CLIMATE CHANGE ADAPTATION STRATEGY

IDENTIFICATION & COMMUNITY OUTREACH STUDY 2021

FEMA REGION 8

Simental Industries Ltd.

Principal Investigator: Mr. Arthur J. Simental, M.S., CEM

Co-Principal Investigator: Dr. Tina Bynum, D.Mgt., MPA

12/30/2022

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*"We are the **first generation** to feel the effect of climate change and the **last generation** who can do something about it." President Barack Obama*

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Executive Summary

Climate Change represents one of the greatest crises of the 21st Century. The impacts of climate change are being witnessed around the world. Across the western United States spanning FEMA Regions 8, 9 and 10 this is experienced through year-round wildfire seasons, extreme-decades long drought, severe storms and wind with category 1-2 hurricane force strength gusts, extreme heat waves, short intense blizzards and sub-zero polar temperatures, and other disasters that continue to increase in frequency, size, and intensity. An even-greater challenge will be adapting to the existential threat of climate change in an equitable manner.

In response to these challenges, FEMA Region 8 launched its first series of higher education research grants to identify climate adaptations strategies and effectively communicate preparedness practices and programs to residents of Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and the 29 federally-recognized tribes within these states. Further to identify climate adaptation community resources and develop communication, outreach and engagement strategies.

Simental Industries Ltd. was awarded FEMA Region 8's *Climate Adaptation Strategy Identification & Community Outreach Research Grant 2021*. Simental Industries Principal Investigators Mr. Arthur J. Simental, and Dr. Tina Bynum developed a multi-part project that originally envisioned surveys and focus group interviews targeting a diverse range of special populations and tribes within FEMA Region 8 to gather their unique perspectives and lived experiences on climate change and adaptation efforts. The project involved working collaboratively with a FEMA Region 8 Project Manager Mr. Daniel Green, a Resilience Analyst, and FEMA Region 8's two Tribal Liaison Officers.

Unique challenges such as working through the COVID-19 pandemic would cause the team to adapt, work virtually, and alter the original study protocol. The most prominent issue during this study became participant recruitment, especially among tribal and selected special populations even with the support of FEMA Region 8. Another challenge and a direct example of climate change impacts and increasing disaster frequency, both project principals Mr. Simental and Dr. Bynum were evacuated briefly due to an outbreak of four wildfires fires burning on the same day in the Colorado Springs, CO area during this study. Of note, the Marshall Fire in Boulder, CO also occurred during the study period in which 991 homes and businesses were destroyed and 127 more were damaged.[1] Every study has a number of challenges, despite these the Simental Industries team was able to overcome them and successfully complete the project.

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[1] Prentzel, O., Gilbert, D., and Vo, T. (2022). Marshall fire officially becomes Colorado's most destructive, with 991 homes and businesses burned, officials confirm. https://coloradosun.com/2022/01/01/marshall-fire-snow-displaced-residents-power-outage/

Enclosed within, this report represents fifteen months of collaborative, interdisciplinary research. This study was executed and implemented by a diverse research team including graduate research assistants, and the support of FEMA Region 8 staff. An overview of the study is provided, the study methodology, design, approach, and human subjects protections. Research findings are then presented: 37 respondents across four of six states within FEMA Region 8 including Colorado, North Dakota, South Dakota, and Montana participated in this study. The study survey data includes demographic information, climate resource outreach and education identification, community climate resource awareness, community hazard and climate identification data, sources of news and information, barriers and challenges to climate change adaptation, and perspectives on FEMA support to communities for climate change adaptation. Followed by question analysis, and a review of the response received to the tribal focus questions.

This report concludes with a discussion of the limitations & challenges, findings, recommendations, opportunities and conclusion of the study. The recommendations provided from this report serve as a roadmap for developing strategies, policies and programs aimed at addressing the threats, hazards and impacts of climate change, community climate change adaption, climate change adaptation education and communication, equitable climate outreach, tribal government and climate adaptation culture within FEMA Region 8. Lastly, this report provides key data to inform decision-making in response to climate adaptation grant objectives and priorities. When operationalized, the findings, recommendations and opportunities that stem from this report will improve the preparedness and resilience of FEMA Region 8.

