



## **Spatial variability analysis of combining the water quality and groundwater flow model to plan groundwater and surface water management in the Pingtung plain**

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As a result of rapid economic growth in the Pingtung Plain, the use of groundwater resources has changed dramatically. The groundwater is quite rich in the Pingtung plain and the most important water sources. During the several decades, a substantial amount of groundwater has been pumped for the drinking, irrigation and aquaculture water supplies. However, because the sustainable use concept of groundwater resources is lack, excessive pumping of groundwater causes the occurrence of serious land subsidence and sea water intrusion. Thus, the management and conservation of groundwater resources in the Pingtung plain are considerably critical. This study aims to assess the conjunct use effect of groundwater and surface water in the Pingtung plain on recharge by reducing the amount of groundwater extraction. The groundwater quality variability and groundwater flow models are combined to spatially analyze potential zones of groundwater used for multi-purpose in the Pingtung Plain. First, multivariate indicator kriging (MVIK) is used to analyze spatial variability of groundwater quality based on drinking, aquaculture and irrigation water quality standards, and probabilistically delineate suitable zones in the study area. Then, the groundwater flow model, Processing MODFLOW (PMWIN), is adopted to simulate groundwater flow. The groundwater flow model must be conducted by the calibration and verification processes, and the regional groundwater recovery is discussed when specified water rights are replaced by surface water in the Pingtung plain. Finally, the most suitable zones of reducing groundwater use are determined for multi-purpose according to combining groundwater quality and quantity. The study results can establish a sound and low-impact management plan of groundwater resources utilization for the multi-purpose groundwater use, and prevent decreasing ground water tables, and the occurrence of land subsidence and sea water intrusion in the Pingtung plain.