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Building Disaster-Resilient Families, Communities, and Businesses

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Building Disaster-Resilient Families, Communities, and Businesses

Abstract

The United States is experiencing an increase in the severity of critical incidents. Extension agents play a significant role in enabling families, communities, and businesses to sustain themselves through these catastrophic events. A substantial body of scientific knowledge is available to guide Extension efforts in enhancing local sustainability. The literature indicates that our nation must adopt a strategy of continuous, sustainable hazards mitigation.

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Introduction

Experts predict that the United States will continue to experience an increase in the severity, and perhaps number of, critical incidents (Cutter 2006, IPCC 2007). Earthquakes, tsunamis, tornadoes, wildfire, drought, contagious disease, and terrorist events regularly occupy headline news. "Every year, natural and technological hazards in the United States cost an estimated \$1 billion per week in the form of lives lost and public and private properties destroyed" (OSTP 2005). "In 2004 and 2005, approximately 2,000 U.S. citizens lost their lives due to hurricanes" (NSB Task Force, 2007). The Spatial Hazard Events and Losses Database (SHELDUS) indicates a pattern of elevating losses (Cutter 2006). In response, states, localities, agencies, nongovernmental organizations (NGO's), and businesses have been augmenting their disaster preparedness plans to prepare for these significant challenges to sustainability.

Disaster Mitigation--A Growing Body of Scientific Literature

The first published disaster-related scientific work was Price's (1920) dissertation on the explosion of the munitions laden SS Mont Blanc in Halifax harbor that killed over 2,000 people. Since then, a significant body of scientific knowledge has developed. From a recent review of the literature, the National Academy of Sciences (NAS) (2006) concludes, "there is a solid knowledge base, at the household level, on vulnerability assessment, risk communication, evacuation and other forms of protective action."

Much of the work has centered on evacuation. The NAS (2006) review indicates evacuation is a collective decision. There is an:

Emergent norm theory of collective behavior which posits that groups faced with the potential need to act under conditions of uncertainty (or potential danger) engage in interaction in an attempt to develop a collective definition of the situation they face and a set of new norms that can guide their collective behavior" (NAS, 2006, p. 126).

As a result, when warnings are issued, people interact with one another in order to identify appropriate responses to it. A number of factors affect people's decisions to evacuate--perceptions of risk/personal safety, knowledge about a specific area, constraining factors (e.g., mobility, pets, family), and fear of the evacuation process. NAS concludes that instead of concentrating on communicating too many warnings, leaders need to focus on how to penetrate the group normalcy process and "provide directives that are detailed enough to follow during an emergency" (NAS,

2006, p.128).

In a 2006 Congressional briefing (and recent publications), Susan Cutter, Director of the Hazards Research Lab at the University of South Carolina, indicated that socio-economic status and age explain the majority of variance in vulnerability. Scientists working in the field have developed a "social vulnerability paradigm" which holds that people experience socially created vulnerability--an elevated probability of loss, injury, death, and/or reduced ability to recover from critical incidents due to a range of social, political, and economic processes. Cutter's research has also found that evacuation plans are confounded because people evacuate as families, taking every vehicle in the household, rather than one principal vehicle as many evacuation plans assume.

Working from the foundation established by White and Hass in their 1972 *Assessment of Research on Natural Hazards*, Dennis S. Mileti (1999) developed a comprehensive review of the disaster science literature in *Disasters by Design: A Reassessment of Natural Hazards in the United States*. Mileti (1999, p. 105) found that "losses from hazards and disasters in the United States in the next millennium will be determined, as in the past, by a large number of variable factors [which can be grouped into three broad categories:]"

- The natural environment--earth's physical systems (e.g., climate).
- Human systems--(e.g., population, culture, technology, social class, economics, and politics).
- The constructed system--(e.g., buildings, roads, bridges, housing).

A National Academies of Science Report (2006) refers to these basic categories as physical vulnerability, hazard exposure, and structural vulnerability. A hazard vulnerability analysis (HVA) incorporates an analysis of these three variables. The National Earthquake Hazard Reduction Program (NEHRP), which includes FEMA, NIST, NSF, and USGS, continues to support research to expand the sophistication and accuracy of hazard prediction and impact models.

From his comprehensive review, Mileti (1999, p. 239) concluded:

Effective preparedness and response activities help save lives, reduce injuries, limit property damage, and minimize . . . disruptions.

The theoretical approach to disaster preparedness has moved from a functional view to one that recognizes the tremendous influence social norms, and public perceptions and expectations have on the occurrence, effects of, and recovery from disasters.

