

THE EMERGENCE OF GROUNDWATER AS THE MOST VALUABLE NATURAL RESOURCE OF THE 21st CENTURY

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Keywords: groundwater depletion, satellite observations, groundwater management

Depletion of groundwater from most of the world's major aquifers, and thousands of smaller ones, is undermining planetary health, food security, economic growth, energy and mineral production, and water availability for humans. If left unchecked, it will create increasingly complex challenges for drought and climate change resilience, while posing an existential threat to the world's desert cities. Over two decades of satellite observations of continental drying, underpinned by poorly-managed and over-exploited groundwater stores, show that the drying regions of the world are expanding, while the wetting regions are shrinking, putting additional pressure on groundwater and decreasing freshwater availability. As the vast majority of the water that drains from the continents accumulates in the ocean, groundwater depletion is now the single largest contributor to sea level rise from the continents, even larger than the contributions from glaciers and ice caps.

This lecture will review the current status of global groundwater depletion, while making the case for coordinated solution strategies to prevent the exhaustion of non-renewable stores. Importantly, groundwater, and freshwater in general, must take a much-elevated role across all three of the Rio Conventions, i.e. the COPs for climate change, biodiversity, and desertification. As hydrogeologists, we must provide best-available, actionable information that makes a compelling case for enhanced groundwater protection to national water ministers of the world; and we must work together to find entry points for highlighting our work in the global discourse. At the grassroots level, experience suggests that science, policy, or technology alone has not been successful in stemming groundwater depletion: transdisciplinarity may be the key to support sustainability pathways in regional aquifer systems. Examples of both the high-level and grassroots strategies will be discussed. A call-to-action to end non-renewable groundwater depletion will close the lecture.