

Assessment of Ground-water Dynamics in the Mid-Taiwan Mountainous Region

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The influencing factor of ground-water dynamics includes topography, geology, ground-water table, recharge area, land use development, channel, lake and aquifer hydraulic properties (thickness, storativity, and hydraulic conductivity) as well. Further, interaction between the various factors will lead to greater changes in ground-water dynamics. Ground-water dynamics is the reflection of a complex process of nature influenced by various influencing factors in certain environments. In this study, the approach is presented for the evaluation of groundwater potential using topographic, geologic and hydrologic characteristics. Field tests results and long-term ground-water fluctuation monitoring data are also used for the influencing factors to analyze the ground-water dynamics in temporal and spatial variations.

In this study, the mid-Taiwan mountain region was chosen as study site. Eight natural environmental factors including slope, drainage density, land use, lithology, hydraulic conductivity, porosity, ground-water depth, regolith thickness have been selected as influencing factors. Each influencing factor was divided into different subareas and the weighted score was given for each subarea with the expert scoring method. Moreover, the shallow groundwater levels in the study site were selected to verify the dynamics of ground-water. In the wet season from May to October, the ground-water fluctuation is influenced by geomorphologic (drainage density) and geological properties (hydraulic conductivity and ground-water depth). In the dry season, the ground-water fluctuation is highly related to geological condition. Comparing the rainfall with the variation of groundwater level, it was found that the observation ground-water level data in the mid-Taiwan mountainous region can be classified as highly fluctuation, regular fluctuation, and almost non-fluctuation. Results indicate that the ground-water level variations in the Cingshuei river basin were the highly fluctuation area.

Keywords: ground-water dynamics, natural environmental factors, groundwater levels