(**Disclaimer:** The views and opinions presented are those of the authors of this report and do not necessarily represent the views of any other agency, organization, policy, position or the United States Government.)

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Section 1 – Introduction

About Simental Industries Ltd.

Simental Industries Ltd. is a Homeland Security & Emergency Management Consulting Firm and Disaster Research Collaborative. Our work spans the Homeland Security Enterprise.

Simental Industries Ltd. mission is to lead cutting edge research and science to develop new, innovative systems, technologies and solutions for the Homeland Security Enterprise. Our goal is to develop solutions that make the world resilient to crime, disasters, climate change and the environment. Solutions and products that revolutionize the way we integrate research, science, data, education, cyber and physical security, safety, emergency preparedness, disaster mitigation, climate adaptation and community resilience into our society.

Research Collaborative – SHIELD Initiative

The *Strategic Homeland Security Enterprise Research Initiative - SHIELD Initiative* is a voluntary *research collaborative* focused on exploring the forefront of research, science, technology and innovation for the homeland security enterprise. Our goal is to bring together practitioners, academicians and industry to push thought leadership and exploration in critical areas to revolutionize how we approach critical topics in the homeland security enterprise. We aim to build a robust, inclusive community of partners and become a force multiplier in homeland security research. In our own efforts to become part of a greater community of homeland security researchers we found this to be an area that was severely lacking. The SHIELD Initiative's goal is to build diverse, cross cutting partnerships and networks across the public sector, private sector, academia and industry. Our philosophy is based on the belief that there is a place for EVERYONE in the homeland security enterprise. We hope you'll join us in confronting some of the biggest problems facing the world today.

SHIELD's strategic research focus areas serve as critical elements in our vision of the future of the homeland security enterprise. This research when realized will shield and safeguard communities for generations to come. Envisioned in our motto in Latin, "Per Scientia, Salus, Securitas et mollitiam" which means "Through Science, Safety, Security and Resilience".

Project Team

Principal Investigator

Mr. Arthur J. Simental, M.S., CEM

Adjunct Instructor & SME – Homeland Security & Emergency Management,

Colorado Technical University

Founder & CEO, Simental Industries Ltd. – Shield Initiative

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Co-Principal Investigator

Dr. Tina M. Bynum, D.Mgt., MPA

Associate Dean of Law, Public Safety, and Social Sciences,

Instructor & SME – Emergency Service Administration

Pikes Peak State College

Chief Research Officer, Simental Industries Ltd. – Shield Initiative

Simental Industries - Shield Initiative Research Partners

Sinan Khan, MBA, MPH, MA, MEP, CEM

Chief Public Health & Emergency Management Research Partner

Associate Director, for the Los Angeles County Office of Emergency Management

Student Research Fellows

Research Fellow

Soumanetra Ghosh, M.A.

Graduate Student - Public Policy, Economic Development and Sustainably

University of Denver

Research Associate

Sarah Lillie

Graduate Student - Environmental Policy

University of Denver

Project Workgroup Support

Research Fellow

Erin Christon, M.A.

Recent Graduate – Research and Evaluation Methods

University of Colorado Denver

Research Associate

Jessica Christon

Undergraduate Student - Homeland Security & Emergency Management

Idaho State University

FEMA Region 8 Project Support

FEMA Region 8 Project Manager

Daniel Green

Resilience Analyst | National Preparedness | FEMA Region 8

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FEMA Region 8 Tribal Liaisons

Thank you to the FEMA Region 8 Tribal Liaisons who supported this study.

