



## **Zonal management of multi-purposes groundwater utilization based on water quality, impact on the aquifer and information of land use**

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Groundwater is widely extracted for meeting the demands of drinking, irrigation, and aquaculture in the Langyang Plain. A long-term groundwater quality survey in northeastern Taiwan's Lanyang Plain has revealed obvious contamination of some part of the groundwater, with some measured hydrochemical parameters in excess of the levels recommended by Taiwan Environmental Protection Administration. In addition, land subsidence and seawater intrusion caused by overexploitation of groundwater are also found in the Langyang Plain. Thus, establishing a sound plan for groundwater resource management that considers groundwater quality and the aquifer impact by pumping in Lanyang Plain is important. This study aims to present a zonal management plan for the multi-purpose groundwater utilization in the Lanyang Plain based on the groundwater quality and aquifer impact by pumping. The Kriging approach is used evaluate spatial distribution of groundwater quality and the safe zones are determined based on the water quality standards for the three groundwater utilization sectors. The suitable zone for the aquifer impact by pumping is then spatially determined based on the ratio of actual groundwater utilization to the transmissivity. Integrating the evaluation results showing the safe water quality zones for the three different purposes of groundwater utilization demands and suitable zones for the low impact on the aquifer. Integrating the evaluation results showing the safe water quality zones for the three different purposes of groundwater utilization demands and suitable zones for the low aquifer impact by pumping can create groundwater management map for multi-purpose groundwater utilization. Ultimately, the obtained groundwater management map is compared with the current land use information to provide a basis for evaluating current land use practices and establishing a water resource management strategy for safe and sustainable use of groundwater to meet multi-purpose groundwater utilization requirements in the Lanyang Plain.