THE ROLE OF THE EXTENSION SERVICE IN RURAL/FRONTIER DISASTER

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ABSTRACT

This study was conducted to determine what the Extension Service's community roles and responses were during flood events and what should be done to better prepare Extension staff for future flooding in rural and frontier counties.

A survey was used to determine the extent Extension staff were prepared to respond to citizen requests for services. A joint meeting was held with emergency management organizations to clarify Extension's role in flood-related disasters. The Extension Service has a primary responsibility for providing the public with information and educational materials. Topics were identified for needed disaster-related educational materials. New materials were developed to fill the gap in previously available resources.

LITERATURE REVIEW

Preparing and responding to natural disasters requires government entities and volunteer response organizations to work together to meet the safety and subsistence needs of citizens. In the United States, the responsibility for planning at the national level for emergencies caused by natural disaster, terrorism, and man-made catastrophes lies with Federal Emergency Management Agency (FEMA) and the U.S. Department of Homeland Security (Spencer, 2010). In addition, the Red Cross and thousands of volunteers and first responders, such as police, firefighters, and medical response personnel, are all involved in emergency preparedness. Governmental agencies and volunteer organizations work together to form comprehensive emergency management plans that assure the adequate protection of the public in the event of emergencies. This requires planning prior to emergencies and responding to the needs of the public during and after an event occurs. According to Spencer, "emergency preparedness refers to actions which can and should be performed prior to an emergency" (para. 12). Emergency preparedness includes (a) meeting and coordination of efforts between response agencies, (b) writing emergency plans and procedures, (c) training and conducting emergency drills, and (d) positioning materials and supplies for use during emergencies. Spencer described emergency response as the "actions taken in response to an actual, ongoing event" (para. 12).

IMPACT OF FLOODING

Emergency planners must consider every type of event that may be encountered. The most common risks encountered by communities are natural disasters. Fritz (1961) defined the term disaster as:

> An event, concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of a society, undergoes sever danger and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society is prevented. (p. 653)

When considering natural disasters (earthquakes, floods, etc.) this functionalist, or systems perspective, implies that the sources of these disasters are external in nature and cause great organizational stress within a society. This stress happens because sharp unanticipated demands are placed on the society (concerns related to public health, safety, property, etc.) which exceeds its capabilities to effectively cope with the situation it is facing (Tierney, Lindell, & Perry, 2001).

Floods are the most costly form of natural disasters in terms of human hardship and economic loss (Nelson, 2010). A flood occurs any time a body of water rises to cover what is usually dry land. Wisner, Blaikie, Connon, & Davis (1994) suggested that floods are a normal and essential component of both agricultural and ecological systems as they provide the basis for the regeneration of crops, plant and aquatic life, and of livelihoods derived from them. Humans have continually had to weigh the trade-offs of coping with the prospect of flooding with the utilization of its benefits. In the second half of the twentieth century flooding was the most common type of natural disaster reported around the globe. Annually, floods impact more people (55% of reported disaster related deaths from 1986-1995) and cause more economic loss than any other disaster occurrence.

Flood effects can be local, impacting a neighborhood or community, or very large, affecting entire river basins and multiple states. While some floods develop slowly, over a period of days; others develop quickly, and are flash floods. According to the United States Geological Survey (2007), over 75% of declared Federal disasters in the U.S. are related to floods. The National Weather Service (2011) reported that floods, more than any other hazard, result in the highest loss of property and crop damage. Between flash flooding and river flooding, river flooding results in the highest losses. In 2010, river flooding caused more than $3 billion (US) in property damage and an additional $1.1 billion in crop damage.

Recent flooding in eastern Australia is estimated by the Australian Bureau of Agriculture and Resources Economics and Sciences (2011) to have reduced agricultural production by $500-600 million (AUD) in 2010-2011. Economic losses did not include the cost of lost farm infrastructure and assets that would have

significantly increased the damage amount. Reduced production of fruits, vegetables, grains, and other crops created upward pressure on prices throughout the nation.