PROJECT TEAM DIVERSITY, EQUITY, & INCLUSION

We are a small but mighty team of interdisciplinary professionals, researchers, university and academic institution affiliated faculty, first responders, emergency managers and enthusiasts with backgrounds from across the homeland security enterprise and the military. We strive to be a growing venture that is built on collaboration, innovation, mutual respect and trust, and have a shared vision where everyone is valued.

Simental industries Ltd. is a small disadvantaged, minority owned and operated firm, dedicated to the principles of equal employment opportunity. We do not discriminate against applicants on the basis of age, race, sex, color, religion, national origin, disability, genetic information or any other applicable status protected by federal, state or local law. We strive to uphold the principals of equity, diversity and inclusion in everything we do.

The charts below represent the demographic composition and makeup of the Simental Industries team that worked on the FEMA Region 8 *Climate Adaptation Strategy Identification & Community Outreach Research Grant 2021.*
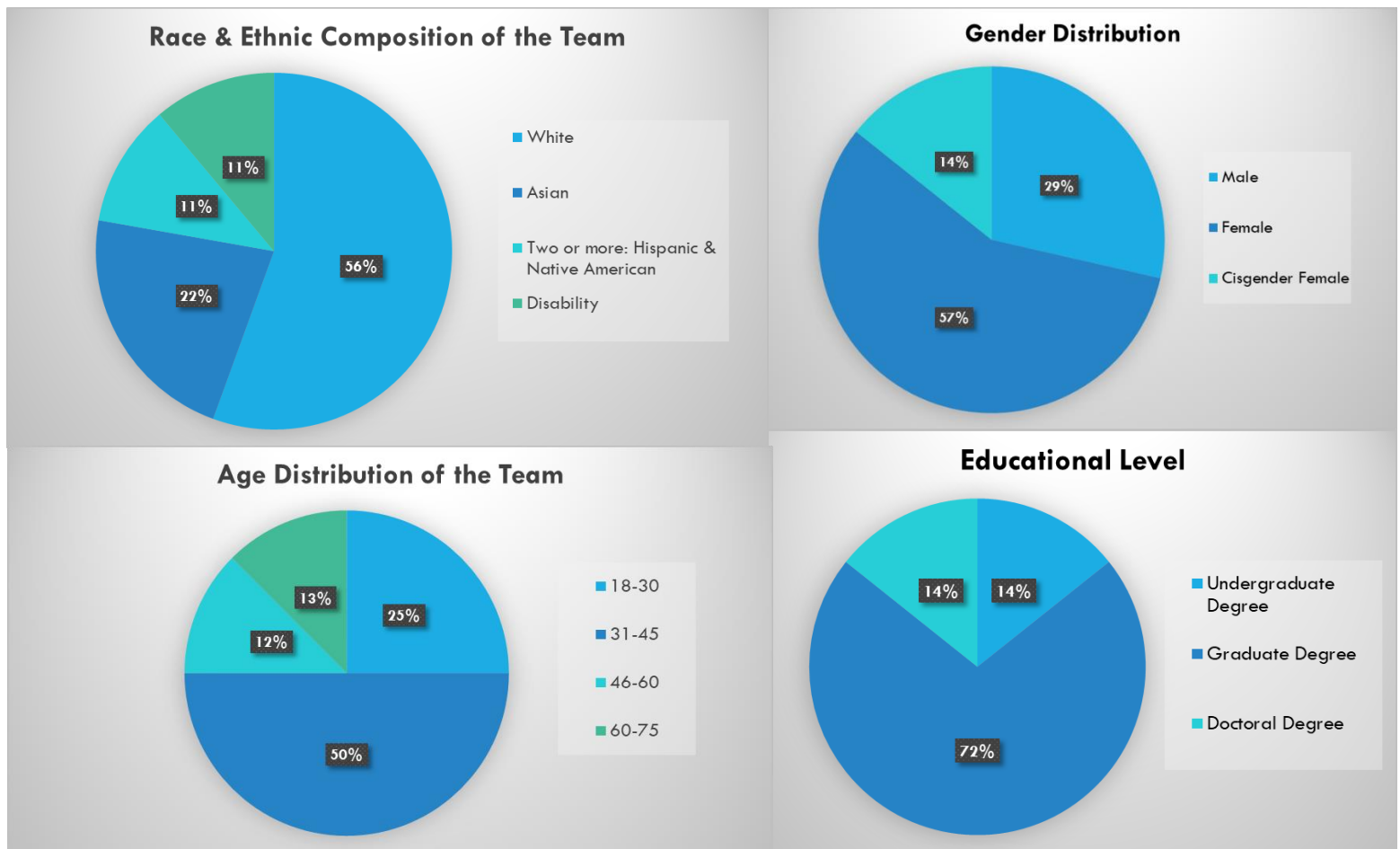
Chart 1 - 4: Simental Industries Project Team Demographics

