

THE KNOW-HOW OF THE LOCALE

Human Centric Design in Mitigation



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About this Report

This report is one of seven reports produced as part of a semester-long, innovative problem solving engagement between FEMA Region 8 and North Dakota State University's Emergency Management Academic Program. Each report in this series addresses a specific problem statement presented by FEMA Region 8 problem sponsors. These problem statements represent challenges that have been identified across the emergency management practice spectrum.



NDSU offered the model interdisciplinary course focused on innovative problem solving for FEMA in partnership with Daniel Green, Resilience Analyst in National Preparedness from FEMA Region 8. The goal was to bring the perspectives and insights of next generation leaders to current challenges facing emergency management practice from a federal perspective. Student teams worked with their problem sponsors and subject matter experts to understand and contextualize the problems. The data collected from interviews, coupled with an understanding of the existing literature, allowed the teams to develop and test solutions within a systems thinking framework, and offer specific insights and recommendations.


The teams approached problem solving from a research and development approach, similar to the approach used by the Pentagon's Defense Advanced Research Projects Agency (DARPA). Using a Pasteur's Quadrant perspective (a use-inspired basic research approach) allowed the teams to seek a fundamental understanding of the problems they were addressing with a focus on dynamic solutions. This approach required a grounded understanding of the problem, and the context and systems within which it exists. The solutions offered often pushed beyond existing programs and workflows.

NDSU's evaluation of this model course's development and delivery is supported, in part, by a research award from FEMA's Higher Education Program. NDSU faculty, Drs. Carol Cwiak and Caroline Hackerott, will supply the entirety of the materials used in the model course as part of the evaluation to encourage other emergency management higher education institutions to engage in similar partnerships. It is envisioned that this model course can be used with partners at all government levels and across a variety of sectors to bring new perspectives to enduring challenges.

NDSU would like to thank the FEMA Region 8 problem sponsors, as well as all the emergency management and partner agency subject matter experts who graciously shared their time, energy, expertise, and guidance. In particular, the team thanks Daniel Green, who brought this opportunity to NDSU and fueled the faculty, students, and problem sponsors with a level of vision, commitment, and enthusiasm that set the tone for the entirety of the experience.




Table of Contents



| | |
|--|----|
| About this Report | 2 |
| Executive Summary | 4 |
| Problem Statement | 5 |
| Introduction | 6 |
| Understanding and Contextualizing the Problem | 8 |
| Rural Communities | 8 |
| What We Know About Mitigation | 8 |
| Building Trust and Partnership | 9 |
| Local Knowledge, Lived Experiences, and Human-Centric Design | 9 |
| Implementing Mitigation | 11 |
| Discussion and Recommendations | 12 |
| Summary | 15 |
| References | 16 |



Executive Summary



The Know-How of the Locale problem statement focuses on finding ways to use human-centric design to integrate local knowledge and lived experiences into local mitigation planning in rural areas, with a specific focus on North Dakota. Through interviews and research the challenges impeding the successful use of human-centric design were considered, as well as the larger implications of mitigation efforts at the local level that are unable to fully advance national disaster risk reduction and resilience efforts.

The NDSU team provided a single recommendation focused at the local emergency management level in rural areas—a grant initiative that funds community-based planning specialists. This recommendation represents a strategic change in approach and is designed to be responsive to cross-cutting issues that impede emergency management mitigation and community integration efforts. This funding initiative will also enhance residents' understanding of emergency management which will change the way the emergency management community is valued, the level of contributions it can make, and the resources available to fulfill its mission.

Problem Statement

EMGT 491/690
INNOVATIVE PROBLEM SOLVING FOR FEMA

THE KNOW-HOW OF THE LOCALE

CHALLENGE

FEMA needs additional ways to better incorporate tribal, state, and local knowledge from North Dakota to fully integrate lived experiences and human-centric design into hazard mitigation.

BACKGROUND

FEMA uses a variety of datasets and tools to evaluate and communicate risk and estimated losses from natural hazards. Often, these tools are developed with a broad, national-level lens. Local knowledge is often either overlooked or excluded from these datasets and tools. This is usually done to create more straightforward, applied products, but it inadvertently creates a gap where local emergency management and local resident know-how is not included. Without this local knowledge included in risk analysis, FEMA risk tools cannot adequately communicate the entire risk profile of a community to decision-makers and emergency managers.



