CLIMATE POLICY LAB

POLICY BRIEF | APRIL 2024

PREPARING FOR NOVEL EXTREME WEATHER EVENTS IN THE UNITED STATES: LESSONS FROM DISASTERS

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Key Policy Insights

- Disaster policy gets stale quickly, and policies need to be routinely reviewed, simulated, and revised to reflect current and evolving climate risks.
- In a changing climate, communities with no recent experience of extreme weather events can benefit from proactively studying lessons from disaster-impacted communities.
- Government and civil society should pre-design methods for emergency communication that reach heterogeneous populations through existing community institutions and incorporate system redundancy in case of infrastructure or other communication failures.
- Existing inequalities and gaps in human services are exacerbated by disasters; preparedness plans should prioritize long-term social service needs, such as mental health and housing, before and after disasters.
- Coordination and unified emergency management training should be improved between all levels of government and with non-governmental organizations and community groups.

The United States experienced 28 billion-dollar disasters in 2023 – far exceeding the previous record of 22 billion-dollar disasters in 2020.[1] All told, these events led to an estimated $92.9 billion in damages. Without significant community preparation, the costs of extreme weather events may be exacerbated in the coming decades, as climate change increases the frequency and severity of extreme events.[2,3] The stakes are high, with broad ranging community impacts, especially on socioeconomically vulnerable populations. Of the 3.3 million people in the United States who were forced to evacuate their homes in 2022 due to hurricanes, floods, fires, and other disasters, the lowest income households had the highest evacuation rates.[4] Extreme weather events can also exacerbate energy inequality and worsen health outcomes for already vulnerable people, including those with lower levels of education, without English proficiency, home air conditioning, or transportation access.[5, 6]

Adequate community preparedness can mitigate the impacts of extreme events on individuals, communities, and infrastructure, yet policy change often happens in the wake of disasters.[7, 8, 9, 10] Studies show that disasters serve as focusing events which grab the attention of the public, media, and policymakers and allow governments to make changes based on new knowledge and past mistakes.[11, 12] But this type of 'reactive' policymaking will become increasingly inadequate due to climate change. Instead, scenario planning – a process in which governments or community groups conduct policy response exercises based on possible future climate scenarios – can

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enable updated, proactive policies that integrate scientific assessments of unprecedented weather extremes before those events occur. In this brief, we provide an overview of emergency preparedness, disaster risk reduction, and climate adaptation policies in disaster-affected communities in the United States and explore the gaps in policy and practice.

Policies for disaster response and preparedness: Learning from past experiences

Lived experience of extreme weather events has been shown to intensify emergency and resilience planning and policy.[14] Extreme events can shift behavior by creating what is referred to as a "policy window," or an opportunity for legislation to pass that otherwise would not have been implemented.[15] Miao (2019) finds not only that many governments implement policies in the wake of major disasters, but also that social networks and community leadership working in tandem with local government capacity is critical to mitigate the effects of natural disasters.

Our work in Butte County, California, found that the 2018 Camp Fire event led to a dramatic increase in county and city wildfire mitigation and response policies. The policy lessons learned in Butte can inform policies in other locations (Figure 1).

Like Butte County, many local governments across the United States have already experienced novel climate events and many others are at risk. Past research, supported by our own, shows that sharing local knowledge and leadership contributes strongly to properly

About this project

The Climate Policy Lab (CPL) at the Fletcher School and the Friedman School of Nutrition Science and Policy, both at Tufts University, have embarked on a multi-year research project, bringing together a team of research collaborators from New York University, Spelman College, and University of Sussex to analyze the current risk of climate extremes across the United States. As part of the NASA-funded program, Tufts University is partnering with the American Red Cross to assist local U.S. disaster managers and community leaders to assess ongoing emergency and resilience preparedness efforts and document gaps in related policies and procedures. In its first stage effort, the Tufts team has evaluated ongoing local disaster response policies in five select communities, which included: Terrebonne Parish, Louisiana; Butte County, California; Montgomery County, Alabama; Yazoo County, Mississippi; and Warren County, Kentucky. This policy brief includes summary findings from in-depth interviews in two of the pilot locations, Butte County and Warren County, selected due to their recent experience of major disasters. Using interviews, scenario storyline workshops, and document analysis, this first phase of the study assessed ongoing disaster response efforts and documented resilience policy gaps in select climate vulnerable communities.[13] As input to the scenario workshops, we analyzed NASA and weather data to understand the types of extremes possible in each location in today's climate. A comprehensive disaster preparedness and adaptation policy inventory was conducted for the five locations, which categorized policies by sector, policy type, and hazard addressed.

