

Delivering Big Data and the Changing Landscape of Mobile and Web-based Technologies to Address Groundwater Security Challenges

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Water security challenges require an understanding of how the primary drivers of groundwater stress—overuse and drought—affect the management of groundwater issues. Major progress has been made in the use of traditional water management tools such as remote sensing and groundwater modeling. In developing and middle-income countries, augmenting traditional water management tools with web-based applications for disseminating large data sets (big data) vital to solving water security challenges is essential. Compiling and disseminating big data by using digital solutions such as mobile and web applications provides water-resource managers with the tools they need to act swiftly and confidently when making water management decisions. For example, unprecedented economic expansion, land development, and climate variability in regions such as Southeast Asia have increased the frequency and intensity of urban and rural groundwater usage. Leveraging new technological solutions has helped the U.S. Geological Survey (USGS) to work with collaborators and stakeholders to track changing groundwater levels and management scenarios over time. In addition to addressing groundwater-level changes and simulating aquifer conditions, emerging technology helps areas that have undergone rapid environmental changes to address other issues such as land-subsidence, and changes in water quality. Trans boundary aquifers are inevitably linked to water-related conflicts, creating the need for faster access to water data for water use and regional allocation decisions. To help alleviate conflict, water-data infrastructure and governance serves as the backbone for efficient data delivery. To enable and sustain a high level of efficiency, rigorous data management processes can facilitate communication among agencies and NGOs to foster collaboration—a key to effective trans boundary water data sharing and delivery. As applications are modernized and new data are included, the public's understanding of groundwater hydrology and how the data benefit their daily lives can also grow. Open access to transparent data on mobile and web-based applications can increase the public's confidence in water management institutions, and data-driven decisions can drive investment in groundwater-resource solutions to meet challenging and continually changing groundwater issues.

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