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Preparing for Increased Weather-Related Disasters in Inland Locations

Effectively Communicating with Responders and the Public During Emergencies

Inland Locations Are No Longer as Safe as Once Thought when Mother Nature Explodes

In recent years, inland areas—long thought to be safe from the fury of natural disasters—are increasingly bearing the brunt of extreme weather events. Droughts, flash floods, wildfires, and even hurricane-force storms are no longer confined to coastal regions; they're now wreaking havoc deep within the country.

This unexpected and severe shift in inland impact has left many communities scrambling to address vulnerabilities they never anticipated. Once a low priority, emergency preparedness and evacuation planning have become crucial concerns for many inland cities, towns, and rural communities that now face the destructive power of Mother Nature firsthand.

It's crucial to explore the evolving risks and challenges that inland communities face in a rapidly changing climate by examining the driving forces behind this shift, the types of natural disasters becoming more prevalent, and the ways communities can adapt and prepare.

From real-life stories to practical strategies for emergency response and crisis management, this guide aims to provide a comprehensive look at why inland locations are no longer the safe havens they once were—and what can be done to improve resilience in the face of increasing natural threats.

The Growing Threat of Inland Weather-Related Disasters

Traditionally, weather-related disaster risks were more localized to coastal and mountainous regions, but climate change has broadened these threats. Inland areas, especially those with dry forests or wetlands, are now increasingly vulnerable to these disasters. What was once thought of as a wildfire problem in California or a hurricane problem along the Florida Coast, is now impacting major swathes of the United States.

To demonstrate, the two maps to the right are from the National Interagency Fire Center and illustrate (1) the **Wildland Fire Outlook** for November 2024 which is concentrated in the South and Mid-Atlantic regions (not normally thought of as at-risk), and (2) a Wildfire Map dated November 11, 2024.

Significant Wildland Fire Potential Outlook
November 2024
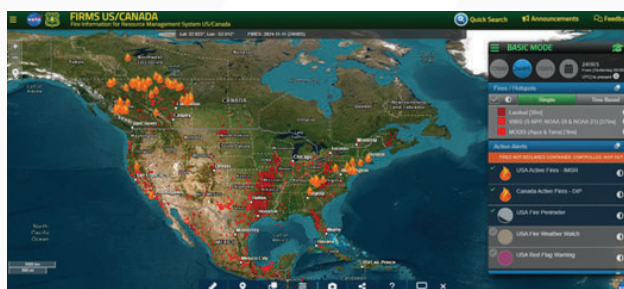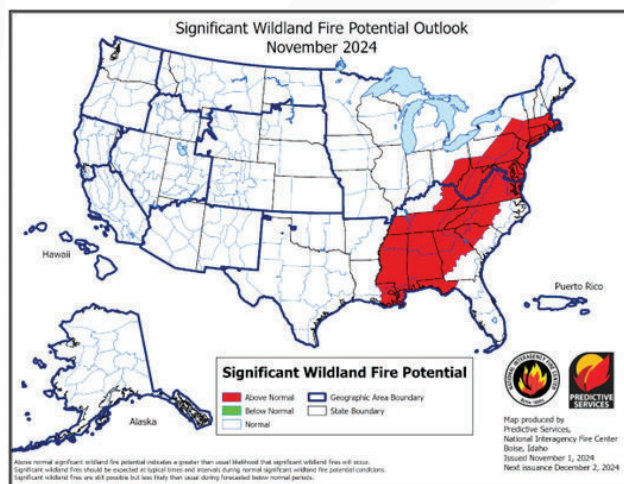
Increasing temperatures, extended drought periods, and sudden, intense rainstorms are forming a dangerous mix that leaves inland areas highly susceptible to frequent wildfires and severe flooding.

This trend is particularly evident in the United States, where states traditionally less prone to these natural disasters, such as Utah, Nevada, Idaho, and Colorado in the West and the Appalachia Mountain states in the East, have experienced alarming increases in both wildfires and floods. These events are driven by prolonged dry spells that dry out vegetation, turning it into fuel for wildfires, and by sudden, heavy rainstorms that overwhelm soil and waterways, resulting in flash floods.

Equally troubling, the power of hurricanes is growing exponentially and now reaching much farther inland with massive amounts of water. The escalation of these disasters reached a critical point in the fall of 2024 when Hurricanes Helene and Milton struck the southeastern United States in quick succession.

