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The Extension Service and Rural/Frontier Disaster Planning, Response, and Recovery

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Abstract: *The purpose of the study reported here was to (a) determine the role of Extension in disaster response, (b) identify the information needs, and (c) disseminate education and training modules through the EDEN. Extension staff should know their county's emergency plan and the role identified for Extension. Extension staff should attend local emergency management meetings, be knowledgeable of local and state resources, and redirect citizen calls to agencies. Extension has a primary responsibility for providing the public with educational materials congruent with Extension's program areas. Topics were identified for disaster-related educational materials and new materials were developed.*

Introduction

During the spring of 2009, North Dakota experienced unprecedented river and overland flooding in eight rural/frontier counties: Barnes, Emmons, Grant, LaMoure, McHenry, Mercer, Ransom, and Sioux. NDSU Extension Service staff were inundated with request from citizens for flood-related

education materials and questions about who people should contact for other emergency services and resources. While some educational materials and information were available to help Extension staff respond to questions, it was often found that citizen requests could not be fulfilled due to the limited number of topics for which flood-related educational materials had been developed. Staff often had to search beyond Extension's own library of materials to try to find answers. Additionally, Extension staff often experienced role confusion about the appropriate role of Extension in a flood-related disaster and the role of other county and state response agencies.

The goal of the study reported here was to assess the disaster response experience of Extension Service personnel in the rural/frontier counties, to identify gaps in the existing disaster training program, to clarify enable NDSU Extension role in emergency planning, and to prepare Extension staff to better respond to the distinct needs of rural citizens.

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 U.S., the responsibility for planning at the national level for emergencies caused by natural disaster, terrorism, and made-made catastrophes lies with FEMA and the U.S. Department of Homeland Security (Spencer, 2011). The Red Cross and thousands of volunteers and first responders, such as police, firefighters, and medical response personnel, are 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. According to Spencer, "emergency preparedness refers to actions which can and should be performed prior to an emergency" (2011). 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."

Floods are the most common natural disaster and the most costly in terms of human hardship and economic loss. Wisner, Blaikie, Connon, and 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. 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 causes more economic lose than any other disaster occurrence.

The effects of flooding can be local, affecting a neighborhood or community, or very large, affecting entire river basins and multiple states. 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 hazards, result in the highest loss of property damage and crop damage. Between flash flooding and river flooding, river flooding results in the highest losses. In 2010, river flooding accounted for nearly $3.1 billion in property damage and an additional $1.1 billion in crop damage (National Weather Service, 2011).

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 and geographically dispersed and emergency response resources are limited. Rural areas are home to 65 million Americans and the site of most of the country's farms, agricultural food handling and processing businesses, and numerous power facilities. According to the Office of Rural Health 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. The feeling of relative safety brought on by the belief that rural areas are at a lower risk 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" (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 connected through repeated interactions through family, acquaintances, and overlapping organizational memberships. According to Miller, "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.

Tierney, Lindell, and Perry (2001) stated that disaster research in the United States developed using a case study method, which would select a particular catastrophic event, identify the consequences of the disaster, and then consider the human and organizational response to those 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.

During disaster events, rural residents rely on the Extension 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 Extension in the formal emergency management and planning process varied from county to county. Because residents in the counties had long-term contacts with Extension for educational information, the county Extension office was frequently the first contact for finding information about disaster preparedness, mitigation, and recovery.

Research related to Extension's role in disasters has taken many avenues. Miller, Grisso, and Lambur (2006) conducted a Virginia study to identify Extension's role in man-made disasters. Worden (1978) studied how families coped with the Big Canyon Flood in Colorado. Telg, Irani, Muegge, Kistler, and Place (2007) reported a study of communication channels used during the 2004 Florida hurricane season. Cathey, Coreil, Schexnayder, and White (2007) provided a reflective review of Extensions strengths during and after hurricanes Katrina and Rita in Louisiana, Extension's people and their culture of service, and the strength of the Extension organizational model of service and response to community needs. Boteler

(2007) concluded that Extension plays a significant role in community resilience, risk reduction, and minimizing losses in disaster events. Boteler provided a literature review on disaster preparedness and response and advocated for adopting a sustainable hazard mitigation perspective in the United States.

The North Dakota 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 of 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.

Purpose of Study

The purpose of the study reported here 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 the 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 and citizens in rural/frontier counties?

Methodology

The study used multiple data gathering and analysis techniques to answer the study questions. All data gathering protocols were approved by the Institutional Review Board. In the first phase of the study, a survey was developed to identify behaviors and actions that contributed to the success or failure of Extension staff in the flooding situations. The researcher used the answers to the questions to identify themes. Two face-to-face, group interviews were conducted to validate the findings of the survey. Following the group interviews, a survey was sent to all county Extension offices statewide to determine whether Extension personnel were involved in their county Emergency Management plan and what role they had in the plan. This was followed by a meeting with Voluntary Organizations Active in Disaster (VOAD) to gain the feedback and perspective of the roles of other response agencies.