Special efforts were made to recruit project team members and students from across each state within FEMA Region 8 from diverse populations. Colleges and Universities with Emergency Management, Climate Science, and Environmental Science programs were selected for recruitment in addition to Tribal Colleges.

Simental Industries Ltd. was successful in recruiting a diverse range of project team members and graduate research students to collaborate and participate in this project.

Project Overview

The Federal Emergency Management Agency (FEMA) 2022-2026 Strategic Plan has identified Climate Change as an integral part of its mission to help people before, during, and after disasters particularly to "address structural inequities in our society [that] compound the impacts of disasters for historically underserved communities" (FEMA, 2022). Instilling equity as a foundation of emergency management, leading the Whole Community in climate resilience, and promoting and sustaining a ready FEMA and prepared nation are the three key goals outlined in the strategic plan.

FEMA will "look beyond disasters for lessons learned to assess future risks as catalysts for change" (FEMA, 2022). This requires a dedication to understanding community stakeholders' perceptions of climate change and their adaptation strategies. Partnering with community organizations, government entities, private sector businesses, faith-based organizations, special populations, tribal nations, and the American public are but a few of the key resources necessary for an informed, whole-community approach to climate change adaptation. To understand and provide the resources needed by these stakeholders, research is needed at the grass-roots level by a variety of institutions across the United States.

ADAPTATION EFFORTS

Unfortunately, limited research has been conducted in the United States that focuses on the ability for communities and their residents to adapt to the emergency preparedness initiatives based on climate change. There are, however, studies conducted in other countries that offer some insight into the challenges, strategies, and programs designed to address Community-Based Adaptation (CBA) (Owen, 2020). McNammara and Buggy (2017) provide some understanding for the challenges in implementing programs within communities (i.e., among residents) due to factors such as social processes and community support. For example, in Georgetown, Guyana and Shanghai, China, specific challenges to implementing CBA for climate change include failing infrastructure, poverty, and implementing policies at the local level (Filho, Balogun, Olayode, et al., 2019), and in the Sub-Saharan region of Africa, poor planning processes for CBA were identified (Nkoana, Verbruggen & Hugé, 2018). The Caribbean region examined vulnerability and resiliency strategies across multiple levels of government, non-government, the private sector, and individual households identifying key areas for CBA efforts including improving the healthcare infrastructure and public health response capabilities, improving the tourism infrastructure, and improving the self-reliance and self-efficacy of households, particularly poorer households, toward navigating pre- and post-disaster assistance (Mycoo, 2018).

