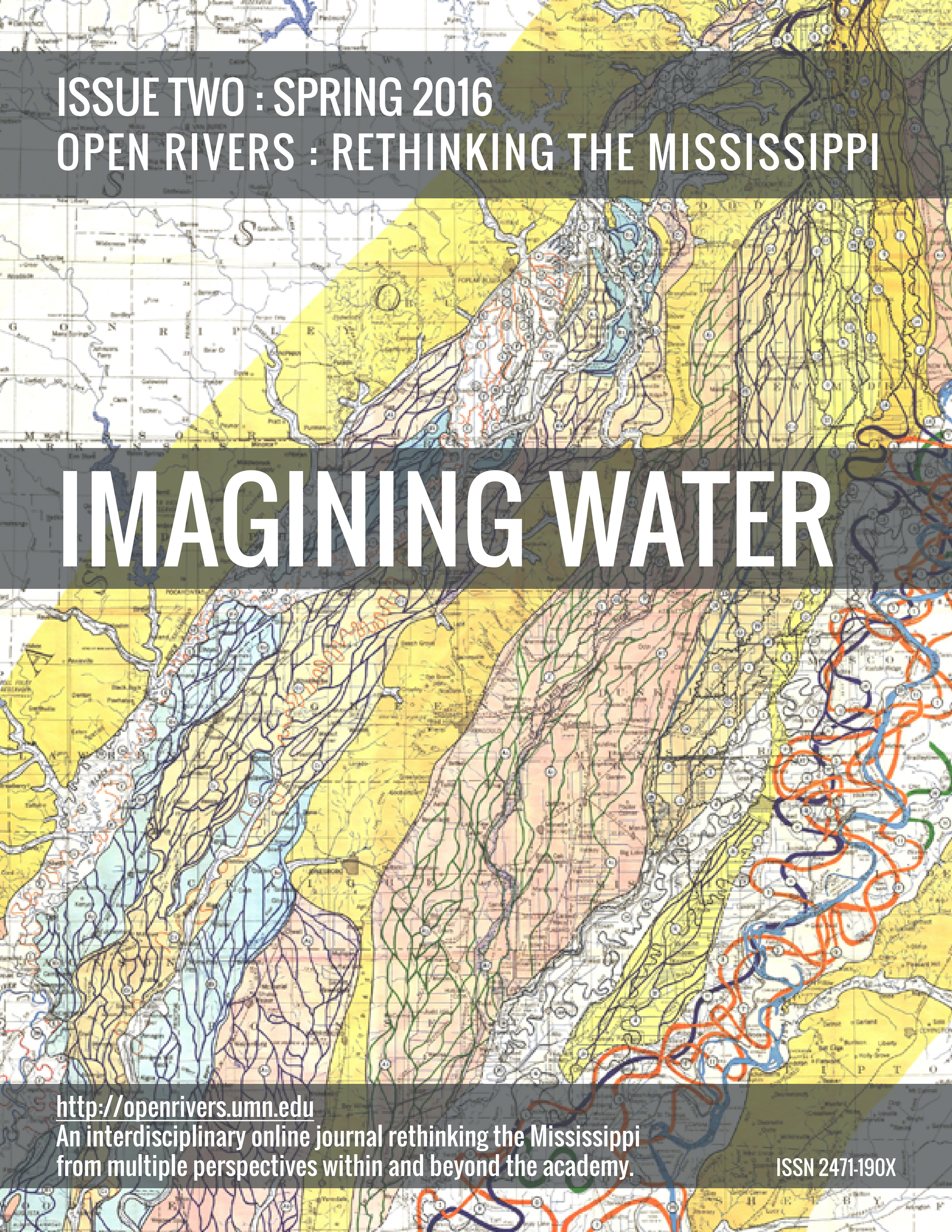

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OPEN RIVERS : RETHINKING THE MISSISSIPPI

IMAGINING WATER

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The cover image is by Harold Fisk, 1944, plate fifteen, sheet one, showing stream courses from *The Alluvial Valley of the Lower Mississippi River*. The map covers sections of Arkansas, Missouri, and Tennessee.