Data Gathering Protocol

The survey asked the respondents to provide information about several flood related topics. The response rate for the survey was 75% (18 of 24 responded). 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?

After the survey data were analyzed, two face-to-face, group interviews were conducted to validate the findings. Extension agents and support staff from the rural/frontier counties were invited to participate at one of two sites (n = 24). Survey data results were categorized into topics and sent to the interviewees prior to the interview meeting.

Table 1.
Topics for Open-Ended Survey Questions

Survey Topics	
Building, maintaining, and disposing of dikes	Maintaining Communications
Protecting fresh water supplies, sewage, and electrical systems	Re-occupying homes and businesses
Managing livestock and containing waste	Collaborating with city, county, and tribal government
Responding to transportation issues	Managing volunteers
Evacuating vulnerable individuals, elderly, & pets	Restoring flood damaged land and property
Providing access to Personal hygiene and care facilities	Other topics: (respondent provided topics)

The nominal group technique was used to allow individuals to respond to the first three interview questions. The fourth set of interview questions was asked and discussed in a large group setting. The interview questions included the following.

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?

The survey data were further crafted into training topics. Data relating to the perceived role of Extension in disaster response were recorded to inform further discussions of Extension's role.

Role Clarification

Following the group interviews, a survey was sent to all county Extension offices statewide to determine whether Extension personnel were involved in their county emergency management plan and, if so, what role they had in the plan. Next, to gain the perspective of other response agencies, input was sought at a meeting of the Voluntary Organizations Active in Disaster (VOAD). The topic areas identified by the survey were shared, and topics for which other organizations had primary control of services were identified. Following the discussions, 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.

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 the 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 where Extension is involved in emergency planning as follows:

- Provide educational information and materials (Just-in-Time approach).
- Organize information and notify the public about how to get information and where to go for referrals.
- Hold regular conference calls to field needs and generate uniform methods of distributing information.
- Listen: 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 and identified needs.

Table 2 provides a listing of the educational material topics for which Extension has a primary role and the topics/issues that are the primarily responsibility of other response agencies.

It was determined that county Extension staff should establish a relationship with county emergency planning personnel and keep current on county issues and needs. Staff should attend emergency planning meetings, as appropriate, and know Extension's role in the emergency management plan. Even if the Extension office is not a formal member of the Emergency Management Board, staff should report identified issues/needs to county emergency planners. When a disaster occurs,

Extension should collaborate with other agencies to address emerging needs in the county, and continue to work with ongoing recovery needs.

Table 2.
Educational Information Topics and Materials by Primary Responsible Agency

Extension	Other Agencies
Clean-up topics	Disaster Communications
Livestock & crop issues	Volunteer mobilization
Food Safety	Governance & public offices
Pesticide & chemical safety	Evacuees & human services
Electrical safety	Dikes & sandbagging
Water quality	Dead livestock disposal [1]multi-agency
Septic & sewage	
Sandbagging safety	
Pet safety & care	
Finance and insurance	
[1]Note: Dead livestock disposal requires cooperation from the State Department of Agriculture, State Health Department, and the Extension Service.	

Within the Extension organization, county staff should provide feedback to Extension specialists about unmet needs so that new programs/materials can be developed. Foremost, county Extension offices should educate the public about resources available and guide them to the appropriate support agencies.

Extension 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. Tables 3 - 6 list the training topics and subtopics, some in preparedness and others in response and recovery. The list was used to determine if (a) materials were currently available on the NDSU Extension website, (b) materials existed on other state Extension websites or the Extension Disaster Education Network (EDEN) website, or (c) new materials needed to be developed.

Table 3.
Extension Educational Information and Material Needs and Training Topics/Issues for Clean-up and Food Safety

Training Topic	Subtopics
Home and Business clean-up	Mold Carpet and floors Drying homes Business cleanup Cleaning supplies

	Cleaning basement walls Disinfecting soiled clothes Debris removal from fields and farmsteads Fuel oil leaks
Food safety	Cookware Handling of food Loss of refrigeration and food quality

Table 4.
Extension Educational Information and Material Needs and Training Topics/Subtopics for Livestock and Crop Issues and Pesticide and Chemical Safety

