

## Assessment of Groundwater Quality and Associated Geochemical Processes in a Tropical Watershed –Walawe River Basin, Sri Lanka

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The Walawe River basin is the fourth largest river basin in Sri Lanka which is undergoing rapid industrial and agricultural development. Hence groundwater has become an important freshwater source for consumption and become vulnerable due to over-exploitation and predicted climate change scenarios. A detailed hydrogeochemical study was carried out in the Walawe river basin to investigate the groundwater suitability for drinking and irrigation purposes. A total of sixty-four groundwater samples were collected from thirty-two locations of the study area during the pre- (May - June) and post-monsoon (February –March) periods and analyzed for their major and trace elements, and also for water isotopes ( $\delta^{18}\text{O}_{\text{H}_2\text{O}}$  and  $\delta^2\text{H}_{\text{H}_2\text{O}}$ ). The solute compositions in groundwater in the region were dominated by  $\text{HCO}_3^-$ ,  $\text{Cl}^-$ , and  $\text{SO}_4^{2-}$ , which were mostly balanced by  $\text{Na}^+$ ,  $\text{Ca}^{2+}$ , and  $\text{Mg}^{2+}$ . The Piper classification indicated that the groundwater in the region was dominated by  $\text{Ca}^{2+}\text{-HCO}_3^-$  type of water with subordinate contributions of  $\text{Ca}^{2+}\text{-Na}^+\text{-HCO}_3^-$ ,  $\text{Ca}^{2+}\text{-Mg}^{2+}\text{-Cl}^-$ ,  $\text{Na}^+\text{-Cl}^-$ , and  $\text{Ca}^{2+}\text{-SO}_4^{2-}$  rich waters. Groundwater in the region exceeded the levels in terms of EC, hardness, and fluoride. A greater percentage (82%) of post-monsoon samples was poor in quality for drinking purposes when compared to pre-monsoon (47%) samples. According to the US salinity laboratory and Wilcox's classification, two-thirds of investigated groundwater samples were suitable for irrigation purposes. The isotope data suggested that the groundwater in the region is recharged from the first inter-monsoon and north-east monsoon events and intensively affected by evaporation events. The findings of this study suggest that water quality management in the Walawe River basin is essential and water resources should critically monitor to reduce the anthropogenic stress on groundwater resources.

**Keywords:** *Agricultural pollution, Environmental isotopes, Irrigation suitability, Water quality index*