

## Book Review

# GIS for Surface Water: Using the National Hydrography Dataset

Reviewed by Michael DeMers, New Mexico State University, Las Cruces, USA

*GIS for Surface Water: Using the National Hydrography Dataset*

Jeff Simley

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GIS for surface water is an in-depth examination of the conceptual framework, underlying principles, construction and use of the National Hydrographic Dataset. While a technical coverage of the dataset and its relationship to GIS, it begins with an overview of the geography of water, and GIS as a tool for modeling and managing a host of surface hydrological problems. This first chapter is followed by a review of water on the earth's surface from water cycle to water use, water management and problems, the different geomorphological and human settings for water, and finally a discussion of the classification systems used for wetlands habitats.

As the text continues it presents a very well-organized history of the mapping of water that leads up to the development of the National Hydrography Dataset as well as the Watershed Boundary Dataset produced jointly by the USGS and the NRCS. This third chapter concludes with a short but meaningful dialogue of the addition of other factors such as drainage area polygons, water-flow data and a host of network attributes such as jurisdiction, permitted discharges, fish species, streambed composition, temperature, salinity, dissolved oxygen, selenium content and many other factors resulting in the NHDPlus dataset. This advanced dataset adds what the author calls intelligence so that advanced analysis can provide considerably more utility than the original.

Chapters four through six describe in some detail how to define and characterize a stream within a GIS, an exploration of the hydrography datasets and their component parts, and a thorough explanation of how to design a hydrography dataset for use. Based on the original premise of the book this allows the reader to understand that the existing datasets are expected to change and take on different characteristics as the users begin pushing the limits of the analytical power that currently exists. These chapters provide the necessary background for such database enhancement, thus making the book itself an invaluable resource for practitioners to contribute to advances in the science.

As one might expect of an Esri book there are ample sections showing how the datasets work with the ArcGIS desktop and ArcGIS Online environments. Chapters seven and eight provide both

background and practical exercises for the practitioner to learn how to obtain NHD and NHDplus datasets and perform typical analyses using the ArcGIS platform. Chapter nine, written by Steve Knopp and Daniel Siegel at Esri provide a discussion of how the datasets can be accessed from the web and subsequently be converted to web services allowing multiple users with appropriate permission to use them for custom applications.

Chapter ten, authored by six authors from Quantum Spatial, adds a demonstration of the use of Lidar and IFSAR derived elevation data. After providing necessary background for the technology, the authors give a rather detailed explanation of the process of creating elevation and hydrologic datasets from these sources. They also provide instructions for incorporating these datasets into an existing NHD. This chapter is essentially the results of a pilot project which the authors suggest demonstrates the ability of this type of remotely sensed data to create more detailed hydrological datasets that will likely be adopted in the future.

Chapter eleven provides a well laid-out set of user stories that demonstrate the applicability of the NHD and NHDPlus to a rather diverse set of circumstances. The chapter is divided into small vignettes, each of which is written by separate authors. These are followed by a short concluding chapter by the author who suggests the future of both GIS and its relationship to the NHD and other datasets as well as some suggestions by others as to their future.

Overall this book is a very good resource for the GIS hydrography practitioner, providing essential background of water geography and the history of the NHD, mostly good detail in chapters four through nine, as well as some useful hands-on exercises in chapters seven and eight. I found the chapter on Lidar and IFSAR a bit out-of-place from the rest of the text, and while relevant to those who plan to use this remotely sensed technology, it seemed both abrupt and focused on both a smaller and a much more advanced audience than the remainder of the book. Of note also is that there are topics covered in this chapter, specifically those related to topographic surface development, that should have been covered in more detail earlier in the text.

The inclusion of success stories, while interesting, might have better been replaced with examples, written by the author himself, within the context of the book itself. If you are expecting this to be a practical handbook filled with exercises to guide you through the processes you will encounter, you will be a bit disappointed as only chapters seven and eight provide such a step-by-step approach. The book's strength is in the technical and conceptual background it provides to the practitioner that will allow for informed practice. It is well written, amply illustrated in color, and authoritative. As such, it fills a necessary gap in the literature and is especially helpful for those beginning to learn about the National Hydrography Dataset and its use in GIS.

*Michael DeMers is a Professor of Geography at New Mexico State University specializing in Geographic Information Science, Landscape Ecology, and Geographic Education. DeMers is the 2010 winner of the Anderson Medal of Honor in Applied Geography awarded by the Applied Geography Specialty Group of the Association of American Geographers (AAG). He holds positions as GIS Section Editor of Geography Compass, Chair of the Anderson Selection Committee (AAG), Alliance Coordinator of the New Mexico Geographic Alliance, and is the current president of the National Council for Geographic Education. He has published over fifty articles and four texts on geographic information systems two of which have been translated into Russian, Simple Chinese, and Arabic. His current educational research focuses on geogaming, geodesign, and the use of immersive virtual worlds as ways of both exploring GIScience and creating new tools for both learning and practicing geography. He also does research in land classification with special emphasis on the nature, methods, and accuracy assessment of land classification boundaries and on the use of GIS for water resources management.*