

Hydro-Geochemical Variations of Ground Water in Different Types of Land Use in Belihuloya Mini Catchment

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The characteristics of surface and underground water are dependent on natural factors in the drainage basin and vary with seasonal differences in runoff volumes, weather conditions and water levels. Human interventions also have significant effects on water quality. This study examined the spatial distribution of hydro-geochemical characteristics of groundwater under different types of land use in Belihuloya mini-catchment area. To investigate spatial variations of hydro-geochemical parameters the water samples were collected during North Eastern Monsoon (NEM) and First Inter-monsoon (FIM) seasons in 2014. 20 water samples were selected containing 10 from springs and 10 from the selected wells. Spatial variation of pH and Ca in sample wells and spring water showed different patterns when comparing of NO₃, SO₄, K and Na in the area. According to the WHO guidelines lower levels of pH (4.5-5.5) were observed of wells located in the western part of the middle catchment area and pH levels of all spring water were within in the recommended level (6.4 to 7.4). Ca concentrations of wells (Ca; 14.4-19.1 mg/L) located in the eastern part of the middle catchment area and of springs (16,2-20.1 mg/L) located in down catchment area were higher than those in the study area. However, all parameters of water samples were less than the WHO recommended limits. The spatial variation of NO₃, SO₄, K and Na in the area showed similar variations with the land use pattern in the area. Higher concentrations of NO₃ (2.2-2.9 mg/L), SO₄, (1.0-1.9 mg/L), K (4.7-9.3 mg/L) and Na (7.3- 9.3 mg/L) were detected in well water along the Eastern part of the middle catchment area associated with paddy, home garden and built-up area. Higher levels of NO₃ (1.6-1.9 mg/L), SO₄, (1.6-1.9 mg/L), K (3.3-3.9 mg/L) and Na (4.4-5.3 mg/L) were detected in spring water along western part of the upper catchment, eastern part of the middle catchment and lower catchment area associated with paddy, home garden, pines, tea, built-up and scrublands in the area. This study attempted to examine the spatial distribution of hydro-geochemical characteristics of groundwater under different types of land use in the Belihuloya mini-catchment area. However, the spatial variation of NO₃, SO₄, K and Na in the area showed similar variations with the land use pattern in the area. Higher concentrations of nutrients due to fertilization were noted along the paddy lands, home gardens, tea and built-up areas, particularly in the middle catchment area where the earliest land use type as forests was found. Lower levels of nutrients in groundwater were observed along forested, scrubland and grasslands. The use of high yielding varieties, intensive agricultural practices and changing the economic mode of production since 1956 have considerably change the water quality. Hence continuous monitoring of ground and surface water quality in the study area is necessary to avoid the potential impacts to the water resources.

Keywords: hydro-geochemical variations, ground water, water quality, land use change