Mapping and GIS Tools for Disaster Preparation and Recovery

Jim Craner
The Galecia Group, jim@galecia.com

Mapping and GIS Tools for Disaster Preparation and Recovery

Abstract

There are many tools for online and offline mapping, as well as geographic information systems ("GIS"), that public librarians can offer their communities. These tools can be invaluable for emergency response planning before a disaster as well as response and recovery operations after a disaster. Librarians, as community information and technology stewards, can play a valuable role in these scenarios.

Keywords

disaster planning, disaster recovery, emergency management, emergency planning, maps, GIS, geographic information systems

Technology Matters

Mapping and GIS Tools for Disaster Preparation and Recovery

Jim Craner (jim@galecia.com)
Collection Development & Operations Manager and Drupal Developer, The Galecia Group

Abstract

There are many tools for online and offline mapping, as well as geographic information systems ("GIS"), that public librarians can offer their communities. These tools can be invaluable for emergency response planning before a disaster as well as response and recovery operations after a disaster. Librarians, as community information and technology stewards, can play a valuable role in these scenarios.

Keywords: disaster planning, disaster recovery, emergency management, emergency planning, maps, GIS, geographic information systems

When disaster strikes, accurate information about the local environment needs to flow as rapidly as power, water, and critical supplies -- and maps are an excellent way to visualize information about affected communities. Librarians, as community stewards of information and knowledge, can play a critical role in supporting victims, responders, and rebuilders during and after a disaster scenario. No matter your library's level of tech-savvy and resource availability, there are mapping and GIS ("geographic information system") tools that you can deploy before and after an incident that can dramatically improve your community's ability to recover. In this column, we'll present a few innovative tools that librarians can bring to community disaster preparedness meetings.

Maps can be used to easily visualize resources and threats to a community in a disaster scenario. For instance, the map below displaying simple shapes on a local neighborhood can be created by a non-technical user in just a few minutes using Google's free "My Maps" tool, then published to the Web and social media.

Obviously we don't want to make maps available only to online residents, especially after a disaster when Internet service may be interrupted. Consider creating and distributing printable black-and-white maps. The map example below was created using the Carto web service [https://carto.com] and the "Toner Lite" black-and-white design color scheme from Stamen Design. This clear and bold design scheme makes the map easy to read and only contains the critical information that your readers need.
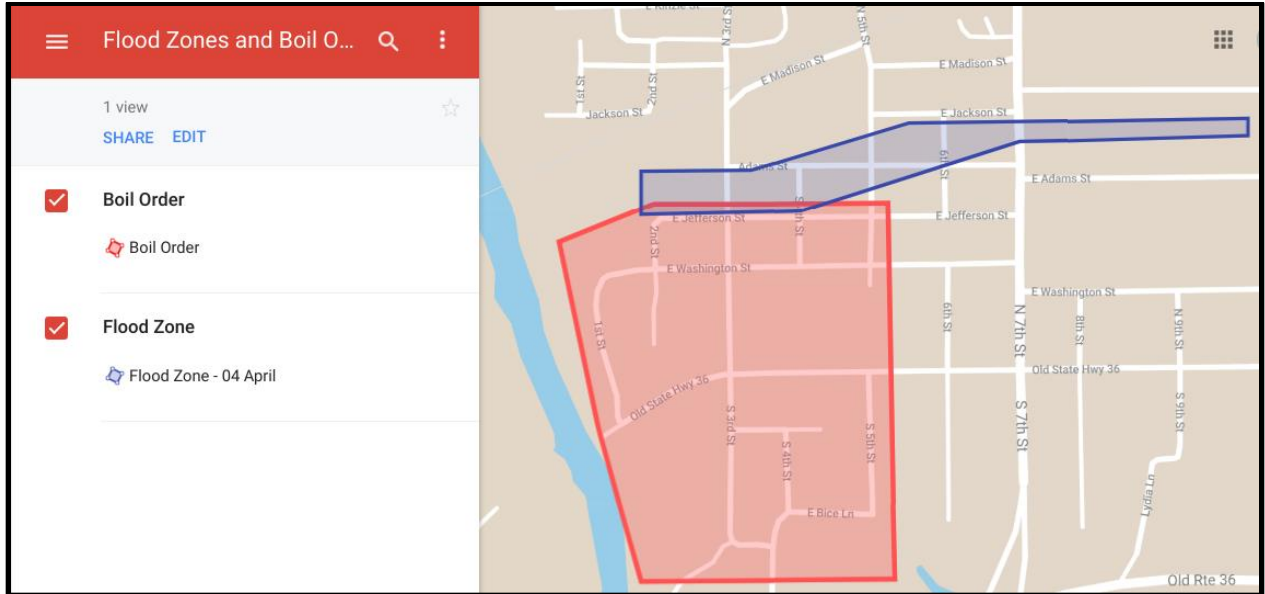
You can also use simple forms and tools to collect data from the community and display it on a map. This practice is known as "crowdmapping," derived from the similar term "crowdsourcing." If your city or county subscribes to ESRI, you can use their Story Map feature for this, but free and low-cost equivalents exist as well. For example, a simple Google Form can collect location data from residents

into a Google Sheet, which can then be shared as a Google Map. You can map many types of resources or hazards thanks to the custom icons available in Google Maps - see the disaster example below with first aid and water distribution icons.

