

## **Modeling for equitable groundwater management**

### **Abstract**

Freshwater lens on small islands may easily be overexploited or polluted due to overdrafts of fresh water by pumping which causes drawdown of the water table a rise or up-coning of the saltwater interface. Present study is concerned with using a three-dimensional finite-difference numerical model to simulate the groundwater flow and transport model to predict the behavior of groundwater system in Manukan Island. The simulations were done using variable density SEAWAT-2000 for three selected pumping schemes. Hydraulic heads (groundwater level) is the highest at the center of the island and decreases in radial shape towards the coast in all the pumping schemes (PS1-PS3). The chloride concentration in the studied aquifer increased by 98.7% in the pumping well if the pumping rate is doubled by the current (PS2 to PS3). The 1.4% seawater-freshwater mixing moves further forward to inland about 1.6m when the current pumping rate was doubled whereas moves backward to sea about 1.7m if the current pumping rate is reduced by 50%. This preliminary model of Manukan island aquifer shows that an overexploitation of groundwater in Manukan Island contributes to the seawater intrusion. Adjusting the future groundwater pumping scheme and improving groundwater management strategies are necessary to protect the freshwater aquifers. The current numerical model is a reasonable representation of the aquifer in Small Island which can be used in similar small islands with similar hydrogeological conditions in elsewhere.