These powerful storms, which maintained hurricane strength unusually far inland, led to catastrophic flooding and damage from Florida and Georgia all the way into Western North Carolina and Eastern Tennessee. Rivers surged over their banks, inundating towns and rural areas while damaging infrastructure, homes, and farmland.

Back-to-back hurricanes underscore the new reality that even inland regions are no longer immune to the devastating impacts of climate change. The need for adaptive measures, such as enhanced flood defenses, proactive fire prevention, and improved crisis communications and evacuation management, have become critical for safeguarding these vulnerable areas as extreme weather becomes more frequent and intense.

The Fire-Flood Cycle:
A Growing Threat in Inland Regions

One of the most hazardous patterns now taking shape in inland areas is known as the fire-flood cycle—a phenomenon where an increase in wildfires directly elevates the risk of subsequent flooding.

When a wildfire sweeps through an area, it leaves behind burn scars that drastically alter the landscape. The intense heat from fires can cause the soil to become hydrophobic, or water-repellent, meaning it loses its natural ability to absorb rainfall. With this protective layer of vegetation and soil integrity destroyed, even moderate rainfall can lead to sudden flash floods and dangerous mudslides. These events pose severe risks to communities located downstream of burn areas, as floodwaters and debris flow rapidly downhill, often with little warning.

To manage the cascading risks associated with the fire-flood cycle, emergency response strategies must consider a spectrum of extreme weather events, including hurricanes, tornadoes, wildfires, and floods. Developing and implementing a comprehensive emergency alert system is essential. Such a system would provide timely warnings to residents about imminent threats, allowing them to take necessary precautions or evacuate if needed.

In addition to alerts, educating the public on evacuation routes and safe zones is critical, particularly in areas that were not previously at risk but are now vulnerable due to recent fires.

This coordinated approach not only increases community awareness and preparedness but also significantly reduces the potential for loss of life and extensive property damage. As the frequency and intensity of extreme weather events continue to rise, adaptive and responsive strategies like these are essential for protecting inland communities from the compounded threats of fire and flood.

Strengthening Public Warning Systems for Better Preparedness

With the rise in inland climate-related disasters, the need for reliable public warning systems has become increasingly evident. A robust emergency alert system is essential to ensuring that residents are aware of the impending risks, even in regions that haven't historically dealt with such events.

Crisis management teams must work to install these systems and ensure they are efficient, far-reaching, and capable of covering even the most remote areas. This means including communication channels that cover most people and others that can reach isolated individuals without access to technology. Additionally, channels that continue to work in extreme conditions and are solar or battery powered with satellite connectivity ensure you are ready when it matters.

Investing in advanced alert technologies can dramatically improve crisis response times, allowing emergency services to focus on evacuation management and reducing harm. Public education campaigns, complemented by clear, actionable warnings, empower residents to act swiftly, often making the difference between life and death in a crisis.

Overall Strategies to Safeguard Inland Communities

The growing intensity and frequency of climate-related disasters demand proactive measures to safeguard communities, particularly in inland regions unaccustomed to such events.

Strategies to consider as your agency moves forward:

1. Technological Integration

The increase in wildfires, flooding, and extreme weather emphasizes the need to transition to a proactive approach by integrating modern emergency alert systems. These systems utilize geospatial intelligence and multiple communication channels to broadcast alerts that enhance resilience and ensure real-time communication. By investing in localized solutions that bridge communication gaps in coverage, even in underserved areas, agencies can reach everyone and minimize the impact of disasters.

2. Coordinated Crisis Response

Beyond technology, success in disaster response depends on a coordinated approach among all participating public safety agencies. Emergency systems should integrate with evacuation and resource management tools and enable multiple agencies from different jurisdictions to work together seamlessly. This holistic framework enables quicker deployment of aid and organized evacuations, minimizing chaos and reducing response times.

3. Comprehensive Plans

A proactive approach to natural threats involves detailed planning. Protective communications help first responders and emergency managers build comprehensive pre-planned messages for quick, clear communication during crises. Simulations and data modeling create realistic scenarios, aiding in evacuation plans that minimize traffic and panic. Situational awareness tools ensure responders prioritize areas needing urgent aid, like schools, hospitals, and shelters, for effective response coordination.

4. Empowering Communities

Emergency communication systems are only effective if the public understands alerts and can act on them. Educational initiatives should familiarize residents with alerts and required actions. Interactive campaigns, drills, and collaboration with local authorities foster a culture of preparedness. Accessible and intuitive public-facing tools ensure accurate and trustworthy information is available to guide the public's decisions during emergencies.

