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Assessment of spatial variation of ground water quality in Colombo district, Sri Lanka

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In Sri Lanka, groundwater resources are widely used for domestic, commercial and industrial purposes and the demand for ground water is steadily increasing, particularly for urban & rural domestic water supplies, irrigated agriculture and in the industrial sector. This rapid increase in demand and lack of management is exerting considerable pressure on the available groundwater resources. Therefore, it's vital to monitor the quality of ground water for sustainable utilization. For ground water quality assessment, Colombo district was selected as the study area since it is urbanized rapidly in last decades. The main aim of the study was assessing spatial variation of ground water quality in Colombo district in year 2018. Some of the physicochemical parameters were selected namely pH, temperature, conductivity, total dissolved solids, salinity, COD, hardness, total phosphate, nitrate-N, DO and BOD₅. Sampling was carried out during the south western monsoon from June 2018 to September 2018. With the availability 03 open wells were selected randomly, from each Divisional Secretary Division (DSD) and water samples were collected during the morning hours in between 0-3 m depths as 03 replicates from each well at once. Total 39 open well samples were tested using standard methods. The obtained results are compared with proposed ambient water quality standards for inland waters in Sri Lanka by the Central Environmental Authority (CEA). The results reveal that in most of the sites pH, COD and BOD₅ are not meeting the standards. Lower pH levels can occur due to natural acidification as well as anthropogenic causes linked to the industrialization, atmospheric emissions or cultivation. Results of PCA analysis reveal that the sites which are surrounded with agricultural areas such as in Hanwella, Padukka, Homagama, Kaduwela, and Kesbewa showed higher nitrate-N, total phosphate levels and low pH values. In contrast higher pH values as well as low nitrate-N and total phosphate levels were observed in non-agricultural areas. Hence come to a conclusion that long-term agricultural practices may have acidified the ground water and elevated organic matter accumulation due to high urban runoff, sewage seepage from slums and poor maintenance of wells could have caused higher COD, BOD₅ levels in urbanized areas such as in Thimbirigasyaya, Moratuwa, Dehiwala, and Kotte. The study of physicochemical characteristics of this ground water samples suggests that the evaluation of water quality parameters as well as water quality management practices should be carried out to protect the water resources. Unless the use of surface area is managed in a sustainable way, it will have adverse repercussions on the environment.

Keywords: pH, Ground water, Colombo district, PCA, Water quality management