

Integrating remote sensing and in-situ data to delineate vulnerable groundwater recharge areas in urban cities of Taiwan

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Stream sediments are transported from mountainous regions to lower terrains before their deposition in the coastal alluvial plains. Since stream gradient and potential groundwater recharge are relatively high in upper stream of alluvial systems, it is critical to develop conservation policies to delineate and protect the vulnerable groundwater recharge areas (VGRAs) for sustainable management of surface and groundwater resources. Even though VGRAs are relatively small in Taiwan, human activities have gradually spread over the VGRAs as a result of urbanization. To address the critical issues about VGRAs linking to urbanization, three cities in the western plains of Taiwan are chosen, including Taichung, Jiayi, and Tainan cities, as study areas. This study integrates remote sensing data and in-situ geologic drilling to delineate the VGRAs in both regional and local scales. Drilled hydrogeological frameworks are implemented with auxiliary soil moisture and land cover derived from MODIS and Landsat images as indicators. Preliminary results show that in-situ groundwater quality and quantity data in delineated VGRAs conform the characteristic of groundwater recharge. Findings of this study provide a possible solution to protect the human-natural system in developing urban and alluvial plains.

Keywords: vulnerable groundwater recharge, geologic drilling, soil moisture, land cover