Strengthening Communication Networks

In a crisis, communication is critical. Building robust communication channels ensures that information flows seamlessly between local governments, emergency services, and the public.

Key elements include:

• Advanced Alerting Systems - Geotargeted multi-channel communication platforms enable precise, real-time updates to even the most isolated populations. Using multiple communication channels improves reach and the rates at which the public adheres to instructions.

• Community-Focused Apps – With an integrated website and app, accurate evacuation, traffic route, and shelter information can be pushed directly to the public and updated in real time.

• Collaborative Information Sharing - Emergency services, local leaders, and community groups must work together to ensure the consistency of messages and to avoid conflicting information.

• Feedback Loops - Mechanisms for receiving public feedback—such as hotlines or surveys—allow officials to address concerns and refine strategies.

Unifying Public Safety Agencies

Large scale emergencies often involve multiple agencies from different jurisdictions. This adds complexity and can create confusion which slows down responses when time is everything. Coordination across multiple agencies across jurisdictions is unavoidable and must be streamlined to ensure success.

To enhance coordination, you will need to:

• Share Timely Information – Collaborative communication platforms effectively connect all participating public safety personnel. The ability to establish a virtual EOC with relevant leadership, create dedicated team chats, and a global responder channel maintains alignment and ensures information is shared quickly.

• Engage External Support – Integrating channels for volunteers ensures their safety and enhances their impact. Collaboration with trusted community figures can be mutually beneficial by guiding them to amplify official messaging accurately and effectively.

• Work from a Single Source of Truth – Responding with a common operating picture ensures all agencies share accurate, real-time information, reducing confusion and miscommunication. This unified approach streamlines decision-making and creates a cohesive, effective response, especially in complex, multi-jurisdictional emergencies.

Planning for All Eventualities

Effective evacuation management starts with meticulous planning. Zone-based evacuation strategies ensure that communities can be evacuated in an orderly and prioritized manner, reducing bottlenecks and confusion.

Critical steps include:

• Mapping Evacuation Zones: Use geospatial data to delineate risk areas, identifying clear routes for escape and areas for staging and temporary shelter.

• Establish Safe Shelters: Establishing shelters is critical, even in regions that are less likely to be affected by the disaster. These facilities must be equipped to handle vulnerable populations, such as the elderly or individuals with disabilities, and provide basic needs like food, water, and medical aid. It is also critical to identify evacuation logistics and shelter options for pets and livestock.

• Identifying Points of Interest: These commonly include locations for critical infrastructure that must be protected if possible or areas that need more attention when evacuating, such as schools, hospitals, homeless encampments, and assisted living centers. Some less common examples are houses with pools for helicopters to refill during wildfires and sandbag stockpiles for flood or hurricane zones. These areas require prioritization in evacuation plans and response strategies to protect vulnerable populations and maintain infrastructure integrity.

• Building Alert Templates: These templates should cover all possible scenarios, including rare events, to avoid delays in crafting messages during a crisis. Alerts should be tailored to different threat levels and include specific instructions. Using the right communication channels—SMS, IPAWS, and acoustic devices—ensures that people receive urgent information quickly, boosting response effectiveness.

• Scenario-Based Planning: Conduct simulations of worst-case scenarios to identify gaps in the evacuation plan, allowing for adjustments before an actual crisis arises.

Engaging and Educating the Public

Communities are the cornerstone of effective disaster response. Ensuring residents are informed and prepared can mean the difference between chaos and order during an evacuation.

To build a resilient, prepared population:

• Educate on Local Risks - Tailored public education campaigns should provide residents with an understanding of wildfire and flood risks specific to their area.

• Simplify Evacuation Instructions - Clear, actionable guidance, such as "grab-and-go" checklists and route maps, helps individuals and families prepare without feeling overwhelmed.

• Practice Makes Perfect - Community-wide evacuation drills familiarize residents with procedures and routes, increasing their confidence and readiness.

• Partner with Schools and Businesses - Collaboration with educational institutions and local businesses ensures broader outreach and participation in preparedness initiatives.

• Leverage Social Media and Digital Platforms - Social media campaigns can amplify messaging and support the official website and app by providing real-time updates during emergencies.

• Recognize Community Champions - Highlight individuals or organizations leading preparedness efforts to encourage wider community participation.

Case Studies - Lessons from Recent Disasters

Inland Flooding - Hurricanes Helene and Milton (2024)

Challenge:
Major back-to-back hurricanes brought unprecedented rainfall to the Southeastern United States, inundating communities in North Carolina and the Tennessee Valley with over 30 inches of rainfall.