BRACE FRAMEWORK

Specific areas to promote CBA efforts can be gleaned from the Center for Disease Control's (CDC) Building Resilience Against Climate Effects (BRACE) model. This model, specifically designed to develop strategies and programs to help communities prepare for the health effects of climate change (CDC.gov, 2021). Hess, et al. (2021) further provides an overview of the BRACE process and its Climate-Ready States and Cities Initiative (CRSCI) strategies for CBA. Examples of efforts to engage the community in CBA to assist in inquiry development and discussion for this study include using schools in community education strategies (Monroe, et al., 2019), simulation exercises (Rumore, Schenk & Susskind, 2016), public communication campaigns (Kreslake, et al., 2018), culturally specific strategies (Nkoana, Verbruggen & Hugé, 2018; Lobbe, et al., 2017), and pooling resources from nearby communities (Kalesnikaite, 2019). Furthermore, Berbés-Blázquez et al. (2017) provide an assessment of 224 individual climate change adaptation strategies in other countries. Thusly, Carlton and Jacobson (2016) indicate that emergency administrators can look at local vulnerabilities and the ability to adapt based on increased risk resulting from climate change to support the CBA efforts. All of which provide a foundation from which to speak about strategies with stakeholders in this FEMA Region 8 study.

There is a fair amount of research in individual areas of CBA, but none provides a holistic approach to efforts that address the plethora of variables in emergency management's ability to provide climate-change adaptation strategies and programs directly to the public.

TRIBAL NATIONS

Some work has been done to understand the culture and nature of climate change adaptation among tribal nations, and to develop planning protocols for disaster preparedness. And emergency management. There have, however, been challenges in the communications and connectivity between U.S. government (federal, state, and local) entities that have created strains on tribal communities. The 29 federally recognized tribal nations in the FEMA Region 8 will serve as a sample to understand the impact Native American culture and their climate change understanding has on forwarding the thinking, cooperation, collaboration, and partnership development. The Oregon Climate Change Research Institute (OCCRI) has developed a Tribal Climate Adaptation Guidebook (2018) that will serve as the foundation for culturally sensitive inquiry.

COPING SELF-EFFICACY

Self-Efficacy is a term used to describe one's perceived capacity to handle life situations and build on confidence which is central to Albert Bandura's *Social Cognitive Theory*. Coping Self-Efficacy (CSE) is more specific in that it measures one's perceived capability to hold positive attitudes and behaviors in the

face of difficult, traumatic, or crisis situations. Research has been done on the impact CSE has on people's response and recovery efforts when a disaster occurs; however, none of this research has linked CSE to the ways in which emergency managers and policymakers can implement adaptation methods using their understanding of a community's psychological perspectives of their own capabilities. Some research via doctoral dissertations have emerged in the past few years focusing specifically on how CSE influences disaster preparedness among special populations (Symonette, 2014; Burns, 2014). This perspective will serve to address the FEMA's strategic plan to ensure the diversity, equity, inclusion, and whole community efforts include the perceptions of individual capability as a factor in this study's emergency management recommendations.

These resources will serve as a foundation to create a more holistic inquiry into the needs and capabilities within FEMA Region 8 and provide support to the recommendations for community-specific adaptation strategies to employ in FEMA Region 8 and beyond.

Purpose

The purpose of this project is to identify climate change adaptation strategies, barriers, challenges, and recommendations to effectively communicate preparedness practices and programs to organizations and residents of Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming, and the 29 federally recognized tribes within these states. This project further serves to identify climate adaptation community resources and develop communication, outreach, and engagement strategies. The targeted populations of this study are state, local, and tribal governments and private sector entities including individuals, faith-based organizations, for-profit enterprises, non-profit organizations, Volunteer Organizations Assisting in Disasters (VOADs), and special populations including refugees, immigrants/migrants including those with disabilities and access and functional needs. This project will engage multiple education institutions within FEMA Region 8 and include undergraduate and graduate student researchers from those institutions.

Goals

This project provides an independent academic study of FEMA Region 8 to develop and implement the following:
1. Identify existing climate change understanding and current adaptation strategies among residents within FEMA Region 8.

2. Identification of climate change adaptation strategies uniquely suited to benefit residents within FEMA Region 8.
3. Development of means by which to communicate climate change adaptation effectively and efficiently to a variety of audiences including, but not limited to individuals, faith-based organizations, for-profit entities, state, local and tribal governments.
4. Improve the overall preparedness and resilience of residents in FEMA Region 8 in the face of all hazards and incidents.