Figure 1: Local Wildfire Policies created per year, Butte County

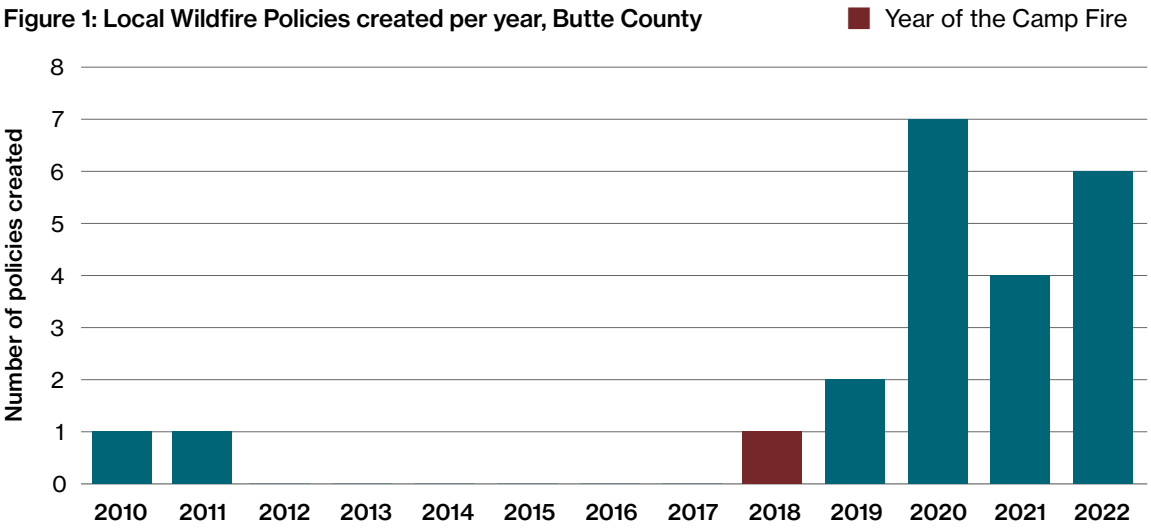

Figure 1, showing the rapid growth in wildfire-related policies in Butte County after the Camp Fire, illustrates the trend identified above: experiencing a disaster is an impetus for policy change. Data is drawn from our 2023 structured internet search of policies implemented in Butte County. Policies were organized by the hazard that they address and year they were first implemented. For this chart, policies were included if they appeared in the search, address wildfire risk and/or preparedness as a central goal, and were implemented in 2010 or after by a city or county government in Butte County.

addressing future climate effects.[16, 17, 18] We posit that learning from the experiences, missteps, and ingenuity of disaster-impacted communities can benefit communities that haven't experienced recent disasters of their own.

Unfortunately, diffusion of experiential knowledge remains a key problem. Our interviews with policy practitioners and community leaders suggest that local governments often must think on their feet when responding to a disaster due to ineffective policy design or unprecedented problems. Ineffective policies can be a result of 'old' or absent knowledge, failure to understand the scale and magnitude of disasters, inadequate long-term investment, and failure to support citizen and community self-mobilization.[19] The separation of Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) fields, particularly on a local-scale, can also contribute to policy incoherence and ineffective use of resources.[20, 21] This suggests the importance of integrating forward-looking climate change analysis and knowledge with traditional disaster resilience and emergency preparedness efforts.

Our work identifies four core problem areas that prevent adequate local government preparedness for extreme weather events:

1) barriers to dissemination of critical information;

2) gaps in provision of community human services;

3) difficulties in planning and coordination across federal, state and local agencies and non-governmental organizations;

4) ineffective policy implementation or design.

1. BARRIERS TO DISSEMINATION OF CRITICAL INFORMATION

Our research and interviews with stakeholders in Butte County, California, and Warren County, Kentucky, identified multiple barriers to sharing critical information about weather hazards by government agencies to the public. For example, community demographic and generational differences meant that language barriers and the use of electronic delivery systems left out vulnerable segments of the population.

