When the water rises: A new tool helps communities plan for floods

By Jeffrey L. Ashby

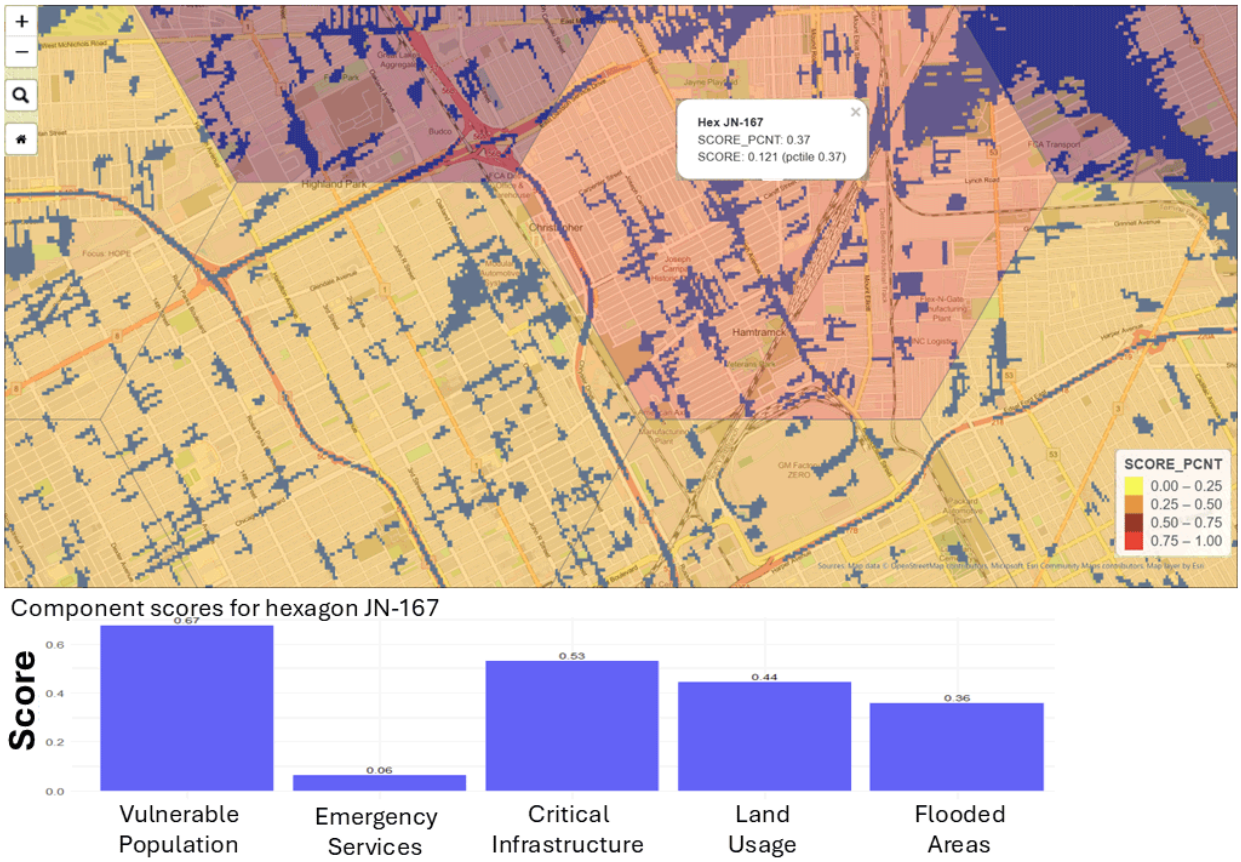
AS THE CLIMATE CHANGES, extreme weather events such as heavier rainfall are becoming more frequent and severe. These events can increase the risk of flooding, yet they are not the only factor. The way cities and rural areas are built and developed also shapes how badly communities flood and how well they recover. Protecting people and the places they live means understanding how climate change affects the roads, buildings, and services that communities depend on every day.

Most existing tools for measuring flood risk take a top-down government perspective. As a result, they often miss how many local factors—from emergency services to neighborhood infrastructure—connect and influence one another on the ground. To close that gap, Diane S. Henshel and I created the Community Resilience and Adaptation Spatial Infrastructure Database (CRASID)—a tool built for the Great Lakes region with communities at the center.

CRASID divides the entire watershed into a grid of hexagons, allowing many different kinds of information to be compared on the same map. The team tested the tool to examine whether people could reach emergency services during extreme flooding.

The analysis showed that a spatial database like CRASID can help identify flood vulnerabilities, such as infrastructure. The findings point to a clear community need: future risk measures will have to focus specifically on infrastructure. The hexagonal design will also support evacuation planning, so that from any location a user can look in six directions, compare routes, and find the safest way out during an emergency.

Jeffrey L. Ashby is a Ph.D. candidate in Public Health at Indiana University Bloomington. Ashby received IAGLR's Outstanding Student Paper Award for the presentation *CRASID: A new community-based tool for risk, resilience, and evacuation planning* at the 2025 annual conference.



Example of CRASID for a suburban community in Detroit, Michigan, showing risk scores by color, flooding areas in blue, and a bar chart of the composite scores used to calculate the risk score. *Credit: Jeffrey L. Ashby and Diane S. Henshel, Indiana University Bloomington. Figure adapted from the authors' presentation at IAGLR's 2025 Conference on Great Lakes Research.*