EMERGENCY RESPONSE

Responding to flooding events places a strain on emergency response resources at the state and local government levels. This is especially true in rural and frontier areas where populations are sparse, geographically dispersed, and emergency response resources are limited. The World Bank (2011) estimated that rural areas in Australia are home to about 2.5 million people or roughly 11.4% of the population, while in the U. S. that figure approximates 20% or 65 million (Federal Highway Administration, 2000). This is important because rural regions house most of these country's farms, agricultural food handling and processing businesses, and numerous power facilities. According to the Office of Rural Health and Policy (2002), "a lack of emergency-related resources in rural areas may compromise rural readiness for future emergencies" (p. 1). Rural areas are often believed to be at a low risk when considering emergency planning, especially for the risk of terrorism. The feeling of relative safety brought on by the belief that rural areas are at a lower risk for terrorism may reduce rural communities' sense of urgency and limit preparation and responsiveness when faced with the most common costly natural threat: flooding. The Office of Rural Health and Policy believes that rural communities must be actively included in local, state and federal efforts to strengthen emergency preparedness. If not, "they may remain bystanders to their own fate. Effective emergency preparedness and mitigation efforts demand consensus and involvement from all stakeholders, including rural providers" (2002, p. 1).

Miller (2008) observed that "small communities and rural areas have a strong tradition of volunteerism and social participation" (p. 272). Rural residents tend to be closely connected socially. Information and assistance flow readily because the residents are closely connected informally through repeated interactions with family, acquaintances, and overlapping organizational memberships (Halsey, 2006). According to Miller (2008), "repeated interactions within a small community also facilitate the coordination of people. Even in unforeseen events, skills and resources availability in the community can quickly match needs" (p. 272). Emergency response planners in rural areas should capitalize on these capabilities when developing disaster preparedness and mitigation programs.

Extension has responded to a multitude of problems and crises in local communities across the country; from economic depression, to hurricanes, earthquakes, droughts and floods (Telg, Irani, Muegge, Kistler, & Place, 2007). Cartwright, Case, Gallagher, and Hathaway, (2002) found that the Cooperative Extension Service has played a key role in keeping local families, communities and businesses informed in case of emergency and/or crisis. Communication delivery methods used by Extension are wide and varied, including fact sheets, information packets, television, radio, and the World Wide Web. An important wcommunication source is the Extension

Disaster Education Network (EDEN). EDEN (2011) is recognized as a significant multi-state effort by Extension Services to share disaster education resources. EDEN's mission is to reduce the impact of disasters by disseminating information to citizens affected by disasters (Koch, 1999).

Boteler (2007) stated that:

> Continued research in disaster preparedness will increase knowledge and understanding of rural and 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. (para. 43)

Tierney, Lindell, and Perry (2001) proposed that disaster research in the United States developed using a case study method that select a particular catastrophic event, identified the consequences of the disaster, and then considered the human and organizational response to the consequences. Ritchie and MacDonald (2010) indicated that issues of preparedness, response, recovery, and resilience are becoming more and more important from an evaluative standpoint than ever before as policy making bodies push for greater transparency and accountability.

The remainder of this article will concern itself with the evaluation process used by one Land Grant University in the United States to meet the training and information needs of Extension Staff for disaster recovery in rural/frontier counties after the unprecedented river and overland flooding that took place in the spring of 2009.

BACKGROUND

The Cooperative Extension Service in the United States is a collaborative venture of the federal, state and county governments. Budgeting, programming, and direction are shared by these three levels of government. This unique structure, where no one entity has dominant control, has provided the Extension Service an independence to conduct objective research and reliable information delivery (Cartwright, Case, Gallagher, & Hathaway, 2002). Over the decades, the Cooperative Extension Service has developed a "substantial body of scientific knowledge...to guide efforts in enhancing local sustainability" (Boteler, 2007). Murray (1999) determined that there are at least three elements of Extension program delivery, as practiced in the United States, that distinguish it from most of its international cousins: a university base, delivery through local county offices, and a "strong reliance on applied research at the county level" (para. 6).