Interviews in Butte County revealed that communications breakdowns resulted in many citizens evacuating much later than they should have, creating road congestion and causing some to shelter in place in large parking lots or evacuate partially on foot. A report by the Butte County Grand Jury found that only 13% of the 52,000 evacuated individuals had received communication regarding the approaching fire.[22]

Research supports the importance of trusted messengers and sources for successful disaster communication.[23] Information must be shared through multiple channels in a clear, consistent, digestible, and ideally repetitive manner. Moreover, individuals are most accepting of the messaging when it takes into consideration their specific needs and aligns with mental models and world views. At a very basic level, successful dissemination must be flexible and culturally appropriate, ranging from text messages to door-to-door campaigns.[24]

2. GAPS IN PROVISION OF COMMUNITY HUMAN SERVICES

Our research revealed gaps in access to key human services, particularly housing and mental health resources, which worsened post-disaster outcomes, especially for already vulnerable groups, such as unhoused people, the energy-poor, and the elderly.[25,26] Respondents in both Butte and Warren counties noted the challenges faced by survivors attempting to secure temporary housing and disaster relief grants. Nationwide, low-income households who might be eligible for disaster assistance are often denied benefits, a problem which is particularly grave for individuals who were unhoused prior to a disaster.[27] A report compiled by the US Government Accountability Office (GAO) confirms that disaster survivors struggle to navigate FEMA's Individuals and Households Program.[28] Studies show that this barrier to aid remains especially prevalent in low-income communities compared to their more affluent counterparts.[29] Rural and low-income communities often lack the funding to create emergency management departments tasked to advocate for federal support on their behalf.[30]

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Following the Camp Fire, 18,000 structures were compromised and 56,000 individuals displaced, putting strain on shelters and housing.[31] This equated to a 16% increase in the unhoused population in Butte County, of whom 23% were experiencing homelessness for the first time. Much of the unhoused population following the fire was made up of low-income owners, the elderly, and renters, all less likely to have the finances necessary to rebuild.[32] Our interviews corroborate these struggles and describe a recovery timeline of years, not weeks or months.

Our interviews with Butte County residents frequently discussed the mental health effects of disaster survivorship and illustrated a lack of support from the government managed recovery process. A neurological study executed in the 6–12 months after the fire revealed that the cognitive and processing ability of survivors was affected by the event, with many individuals showing symptoms of Post Traumatic Stress Syndrome.[33] Rural communities tend to have limited mental health resources and are especially susceptible to health services breakdown following disasters.[34] The Camp Fire destroyed existing mental health infrastructure such as health centers and schools that offered formal and informal services. Following the fire, Butte was labeled by the Health Resources & Services Administration as a Mental Health Shortage area.[35]

3. DIFFICULTIES IN PLANNING AND COORDINATION ACROSS FEDERAL, STATE, AND LOCAL AGENCIES AND NON-GOVERNMENTAL ORGANIZATIONS

Interviewees and scenario workshop participants identified lack of coordination across different government agencies and nongovernmental organizations as a barrier to effective disaster response. They reported

that government agencies did not always communicate with each other when creating and implementing policy, which at times led to incoherent and duplicative policy responses, as well as inefficient use of resources, such as for training. Warren County interviewees described "siloing" of city and county agencies, as well as lack of communication between state, county, and city officials. Analysis following the 2018 Camp Fire in Butte County found that failures in communication between federal and local officials prevented adequate advance contracting, and led to a shortage of telecommunication services, housing units, and generators in areas affected by the Camp Fire.[36]

Other research supports the importance of social capital, meaning networks of relationships and the resources embedded in them, to improve community resilience.[37, 38] Ties between individuals and family, social groups, community organizations, and local government can provide financial and nonfinancial resources and ensure dissemination of information and warnings in preparation, during, and in the aftermath of extreme events. In the aftermath of Hurricane Katrina, when federal and state resources failed to support residents, local organizations and community groups played vital roles in providing access to food, mental health support, health care, and legal services.[39]

4. INEFFECTIVE POLICY IMPLEMENTATION OR DESIGN

Our interview research demonstrated that many local stakeholders believe that state and federal policies are inadequate for their unique disasters and communities. Policies may be ineffective if they are not tailored to the specific needs of each community, and if they are not routinely updated to reflect the changing nature of many types of extreme weather events.[40]

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In the case of Butte County, the community's existing evacuation plan wasn't designed for the rapid spread of the Camp Fire, the deadliest and most destructive wildfire in California's history.[41] Local policies may be increasingly ineffective without re-evaluation of risks in a changing climate. While the Camp Fire is an extreme case, across the western United States, wildfires are becoming larger and more severe.[42] This is in part due to mismanagement, but is also an effect of climate change, which has heightened dry conditions across forests and stimulated a two-fold increase in the area of land in the western U.S. burned by wildfires between 1984 and 2015.[43] It is vital that local and state authorities update policies and integrate climate modeling into disaster risk reduction and emergency management programs.

