

Data Sharing as a Foundation for the Advancement of Hydrologic Science

David R. Maidment, University of Texas, Austin

Richard P. Hooper, CUAHSI

Among the challenges facing hydrologic science today, two stand out. First is the need to extend hydrologic theory to account for the couplings among components of the hydrologic cycle and among water, the solid earth, biota, and humans. Second, is the need to enhance predictive ability by separating the unique aspects of a particular place from the general theory that explains the patterns observed at any location. In both cases, the need to easily assemble data from multiple locations and collected by multiple disciplines is needed to make progress. The opportunities afforded by technological advances in cyberinfrastructure, and, in particular, in web-based standards and services can provide the foundation for an unprecedented era of synthesis in hydrologic science.

The Hydrologic Information System (HIS) project of the Consortium of Universities for the Advancement of Hydrologic Science, Inc (CUAHSI) has developed Water Data Services (WDS) using a services-oriented architecture. The underlying technological developments include WaterML, an XML-based language for transmission of time-series data, WaterOneFlow, a set of web services that can provide access to data and metadata using standard web protocols, and the Observation Data Model (ODM), a standard data base schema for time-series data. WDS also includes a registration service for published web services and maintains a metadata catalogue of all services. An ontology of hydrologic concepts is included as part of this central service to enable variables to be mapped to a common set of concepts. These technologies form the basis for an extensible data publication system. Some tools have been developed by the project, such as a map-based discovery tool, Hydroseek (<http://www.hydroseek.net>), and others, such as HIS Desktop, are under development. However, the true power of these technologies will be realized when the community uses these technologies to develop further applications.

CUAHSI WDS extends beyond academic investigators. CUAHSI has been working with US government agencies, such as the US Geological Survey, on providing access to their data holdings using web services and transmitting data using WaterML. Metadata from these agencies has been included in the central metadata catalogue, thereby enabling seamless access to both government and academic environmental data. CUAHSI WDS is an open system that in which any group or government agency around the world can participate. All software is freely available at <http://his.cuahsi.org>

Within Texas, a state-focused Texas Hydrologic Information System has been built using CUAHSI HIS technology and the collaboration of the state water agencies and the Texas Natural Resources Information System, who are preparing a web portal for the discovery and dissemination of data from the Texas Hydrologic Information System.