

# Future Mapping



Stephen A. McElroy

How cities & utilities  
can use GIS to  
manage water

**G**eographic information systems (GIS) play a key role in managing the world's water resources. An effective GIS system can help solve failing water infrastructure and water scarcity issues. *SWS* Assistant Editor Mary Ellen Shoup spoke with GIS expert Stephen A. McElroy, Ph.D., to learn how GIS can be used to improve water management for utilities and municipalities.

**Mary Ellen Shoup:** What is GIS?

**Dr. Stephen McElroy:** GIS is a collection of software, hardware, data, people and procedures designed to capture, store, manipulate, analyze, manage and present all types of spatial data; essentially, it is computerized maps and databases. All the data that are behind the screen are functioning as the GIS. GIS is the mapping part—all the data and how they are organized and the structure that allows people to query that data and find out that information in a map format.

**Shoup:** How can GIS help solve issues like aging and failing infrastructure and water scarcity?

**McElroy:** In terms of infrastructure, a complete comprehensive inventory of your water infrastructure [can help] to see how old it is and what parts are failing. After all asset attribute data are collected, you would have an understanding of the conditions of those assets, so you can look at some long-term maintenance plans.

For the water scarcity issue, GIS is a good way to integrate all that data. Through mapping and visualization efforts, new insights can be gleaned regarding both the collection of water infrastructure and related assets as well as the intertwined nature of the hydrologic system.

Municipal water and wastewater management agencies can assess water quality, monitor rivers for flood control, oversee water resources on a local or regional

scale, and utilize environmental modeling to assess the relationships between runoff and groundwater recharge, usage rates and seasonality of usage.

**Shoup:** What are ways that GIS can benefit storm water management?

**McElroy:** Gaining a comprehensive understanding of the various facets of the water resource management process is possible through GIS. The ability to synthesize data and information and put it to effective use is a critical skill for water management professionals. GIS provides the context by which an individual can begin to understand the relationships among all of the moving parts of a project and can distill the critical inputs and outputs.

**Shoup:** What are some examples of ways GIS has aided cities or utilities?

**McElroy:** GIS is being used to enhance field operations by integrating the data with inspectors or with maintenance crews. It can be used in capital planning and system design in new urban areas. A more innovative approach is through the smart grid technology, where you can have sensors placed on pipe to create alerts when there are leaks or breaks. You can also use GIS [to communicate] advisories or outages to customers through a Web map portal. GIS can provide reports on water usage patterns and trends, water violations, water pollutants, cultivation patterns or construction anomalies when the data are integrated into the GIS system. **SWS**

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