It is also important that policy accounts for human error. During the Camp Fire, a key information post was abandoned, which, according to interviewees, prevented many people from receiving updated evacuation notifications. This was then amplified by technical failures. As the fire damaged infrastructure, even individuals who had opted-in failed to receive notifications. Additional technical issues arose as cellphone towers were overtaken by flames. Dispatchers became overwhelmed by the volume of reports.[44] As a result, residents dependent on cell phones found themselves without communication. Alternative communications like the national emergency alert systems – Wireless Emergency Alerts (WEA) and Integrated Public Alert and Warning System (IPAWS) – were unable to be deployed as both required broadband spectrum and internet services.[45]

In Warren County, ineffective policy implementation or design was evident in the management of post-disaster support systems. Government officials suggested that the time and costs involved in navigating the FEMA assistance process were barriers to effective distribution of resources in the aftermath of extreme weather. According to interviewees, many disaster-affected individuals who should have qualified for support were denied it, and precious county resources and time were spent

applying for grants. Residents of Warren were underprepared to absorb and distribute public charitable donations that were received in the aftermath of highly publicized severe storm outbreaks, interviews revealed. The county also had insufficient resources to clear and store debris. In the years since the 2021 tornadoes in Warren County, local government agencies have developed procedures and plans to address these gaps.

Figure 2: Four Key Policy Challenges and their Solutions in Butte and Warren Counties

