



Modernizing Disaster Preparation and Response

*Climate risks require
new tools and tactics*



Floods, hurricanes, wildfires and other climate-related disasters are becoming more common, inflicting greater damage.¹ How can state and local disaster-response teams best cope with these risks and foster long-term recovery?

Modern software platforms that combine GIS tools, GPS tracking and IoT sensors can be a huge help. Here's a look at the challenges state and local agencies must confront in an era of rising climate risks, the technology solutions that can help address them and best practices for successful modernizations.

Preparation and Response Challenges

State and local disaster-response leaders face multiple hurdles when confronting climate-related incidents.²

Escalating climate and infrastructure pressures. Legacy infrastructure wasn't designed for today's communities or to endure decades of severe storms, floods, wildfires and heat waves. "Culverts aren't large enough," says Eric Holdeman, senior fellow with the Center for Digital Government (CDG) and a longtime disaster-response leader in the U.S. Northwest. "Dams aren't high enough. The electrical grid isn't strong enough for heat waves."³

Government agencies and emergency response teams often lack current, actionable insight on the health of critical infrastructure assets. "They need to shift to more of a data-driven, quantifiable approach," says Jeff Smith, solutions engineer at Trimble, which has been providing infrastructure-monitoring technologies to the public and private sectors for decades. Reliable data helps leaders shift from reactive to proactive when disasters loom, Smith adds.

Operational gaps and overconfidence. State and local agencies have limited staffing and resources — often just one or two dedicated personnel. Leaders, meanwhile, tend to overestimate readiness for disaster-level events because they haven't completed rigorous testing and realistic assessments, Holdeman cautions. Even agencies that have prepared for moderately severe incidents can be overwhelmed in a catastrophic event.

Communication and coordination barriers. Siloed data and legacy technologies can handcuff disaster planning and response. "Whether it's a hurricane, flood, fire or train derailment, first responders don't have all the information they need at their fingertips," Smith says. Essential response data may be in a spreadsheet that's difficult to share, for instance.

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Meanwhile, inconsistent warning protocols make it difficult to send the same information to everybody affected by a catastrophe. Gaps in disaster communications contribute to misinformation that undermines public trust, Holdeman cautions.

Solutions That Drive Value

Modern software platforms encourage data-driven disaster planning and response. Key advantages:

Situational awareness and decision support. Geographic information systems (GIS) provide dynamic regional base maps. GIS mapping layers can add transportation networks, waterways, utility systems, homes, businesses and demographic information. Integrated satellite imagery and real-time data updates guide response teams to areas that need the most help.

"When a disaster happens and you overlay the impacts on top of that, you can quickly give a situational picture of what might be happening before the reports come in," Holdeman says. This helps leaders stay proactive because they're avoiding nasty surprises.

Mobile phones and tablets collect field data with high-accuracy positioning, accelerating damage assessments. GPS-tracking tools show locations of vehicles and support crews, helping leaders allocate resources more effectively in a crisis.

Asset and infrastructure management. Centralized software platforms can track conditions, maintenance and incident response. These systems can score an asset based on its age and need for repairs.

“For example, if a pump station no longer has power or its backup generator is out, the software can instantly symbolize this issue on a live GIS map, alerting operators to the problem,” Smith says.

Remote sensing and IoT monitoring tools allow early hazard detection in assets like bridges, dams and water mains. “A combination of GIS maps, mobile data collection and IoT sensor integration tells you what’s happening every second of the day,” Smith adds.

Laser-scanning techniques combined with high-resolution imagery can provide 3-D perspectives on a built environment, helping central planners understand what their field teams are dealing with.

Logistics and recovery management. During an emergency response event, every minute counts. Routing tools point emergency vehicles to where the help is needed and support supply chains to keep the aid flow coming. Ultra-precise positioning tools reveal exact asset locations — even if they’re submerged or buried by debris. Asset hunts that used to take three hours now take 15 minutes, Smith says. Once the initial response is underway, project management platforms take over, helping leaders oversee recovery initiatives, track budgets and manage compliance.

Best Practices

These tips will help disaster response leaders succeed when modernizing their technology stacks:

Build relationships and data-sharing agreements.

Real-time data exchange across jurisdictions is essential to proactive disaster management. Leaders should build formal, cross-jurisdictional partnerships and maintain

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regular engagement with their partners to build trust before, during and after disasters. There’s no way to integrate technologies successfully across jurisdictions without these relationships in place, Holdeman says.

Select vendors strategically. Smith notes that the best solutions address four issues:

- Usability, ensuring people can easily operate the software and navigate its interfaces
- Training, showing users the full range of software capabilities
- Integration, pulling in data and resources from multiple agencies and software platforms
- Governance, providing guardrails and policies to protect data, applications and users

Embed technology into daily operations. Train staff and run exercises that integrate tools into everyday tasks. Start with the most impactful, easy-to-use capabilities and then scale up gradually.

Plan for sustainability and inclusion. You’ll likely need multi-year funding to modernize. To win over reluctant leaders, “focus on demonstrating clear and quantifiable return on investment,” Smith advises. Explore grant programs for projects that include technology upgrades.

Make sure your systems serve all populations, including those with accessibility or language needs. Some urban populations speak 90 languages or more. Agencies should reach out to leaders in these communities to build connection. Make sure there are no gaps in getting urgent information out to everyone.

A Proactive Approach

Disaster-response teams need modern tools for emerging climate threats. At the same time, emergency management requires degrees of caution that don’t align with the “fail-fast” ethos common in the private sector.

“You can’t fail quickly with public dollars,” Holdeman says. “They expect you to invest in systems and have them work.”

A sound approach is to partner with proven technology vendors that understand the scope of climate challenges and have proven experience helping disaster responders adopt a proactive stance and adapt to changes quickly as they arise.

1. climate.gov/news-features/blogs/beyond-data/2024-active-year-us-billion-dollar-weather-and-climate-disasters
2. climatecentral.org/climate-matters/billion-dollar-disasters-2025
3. webinars.govtech.com/Navigating-the-Storm%3A-Strategies-and-Tech-for-Enhancing-Emergency-Management-This-Hurricane-Season-143480

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