

Integrating Groundwater Boundary Matters into Catchment Management

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With 97% of the world’s freshwater resources stored underground, the connection between groundwater resources to the metrics of space, scale and time common to the geographic study of groundwater has not been extensively investigated by political geographers. Recognized as a common pool resource, the management and governance of groundwater resources is challenging and increasingly conflictive not only due to its hidden nature, but also because of the difficulty in placing boundaries around the groundwater resources and user domains.

Given that groundwater is the world’s most extracted raw material with withdrawal rates estimated to range between 800 to 1,000 km³ per year through millions of water wells, the groundwater domain boundaries are three-dimensional and change with time. A previously unrecognized typology for groundwater resources and user domains determined that (1) traditional approaches to defining groundwater domains focus on predevelopment conditions, referred to herein as a “commons” boundary; (2) groundwater development creates human-caused or a “hydrocommons” boundary where hydrology and hydraulics are meshed, and (3) the social and cultural values of groundwater users define a “commons heritage” boundary acknowledging that groundwater resources are part of the “common heritage of humankind”. This typology helps define a fundamental unit of analysis to aggregate demographic, social, and economic data. Emerging paradigms of groundwater governance suggest “unitizing” some groundwater development situations as one means to mitigate the inefficiency of a possession or use-based system of groundwater along with the inefficiencies associated with joint access to groundwater. Yet drawing these domain boundaries is supremely political and morphs with changing social and cultural values. Incompatibilities often arise over the use and equitable, or inequitable, distribution of groundwater, “values” attached to groundwater, conceptual models, uncertainty, as well as on missing information, inaccurate data, and how the “science” will be used by knowledge entrepreneurs, fueling the “dueling expert” syndrome.

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