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Editorial Board

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GEOGRAPHIES

MAPS, GEOGRAPHIES, AND THE MISSISSIPPI

By Len Kne

U-Spatial provides support for spatial research. We make maps. And help colleagues at the University of Minnesota discover and analyze geospatial data. We collaborate with people in public health, nursing, business, history, anthropology, education, design, engineering, natural resources, and even dentistry. Thanks to popular apps like Google Maps, billions of people are thinking spatially and becoming more aware of geography throughout the world.

There are countless ways to think about the geography of the Mississippi River. In physical terms, we can, for example, look at tributaries, watersheds, water flow, and water quality (figure 1). In human terms, the river crosses countless cities and neighborhoods, and it shapes transportation, utilities, agriculture, land ownership, commerce, demographics, and zoning. While maps are a great way to show how we interact with the river, getting started with mapping can be daunting. This article will introduce you to some resources that can help.

Confluence of the Minnesota and Mississippi rivers.
Using satellite imagery, we can compare the amount of sediment coming into the Mississippi River from the Minnesota River (the lower river).
Satellite Image Courtesy of DigitalGlobe Foundation.

Figure 1. Confluence of the Minnesota and Mississippi rivers. Using satellite imagery, we can compare the amount of sediment coming into the Mississippi River from the Minnesota River (the lower river). Satellite Image Courtesy of DigitalGlobe Foundation.

Geographic Information Systems (GIS) aid in the collection, maintenance, storage, analysis, output, and distribution of spatial data and information (Bolstad 2005). Most of us are familiar with spatial data through our use of Google Maps. Spatial data can be defined as information that has coordinates (i.e., latitude and longitude), as well as attribute data. GIS takes spatial data and creates a model of the real world that we can use to perform analysis, answer questions, and, yes, make maps.

Three core concepts go a long way when thinking spatially: layers, scale, and spatial relationships. Spatial information and data are stored in **thematic layers** that a GIS can mash together to answer questions. Finding data can be challenging; then, once the data are discovered, harmonizing multiple data sources in order to overlay it on a map can be time consuming. A good starting point for finding data is the Borchert Map Library, located at the University of Minnesota. Later in this article, we will introduce ArcGIS Online, another tool for discovery and mapping of spatial data.

Map Scale is an important consideration when representing spatial data. Commonly seen as a scale bar, the map uses a representative fraction to show distance. For example, U.S. Geological Survey (USGS) topographic maps commonly use a 1:24,000 scale, which indicates that one inch on the map is equal to 24,000 inches (2,000 feet) on the ground. The amount of detail we want to show on a map determines how we represent a feature. When looking at the entire length of the Mississippi River, we represent the river as a line. However, when looking at an individual reach of the river, we want to show the width of the river and, thus, display it as a polygon (figure 2).

Spatial relationships define how we interact with the data. Three common spatial relationships are "adjacency," "within," and

