A national water census: quantifying, forecasting, and securing freshwater for America's future

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The 21st century has brought a new set of water-resource challenges. Water shortages and use conflicts have become commonplace in many areas of the United States – even in normal water years – especially for irrigation of crops, for growing cities and communities, for energy production, and for supporting environmental flows and species protected under the law. Much has changed since the last overall assessment of water resources for the Nation was published by the Water Resources Council in 1978. Over the next 10 years, the US Geological Survey (USGS) plans to conduct a new assessment of water availability and use for the nation that will account for the quantity and use of water resources across the United States. We call this assessment "A National Water Census", which is one of the six strategic directions identified in the USGS Science Plan. The census fulfils an important recommendation of the National Science and Technology Council: to conduct "… *an ongoing census of water that describes the status of our Nation's water resource at any point in time and identifies trends over time*." The Census also addresses critical aspects of recent Federal legislation, including the need to establish a national program to provide an accurate assessment of the status of water resources throughout the United States.

This contribution demonstrates how the USGS will conduct a national assessment of water availability and use through the National Water Census. It also presents recent examples from the USGS pilot study of water availability and use in the Great Lakes watershed, which concluded in 2009.

As part of the National Water Census, the USGS will produce a seamless coverage of hydrological information across the nation. This information includes all important aspects of the water cycle and the environmental requirements for water. This effort will include expansion of the existing water-use science programme within the USGS. Initial work will concentrate on integrating national, state, and private databases of water-withdrawal and -use, return-flow, population, climatologic, agricultural, and economic information. In future years, this information will be used to develop statistical relations between these data sets and measured withdrawal, delivery, and return-flow data for water within each of several geographic regions. Ultimately, these relations will be used to estimate water use (demand) by small geographic areas.

The USGS will launch a research and assessment effort to characterize the flow needed to support aquatic species and their habitat. Initially, this effort will focus on classifying the streams across the nation into hydro-ecological types. In future years, the efforts will expand to systematically examine the ecological response to hydrological alteration and, later, develop flow alteration–ecological response relations for each stream type.

The USGS will also begin three geographic focus area studies in the following basins: Colorado River, Delaware River, and Apalachicola, Chattahoochee, and Flint rivers. These studies will be implemented to comprehensively examine all of the hydrological and biological aspects of water availability, as well as human water use, and to report on areas of significant competition over water resources and the factors that are influencing that competition. It is envisioned that each focus area study will be conducted over a 3-year time-frame.

In 2005, the USGS began a pilot study of water availability and use in the Great Lakes watershed. This pilot study focused on understanding the dynamics of the water resources in the basin with respect to groundwater and surface water flows and yields, and demonstrates the importance of water-use data in quantifying water availability.

REFERENCES

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