Estimating Regional Groundwater Recharge from
Fluctuations of Groundwater Level, Oxygen Isotope and
Well Yields at a Well Field near Chien-Shih Area, Shinchu,
Taiwan

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Abstract

Although annual accumulated precipitation is high in Taiwan, rainfall concentrates in May to September, this phenomenon is in connection with plum rain, typhoon, and topography. Thus, water resources per capita is only one seventh of the world average. Due to global climate change, the climate pattern will getting more extreme with longer drought season and heavier rainfall. Groundwater is expected to be the only reliable water resources in Taiwan. Therefore, estimating groundwater recharge is a key component in determining the sustainable yield of groundwater resources. Study methods applied include tracer techniques, field investigations and hydrological budgets which incorporate data on boundary conditions, aquifer properties, groundwater levels, and groundwater production. The spatial and temporal variation of stable oxygen isotope involved in the hydrologic cycle can evaluate groundwater being recharged from precipitation, river or other sources. 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. The isotopic data were compared with past geochemical characteristics of aquifer and local meteoric water in Chien-Shih area. According to mass-balance equation, the ratio of recharge source from precipitation was much more influencing in spring water (13.70~46.30%) than in river (11.94~16.67%). For the purpose of regional groundwater management, the residence time of groundwater is an important parameter, which helps to take into account the assessment of groundwater quality.