

## Groundwater assessment at Manukan Island, Sabah : multidisciplinary approaches.

### ABSTRACT

A rapid increase in the number of tourists has placed a heavy demand for freshwater on Manukan Island, a small island located offcoast of Kota Kinabalu, Sabah. Hydrochemical and numerical approaches have been applied in this study to evaluate the groundwater quality of unconfined aquifer lying in Manukan Island, Sabah, East Malaysia. This is vital to enhance better understanding about groundwater management. Hydrochemical analysis output indicated NaCl water type in sampling locations. Seawater intrusion is marked by its relatively high  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Cl}^-$  and  $\text{SO}_4^{2-}$  concentrations. Hydrochemical analysis output clearly showed the influence of seawater in groundwater of Manukan Island. The numerical model output proved the influence of seawater in groundwater of Manukan Island by indicating the upconing process at the beneath of the pumping well. Current status of seawater intrusion in Manukan Island is about 14.6% of freshwater and seawater mixing ratio in low lying area of Manukan Island as simulated by SEAWAT-2000 model output. Numerical model SEAWAT-2000 output showed clearly that the upconing process is the possible route of seawater to influence the fresh groundwater aquifer chemistry in Manukan Island. The results have enhanced the current understanding of seawater intrusion in the study area. Future studies will focus on using numerical models to simulate and suggest suitable groundwater management plans in Manukan Island.

**Keyword:** Shallow groundwater; Hydrochemical; Numerical model; Seawater intrusion; Small island.