More complex map-related applications are possible for libraries or governments with greater technical resources. For instance, the Ushahidi project [https://www.ushahidi.com/] began as an open source crowdmapping project in Kenya's post-election political violence in 2008. It allowed members of the public to submit reports of violence which were categorized and placed on a map, allowing the turmoil to be visualized. Since then, the software has been used to help map incidents such as hurricanes, earthquakes, and civil unrest. The project, which offers a paid service and a downloadable open source version, can be deployed to allow residents and responders to report and map incidents in real-time.

You may have heard of OpenStreetMap ("OSM") [https://welcome.openstreetmap.org/], an open community atlas of the world built by thousands of volunteers -- think of it like the Wikipedia of online maps. There is a special subset of volunteers focused on humanitarian concerns, disaster response, and using online mapping technology for positive social change, known as the Humanitarian OpenStreetMap Team, or HOTOSM [https://www.hotosm.org/]. If roads are temporarily closed, if villages or neighborhoods are flooded, or if no good existing maps exist of an area, this group of volunteer cartographers around the world can use their tools and satellite imagery to quickly and thoroughly map the affected area. The group is currently working on a focused effort with the International Committee of the Red Cross and Doctors Without Borders to map the flooded African nations affected by Cyclone Idai as well as a separate effort to map refugee movements around Venezuela. Because all of the tools and data used by OSM and HOTOSM are open and open source, they can be used by any responders around the world.
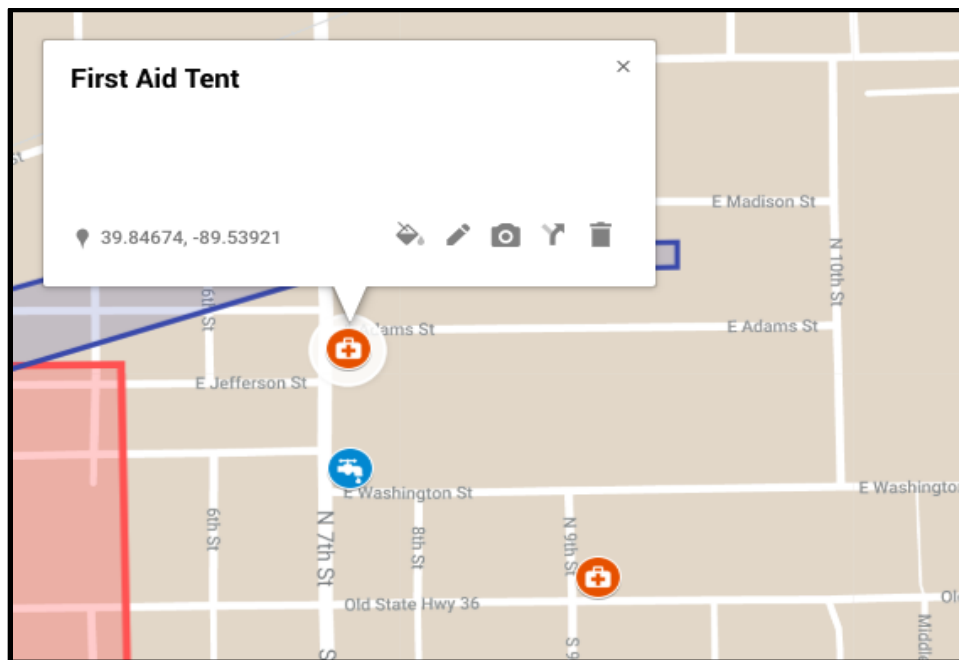
The ability to quickly acquire and process updated aerial imagery after a disaster is a relatively recent innovation available to more and more communities. Private satellite companies have started offering before-and-after imagery of disaster-affected areas for free to responders and recovery specialists. New innovations in machine learning can let sophisticated computer programs automatically analyze satellite imagery to show affected buildings, roads, farmland, etc., saving time from human analysts. [https://www.pobonline.com/articles/101492-fighting-natural-disasters-with-satellite-imagery] In addition, many communities now have their own camera-equipped drones, which can capture vast amounts of detailed aerial imagery available for immediate use.

Just like any other aspect of disaster management, preparation in the mapping field *before* the disaster can make response more effective. If your library is affiliated with a city or county with a strong GIS practice, you can discuss mapping platform options with them. If not, you may want to familiarize yourself with some of the commonly-used online mapping tools that we've discussed above.

Librarians have access to information and tools that could help their communities and the responders working in their community. It's just a matter of learning how to use them before the next earthquake or tornado or hurricane or riot or wildfire or …