Objectives

This project will adapt the Center for Disease Control and Prevention's (CDC) Building Resilience Against Climate Effects (BRACE) framework in the five-step process that allows emergency management officials to develop strategies and programs to help communities prepare for the effects of climate change. Using this model, this project will:

1. **Anticipate Climate Impacts and Assess Vulnerabilities in FEMA Region 8**.

   Identify the type and scope of climate impacts, associated risks and hazards, and populations and locations vulnerable to these impacts.

2. **Estimate or Quantify Issues**

   In adapting strategies and identifying barriers and challenges for communicating climate change preparedness practices and programs to residents in FEMA Region 8 by conducting key informant interviews and surveys. Specifically, the identification of climate adaptation strategies uniquely suited to benefit residents within FEMA Region 8.

   a. Identification of climate adaptation strategies specifically tailored to federally recognized Tribal populations in FEMA Region 8.

   b. Specific identification of aspects of tribal culture and tribal government that is impacted by climate change and proposed solutions.

   c. Identification of barriers and challenges of climate adaptation for select populations.

   d. Identification of climate adaptation strategies for private sector entities including individuals, faith-based organizations, for-profit enterprises, non- profit organizations, VOADs, and special populations including refugees, immigrants, migrants, those with access and functional needs, and disabled persons.

3. **Assess Community Adaptation Resources**

   Identify the most suitable resources for the identified impacts of greatest concern.

4. **Develop and Implement a Climate Adaptation Plan**

    For communication, outreach, and engagement strategies. Develop a written adaptation
    plan. Disseminate and oversee implementation of the plan to the states in FEMA Region 8
    including, development of means by which to communicate climate adaptation effectively
    and efficiently to a variety of audiences including, but not limited to individuals, faith-based
    organizations, for-profit entities, and state, local and tribal governments. Through the development
    of climate adaptation community outreach, engagement and communication strategies that are
    equitable and accessible to a wide variety of audiences, including those with disabilities, limited
    English proficiency, varying cultural backgrounds, historically underserved populations, and
    socially vulnerable areas.

5. **Evaluate Impact and Improve Quality of Activities**

    Evaluate the process. Determine the value of information attained and activities undertaken. Project
    will identify potential applicability of findings beyond FEMA Region 8, focused on Western U.S.
    and FEMA Region's 9 & 10.

Priorities

1. Identify the threats and hazards most likely to impact residents of FEMA Region 8 and ways in
    which climate change will change the impacts of these hazards upon residents.
2. Develop outreach strategies that are equitable and accessible to a wide variety of audiences,
    including those with disabilities, limited English proficiency, varying cultural backgrounds,
    historically underserved populations, and socially vulnerable areas.
3. Specific identification of aspects of tribal culture and tribal government that will be impacted by
    climate change and proposed solutions.
4. Allow for participation among multiple universities in FEMA Region 8
5. Use of student researchers to gain first-hand knowledge of developing issues in emergency
    management in FEMA Region 8
6. Potential applicability of findings beyond FEMA Region 8 with an eye towards the Western U.S.
    (Region 9, Region 10)

Section 2 – FEMA Strategic Plan Alignment

Goal 1: Instill Equity as a Foundation of Emergency Management

Outreach efforts to individuals from specific emergency management organizations, the private sector, special populations (refugee, migrant, immigrant, disabled, function/access needs), and from the 29 federally recognized tribal nations in FEMA Region 8 were made. In addition, surveys were designed to uncover information about community hazards, geographical implications, political, historical, and cultural perspectives on or as a result of climate change. This study attempted to understand the needs of and the broad implications involved in assisting a community through a disaster from their own perspective. Surveys were sent via email and LinkedIn Groups to every state's emergency management organization, listed non-profit organizations through the individual VOAD sites, faith-based organizations, and environmental and tribal nations' groups.

