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ANALYSING THE EFFECT OF EXTENSIVE AGROCHEMICAL USAGE ON THE QUALITY OF GROUNDWATER IN INTENSIVE VEGETABLE CULTIVATION AREAS IN SRI LANKA - A CASE STUDY IN DIYATHALAWA

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ABSTRACT

Groundwater is an important water source which provides freshwater. The quality of groundwater varies from place to place, mainly depending on its geological origin and it is deteriorated heavily by various anthropogenic activities. Objective of this study was to analyse the effect of extensive agrochemical use on the quality of groundwater in intensive vegetable cultivation areas in Sri Lanka. The study was conducted as a case study in Diyathalawa where vegetable cultivation is practiced intensively and agrochemicals are used extensively. Within the area intensive vegetable cultivation area was identified with the GPS coordinates, where people mostly used groundwater for various purposes and near to the sources which the groundwater quality may affect. 0.5 km^2 land area which is encircled by intensively vegetable cultivated lands was selected and 40 well water samples were collected as before and after addition of agrochemicals to test for the Temperature, Turbidity, pH, Electrical conductivity (EC), Total Dissolved Solids (TDS), Nitrate ($NO3^-$), Phosphate ($PO4^{-3}$), Sulphate ($SO4^{-2}$), Bicarbonate ($HCO3^-$), Carbonate ($CO3^{-2}$), Chloride (Cl^-), Fluoride (F^-), Potassium (K), Magnesium (Mg), Copper (Cu), Sodium (Na), Cadmium (Cd), Calcium (Ca), Manganese (Mn), Iron (Fe) and Strontium (Sr). Data were analysed by using Minitab 18.0, GW Chart and Visual MINTEQ 3.1. The distribution of Electrical Conductivity and Total Dissolved Solids were almost same in all the samples collected from the selected area. Cadmium concentration exceeded the SLS maximum permissible limit defined in Sri Lanka Standards for potable water of SLS 614: 2013. Therefore, it is important to further analysis for Cadmium as it is considered as a major cause for Chronic Kidney Disease of uncertain aetiology (CKDu). The other parameters did not exceed the maximum permissible limits in almost all samples. Therefore, it is possible to conclude that groundwater in the area is in good quality except for Cadmium concentrations.

Keywords: Groundwater contamination, Extensive agrochemical use, Intensive vegetable cultivation