Suitability of surface water and groundwater in Dry Zone in Sri Lanka for irrigation and domestic purposes

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The dry zone in Sri Lanka consists of several major districts, occupies two-thirds of the island receives about 1000 mm rains annually that comes entirely from the North-East monsoon. Due to low rainfall and higher demand of water supply, the government of Sri Lanka had diverted a major river the Mahaweli to the dry zone under the Mahaweli Development project for cultivation and other domestic purposes. Farmers regularly add more fertilizers and agrochemicals to their lands expecting high yield and this may exceed recommended levels causing substantial changes in the hydrology and geochemistry of water bodies in agricultural areas. Many studies suggest that the cause of diseases to human is related to poor quality of drinking water and contaminants in the geo-environment of Sri Lanka as the entire population obtains its food and water from the surrounding areas. Therefore in this study, surface and groundwater collected from areas in which intense agricultural activities are taking place were geochemically investigated to evaluate the processes which are important for sustainable development of water resources in the country.

Using World Health guidelines, pH value and Ca^{2+}, K^{+} ions in the dry zone were found to be within the permissible limit and 14% of Electrical Conductivity (EC), 9% of Mg^{2+}, 11% of Cl^{-}, 77% of Na^{+} in the samples were found to be above the permissible level and 9% Total Dissolved Solids (TDS) made the water of brackish type, 55% were hard, 24% were very hard in the samples. Na^{+}, Ca^{2+}, Mg^{2+} and HCO_3^{-}, Cl^{-}, SO_4^{2-} are the major cations and anions in dry zone. The abundance of major cations was in the order $Na^{+} > Ca^{2+} > Mg^{2+} > K^{+}$ and anions followed the order $HCO_3^{2-} > Cl^{-} > SO_4^{2-} > CO_3^{-}$. 93 % of surface water samples were found suitable for irrigation. The suitability of reservoir water for irrigation is 75% on the basis of Na%, 46% on the basis of Residual Sodium Carbonate (RSC). Evaporation plays a major role in deciding the chemical composition of groundwater in this area. Influence of anthropogenic activities on groundwater was studied in terms of pollution constituency and 26% of the water samples were found to have high percentages of pollution indicating increased contamination. Continuous monitoring of water quality in the area will be required during the process of restoration to follow the progressive improvement in ground and surface water quality.

Financial support from the National Research Council (Grant 12-125) is gratefully acknowledged

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