Goal 2: Lead Whole of Community in Climate Resilience

Outreach efforts were made to many varied community organizations and citizens across a wide range of methods to include: state and local emergency managers via state emergency management associations, VOADs, faith-based organizations, immigration and migrant worker support offices, human services departments and organizations serving those with disabilities or functional and access needs, tribal nations' LinkedIn groups and colleges, and all community colleges within the 29 federally recognized tribal nations. Concerted efforts were made to ensure an equitable and community-focused approach to identify those who manage and support climate-related emergencies along with the general population across the region's states.

Goal 3: Promote and Sustain a Ready FEMA and Prepared Nation

The data collected, and assumptions on the reason and potential meaning behind a lack of data, provides support to this report's recommendations for policy, communications, training, and education on climate change adaptation within specific, diverse communities to increase the nation's overall emergency management capabilities at all levels of government, as well as the private sector, the nonprofit sector, and among individuals.

Section 3 – Methods

This project explored perceptions, knowledge, and preferences regarding climate change adaptation understanding and actions with organizations that typically provide resources to the

community for disaster mitigation, preparedness, response, and recovery; less-powerful community members among special populations; and residents of tribal nations. A mixed-method approach captured the perceptions, expectations, and desired actions of the participants most effectively.

Population and Sample Selection

Targeted populations of this study were *state, local, and tribal governments and private sector entities including individuals, faith-based organizations, for-profit enterprises, non-profit organizations, VOADs, and special populations including refugees, immigrants, migrants including those with access and functional needs and disabilities*. These populations were organized into six distinct categories: Government (state & local), Private Sector (For-profit & Nonprofit organizations), Faith-based organizations, VOADs, and Special Populations (refugees, immigrants/migrants including those with access and functional needs and disabilities,) and Federally Recognized Tribal Nations. Definitions of Special Populations can be found attached: **Appendix A: Special Population Definitions.** Persons under the age of eighteen (18) years of age and those with intellectual, cognitive, or mental impairments that would require another consenting adult legal guardian were excluded from this study.

Data Collection

Data collected through Survey Monkey was stored securely on investigator computers and Survey Monkey Servers. Access to the data is password protected. The type of information requested was general information on public climate change adaptation perceptions, communication, and hazard awareness. Identifiers and contact information for potential respondents were only needed for communications purposes but were not linked to responses.

SURVEYS

Surveys use Likert-type scales, open-ended questions, ranking questions, and other formats, collected through the Survey Monkey generator with outputs transformed into Excel or SPSS as appropriate for various analytical processes.

Data Management

ANALYSIS

This report represents general descriptive data formulated in tables and narratives.

There is some level of risk or discomfort involved in all research studies. This study is estimated to involve no more than minimal risk.

No personally identifiable data was collected from participants. All survey data collected is anonymous; Although Tribal focus groups were originally part of the study design, no focus groups were conducted due to lack of tribal participation. No personally identifiable data was collected. This ensured that the risk remained minimal throughout the study. Further, this study was reviewed by Colorado Technical University's & Pikes Peak Community College's Institutional Review Boards respectively (IRB) prior to the commencement of outreach activities. Both IRB's provided feedback and guidance to ensure Human Subjects protections were adequate, however both IRB's reviewed and determined that as an independent study this was beyond their scope to approve. Due to time constraints to execute this project as prescribed by the FEMA grant award (< 1 year), further independent IRB approval was not sought. The Principal Investigators worked diligently to ensure that the greatest care was taken to ensure no more than minimal risk for participants and that all data collection would be safeguarded and completely anonymous. Lastly, both Principal Investigators have completed COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE Program (CITI) Basic/Refresher Course - Human Subjects Research Management Researchers within the last five years with passing scores.

Section 4 – Results

Thirty-seven respondents have completed the survey as of November 30, 2022. Of these respondents, there are several notable trends within their answers, as well as many variants. This section contains the findings in descriptive format.

