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The Definition of Groundwater Recharge Area Using GIS Approach –A Case Study of Choshuihsi Alluvial Fan, Taiwan

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Groundwater recharge areas are regions with high permeability that accept surface water more readily than other regions. If the land use/cover were changed, it would affect the groundwater recharge. Also, if this area were polluted, the contamination easily infiltrates into the groundwater system. Therefore, the goal of this study is to delineate the recharge area of Choshuihsi Alluvial Fan.

This study applies 6 recharge potential scale factors, including land use/land cover, soil, drainage density, annual average rainfall, hydraulic conductivity and aquifer thickness to estimate the infiltration ability and storage capacity of study area. The fundamental data of these factors were digitized using GIS (Geographic Information System) technology and their GIS maps were created. Then each of these maps was translated to a score map ranged from 1 to 100. Moreover, these score maps are integrated as a recharge potential map using arithmetic average, and this map shows recharge potential in 5 levels, such as very poor, poor, moderate, good and excellent. The result shows that majority of “good” and “excellent” areas is located at the top of the fan. This is because the land use of top-fan is agricultural and its surface soil type is gravel and coarse. The top-fan, which is close to mountain areas, has a higher average annual rainfall than other areas. Also, the aquifer thickness of top-fan is much thicker than other areas. The percentage of the areas ranged as “good” and above is 9.63% of total area, and most areas located at top-fan. As a result, we suggest that the top-fan of study area should be protected and more field surveys are required to accurately delineate the recharge area boundary.