

# **A Study on Hydrogeological and geochemical Properties of Groundwater in Saga Plain, Japan**

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Hydrogeological analysis of ground water resources of Saga plain that is located in the west of the Kyushu Island of Japan is discussed. Saga plain is an alluvial deposit plain, surrounded by mountains in north, west, east and, Ariake Sea at south.

Saga plain is underlain by about 10 to 30 m of soft compressible clay. Underneath are the unconsolidated sedimentary layers of mainly mingled marine sand and silt. The groundwater in Saga plain is seriously affected by over-pumping and resulted the environmental problems of ground water drawdown and land subsidence.

The groundwater system of Saga plain was analysed with respect to geology, water quality and quantity to predict the fluctuation of groundwater level and give a reference guide to the pumping operation. A model of one-layer two-dimensional plane was realistically adopted to simulate the fluctuation of groundwater head. Simulation results showed that the model matched well with the actual observations.

According to the analysis of groundwater chemical components ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Cl}^-$ ,  $\text{HCO}_3^-$ ,  $\text{SO}_4^{2-}$ ) in different aquifers, it was found that the variation of water quantity caused the change of water quality in Saga plain. Salt-water intrusion took place from the south Ariake Sea in shallow and medium aquifer due to low level of groundwater. The test results showed that generally the concentration of  $\text{Cl}^-$  was between 3.1ppm and 47ppm, but at certain location, the value was over 7500ppm. The effect of salt-water intrusion was found to be larger along coastal area than inland area.