



Evaluation of groundwater recharge at a well field near Chien-Shih area, Shinchu, Taiwan: combined pumping test and isotopic studies

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Groundwater plays an essential role of water resource in Taiwan, particularly in the mountain region. In order to utilize groundwater resource effectively, combined isotope studies and field investigations can provide valuable information about water recharged and groundwater flow path in relation to geological setting, as well as interactions among precipitation, surface water and groundwater. This research established a monitoring network of groundwater levels among one pumping well and other four wells at NCU Research well field near Chien-Shih area, Shinchu. Groundwater was sampled on specific time interval during the pumping test. Nearby river and spring water were also collected before and after the pumping test. Stable oxygen isotope of water samples were then analyzed. The variance of oxygen isotope indicated that the major recharge near Well-W are river, shallow aquifer, and precipitation, whereas Well-W1 has a relatively steady recharge and similar source, and the recharge source of Well-N is very stable, i.e. mixing the shallow aquifer with some deep ones. According to mass-balance equation, the ratio of recharge source from precipitation was much more influencing in spring water (13.70~46.3 percent) than in river (11.94~16.67 percent). Finally, the isotopic data were compared with past geochemical characteristics of aquifer and local meteoric water line (LMWL) in Chien-Shih area. Recharge mechanism of the well field can thus be evaluated, especially the source and path of recharge.

Keywords: pumping test, oxygen isotope, recharge, groundwater level.