Response:
- Public alerting and instructions: Officials used social media, press conferences, and IPAWS, which included WEA, radio broadcasts and notifications through the FEMA app to inform the public.
- Response challenges: The scale of damage, community spread, communication breakdowns in isolated areas, and the overlapping impact of both hurricanes, meant resources were strained and coordination was extremely difficult across multiple states.

Key Takeaways
1. Local involvement was essential in immediate rescue efforts and in providing support to affected individuals.
2. Extensive damage to roads, bridges, and water systems highlighted the need for resilient infrastructure capable of withstanding extreme weather events.
3. The spread of misinformation regarding FEMA's role hampered relief operations. Accurate information dissemination is vital to ensure coordinated and effective disaster response efforts.

Camp Fire - Paradise, California (2018)

Challenge:
The Camp Fire devastated the town of Paradise within hours, highlighting gaps in evacuation planning, such as delayed alerts, non-operational cell towers, and gridlocked evacuation routes.

Response:
- Pre-disaster Assessment: After the fire, experts identified the need for multiple evacuation routes and better public awareness of wildfire risks.
- Technology Issues:
  o Cell tower failures due to the fire meant many cell alerts did not go through.
  o Some residents were unable to receive alerts due to power outages or lack of signal.
  o The pace of the fire's spread outstripped the capacity of these systems to warn everyone effectively.
  o Lack of redundancy in communication systems made some technologies unreliable.
- Outcome: Lessons learned from Paradise have become a benchmark for other communities.

Key Takeaways:
1. Map multiple evacuation routes to avoid bottlenecks.
2. Conduct community drills to test evacuation readiness.
3. Integrate geotargeted alerts to minimize confusion.

Flooding - Central Tennessee (2021)

Challenge:
Historic flooding overwhelmed infrastructure, catching many residents unprepared due to a lack of prior flooding experience in the area.

Response:
- Community Alerts: Authorities leveraged mobile alert systems and social media to issue rapid warnings.
- Public-Private Collaboration: Local businesses provided temporary shelters and resources for displaced families.
- Outcome: While damage was extensive, efficient communication and quick resource deployment saved lives.

Key Takeaways:
1. Use diverse communication channels to ensure alerts reach everyone.
2. Engage local businesses and NGOs in disaster planning.
3. Establish shelters in elevated areas as part of flood response planning.

The Role of Leadership in Driving Resilience

Disaster resilience isn't just about infrastructure—it's about leadership that prioritizes long-term safety and sustainability. Community leaders, policymakers, and planners must champion resilience by fostering collaboration, securing funding, and driving innovative solutions including strategic communications solutions that support collaborative relationships with emergency managers, responders, and the public.

Leadership plays a pivotal role in fostering resilience to weather-related disasters, particularly in inland locations where communities may be less accustomed to such events. Effective leaders act as visionaries, setting clear goals for disaster preparedness and long-term sustainability while rallying communities to work collaboratively toward these objectives.

These impactful leaders recognize the importance of integrating climate risk assessments into local planning, infrastructure investments like mass notification systems and evacuation management solutions, and community engagement initiatives. By leveraging data-driven insights and fostering partnerships with fellow community leaders and emergency managers, urban planners, and emergency responders, they can develop actionable strategies to mitigate risks and enhance recovery efforts.

A Final Word

As inland locations become increasingly vulnerable to hurricanes, wildfires, and floods, the urgency of developing tailored crisis management and emergency alert systems cannot be overstated. From understanding the fire-flood cycle to strengthening public warnings, implementing evacuation plans, and investing in climate-resilient infrastructure, there are clear steps that communities can take to reduce their risk.

