The Finger Lakes Watershed Environmental Network (FLoWEN): A Web Services–Based Approach to Environmental Monitoring Data Management

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Abstract

Within the Adaptive Management water resources program circular paradigm of "Assess > Design > Implement > Monitor > Evaluate > Adjust > Assess," the local stakeholders are limited with monotonous regularity to their own resources in trying to confront water resource degradation and threats. During assessment and design, the watershed management tools available to the land manager are more frequently indirect (e.g. a permitting process) than direct; there is a critical lack of scientific analysis and interpretation to help the implementation group and management understand the problem assessment and response design. At implementation time the local manager's monitoring needs are the same as for the State or Federal manager: fluid communication across participant groups and technical/scientific boundaries is paramount for success. In particular, access to data in an appropriate presentation and time frame is necessary. In the Finger Lakes Region of New York State, efforts have been underway to develop standard protocols for managing both remotely sensed monitoring data and historic environmental monitoring data in such a way that facilitates exploration, discovery, and collaboration. Based on the CUAHSI (Consortium of Universities for the Advancement of Hydrologic Science, Inc.) Hydrologic Information System architecture, a regional system was built to consume remotely sensed monitoring data from regionally managed buoys, stream gages, and precipitation stations and integrate that data with State and Federal programs and existing CUAHSI-based services. The system provides mechanisms to consume data directly from locally managed sensors in the field as well as local historical environmental monitoring data, and to translate that information into a common data model for warehousing and distribution. Data are published through a standardized web services architecture. A prototype web-based viewer for data exploration and discovery offers potential data users the opportunity to evaluate specific data elements both spatially and graphically (time series) from a range of sources and warehouses and offers options for either direct data extraction or web service connectivity. By standardizing the architecture it becomes possible to decentralize data management while leveraging web services to facilitate collaboration and data sharing. In conclusion, communication and (modern) data sharing among willing stakeholders is the lubricant that makes possible (an adaptive) response to many water resources problems at the local watershed scale.

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