

Hydrology exploration for groundwater management case study : Donpradoo Subdistrict and Pakpayoon Subdistrict, Pakpayoon District, Phatthalung Province

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Donpradoo and Pakpayoon subdistricts, Pakpayoon district, Phatthalung province, are predominantly lowland areas adjacent to Songkhla Lake. During the rainy season, seawater inundates natural canals, resulting in brackish, turbid surface water unsuitable for consumption. In the dry season, surface water dries up, and saline intrusion affects shallow wells and groundwater wells, leading to water shortages. The development of groundwater in this region is challenged by the area containing hard rock aquifer (meta-sedimentary aquifers) and issues of iron contamination and salinity in aquifers near Songkhla Lake. Therefore, it is essential to study, survey, and evaluate the groundwater potential to determine the area's hydrogeological conditions, groundwater quantity, and quality. This will guide the development of groundwater resources and propose appropriate management strategies.

The methodology consisted of collecting and analyzing data on geology, hydrogeology, and groundwater wells to prepare for field surveys. Fieldwork includes geological surveys, groundwater level measurements, collecting water samples, a geophysical resistivity method using the vertical electrical sounding (VES) to identify suitable drilling locations, and Drilling groundwater wells and conducting borehole electrical logging to identify and select aquifer layers. The data will be used to design and construct groundwater wells for pumping tests and water quality analysis.

Results indicate that the area is underlain by hard rocks, such as chert, shale, shale-interbedded limestone, and sandstone, groundwater aquifers were found in fractures and at the interfaces between rock layers and weathered rock at depths of 60-300 meters, and average water levels at 0-7 meters above mean sea level. Northern areas exhibit high groundwater potential with yields of 14-25 cubic meters per hour, while central and southern areas show low to medium groundwater potential with yields of 2-5 cubic meters per hour. Groundwater quality generally meets standards, with total dissolved solids ranging from 30-1200 mg/L, but some areas exceed the iron maximum permissible standard of 1.8 mg/L and require treatment to reduce iron levels to below 1.0 mg/L.

The proposed management models for groundwater resources, based on groundwater potential in terms of quantity and quality, involves distributing water from the northern area of Donpradoo subdistrict, which has high groundwater potential, to the central, southern areas of Donpradoo subdistrict and the southern area of Pakpayoon subdistrict, which have lower groundwater potential. There are three models: Model 1, Long-distance groundwater (A1, A2) for 561 households in Donpradoo subdistrict. Model 2, Long-distance groundwater (B1, B2) for 1,141 households in Pakpayoon and Donpradoo subdistricts. Model 3, Long-distance groundwater (C1, C2) for 1,975 households in Pakpayoon and Donpradoo subdistricts. These models support planning and decision-making for appropriate groundwater resource management.

Keywords: Meta-sedimentary aquifer, Groundwater management, Hydrological exploration