The increase in climate disasters for recently impacted inland locations underscores the importance of tailored crisis management plans. As the USDA Forest Service Wildfire Risk map below shows, the threats of wildfires are expanding across most of the United States, into areas that are not typically viewed as wildfire territory. Expanding threats are a common trend across the category of natural disasters. Local governments and communities that may be unaccustomed to dealing with these challenges are urged to develop resilient infrastructure, implement public warning systems, and foster community awareness of these evolving threats.
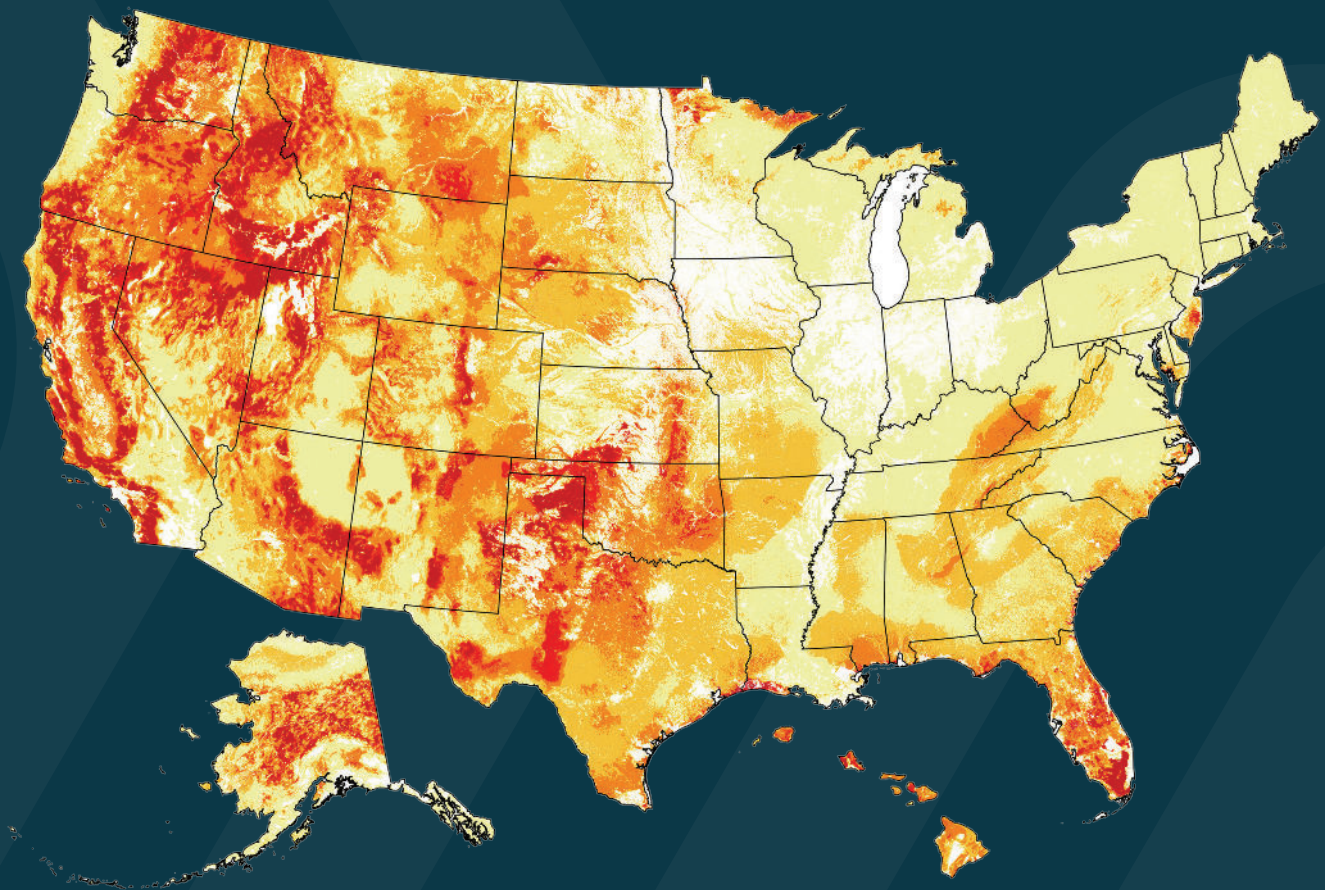
The Protect Platform rovides a full suite of Protective Communications tools for all hazards providing targeted emergency communication, data-driven decision making, secure inter-agency collaboration, and more. It is composed of **Genasys Protect, Evertel and Acoustics.**

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Communication zones
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Planning and Modeling
Enhance response with local data to simulate emergencies and model traffic flow.

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Multi-channel alerting
Reach people when it matters over different media and delivery methods.

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Use the Genasys Protect app and website for trusted location-focused information.

Genasys Evertel - Compliant cross-agency communication and collaboration across a secure app and desktop platform

Genasys Acoustics - Highly audible and clear voice messaging thousands of meters away, staying on and connected even during broad power outages and network downtime

Long Range Acoustic Device (LRAD) systems deliver live or recorded voice messages with exceptional clarity and intelligibility for any operational scenario, providing the ability to communicate at safe distances, establish safety perimeters, and escalate the use of non-lethal force.

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