The spring flood of 2009 in North Dakota placed a strain on many state and community resources including North Dakota State University (NDSU) Extension Service personnel. Extension offices are present in nearly every county in North Dakota. Their mission is to extend education to residents of all ages and walks of life,

conduct and disseminate research, strengthen agriculture, and develop the potential of youth, adults, and communities. In many communities it is the only public office representing the state and federal government.

During disaster events, rural residents rely on the Extension Service for information about how to prepare their homes and businesses for natural disasters, how to mitigate disaster impacts, and how to restore their homes and business after an event. Historically, the role of the Extension Service in the formal emergency management and planning process varied from county to county. Because many residents in the counties have long-term contacts with the Extension Service staff for educational information, the county Extension office is frequently the first contact for finding information about disaster preparedness, mitigation, and recovery.

The flooding that took place in 2009 required the mobilization of county, state, and federal emergency management teams, the Red Cross, and multiple volunteer response organizations into the flood stricken counties. The local population, unaccustomed to the array of organizations involved, often, as in the past, used the county Extension office as a source for first contact for all of their flood-related questions and needs. Extension staff struggled with the ambiguity of the primary roles of agencies and organizations deployed to the county and found that they did not have the resources to answer some of residents' requests for flood-related educational materials. Considering the extent of flooding in Australia, agencies may benefit from this study and the experience of the NDSU Extension service in responding to flooding in rural and frontier areas.

PURPOSE OF STUDY

The purpose of this study was to determine the training and information needs of county extension staff to respond to the distinct needs of rural/frontier counties by expanding disaster response training and to clarify the role of county extension staff in emergency management planning and disaster response.

The following study questions guided this study:

1. To what extent were County Extension staff prepared to respond to citizen requests for services during the flood disaster of 2009?
2. What should be the role of County Extension in disaster planning and response in relation to other disaster response agencies serving rural/frontier counties?
3. What are the gaps in the existing disaster relief training and information resources available to Extension staff in rural/frontier counties?

METHODS

This study used multiple data gathering and analysis techniques to answer the study questions. All data gathering protocols were approved by the NDSU Institutional Review Board. In the first phase of the study, a critical incident survey was developed. Flanagan (1954) developed the critical incident technique (CIT) to identify behaviors and actions that contribute to the success or failure of individuals or organizations in specific situations. To analyze a situation using CIT, a researcher first asks questions of people who are familiar with a situation for a recent example of effective or ineffective behavior. In this study, the participants had all responded to the demands of clients during a rural flood disaster. The researcher uses the answers to the questions to identify themes and then asks other involved parties to sort the incidents into proposed content dimensions. The content dimensions are then used to modify behaviors, processes, or other organizational actions to improve success in similar situations in the future.

Data Gathering Protocol

For this study, a survey was developed to determine the extent to which the Extension personnel were prepared to respond to citizen requests for services during the last flood-related disaster. The survey asked the respondents to provide information about several flood related topics. The topics are listed in Table 1. For each topic, the respondents were asked the following questions:

- What questions did you receive about this topic that you were able to answer?
- What information resources did you use to provide information to your community members?
- What questions did you receive about this topic that you were unable to answer?
- What questions did you receive from individuals/groups that were not among your typical target audiences?

The survey was sent to 24 Extension agents and support staff in the eight rural/frontier counties impacted by overland and tributary flooding. The response rate for the survey was 75% (18 of 24 responded).

Table 1. Topics for Open-ended Survey Questions

Survey Topics	
Building, maintaining, and disposing of dikes	Communications
Protecting fresh water supplies, sewage, and electrical systems	Re-occupying homes and businesses
Livestock management and livestock waste containment	City, county, and tribal government issues
Transportation	Managing volunteers
Evacuation issues (care of vulnerable individuals, elderly, pet evacuation	Restoration of flood damaged land and property
Personal hygiene and care (showers, laundry, portable toilets, etc.)	Other topics

After completion of the survey, two (2) face-to-face, group interviews were conducted to validate the findings of the survey. Extension agents and support staff from the rural/frontier counties were invited to participate at one of two sites. Survey data results were categorized into topics and sent to the interviewees prior to the interview meeting. There were 13 participants at the first site and 11 participants at the second site. The nominal group technique was used to allow individuals to respond to the first three interview questions. The nominal group technique is a structured, group method that encourages individual participation and places equal value on each person's ideas. The fourth set of interview questions was asked and discussed in a large group setting. The interview questions included:

1. What is *not* on the list of survey responses that should be there? What is missing?
2. Information was readily available for which of the survey topics?
3. Information was difficult to locate for which survey topics? Information was not available for which survey topics?
4. What is Extension's responsibility during a flood disaster? What activities and questions should Extension handle during a flood? What activities and questions should other organizations and agencies handle during a flood? Why? What are the names of those organizations and agencies?