A great deal has been learned about who prepares for disasters (households with higher socioeconomic status and those of non minorities), but why they do so is still a mystery.

The myth of human dysfunction in the immediate emergency period after disasters has been thoroughly dispelled.

Extension Activities in Critical Incident Preparedness

Extension plays a significant role in enabling families, communities, and businesses to successfully respond to these critical incidents. Local Extension agents often function as a critical node of communication in rural areas--particularly when normal communication systems have temporarily broken down following a disaster. Indeed, in reviewing responses to Katrina, some observed that when Extension agents were closely tied to the state's disaster response team, communications flowed much more quickly to affected individuals. In another example, Cornell Extension maintains a Web page enabling New York residents to easily access comprehensive information resources for recovery from 9/11 affects. And Michigan State University (2000) has developed a "Critical Incident Protocol" guiding public and private partnerships in developing disaster preparedness plans.

Several Cooperative State Research, Education, and Extension Service (CSREES) programs advance knowledge about disaster preparedness and response. The Extension Disaster Education Network (EDEN) is recognized as a significant information system for sharing disaster preparedness and response information. Recently, CSREES completed work with several other agencies in augmenting EDEN to include information on the development of disaster preparedness plans for small businesses. Also, CSREES's Information Technology program has been actively engaged with 4-H youth and the National Geographic Society to identify GIS/GPS-based disaster evacuation routes and shelter sites for local communities in the hurricane impact zone of the U.S. coast spanning from Texas to New Jersey.

And the Southern Rural Development Center (SRDC) has been facilitating training of cooperative Extension faculty in post-trauma outreach to individuals, families, and communities affected by Rita and Katrina. Shortly after Katrina, SRDC joined with CSREES and the Rural Sociological Society in hosting a National Summit to begin implementation of a comprehensive rural development strategy for rural, affected areas of Louisiana, Mississippi, and Texas. During the Summit, land-grant system specialists, agency officials, foundation leaders, and university research and Extension faculty met to identify current capacity and professional development needs for long-term responses to disasters that support sustainable community and economic development in disaster-affected areas.

Towards a Framework for Extension's Response

Mileti (1999, p. 122) emphasized that critical incidents should not be viewed as isolated problems. The effects of such incidents are exacerbated by systemic factors such as amount of investment in social capital, energy, and transportation systems. He called for "a fundamental shift in the character of how citizens, communities, governments, and businesses conduct themselves in relation to natural environments they occupy . . . the [challenge is to] create and install sustainable hazards mitigation into the culture of the nation" (1999, p. viii).

The Natural Hazards Center at the University of Colorado serves as a clearinghouse for disaster-related research and publishes a bimonthly *Natural Hazards Observer* that includes thoughtful articles, research summaries, and post conference and training opportunities. A 2001 publication by the Center, *Holistic Disaster Recovery: Ideas for Building Local Sustainability After a Natural Disaster*, was used as a basic reference guide for post-Katrina recovery. The publication identifies (2001, p. 1-3) six principles of community sustainability:

- Maintain and, if possible, enhance resident's quality of life.
- Enhance local economic vitality.
- Ensure social intergenerational equity.
- Maintain and, if possible, enhance environmental quality.
- Incorporate disaster resilience and mitigation.
- Use a consensus-building, participatory process when making decisions.

In August 2006, the USDA sponsored a "Partners Conference" focused on NGO leaders of socially disadvantaged groups. During a workshop on disaster mitigation, participants noted that government must find better ways to partner with grass roots organizations in order to more effectively respond to disasters. Some suggestions included developing improved communications with local faith-based organizations (e.g., using them to base immediate emergency response supplies) and posting bulletins on Spanish speaking radio.

Working from this information, a basic framework of Extension's role with critical incident preparedness and response can be derived. The framework is based upon the recognition that Extension has a science-based communication, education, facilitation, and information role in enabling communities and businesses to respond to critical incidents through two basic mechanisms: serving as nodes of communication dispersal of science-based information and facilitating holistic preparation and planning efforts.

In regard to communications, science-based information resources are available for Extension agents to use in guiding community and small business activities in developing disaster preparedness plans. Some of these resources include the critical incident protocol developed by Michigan State University, publications available from the Natural Hazards Center at the University of Colorado, and information sources listed on EDEN such as guidelines for small business disaster preparedness plans.