Training Topic	**Subtopics**
Livestock & crop	Feeding contaminated feed to livestock Wet or Molding hay Grain issues Wet silage piles Feed for stranded animals How to evacuate livestock Hay storage Alternative feed for livestock Lack of feed for animals, who can help Livestock assistance program Livestock loss reimbursement Documenting livestock loss Carcass removal and disposal Disease protection Treat or inspect animals standing in water. Funding and replacement of damaged fences Manure getting washed out of containment system
Pesticide and chemical safety	Disaster preparations Safety of home to move back in Pesticide storage and safety Wet pesticides Disposing of chemicals Wet lawn/garden chemical and fertilizer Storing damaged pesticides Chemicals contaminated by flooding

Table 5.
Extension Educational Information and Material Needs and Training Topics/Subtopics for Electrical Safety, Water Quality, Septic/sewage, and Sandbagging and Dikes

Training	

Topic	Subtopics
Electrical safety	Houses and outbuildings being flooded, electrical underwater Shut off electrical - when to do it? How? What to do with irrigation pivots under water Electrical safety - going in to houses and barns When can we go back into homes Health risks - what are they Keep/reuse electrical appliances Irrigation systems under water
Water quality	Reduce water usage Well water contamination Cleaning flooded wells Water conservation Water quality Water testing How to disinfect/chlorinate contaminated water
Septic /sewage	Sewer failure Plugging septic systems Sewage back-up in home Waste water containment How to "rig" waste water disposal so it doesn't go down the drain
Sandbagging and dikes	How to build a sandbag dike How to fill sandbags Where to get sandbags How to get volunteers to help with sandbagging Location of sandbagging operations. Personal injury prevention Disposing of sandbags How to build and maintain permanent dikes

Table 6.
Extension Educational Information and Material Needs and Training Topics/Subtopics for Post-flood Recovery and Other Topics

Training Topic	Subtopics
Post-flood Recovery	Post-flood machine maintenance Is my garden produce safe to eat Water invaded yards and fields Debris disposal Health of flooded trees and shrubs Pet safety & care Finance and Insurance Disposing of contaminated batteries Missing property Missing propane tank Chemical tank floated away Clean up fuel oil Submerged fuel storage tanks

	Separation of garbage Government programs for help Pasture land that has been under water for a long time
Other topics/issues	Fair price for cleaning, cost of services (e.g. sewage backup) What's worth cleaning? Resource list of commercial cleaners (Link to Dept. of Health website) Moisture meters and how to read them. Information about laundry facilities Debris removal from fields and farmsteads

New materials were developed for topics listed in Tables 3 through 6 for which existing educational materials could not be found. The state Extension specialists and the Agricultural Communications Department collaborated on the development of new 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. Extension 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 Extension Disaster Education Network (EDEN) website.

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. In addition, 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.

Train 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 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. All educational and training materials were uploaded to the NDSU Extension website <http://www.ag.ndsu.edu/extension/> and shared with the EDEN <http://eden.lsu.edu>.

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 knew where to find disaster education resources on the new website.

Conclusion

The North Dakota Emergency Management Association (2011) defined Emergency Management as "a comprehensive effort coordinating a wide

range of public safety and awareness programs to ensure that a high level of preparedness, mitigation, response and recovery will be maintained for all known hazards." Continuous assessment, planning, training, and exercising are undertaken involving public agencies and the public sector. In doing this, a partnership with a good working relationship is formed with local emergency response agencies, such as fire, law enforcement, public works, volunteer agencies, public health, and emergency medical services. These joint events bring about an awareness of each other's capabilities and limitations.

The NDSU Extension Service is one of many public agency 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 disaster response for several years, the general public may not know that the information they use originated with Extension. For example, the North Dakota Department of Emergency Service (2011) website <http://www.nd.gov/des/> has made available 30 flood-related informational materials that were developed by Extension.

In the spring and summer of 2011, North Dakota experienced another record-breaking flood season. The research completed after the 2009 floods provided a wealth of information that 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 three major urban counties, experienced major flooding in the spring and summer of 2011. The process used to develop new tools proved to be a success. Extension agents in counties affected in 2009 are sharing tips and tools with those responding to the recent flood events. Using multiple delivery modes to disseminate materials has provided instant access. The last tool developed was a droid-based application that allows citizens to record needed information, photos, and voice descriptions of disaster incidents. Other delivery modes include traditional publications (paper and web-based), YouTube educational clips, and emerging App technology. Technology makes it possible for every state to share the best of its resources with anyone, in any state, using EDEN (Koch, 1999).

Recent disaster conditions in western North Dakota and Minot, North Dakota, 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 disaster response and recovery. Extension provides a link to many agencies and organizations in every county.

It is important to note that the materials identified in the study reported here are specifically designed to assist in a flood-related disaster in North Dakota and may not be appropriate for states in other climates and regions or for other types of natural disasters. Each state Extension should take care to identify and create resources that are appropriate to the unique needs of the state.

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