

Assessment of the Disastrous Groundwater Resources in Hanoi, Vietnam from an Environmental Perspective

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Groundwater plays a key role in public water supplies around the world. Worldwide, more than two billion people depend on groundwater for their daily supply and over half of the world's population depends on groundwater for drinking. In Vietnam, the groundwater resources have become the most important water supply for the community, especially in the capital, Hanoi, where most of the main rivers and lakes are seriously polluted. Hanoi's groundwater is the target addressing the environmental sustainability issues because the rapid exploitation without an appropriate management system has caused a series of adverse impacts including drying up of shallow wells, level decline, and land subsidence. Falling groundwater levels can be disastrous to those communities who tap their water from wells or shallow boreholes. This resource has been also reported as regionally arsenic, coliform, and nitrogen contamination. Both quantity and quality degradation are life-threatening because making sure a safe and affordable drinking water for all is one of the main targets of the 17 universal sustainable development goals.

This study is an attempt to assess the sustainability of the disastrous groundwater resources in Hanoi from an environmental perspective. The indicator-based approach is used because it is considered suitable for sustainability assessment; in which, defining the appropriate list of indicators is one of the main tasks. This study proposes the indicators by using non-linear relationships and makes a comparison between the results of using non-linear and linear relationships for the indicator definitions. This study found that using non-linear relationships is more practical than using the linear ones, which are normally used in UNESCO report of groundwater sustainability indicators. As the results, the sustainability assessment is closer to the reality; so that the non-linear relationship indicators can reflect better the actual situation and the sustainability report can be more useful for decision makers.