Trend and Variability in Groundwater Level and Quality over South Korea (2009-2020)

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1. Key issues or problems addressed

In recent years, human activities have intensified the consumption of water resources. Pollutants often come from the leakage of domestic sewage, industrial wastewater and agricultural irrigation under the ground and have directly affected the water quality. This results in varying degrees of pollution in many countries. However, understanding of trend and variability in groundwater level and quality remains limited due to lack of available records.

2. Purpose of research hypothesis

Our research hypothesis is whether there are spatiotemporal variation of trend and variability of groundwater level and quality. The purpose of this study is to quantify the magnitude of trends in groundwater level and quality and examine association between groundwater level and quality in South Korea.

3. Methodology or approach used

This project used daily groundwater data from 800+ stations in South Korea. The groundwater data include water level, water depth, water temperature and electronic conductivity. The temporal coverage of these data is from January 2009 to December 2020. These stations were selected based on geographic position and data availability. Mann-Kendall test was applied to detect statistically significant tends in groundwater level and quality. For the future study, a hydrological model will be evaluated its performance for groundwater hydrology against the groundwater data.

4. Results or conclusions derived from the project

Based on the analysis of these data, it is found that the groundwater temperature varies seasonally with air temperature and its temperature is usually the lowest in March. Due to high temperature and intense rainfall, the groundwater depth increases in summer. Through the overall trend during the 12 years, it is found that although the groundwater is well protected in Korea, the water quantity in some of the stations has been decreased, indicating a high risk of groundwater depletion. In addition, the water quality has been degraded gradually, which require a need to develop an integrate management and policy for sub-surface and surface water resources.

5. Implications of the project relevant to congress themes

A: Building a resilient system for climate change, growing populations, and epidemics
A3: Reducing disaster risks: improving preparedness and resilience

Keywords : Groundwater, Mann-Kendall test, water quality, risk, variability.