



## **Applying Model Simulation to Identify The Importance of Protecting Groundwater Recharge Area - A Case Study of Choshuihsi Alluvial Fan, Taiwan**

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Groundwater is an important source of water supply, especially for areas lacking in surface water. Many countries have delineated recharge areas to protect groundwater resources. If the areas were not protected, the groundwater quantity and quality would be affected because of human activities. To understand the importance of recharge areas, this study applied MODFLOW and MODPATH to qualify the effects after a recharge area was polluted.

This study developed a steady state groundwater simulation model consisting of three aquifers to simulate the groundwater flow of Choshuihsi Alluvial Fan. The simulation heads from MODFLOW were used as input into MODPATH to estimate concentration field. The initial condition of MODPATH was that the contamination particles were distributed on the surface of the shallow aquifer inside the recharge area and the simulation period was set as 200 years. Results shows that parts of the particles flow into the deep aquifers and parts of them flow into the distal-fan of the shallow aquifer 200 years. The result also shows that 22.2%, 45.3% and 22.4% of the three aquifers were polluted, respectively.

The second aquifer was polluted widest, this is because the confining bed at mid-fan and distal-fan between first aquifer and second aquifer were well developed. This caused the recharge of second aquifer to rely on the lateral recharge from recharge area and so does third aquifer. Furthermore, the large amount of pumpage at distal-fan of second aquifer caused groundwater level to lower. This situation makes a higher head difference between top-fan and distal-fan of second aquifer. Therefore, the contamination from recharge area has more opportunity to be transported to distal-fan.