In regard to facilitating preparation and planning efforts, the research literature indicates that a holistic perspective is called for in order to "create and install sustainable hazards mitigation into the culture of the nation" (Mileti 1999, p. viii). This includes:

- Building resilient community economies,
- Enhancing environmental systems so they can sustain and function to ameliorate impacts,
- Being cognizant of the social norms that affect evacuation and recovery efforts (e.g., emergent norm theory of collective behavior)
- Being aware of social justice concerns (e.g., social vulnerability paradigm), and
- Facilitating partnerships between all stakeholders (e.g., levels of government, NGO's, grass roots organizations, faith based organizations, and local citizens) in coordinating planning efforts using a consensus building, participatory process to develop plans.

Research Needs and Opportunities

The Subcommittee on Disaster Reduction of the National Science and Technology Council released a report in 2005 on the *Grand Challenges for Disaster Reduction*. The Subcommittee found that "high-priority science and technology investments, coupled with sound decision-making at all levels, will dramatically enhance community resilience and thus reduce vulnerability." It identified six great challenges to reduce losses from disasters:

1. Provide hazard and disaster information where and when it is needed.

- Improve data collection to increase understanding of the ways in which hazards evolve.
 - Create standards for sharing, storing, and analyzing data.
2. Understand the natural processes that produce hazards.
 - Improve models and visualization techniques.
 3. Develop hazard mitigation strategies and technologies.
 - Create resilient structures and infrastructure systems using advanced building technologies.
 - Support structural advances with effective nonstructural mitigation.
 - Quantify the monetary benefits of disaster mitigation using economic modeling.
 4. Recognize and reduce vulnerability of interdependent critical infrastructure.
 - Develop science and technology to prevent cascading failures in public infrastructure systems.
 - Enhance the ability to protect public health before and after a hazard event.
 5. Assess disaster resilience using standard methods.
 - Support intelligent community planning and investment strategies and protect natural resources with comprehensive risk assessments.
 - Assess the resilience of the natural and human environment.
 - Learn from each hazard event.
 6. Promote risk-wise behavior.
 - Raise public awareness of local hazards.
 - Warn people with consistent, accessible, and actionable messages and a national all-hazards emergency communication system.
 - Develop policies that promote risk-wise behaviors and are based in social science research.

Continued research in disaster preparedness will increase knowledge and understanding of rural community vulnerabilities to critical incidents; increase capacity to respond to disasters, shocks, and stresses; and develop methods to help rural governments, communities, families, and businesses achieve resiliency. To adequately address these factors, Cutter (2006) calls for the integration of natural science, engineering science, and social science data and perspectives.

When applied to disaster preparedness this integrated approach is referred to as "vulnerability science." Focus areas for applied scientific work in vulnerability science would include the effects of economic structure, governance, and family systems on the potential for resiliency; identification of cost-effective communication methods to successfully alert and evacuate people; preparation of vulnerable communities for emergency response and disaster recovery; and identification of effective coping strategies for families, communities, and businesses.

Major federal research agencies have been providing support for vulnerability science. The National Science Foundation (NSF) has a long history of supporting disaster-related work--including supporting the Natural Hazards Center at the University of Colorado and the comprehensive review of the literature by Mileti. NSF was able to support research teams to examine the causality of the Katrina-related catastrophe shortly after the event. Also, the National Earthquakes Hazard Reduction Program, supported by FEMA, NSF, NIST, and USGS, has been very active in supporting ongoing research on disaster preparedness and response.

Recently, the National Institutes of Health have initiated new programs to examine the human dimensions of vulnerability science. The National Institute on Aging is interested in research on the elderly in disasters, especially elderly residents of institutions and frail elderly in the community. The National Institute of Child Health and Human Development is supporting research on children and other vulnerable populations in disasters. And the National Institute of Nursing Research is

interested in research that will develop interventions to improve outcomes for persons affected by natural and manmade disasters.

Finally, the National Science Board, a 24-member independent advisory body to the President and Congress, has called for a major new National Hurricane Research Initiative (NSAB 2007). In the report, the Board "calls for a wide interdisciplinary and organizational approach to address priorities needed for the nation to become "more resilient" to hurricane impacts."

In Conclusion

With the projected increase in severity of critical incidents, the United States will be subject to continued catastrophic losses. Extension plays a significant role in enabling families, communities, and businesses to enhance resiliency, reduce risk, and minimize loss due to impacts from critical events. An extensive scientific literature on disaster preparedness and response is available in the form of academic reports, texts, and practical guides to assist Extension efforts. The literature indicates that the United States should adopt a sustainable hazards mitigation perspective. Working from this literature, Extension can enhance community resiliency and significantly reduce adverse effects.

Disclaimer

The views expressed are those of the author and do not necessarily represent the policies or views of the USDA.

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