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Estimation of suitable groundwater safe yield under the unusually constraints of environmental conditions in Changhua area, Taiwan

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ABSTRACT

There is no reservoir in Changhua area of Taiwan, all the source of water requirement comes from the groundwater. However, the groundwater here is not enough that needs other water supply from Feng-yuan and Lin-nei. In the recent years, several areas near the coast in Changhua are set to be the groundwater restricted areas that the groundwater yield is limited.

In the present study, the hydrological numerical model was built to simulate the groundwater system by the MODFLOW code. To calibrating the numerical model by groundwater level to fit the field conditions, there were limits including yield in each area; location of pumping wells; limit of groundwater restricted areas; water requirement and deployment of water pipe network. The MODMAN code was introduced to construct the response matrix, and the code, LINDO, was used to estimate the best water supply system in management and redeployment among Changhua area, Taiwan.

The results showed that the management cases are set with 3 limits of water level and 4 systems of supplied surface water. The best one among 12 cases is the combined water supplies from Feng-yuan, Lin-nei, Kuai-guan and Jhu-tang under the limit of groundwater with the safe groundwater level. The reduction of pumping was about 7.06×104 tons/day, which resulted in the increment range of groundwater level from 1.98 to 5.84m.

Keywords: water supply system, groundwater, MODFLOW, MODMAN, LINDO