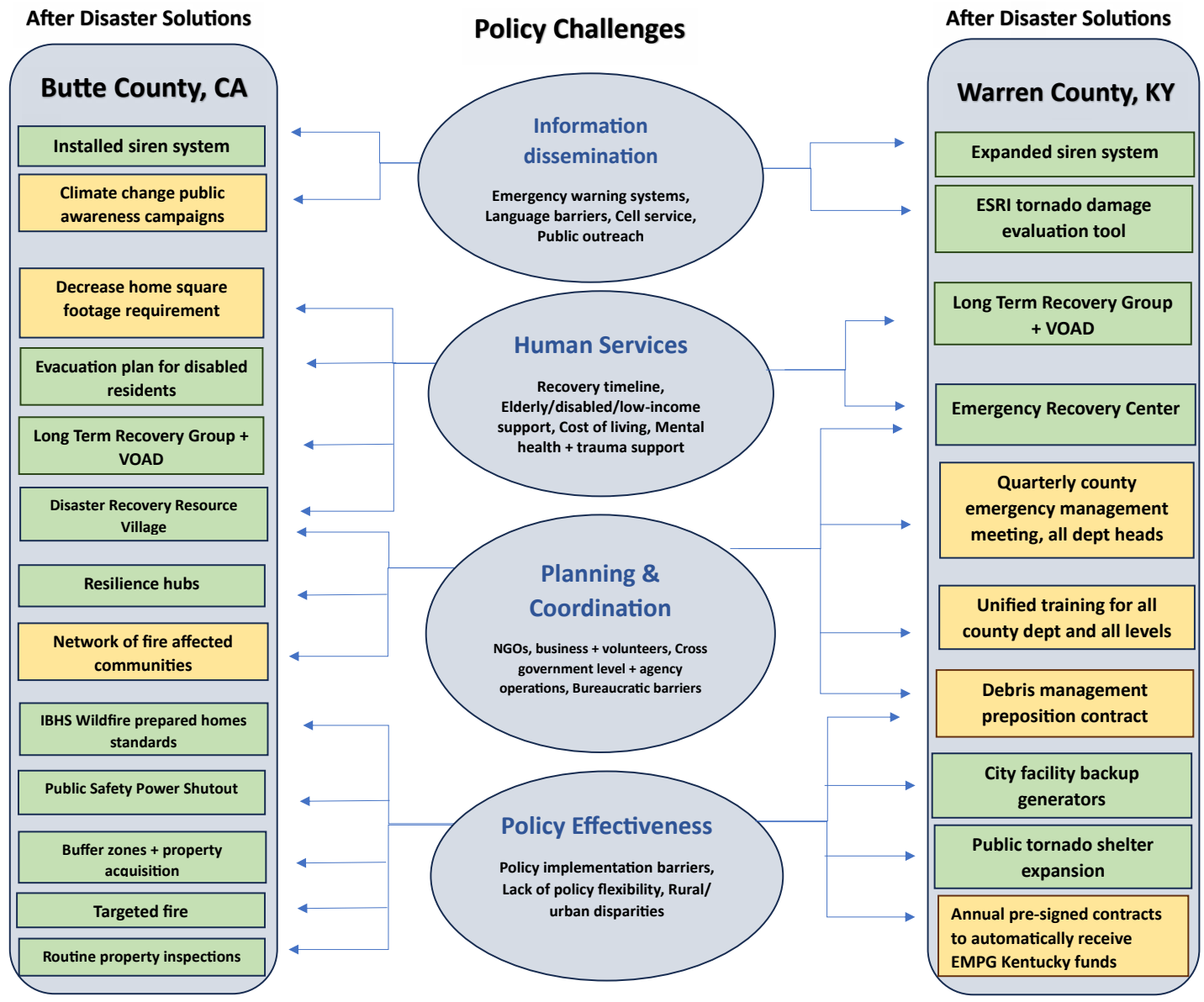

Figure 2 illustrates four key problem areas identified in our research and key policy solutions that were put into effect in the aftermath of the disasters that they experienced. The solutions shown are not a comprehensive image of all policies implemented in these communities, but they are illustrative of the kinds of policy change that occurred following acute events in each location. Some solutions were implemented in both locations, such as expanding siren systems, and others were specific to each place. However, many of the solutions address similar challenges.

Recommendations for Policy Makers

Our research found that local leadership was a critical factor when addressing extreme weather events. Interviewees emphasized that local knowledge, capacity, and competency are consistently among the best answers to the varied challenges that their communities face. This is supported by existing research, which shows that social networks and community leadership that works in-tandem with local government capacity is necessary to mitigate the effects of natural disasters.[46] Traditional disaster risk reduction and emergency preparedness policies often focus on physical infrastructure; by contrast, our analysis supports the need for better social infrastructure. Social capital – or networks of relationships and the resources embedded in them – can improve community outcomes.

When creating updated policies, policy makers should consider:

- How will information be shared with the public?
- Who is being supported by this policy, who is being left behind?
- How will we collaborate with other governmental groups?
- How can we ensure that members of my agency are aware of this policy and its implications?
- Are there groups in my community already working on this topic and how can they be included in the policy solutions?

To improve policy for community adaptation, resilience, and emergency response, we recommend the following:

Curate multimedia and multi-lingual communications and alerts: audio, visual, in person, written.

Introduce redundancy in emergency management systems, such as: communication methods that don't require cell service, backup generators in key facilities, shared responsibility for sharing information with the public during an emergency, and automated communication processes.

Cultivate social networks and trust between local governments, emergency preparedness teams, and other organizations important to disaster response. This can include building relationships and developing bilingual communications with community leaders and institutions such as community centers, religious institutions, and local schools, particularly targeting higher risk or harder to reach groups.

Include non-governmental groups in emergency management training and drills, such as religious institutions, civic and community centers, nonprofits, and schools.

Develop systems for disaster relief application support that are active prior to extreme events. Train multiple people in the process of filing and screening applications and establish a benefits resource center in the community.

Prioritize affordable housing, which is a long-term, not acute, post-disaster challenge. Better planning and governmental coordination at the federal, state, and local levels is needed to provide rapid, mid- to long-term affordable housing after a disaster. Ensuring that affordable housing is available before extreme weather events can minimize strain on housing stock in the aftermath of an extreme event.

Improve mental health resource access for both first responders and affected populations. Mental health support is an often-unaddressed need of disaster affected individuals. Counseling and assistance may be particularly beneficial as individuals navigate the disaster relief application system.

Routinely update policies and integrate climate modelling and analysis of the changing nature of extreme weather events into community policies and plans. •

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