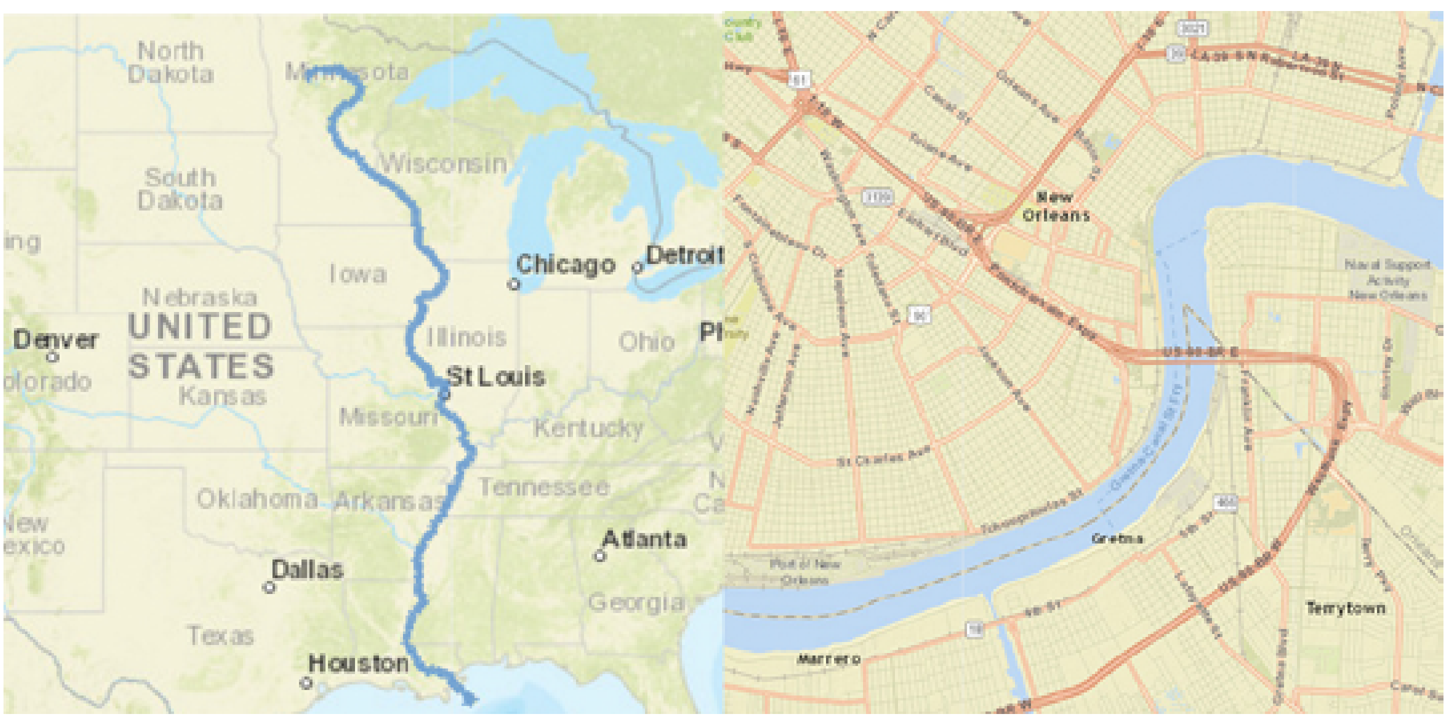

Figure 2. Demonstrating scale.
The map on the left is small scale, with the Mississippi River represented as a line.
The map on the right is large scale, with the river represented as a polygon.
Map illustration by Len Kne. Courtesy of U-Spatial.

"connectivity." Minnesota is adjacent to Iowa, Hannibal is within Missouri, and the Mississippi River connects St. Paul and New Orleans. We can use GIS operations to query data using these spatial relationships. For example, how many people live within 10 miles of the Mississippi River in the St. Louis area? We use the buffer tool to pad the river by 10 miles on each side and then the overlay tool to sum the population from a census layer in the buffered area. The answer is 1,935,000 for 2015 (see figure 3 for other selected statistics of the area).

Creating informative maps has gotten easier, thanks to several web-based GIS tools. I like **ArcGIS Online** because it has a vast collection

				Land Use				
Total Area (sq miles)	2015 Population	Total Employees	Households with dog	Developed	Forest	Crops	Wetland	Other
5,630	1,935,031	1,024,674	299,700	15%	30%	44%	5%	6%

Figure 3. This map shows a 10-mile buffer (blue) of the Mississippi River near St. Louis, MO. Using ArcGIS Online, we can enrich the area by overlaying a variety of data with a few clicks of the mouse.
Map illustration by Len Kne. Courtesy of U-Spatial.

of data (check out the Living Atlas of the World), as well as the tools needed to analyze the data and make compelling maps that can be easily shared. For example, here is the map used in the St. Louis illustration above. Another example demonstrates a geodesign application that models practices that can improve the water quality of the Minnesota River (figure 4). ArcGIS Online offers a free trial account that allows anyone to explore the world using their tool. Most universities have a license agreement for students, faculty, and staff to access ArcGIS Online. All K-12 schools have free access through the Esri ConnectED program.

The U-Spatial website is a good place to start when looking for help with mapping and spatial analysis. The site provides links to training, data, and GIS tools. Another resource is GeoMentors; they can help bring spatial thinking into the K-12 classroom. Happy mapping.

