mg/L which shows an increase by about four fold within 16 years compared to studies in 2001. Elevated levels of nitrate content were found in Inuvil, Uduvil and some places in Kopay. A survey conducted among the farmers has shown that application of fertilizers in those areas were high. The nitrate content varied from 2.7 to 199.5 mg/L. 37.5% samples showed higher content of nitrate than the permissible level (50 mg/L) making them unsuitable for drinking purposes. The pH values of the water samples were within the range of 6.8 to 10.39 indicating slight alkalinity. The phosphate level varies from 0.18 to 3 mg/L in Kopay and 0.12 to 2.4 mg/L in Kondavil area. Compared to a study in 2013, the phosphate levels have increased in the study areas by three folds. The present study suggests that water quality of groundwater in Valigamam zone has increased in the levels of nitrate, phosphates, sulfate and calcium. Agriculture practices impact on the water quality parameters and use of fertilizers in agriculture should be minimized in Valigamam area.

Keywords: Jaffna peninsula, nitrate, phosphate, water quality parameters