

Saturation states of carbonate minerals in a freshwater-seawater mixing zone of small tropical island's aquifer

ABSTRACT

Groundwater is a crucial resource on the Manukan Island as it is the only source of freshwater available on the island. The aquifer has deteriorated to a high degree, during the last decade. Nine domestic wells were sampled from March 2006 to January 2007 to probe the hydrochemical components that influence the water quality. Geochemical data on dissolved major constituents in groundwater samples from the Manukan Island revealed the main processes responsible for their geochemical evolution. The results using statistical analyses, graphical method and numerical model output (PHREEQC) showed that the groundwater was chemically highly enriched in Na and Cl, indicative of seawater intrusion into the aquifer as also supported from the Na-Cl signature on the Piper diagram. From the PHREEQC simulation model, calcite, dolomite and aragonite solubility showed positive values of the saturation indices (SI), indicating supersaturation which led to mineral precipitation condition of water by these minerals.

Keyword: Manukan Island; Seawater intrusion; Hydrochemistry; Saturation index