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Introduction

The Know-How of the Locale problem statement is focused on ways to collect and integrate local knowledge and lived experiences into mitigation planning and practice in FEMA Region 8 generally, and North Dakota specifically, through a human-centric design model. Region 8, as a whole, is comprised mostly of areas that are considered to be rural (Center on Rural Innovation, 2022). The rural emergency management practice construct is different than urban emergency management practice (Cwiak & Butterfass, 2024). This difference carries with it specific service challenges that warrant solutions specific to rural areas.

Mitigation - sustained actions that reduce or eliminate long-term risk to people and property from hazards and their effects - is one of the most powerful tools that the field of emergency management has to reduce risk (NDSU, 2017). Each dollar invested in mitigation in the United States saves an average of six dollars in future costs (Lightbody & Fuchs, 2018; Multi-Hazard Mitigation Council, 2017). In the built environment, mitigation can save up to \$13 for every dollar invested (National Institute of Building Sciences, 2020).

Mitigation plans are created at the State, Local, Tribal, and Territorial (SLTT) government levels to identify risk from known hazards and to develop a project prioritization and strategy to reduce or eliminate that risk (where possible). Mitigation projects can be as simple and inexpensive as planting trees (FEMA, 2001) or as complex and costly as a diversion (Walls, 2015). FEMA has a number of programs focused on funding mitigation plan development and project efforts (see for example, Pre-Disaster Mitigation (PDM) Grant Program, Hazard Mitigation Grant Program (HMGP), and Building Resilient Infrastructure and Communities (BRIC) Grant Program) (FEMA, 2023).

States develop overarching state level mitigation plans and provide information and training to assist plan development at the local level. In North Dakota, for example, mitigation is prioritized (NDDDES, 2023a). North Dakota has an Enhanced State Hazard Mitigation Plan. This plan is part of their comprehensive statewide mitigation program created by the North Dakota Department of Emergency Services (NDDDES) in partnership with the State Hazard Mitigation Team (SHMT) (NDDDES, 2023b).

Mitigation planning is time consuming and labor intensive and often beyond the capacity of rural emergency management offices. In these areas, there is typically only one emergency manager serving at a county, tribal, or territorial level who is responsible for the entire spectrum of emergency management responsibilities in their jurisdiction (Cwiak & Butterfass, 2024). The breadth of responsibilities these emergency managers are tasked with typically precludes them from having the requisite time to dedicate to mitigation planning (Cwiak & Butterfass, 2024). Hence, mitigation planning in rural communities is often contracted out to consultants

who use templated frameworks to complete plans that will meet the primary function of the plan—the ability to access federal mitigation dollars.

Mitigation planning is, by intent, an immersion in the community’s identity (i.e., the process involves identifying the community’s history, natural and built characteristics, demographics, priorities, hazards faced, impacts from hazard events (past and projected), current capabilities, etc., and also includes public outreach and engagement requirements).

The mitigation planning process, similar to other emergency management planning processes, is as important, if not more important than the plan itself. But the value of that process to the rural emergency manager is mostly lost when the plans are handled by contractors who have a transactional relationship with the jurisdiction.

Contractors are less likely to capture the types of community nuances that are developed from spending time at the local diner, high school football games, or other community events (as a locally-based emergency manager ideally would). It simply is not cost-productive for contractors to be immersed at that level with the community and its residents. Hence, the ability to capture local knowledge and lived experiences in a human-centric design model is not likely with the current level of engagement provided by contractors (this statement includes the recently enacted changes effective in 2023 which increased expectations for partner and community-based organization engagement).

This is not to say that rural emergency managers should be made to undertake this effort themselves as the capacity issue in rural areas remains a limitation (Cwiak & Butterfass, 2024). Other options must be examined that can be utilized to collect and integrate local knowledge and lived experiences into mitigation planning and practice in rural areas, with an understanding that local knowledge is passed by word of mouth and is rarely written down. Local knowledge is typically only shared if there is a relationship and trust between the community and the emergency manager (Skytt & Winther, 2011). This type of knowledge is gained through lived experience and its application to mitigation plans can help ensure that mitigation plans mold to specific community needs (Smith et al., 2024).



Understanding and Contextualizing the Problem

The NDSU team conducted interviews with subject matter experts and reviewed relevant literature to understand and contextualize the current state of mitigation planning in Region 8 (specifically, North Dakota). The rural landscape of North Dakota is representative of the majority of Region 8. Understanding the composition and characteristics of rural communities, coupled with essential elements of sound mitigation practice, were important to the team’s ability to consider ways in which local knowledge and lived experiences could be integrated into mitigation efforts.

