

Using GIS and Map Data for the Analysis of the Relationship between Soil and Groundwater Quality at Saline Soil Area of Kham Sakaesaeng District, Nakhon Ratchasima, Thailand

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Abstract : The study area is Kham Sakaesaeng District in Nakhon Ratchasima Province, the south section of Northeastern Thailand, located in the Lower Khorat-Ubol Basin. This region is the one of saline soil area, located in a dry plateau and regularly experience standing with periods of floods and alternating with periods of drought. Especially, the drought in the summer season causes the major saline soil and saline water problems of this region. The general cause of dry land salting resulted from salting on irrigated land, and an excess of water leading to the rising water table in the aquifer. The purpose of this study is to determine the relationship of physical and chemical properties between the soil and groundwater. The soil and groundwater samples were collected in both rainy and summer seasons. The content of pH, electrical conductivity (EC), total dissolved solids (TDS), chloride and salinity were investigated. The experimental result of soil and groundwater samples show the slightly pH less than 7, EC (186 to 8,156 us/cm and 960 to 10,712 us/cm), TDS (93 to 3,940 ppm and 480 to 5,356 ppm), chloride content (45.58 to 4,177,015 mg/l and 227.90 to 9,216,736 mg/l), and salinity (0.07 to 4.82 ppt and 0.24 to 14.46 ppt) in the rainy and summer seasons, respectively. The distribution of chloride content and salinity content were interpolated and displayed as a map by using ArcMap 10.3 program, according to the season. The result of saline soil and brined groundwater in the study area were related to the low-lying topography, drought area, and salt-source exposure. Especially, the Rock Salt Member of Maha Sarakham Formation was exposed or lies near the ground surface in this study area. During the rainy season, salt was eroded or weathered from the salt-source rock formation and transported by surface flow or leached into the groundwater. In the dry season, the ground surface is dry enough resulting salt precipitates from the brined surface water or rises from the brined groundwater influencing the increasing content of chloride and salinity in the ground surface and groundwater.

Keywords : environmental geology, soil salinity, geochemistry, groundwater hydrology

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