Based on the interview findings, the survey data were further crafted into training topics. Additionally, the data related to the perceived role of Extension in disaster response was recorded to inform further discussions of Extension's role.

Role Clarification

Following the group interviews, a survey was sent to all county Extension offices throughout North Dakota to determine whether Extension personnel were involved in their county Emergency Management plan and, if so, what role they had in the plan. The researchers then met with the Voluntary Organizations Active in Disaster (VOAD) to gain the perspective of other response agencies. During the discussion with VOAD, the topic areas identified by the critical incident study were shared and topics for which other organizations had primary control of services were identified. Following the discussion with VOAD, the list of information topics and role of Extension were further revised.

The final list of information topics and the roles of Extension were used to develop training modules and to make the modules available for quick access by webinar, written format, and/or the Extension website. The final steps in the project included the training of Extension staff, the evaluation of the training program, revisions to the training program, and the dissemination through the Extension Disaster Education Network (EDEN) to aid other states with significant rural/frontier populations.

DISCUSSION OF FINDINGS

Extension's Role in Emergency Response

Survey results showed that 53% of the county Extension offices (n = 41) had a defined role in their county's emergency management plan. In 47% of the responding counties, Extension was a member of the Emergency Management Board. Respondents participating in emergency planning reported the primary roles of Extension in counties were as follows:

- Provide educational information and materials using Internet-based formats.
- Organize information and inform the public about how to get information and where to go for referrals.
- Regular conference calls to field needs and generate uniform methods of distributing information.
- Listening: people come with unmet needs and Extension steers them in the right direction to meet their need.
- Collaborate with North Dakota disaster agencies to develop responses to identified needs.

After meeting with other response agencies, the scope of topics for which educational information and materials should be provided was further refined. Table 2 provides a listing of the topics for which Extension had a primary role and the topics/issues that are primarily the responsibility of other response agencies.

Table 2. Educational information and materials by primary responsible agency

Extension	Other Agencies
Clean-up topics	Disaster Communications
Livestock and crop issues	Volunteer mobilization
Food Safety	Governance and public offices
Pesticide and chemical safety	Evacuees & human services
Electrical safety	Dikes and sandbagging
Water quality	Dead livestock disposal [1]multi-agency
Septic and sewage	
Sandbagging safety	
Pet safety and care	
Finance and insurance	

[1]*Note: Dead livestock disposal requires cooperation from the State Department of Agriculture, State Health Department, and the Extension Service.*

County Extension staff should know the county emergency planning personnel and establish a relationship with them to keep current on county issues and needs. Staff should attend emergency planning meetings, as appropriate, and know Extension's specific role in the emergency management plan. The role of Extension in a specific county's plan may vary depending on other response agency resources present in the county. Even if the Extension office is not a formal member of the local Emergency Management Board, staff should report identified issues/needs to county emergency planners as those issues/needs emerge or are reported to the Extension office. When a disaster occurs, Extension should collaborate with other agencies to address emerging needs in the county, and continue to work on ongoing recovery needs.

Within the Extension organization, county staff should provide feedback to Extension specialists about unmet needs in the specialist's subject areas so new programs/materials can be developed. Foremost, county Extension offices should educate the public about resources available and guide them to appropriate support when other agencies have primary response duties.