Rural Communities

Most of North Dakota’s land is considered rural and about 40% of all residents live in rural areas (FEMA, 2021a). Rural communities have lower population densities with higher proportions of children and elderly, and face specific challenges including: less access to high-speed internet; run-down infrastructure; longer driving distances to access community meeting spaces; lack of workforce development and capital access; and fewer educational and medical institutions (Mileti, 1999; NCSL, 2020). Research shows that “rural areas have a stronger sense of community than urban areas” and power in these areas “is often



controlled by a few, and outsiders are often treated with suspicion” (Mileti, 1999). Other obstacles emergency managers face in rural communities are lack of funding, capacity, and a lack of community engagement (Cwiak & Butterfass, 2024; Janssen, 2006). These constraints change the construct for emergency management practice and make it challenging for emergency managers to meet their daily responsibilities, let alone higher levels of engagement, such as, incorporating local knowledge and lived experiences into mitigation planning.

What We Know About Mitigation

The increasing frequency and severity of disasters, which are escalating disaster impacts and costs, will continue to heighten the focus on mitigation (NCEI, 2024). It has long been established that mitigation efforts can reduce loss of life and damage to property and the environment (Mileti, 1999). It is also been well-documented that mitigation expenditures are a good investment that deliver predictable cost savings (Lightbody & Fuchs, 2018; Multi-Hazard Mitigation Council, 2017; National Institute

of Building Sciences, 2020). The heightened focus on climate change continues to re-orient government's focus on reduction of impacts (mitigation), as well as coping with impacts that cannot be reduced (adaptation) (Laukkonen et al., 2009). In rural areas, climate change is expected to have a variety of socio-economic impacts that will have far-reaching consequences for the rest of the country (Lal et al., 2011; Ristino, 2019).

North Dakota uses three main types of grant assistance for mitigation efforts: HMGP, which was created to help fund actions meant to reduce or permanently eliminate risk to lives and property after a disaster; the BRIC grant that allows jurisdictions to fund mitigation projects before a disaster event; and the Flood Mitigation Assistance Grant Program (FMA) which is used to fund mitigation projects to reduce or eliminate risk due to flood damage (FEMA, 2023; NDDDES, 2024). These grants are extremely important in North Dakota because many jurisdictions do not have enough funding to support mitigation projects without federal help.

An approved mitigation plan is necessary to access federal mitigation grants. The mitigation planning process is time intensive, typically takes eight to twelve months to complete, and must be updated every five years (FEMA, 2022). This process, in-and-of-itself, presumes emergency management capacity (i.e., personnel, equipment, and resources needed to meet the level of capability required to accomplish the necessary tasks within the breadth of the emergency management scope of responsibility) and capability (i.e., the knowledge and skill required to accomplish the necessary tasks within the breadth of the emergency management scope of responsibility) that often do not exist at the local level (Cwiak & Butterfass, 2024). Funding for emergency managers in rural areas is typically limited. "It is not uncommon to find emergency management positions in rural areas funded as a 10 or 20 hour a week position as a supplement to other assigned duties" (Cwiak & Butterfass, 2024). The rate of pay, along with the complement of assorted duties entwined with emergency management responsibilities, make it difficult to hire someone with actual emergency management experience or an emergency management college degree. This lack of established subject matter expertise only exacerbates an already unmanageable burden on the local level regarding mitigation planning expectations.

Building Trust and Partnership

Community engagement activities relating to the creation of mitigation plans historically have low citizen engagement (Godschalk et al., 2003). The NDSU team's interviews confirmed that challenge endures despite valiant efforts. FEMA's 2023 changes to local mitigation planning expectations explicitly calls for increased inclusion in the planning process to include "representatives from a broad range of sectors, community lifelines, the public and community-based organizations that support underserved communities" (FEMA, 2022). This change, along with other changes designed to show greater mitigation commitment at the local level (to include expectations to use local building codes, land use regulations, and ordinances to effectuate mitigation) and incorporation of more expansive risk framing (to include expanded scope and time), will challenge contractors ability to work with old frameworks and increase the amount of time, effort, and cost involved in the production of plans.

The recent changes in mitigation planning expectations at the federal level align with longstanding, established mitigation best practices (Mileti, 1999). Informing the community about emergency management and the ways in which implementation of mitigation actions can help reduce risk, is important to individuals' ability to manage their own risk and can be the first step in increasing community engagement (FEMA, 2021b). It is the emergency manager's job to educate the public on emergency management and in return, to learn about the community (Springer, 2009). When emergency managers partner and engage with stakeholders in the community, like school districts and local community leaders, it strengthens the emergency manager's ability to influence the community and increases community engagement (FEMA, 2024b). When trust between local emergency managers, local government, and the community is strong, communication and discussion between the three entities can flow (Islam & Ryan, 2016). This allows community members to feel respected and heard, and also allows them to feel a sense of ownership of community-based emergency management plans.

