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Groundwater Quality and Public Health

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Abstract

Groundwater deterioration due to enrichment with contaminants of either geogenic or anthropogenic origin has adversely affected safe water supply for drinking and irrigation, with pervasive impacts on human health and ecosystem functions. However, the spatiotemporal evolution and public health effects of groundwater quality remain unclarified, posing a grand challenge for the safe and sustainable supply of global groundwater resources. This article provides a state-of-the-art review of the complexity and dynamics of groundwater quality, as well as the impacts of various groundwater substances on human health. In particular, knowledge is growing about the health impacts of key substances ranging from nutritional elements (e.g., Ca2+, Mg2+) to pollutants (e.g., heavy metals/metalloids, persistent organic pollutants, and emerging contaminants) and, further, to pathogenic microorganisms to which the human body can be exposed through multiple patterns of groundwater use. Proliferating concerns at the same time call for enhancing science-based governance directives, economic policies, and management strategies coordinating groundwater quality. We propose that safeguarding groundwater-dependent public health needs concerted efforts in source control, cross-scale rehabilitation, and social hydrology-based groundwater governance.

Keywords: groundwater quality, public health, drinking water supply, irrigation water, geogenic contaminants,

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