Investigation and mapping of rock type aquifer in central mountainous region of Taiwan

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Taiwan is located at the boundary of the Philippine Sea Plate and the Eurasian Plate. The tectonic collision creates a series of fold-and-thrust belts, and it also results in the Taiwanese mountain range consisted of nine rock types. With the complex of geology, aquifer hydraulic properties are various. Thus, the main purpose of this study is to delineate distinct hydrogeologic units in a form of rock type. The work was done by the implementation of subsurface exploration technologies, including drilling, core description, borehole and hydraulic testing.

The study area is situated in the Jhuoshuei and Dajja River watershed of Taiwanese central mountainous region. The formations of consolidated rock mainly include sedimentary and metamorphic rocks ranging from Eocene to Pleistocene. With the limited budget to get more data effectively, 49 boreholes (depth: 100 meters) were completed in different geologic units, elevations and subbasins.

Results show there are three main rock type groups in the study area: (1) Conglomerate, Mudstone (Pliocene~Pleistocene), (2) Sandstone, Slate, Phyllite (Oligocene~Pliocene), and (3) Argillite, Slate, Phyllite (Eocene~Miocene). According to the hydraulic parameters, the classification of aquifer divided into four classes on groundwater productivity has been carried out. The rock types for a class with higher groundwater potential are Sandstone, Slate, and Phyllite rocks located at elevations from 600m to 800m. Furthermore, the subsurface hydrogeological classes with higher productivity are distributed at depths between 0~30 and 50~70 meters below ground level. Ultimately, the results incorporated with a GIS-based system have shown the mapping of rock type aquifer in the study area.