Wildfire Maps Aid FEMA Mission

By Dr. JoAnne Castagna

Photo courtesy of FEMA Joint Field Office

In October 2007, a series of wildfires began burning across Southern California, leaving death and destruction in their path. Twenty raging brush fires were fanned by strong winds that quickly spread to seven counties. At least 1,500 homes were destroyed, leaving thousands homeless, and more than 500,000 acres of land burned from Santa Barbara County to the United States–Mexico border. Nine people died as a direct result of the fire; 85 others were injured, including at least 61 firefighters. More than 6,000 firefighters fought the blazes, aided by United States Army units, almost 3,000 prisoners convicted of nonviolent crimes, and 60 firefighters from the Mexican cities of Tijuana and Tecate. Major contributing factors to the extreme fire conditions were drought, hot weather, and unusually strong Santa Ana winds with gusts reaching 85 miles per hour. The fires had numerous sources.

A precise method to help locate and assist displaced people was needed. In response, the Federal Emergency Management Agency (FEMA) sought the expertise and capability of the United States Army Corps of Engineers Geographic Information System (GIS). The Corps had used its GIS expertise on several past missions, including during response to Hurricane Katrina and 9/11 at the World Trade Center. In California, the GIS maps helped FEMA identify the affected areas in the scorched counties and locate displaced people requiring assistance. The maps will also help to protect the state from potential safety hazards that can result from wildfires in the future.

The GIS is a computer-based information system and tool for analyzing spatial data. It takes information from various sources, such as aerial photographs (pre- and postevent), drawings, satellite imagery, commercial data sources, and vector data from field sources such as fire perimeters, ignition points, and burn intensity data, and combines these layers of information in various ways as overlays to perform spatial analysis and produce an electronic map that depicts the results of that analysis.

There are several types of GIS maps:

- County and damaged structure maps
- FEMA individual assistance application maps
- Demographic maps
- Flood plain maps
- Soil burn severity maps

County and damaged structure maps identify counties adversely affected and damaged homes and businesses. The information shows FEMA where to set up Disaster Recovery Centers (DRCs) to enable residents to obtain FEMA assistance applications. Maps of the DRC locations were also created to direct the public to the nearest DRC. When FEMA receives assistance applications from residents, they contact them to verify the location of their damaged structure. FEMA then uses the Corps's GIS maps to verify that the county they live in was badly burned and that structures were damaged.

FEMA individual assistance application maps are used to locate where clusters of residents are submitting applications

Photo courtesy of FEMA Joint Field Office

An area of southern California engulfed in flames from wildfires that made their way across the region last fall.

for FEMA assistance, where damage may have occurred, and where a DRC may need to be set up.

Demographic maps locate where economically challenged individuals live who don't have transportation to get to the nearest DRC. Once identified, FEMA sends a mobile DRC to the area.

Flood plain maps identify areas that border rivers that are prone to flooding. In order for FEMA to set up temporary trailer parks for residents, it needs to know where flood plains are located in order to avoid those areas.

Soil burn severity maps show where the wildfires burned the most and where there is the most soil erosion. This is important for FEMA to know because when fire "cooks" the soil, it eventually breaks it up, leaving chunks of soil that are like pottery. When the rainy season comes, these large pieces of hard earth can cause mud slides on hills, injuring people and damaging property.

These GIS maps are also being used by groups other than FEMA. For example, the Environmental Protection Agency looked at the burned areas to see what environmental impacts had occurred, and emergency responders used them to identify where they needed to evacuate people. The geospatial information and data products provide disaster emergency managers and responders at all levels of government with information to help them make more informed decisions, ultimately reducing the risk to life, property, and the environment.

Photo courtesy of Chad Markin, USACE, Rock Island District

An area of southern California that was badly burned by devastating wildfires.

Dr. Castagna is a technical writer/editor for the United States Army Corps of Engineers New York District. She can be reached at <joanne. castagna@ usace.army.mil>.