Local Knowledge, Lived Experiences, and Human-Centric Design

Including local knowledge and lived experiences from community residents in mitigation planning efforts produces better-informed, and more realistic plans. For example, local residents are both more likely to know which roads will flood and the work-arounds for when those roads flood from their own experiences. Residents are the ones who live with impacts of hazard events in the community, who may have changed behaviors based on past experiences, and are likely to have ideas about how things can be changed to improve commonly occurring impacts (Smith et al., 2024).

The role of residents' local knowledge and lived experiences has long played a role in the shaping of local ordinances, zoning and planning, and other community-based decisions that affect or impact community safety, quality of life, or property values (Svara & Denhardt, 2010). One can hardly imagine a council or commission meeting where community residents are not present to share their thoughts on matters that affect them and are within the governing body's ability to fix. Often, the topics addressed are safety oriented, such as a need for a stop sign, or a speed limit change. This community engagement model is built into our concept of local government. Yet, there appears to be a disconnect between matters of relevance in the emergency management arena and residents' connection to it pre-disaster, despite the fact that it can have profound impacts on their lives, livelihoods, and quality of life that are similar to the aforementioned stop sign and speed limits. Nowhere is this disconnect more evident than in the mitigation planning process, where calls for resident engagement historically fall on deaf ears.



Human-centric design is used to provide communities of interest an opportunity to share their experiences and viewpoints in the development of plans, policies, and other projects that will affect them (Prasad et al., 2023). This process is commonly used in recovery (to varying extents) to inform priorities for re-envisioning the community. Several community examples of this are: Grand Forks, North Dakota; Northwood, North Dakota; Joplin, Missouri; and Greenburg, Kansas (Arendt, 2023; FEMA, 2001; ICMA, 2007; Stofferahn, 2017). When human-centric design concepts are successfully used for local planning efforts, residents feel more involved and connected to their community (Prasad et al., 2023).

Post-disaster disruption increases the salience of community engagement. The discussion of mitigation efforts, which is ramped up every five years in the planning cycle, does not typically generate the same level of urgency or necessity for engagement among residents. This is the hurdle that emergency management must clear to be able to gather local knowledge and lived experiences.

Implementing Mitigation

The best way to implement sustainable mitigation efforts is to start with engagement at the local level (Mileti, 1999). Local communities must be made aware of their role in mitigation. Those with local knowledge are best equipped to identify areas where mitigation activities would be beneficial. Without local community engagement and commitment, mitigation cannot be effectively pursued (Blackett, 2007).

Residents' lack of understanding of emergency management's role in resilient communities is an endemic issue that diminishes the ability of the practitioner community to effectively accomplish their important work (Owen et al., 2016). When emergency managers cannot effectively complete activities designed to move communities toward greater resilience, lives, livelihoods, and quality of life will suffer (Islam & Ryan, 2016). Hence, the community's understanding of emergency management's essential role is foundational to advancing mitigation goals.

Mitigation goals should be integrated into community development goals to help ensure the community's resilience. Educational efforts can help the community understand that mitigation is as essential to community wellbeing as infrastructure, business development, and quality of life issues (Islam & Ryan, 2016). Mitigation goals need to be understood as inextricably tied to the success of community goals.

Discussion and Recommendations

In evaluating ways in which human-centric design could be used to capture and integrate local knowledge and lived experiences into mitigation, the NDSU team considered: the current realities of the community's understanding of emergency management; the level of integration, or lack thereof, of the emergency management function and expertise in advancing community development goals; the capacity and capability of rural emergency managers; the substantial role of contractors play in the development of mitigation plans; the valuable role the mitigation planning process has in capturing the unique identity and needs of a community; the importance of mitigation to the success of the overall goals of disaster risk reduction, resilience, and emergency management practice as a whole; and ways in which local knowledge and lived experiences could be gathered to benefit mitigation planning and other important initiatives.



The complexities of this problem extend beyond the simple addition of another step in the mitigation process. At its core, this problem is best summarized as an urgent need for the importance of mitigation efforts in the overall management of hazards and disaster impacts to be realized and acted upon. Without the ability to use this powerful tool effectively at the local level, rising disaster costs will not be abated, local and state economies will suffer, and human suffering will

increase. The federal government simply cannot sustain the disaster expenditure trajectory it is currently facing. Simply put, successful mitigation efforts are central to humans being able to continue living in a exceedingly volatile, uncertain, complex, and ambiguous (VUCA) world.

