

### 1381 - Eco-social Sustainability Assessment of Groundwater Resources in Hanoi, Vietnam

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In Hanoi, Vietnam, groundwater has become the most important water supply source for the communities. Although the public water fully covers all the urban districts, about 30% of households still used freely accessed water from their private and community wells without any quality standard. The reasons are explained as the unstable quantity and quality of the water supply, the relatively high water prices compared to their average incomes, and even their water use habits. Unfortunately, this natural resource is seriously degraded in both quantity and quality as the certain consequences of inappropriate usage and management manners, threatening the sustainable development of the communities. This study, therefore, is an attempt to assess the sustainability of groundwater with the consideration of Hanoi current situation. The social and economic criteria of three sustainability pillars here are mainly considered in this study. The eco-social sustainability (ECSS) aspects and indicators for groundwater resources are proposed by utilizing an Analytical Hierarchy Process (AHP) approach, this step has been considered one of the most challenging tasks in AHP sustainability applications. To do that, we here carefully review and explore the current eco-social problems of groundwater to propose three main aspects (quantity, quality, and management) and appropriately define their 18 ECSS indicators for the target area. We introduce a sustainability index function (SIF) to clarify the relationship between the indicator value and its sustainability index. Furthermore, we consider not only the linear relationship SIF as it is usually developed in the literature but also a non-linear one to obtain a more reasonable sustainability assessment. As for the results, the final ECSS index using the linear relationship SIF is assessed at a good level; and this index using the combined linear and non-linear SIFs are appropriately reduced to poor, well reflecting the current eco-social problems of Hanoi groundwater resources.