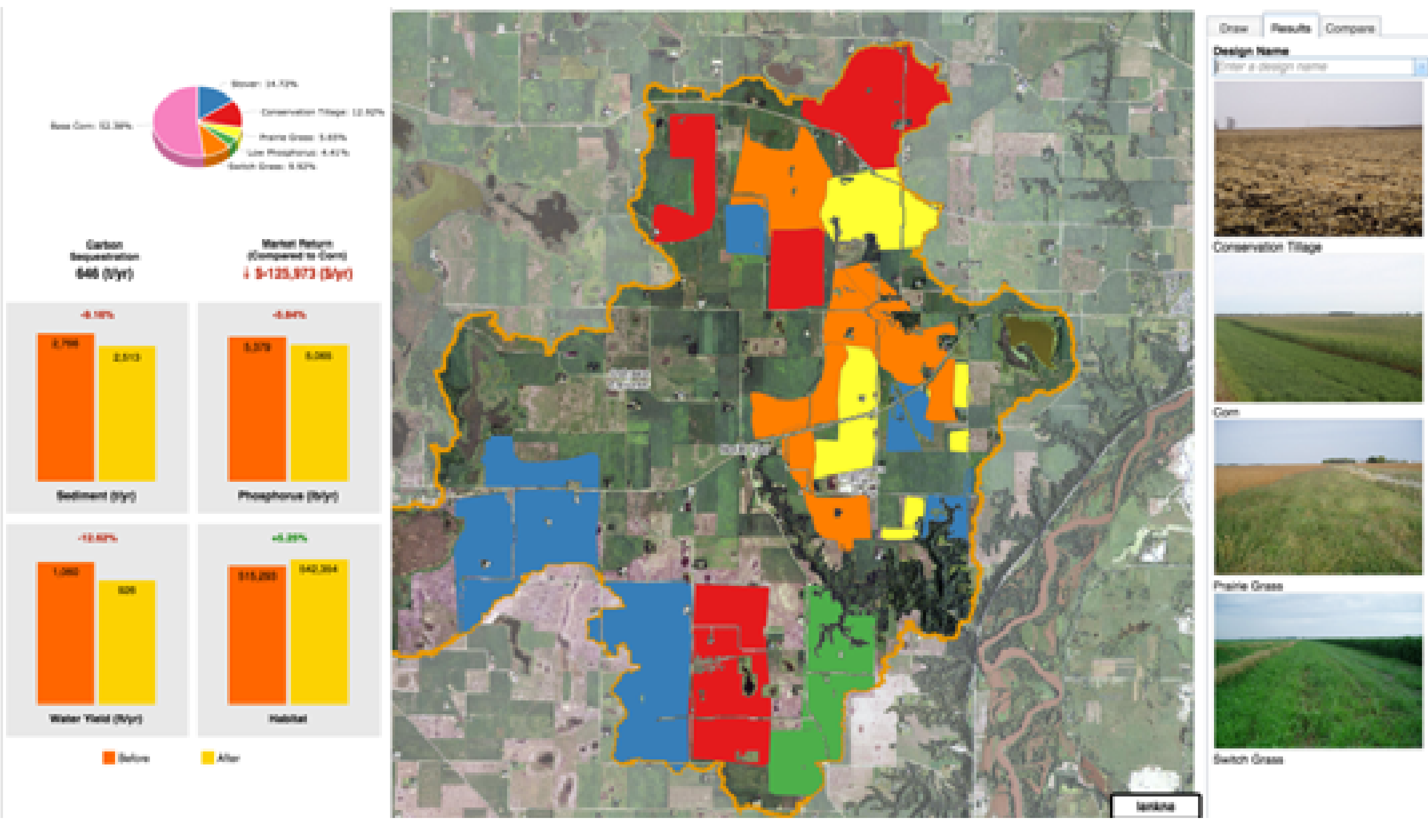

Figure 4. The New Agricultural Bioeconomy Project provides state-of-the-art technology and a participatory process for exploring opportunities to enhance economy, environment, and community vitality. This example of geodesign looks at land use change to encourage a biofuels market and improve water quality in the Seven Mile Creek watershed district near Mankato, MN. The Minnesota River is visible on the east side of the image. Participants are able to try multiple scenarios in real time and look for the best scenario.
Map illustration by Len Kne. Courtesy of U-Spatial.

References

Bolstad, Paul. 2005. GIS Fundamentals: *A First Text on Geographic Information Systems, 2nd edition*. White Bear Lake, MN: Eider Press.

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About the Author

Len Kne is the Associate Director of U-Spatial, a center at the University of Minnesota that provides support for spatial research. He is an alumnus of the University of Minnesota with a B.S. in recreation resource management and an M.S. in geographic information science. He is on the faculty of the Master of Geographic Information Science program and teaches project management, spatial databases, and a variety of graduate seminar classes focusing on the use of technology in GIS. He is looking forward to the day when everyone is thinking spatially.