Yet, mitigation efforts are too often mired in relative obscurity at the local level and a mix of emergency management realities are circumventing the potential of mitigation as a tool, particularly in rural areas. A different approach that is cognizant of both the dynamics of the problem and the increasing role of emergency management in shaping resilient communities is needed. The NDSU team has focused its singular recommendation on addressing cross-cutting issues that have arisen in the examination of this problem. While this recommendation will not remedy every challenge emergency management practice faces, or address every reality of the current mitigation planning process, it will significantly advance essential emergency management efforts.

The NDSU Team proposes the following as a solution to accomplishing the integration of local knowledge and lived experiences in mitigation planning through human-centric design.

Community-based Planning Specialist Initiative

- Fund a federal grant initiative that allows local emergency managers from rural areas (at the county, tribal, or territorial level) to apply for grant funds to hire a 36 month community-based planning specialist to be housed in the emergency management office. This specialist will work with the emergency manager and will facilitate essential emergency management initiatives through outreach, engagement, education, partnerships, data collection, and information sharing. Any retention beyond the initiative funding period would have to be integrated into the jurisdiction's budget or adopted as a state-level initiative.
- In addition to a foundational understanding of emergency management practice, the community-based planning specialist must bring a history of successful engagement with public outreach, community building, and community-based planning to the position.
- The community-based planning specialist will be tasked with five responsibilities:
 1. Public outreach and community engagement for emergency management;
 2. Liaison to local government officials and positions focused on planning, community and economic development, zoning, emergency services, infrastructure, social services, and other positions relevant to community resilience;
 3. Citizen and community partner engagement;
 4. Community profile development and annual updating; and,
 5. Sharing information and community best practices with regional, state, and federal partners.

The goal of the community-based specialist program is to increase emergency management capacity and capability with the specific intent of fully integrating into the local community. This integration will provide the specialist with a platform to gather local knowledge and lived experiences that can be used to enhance the mitigation planning effort. The specialist's integration will also facilitate greater public interest in, and understanding of, emergency management practice and its role in supporting community development goals, resilience, and protection of lives, livelihoods, and quality of life. The more expansive impact of such a shift in understanding is that it will change the way the emergency management community is valued, the level of contributions it can make, and the resources available to fulfill its mission.

The specialist will be able to work closely with contractors to ensure that the nuanced identity of the community and the knowledge and experiences of the residents are fully captured. The specialist will also be able to facilitate a higher level of community engagement with the mitigation planning effort. This will result in better informed mitigation planning products and will advance FEMA's efforts to deepen community engagement. This additional assistance should also allow the contractors working on these plans to more easily meet the expectations without a need for an increased time commitment, which should avoid increases in contractor costs to the jurisdiction.

Better informed mitigation planning products will result in more purposeful mitigation projects that can effectively reduce community risk, while also meeting national emergency management goals of advancing community resilience and sound emergency management practice. Best practices learned from the funded specialist positions can be shared to help inform shifts in approaches and strategies for practice. It is expected that over time the engagement achieved by the specialist position will become normalized practice across all sizes of local jurisdictions.

More Mitigation Measures, More Savings




**One dollar invested in mitigation =
six dollars U.S. saves in future costs**





Summary



All communities are unique. They can have different local knowledge and lived experiences, face different hazards, and have different priorities, and their mitigation plans should reflect that uniqueness (Islam & Ryan, 2016). Mitigation plans, while standardized in many ways, require a human-centric design approach to effectively capture the essence of a community. This requires a level of integration and engagement that is outside the contractor sphere and beyond the current capacity of local emergency managers in rural areas.

The importance of successful mitigation efforts, at all levels, to national disaster risk reduction and resilience efforts cannot be overstated. Success in these efforts at the local level underpins success at the state and federal level. Yet, the local level, particularly in rural areas, is currently situated for failure based on the challenging reality of the rural emergency management construct.

A change in the approach at the local level in rural areas is warranted. In funding community-based planning specialists, the locale and its residents, region, state and other partners will reap the benefits that come with enhanced community integration, alignment with community goals, and increased knowledge of, and engagement with, emergency management. This small, but significant, step is responsive to cross-cutting issues affecting the effective utilization of one of emergency management's most powerful tools—mitigation.

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