

## FORUM

## Developing a National Stream Morphology Data Exchange: Needs, Challenges, and Opportunities

PAGE 195

Stream morphology data, primarily consisting of channel and floodplain geometry and bed material size measurements, historically have had a wide range of applications and uses including culvert/bridge design, rainfall-runoff modeling, flood inundation mapping (e.g., U.S. Federal Emergency Management Agency flood insurance studies), climate change studies, channel stability/sediment source investigations, navigation studies, habitat assessments, and landscape change research. The need for stream morphology data in the United States, and thus the quantity of data collected, has grown substantially over the past 2 decades because of the expanded interests of resource management agencies in watershed management and restoration. The quantity of stream morphology data collected has also increased because of state-of-the-art technologies capable of rapidly collecting high-resolution data over large areas with heretofore unprecedented precision. Despite increasing needs for and the expanding quantity of stream morphology data, neither common reporting standards nor a central data archive exist for storing and serving these often large and spatially complex data sets. We are proposing an open-access data exchange for archiving and disseminating stream morphology data.

Development of common reporting standards and a strategy for exchanging consistent stream morphology observations nationally is needed because recent data collection technologies (e.g., airborne and terrestrial lidar (light detection and ranging)) provide point-rich data sets in a variety of formats. More traditional survey data (e.g., cross-section geometries, longitudinal profiles, and bed material characteristics) are also being collected by a wider array of instrument types than in the past that provide large quantities of data in various formats (e.g., hydroacoustic multibeam echo sounders). Aggregating and

servicing these data across a common architecture will increase their utility to the large variety of user groups in the public and private sectors. For example, there is a need to have physical channel characteristics georeferenced to digital stream networks (e.g., the National Hydrography Dataset) for modeling applications [Muste *et al.*, 2010]. Standardized stream morphology data will also support tools such as the Consortium of Universities for the Advancement of Hydrologic Science, Inc., Hydrologic Information System that integrates geospatial and observational data for rivers for the purposes of data discovery and access. Developing the data exchange in consultation with international standards organizations including the Open Geospatial Consortium through its Hydrology Domain Working Group will offer opportunities to collaborate with related activities internationally and help ensure the broad adoption of stream morphology standards by government, academic, and private sectors.

The Subcommittee on Sedimentation (SOS), a subcommittee of the Advisory Committee on Water Information, which promotes collaboration on sediment issues, formed a work group in 2009 to investigate development of a national stream morphology data exchange (NSMDE). The NSMDE work group members represent several federal agencies and nonfederal organizations that collect and/or use stream morphology data (see <http://acwi.gov/sos/> for more information about SOS and its member organizations).

Although the need and value of a NSMDE is clear to the work group members, its development presents many technical, logistical, and administrative challenges. To begin to address these challenges, the SOS work group sponsored a NSMDE workshop in April 2011 in Middleton, Wis., that explored three primary themes: data exchange scope, data exchange scale and potential data models, and administration. A summary of the workshop, including

recommendations to SOS for advancing a NSMDE, is available at [http://acwi.gov/sos/sos\\_stream\\_morph\\_db\\_workshopo\\_summary\\_to\\_SOS\\_10\\_13\\_2011.pdf](http://acwi.gov/sos/sos_stream_morph_db_workshopo_summary_to_SOS_10_13_2011.pdf). The full SOS resolved at its regular meeting in October 2011 that the work group should continue efforts to develop a NSMDE using the workshop recommendations as a guiding framework. Toward that end, the NSMDE work group has convened an ad hoc subcommittee to identify and potentially implement specific actions to achieve a NSMDE as envisioned by workshop attendees. These efforts may be especially timely given recent related discussions in the geodetic community about developing metadata standards for terrestrial laser scanning (i.e., ground-based lidar) [Phillips *et al.*, 2012].

Successful development and deployment of a NSMDE will require the engagement of an interdisciplinary community. We recognize that the effort will only succeed if data submissions are easily facilitated, if data retrievals are user-friendly, and if data are served in a consensus format that is well documented and supports high-quality data. The SOS NSMDE work group welcomes the participation of interested ecologists, engineers, geomorphologists, database specialists, and end users to help make geomorphology data more available for a wide range of assessment, monitoring, and research activities and ultimately help the nation make better resource management decisions.

## References

- Muste, M., V. Merwade, D. Kim, D. Maidment, and T. Whiteaker (2010), Vision and progress: Data models for multi-dimensional representation of the river processes, *J. Hydraul. Res.*, 48(4), suppl. 4, 58–59.
- Phillips, D. A., J. S. Oldow, and J. D. Walker (2012), Outlining a strategic vision for terrestrial geodetic imaging, *Eos Trans. AGU*, 93(11), 121, doi:10.1029/2012EO110005.
- MATHIAS J. COLLINS, National Oceanic and Atmospheric Administration, Gloucester, Mass.; E-mail: mathias.collins@noaa.gov; JOHN R. GRAY, U.S. Geological Survey (USGS), Reston, Va.; MARIE C. PEPPER and FAITH A. FITZPATRICK, USGS, Middleton, Wis.; and JOSEPH P. SCHUBAUER-BERIGAN, U.S. Environmental Protection Agency, Cincinnati, Ohio