Hydromechanical model of land subsidence in Chousui River Alluvial Fan

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Abstract

The Choushui River Alluvial Fan is currently facing serious land subsidence problems. In recent years, the main subsidence areas have gradually moved inland, causing security issues for the Taiwan High Speed Rail (THSR). Although the pumping of groundwater along the high-speed railway is forbidden, the problem of sinking land has not disappeared. The causes of land subsidence can be multiple and complex. There are discussion about the causes of land subsidence in the Chousui River Alluvial Fan. Agriculture, aquaculture and industry are believed to be the main causes of land subsidence in the Chousui river alluvial fan. Agriculture and aquaculture have pumped groundwater from the shallow unconfined aquifer and the industry have pumped groundwater from the deeper part of the aquifer in the basin. The contribution to land subsidence from each activities still unclear. This study assesses the contribution of shallow groundwater pumping to total land subsidence in this area. Finite Difference model MODFLOW 2005 conjuction with SUB-WT package were used to simulate hydromechanical simulation. Numerical simulation in each aquifer were conducted to evaluate which layer has the greatest contribution to land subsidence. to verify the numerical model performance, each modeling result will be compared to observed data. Model simulation show that the largest land subsidence in the Chousui river alluvial fan located near the coastal area. Especially for yunlin county, the distribution of land subsidence spreads to the middle of the basin. The subsidence rate reaches 5 cm/year.Based on the understanding of the local variation process of the land subsidence, we could carry out an efficient management plan to mitigate subsidence in the Choushui River alluvial fan.