Information Needs and Training Topics

Given the specified roles of Extension in emergency response and recovery, the list of educational information and training topics was further developed using the data collected from the interviews, surveys, and meetings with other response agencies. The list was used to identify where information needs were met with existing materials and what new materials needed to be developed and/or added from other sources. The major training topics identified included: clean-up (homes, farms, and businesses), food safety (handling, refrigeration), livestock and crop issues (evacuation, contamination, protection), pesticide and chemical safety (preparation, storage, disposal), electrical safety (homes, farms, businesses), water quality (contamination, quality, conservation), septic and sewage issues (containment, contamination), sandbagging and dikes (proper construction and maintenance,

logistics, disposal), and post-flood recovery (disposal, healthcare, contamination, restoration, information dissemination).

If educational materials were not available for specific topics, State Extension Specialists and the Agricultural Communications department developed web-based videos. Examples of topics for which materials were developed include Sandbag Safety, How to Build a Sandbag, Plugging Home Drains, How to use Generators, Sump Pump Tips, and Using a Moisture Meter. The Extension Service worked with the State Department of Agriculture and State Extension Veterinarian to develop protocol for removing and disposing of dead animals. All educational and training materials were uploaded to the NDSU Extension website (http://www.ag.ndsu.edu/extension/) and shared with the Extension Disaster Education Network, a free Internet based information repository found at http://eden.lsu.edu. In addition, "For Employee Only" training programs were developed by State Extension Specialists and other agencies for the following areas: Family Preparedness, Ready Business, Family Disaster Supplies Kit, Food Safety at Volunteer Feeding Sites, and Entering a Flooded Home. Further, public service announcements and radio scripts were developed for Resiliency, Food Safety, and Talking to Kids about Disasters. A special website was developed for Extension staff to share their tips on specific issues such as handling laundry in a city with no water/sewer; pet care and evacuation with no Humane Society or related organization; and protocol for locating people in high risk rural areas.

Training of Extension Staff

The final step in the Rural/Frontier Disaster Response Program was to train Extension staff on the use of the new disaster resources. A webinar was hosted to showcase new website resources, answer questions, and get suggestions for any areas that may need further development. Next, a "Speed Programming" session on Disaster Response was held at the State Extension Fall Conference. Presenters included several Extension staff involved in developing disaster response resources including: New Disaster Resources on the Web, Financial Recovery Toolkit, Family Preparedness and Ready Business Training, Strengthening Community, Agro-security Planning, and Extension's Roles in Emergency Management Plans. Following the training, an evaluation survey was sent to those who completed the training. All Extension staff responding to the survey indicated that the training met their needs and that they know where to find disaster education resources on the new website.

SUMMARY

The NDSU Extension Service is one of many public agencies that plays an important role in rural communities during natural disaster events by providing educational materials to help residents cope with disaster related issues and problems. The materials developed as a result of this project have already been used widely by extension and other emergency response agencies. It is interesting to note that, while

NDSU Extension has been working with disasters for a long time, the general public may not know that the information they use originates with Extension. For example, the North Dakota Department of Emergency Service website (http://www.nd.gov/des/) has posted 30 flood-related documents that were developed by Extension under the categories Information for Families, Information for Farmers, and Information for Homeowners and Renters.

In the spring and summer of 2011, the state of North Dakota experienced another record-breaking flood season. The research completed after the 2009 floods provided a wealth of information which led to the development of many resources identified as important for flood and disaster recovery. These tools are now being tested. Rural and Frontier counties, along with 3 major urban counties, experienced major flooding and the process used to develop new tools proved to be a success. Extension agents in counties impacted in 2009 are sharing tips and tools with those impacted today. The last tool developed is a *droid-based* application that allows citizens to record needed information, photos, and voice descriptions of disaster incidents. From traditional publications (paper and web-based) to You Tube educational clips and now the emerging *app* technology, NDSU Extension has worked to develop the educational information that citizens need. Technology also makes it possible for every state to share the best of its resources with anyone, in any state, using EDEN and a variety of webinars.

Recent disaster conditions experienced in western North Dakota and the City of Minot, ND, brought many citizens to realize the significance of having a county Extension presence. New audiences are emerging from the prompt service provided during the flooding. Citizens value having a trusted source of educational information and facts to aid them in the recovery. Extension provides that link to many agencies and organizations in every county of the state.

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