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Editorial

Groundwater Quality and Groundwater Vulnerability Assessment

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Groundwater is a valuable and finite resource covering only 30% of the freshwater (3% of the total volume of water) on Earth. Both groundwater quantity and quality are becoming dominant issues in many countries. Groundwater, as a source of public water supply, presents significant advantages compared with surface water due to its protection from surface pollutants. However, the growth of the world population, up to 9 billion by 2050, is leading to increased demands of groundwater, growing urbanization and high living standards, intensive agricultural activities and industrial demands. Additionally, climate change/variability triggers extreme hydrological events such as droughts and floods which influence groundwater recharge processes. Obviously, groundwater resources are under intense anthropogenic pressures and constant threat of pollution. Human activities, such as agriculture, urbanization and industry, have caused irreversible degradation of groundwater quality; therefore, prevention is the most appropriate strategy in the fight against groundwater pollution. Vulnerability and pollution risk maps of groundwater constitute important tools for groundwater management and protection. The concept of the groundwater vulnerability is based on the assumption that the physical environment may provide some degree of protection to groundwater against human activities. Groundwater vulnerability is divided into specific vulnerability and intrinsic vulnerability. Intrinsic vulnerability of an aquifer can be defined as the ease with which a contaminant introduced onto the ground surface can reach and diffuse in groundwater. Specific vulnerability is used to define the vulnerability of groundwater to particular contaminants, or a group of contaminants, by taking into account the contaminants' physicochemical properties and their relationships. Groundwater pollution risk can be defined as the process of estimating the possibility that a particular event may occur under a given set of circumstances, and the assessment is achieved by overlaying hazard and vulnerability. Regional assessment of groundwater vulnerability is a useful tool for groundwater resource management and protection. The results provide important information, and the vulnerability maps could be used by local authorities and decision makers. These maps are designed to indicate the areas of greatest potential for groundwater contamination on the basis of hydrogeological conditions and human impacts. Some countries use vulnerability maps as a basis for protection zoning. This special issue entitled "***Groundwater Quality and Groundwater Vulnerability Assessment***" attempts to cover the main fields of groundwater quality and groundwater vulnerability against external pollution, presenting case studies in various countries concerning the physicochemical characteristics of groundwaters and methods for groundwater vulnerability assessment.

Particularly, this issue includes 10 articles, providing an integrated analysis of factors that influence groundwater quality, the key parameters of aquifer conceptualization in order to assess groundwater vulnerability. In the article of Bannenberg et al. [1] an integrated approach has been presented in order to conceptualize the hydrogeological and hydrochemical regime of the basin. Mapping of groundwater quality is also a critical issue and has been presented by Adnan et al. [2]. Within the special issue a detailed analysis of critical pollution sources has been presented [3–5]. Groundwater quality is also influenced by water table variations. The related Hydro-Meteorological Variables that influence the water table by using intelligent techniques of Fuzzy Logic have also been analyzed in the presented articles [6]. Groundwater vulnerability has been assessed in a coastal aquifer using the GALDIT method [7], as well as in karst aquifers by using different methods such as EPIK and PaPRIKa [8,9]. The PaPRIKa method has been applied by using a novel tool in the QGIS environment [9]. Finally, within this special issue a novel tool named GVTool have been presented [10]. The tool has been developed in QGIS software, providing the capability to assess groundwater vulnerability maps considering four different methods: DRASTIC, GOD, SINTACS, and Susceptibility Index (SI).

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Conflicts of Interest: The authors declare no conflict of interest.

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