Question Analysis

1. **Please select the group or population you are affiliated with the most.**

Group/Population	Percentage (n = 35)
Government	37.14%
Nonprofit Organization	25.71%
Private Sector	17.14%
Volunteer organizations focused on Disasters	5.71%
Not Affiliated with a Specific Group or Organization	8.57%
Other: Education/Healthcare	5.71%
Faith-Based/Religious Organization	0.00%
Federally Recognized Tribal Nations	0.00%

| Non-Federally Recognized Tribal Nations | 0.00% |

a: Two respondents chose "Other," one expressing involvement with "higher education" and the other affiliated with "healthcare."

2. What are the top 3-5 biggest challenges facing your organization regarding climate change?

This question was framed as a type-your-answer response. Responses were thematically coded and grouped.

Challenges	Percentage (n = 35)
Wildfires	55.19%
Smoke	12.23%
Drought	7.15%
Flooding	7.15%
Lack of Funding	3.85%

Notable responses include: **a: "**False info. The climate is not changing unnaturally." **b:** "Doing something about it now; teaching others that climate change is real; how do we actually effectuate policy changes that mitigate and are truly helpful?" **c:** "Expectations and incident assumptions, planning for the unknown, budget/funding for disaster relief."

3. In what ways will climate change impact your organization's ability to provide services?

This question was also framed as a type-your-own-answer. Responses were thematically coded and grouped.

Climate Change Impacts	Percentage (n = 33)
Resource Depletion	42.23%
Money	15.98%
Services	14.23%
Changing Communities	5.45%
Lack of Outdoor Access	5.45%

Some notable responses include: **a:** "We are already seeing an increase in climate-related events in the county which increases workload and the ability to provide services." **b:** "Not directly. However being more environmentally conscious and educating the community is part of the overall educational mission."

4. In what ways will climate change impact your organization's ability to provide services?

This question was also framed as a type-your-own-answer. Responses were thematically coded and grouped.

Responses	Percentage (n=22)
Higher frequency of disasters	31.82%
Funding issues/lack of revenue	27.27%
Inability to provide need as disaster frequency increases	22.73%

Lack of water	18.18%

Other answers included: **a:** "It increasingly defines out programs, priorities, and operations." **b:** "Laying off staff, property values, loss of revenue." **c:** "Food supplies impacted county-wide tourism impacted more disasters, more time, more recovery."

Responses to this question indicate the span of climate impacts on such a large variety of organizations/operations.

5. **What changes will your organization undertake to adapt to climate change hazards?**

This question was also framed as a type-your-own-answer. Responses were thematically coded and grouped.

Responses	**Percentages (n = 18)**
Planning	44.44%
Education	22.22%
Lobbying	16.67%
Expansion of programming	16.67%

Other answers included: **a:** "This is not clear – the administration seems to be mulling this now. As far as I know, there have been no major announcement to changes to operations and/or equipment that are intended to make an impact on climate change hazards." **b.** "Engaging in mitigation and adaptation conversations with communities, understanding climate change/increasing hazards and the scale of our response."

6. **How can FEMA help your organization adapt to climate change hazards?**

This question was also framed as a type-your-own-answer. Responses were thematically coded and grouped.

FEMA Assistance	**Percentage (n = 33)**
Increasing Funding	33.23%
Assistance with Disaster Planning	25.55%
Increased Education Surrounding Climate Change	8.85%
Increased Education Surrounding Solutions	7.65%
Emergency Assistance	3.85%

Other answers included: **a:** "I'm not sure, can FEMA tell us how they can help? Provide access to funding and resources!" **b:** "Providing easily accessible funding to prepare for slower moving disasters, like wildfire smoke and heat." **c:** "Support and tag onto related legislation that increases the cost-effectiveness and availability of renewable energy sources."

Most responses to this question were related to the hope to be more involved/connected to environmental disasters. Respondents seem especially interested in greater communication across their communities.

7. **Please indicate the number of persons in your household.**

Number of Persons	**Number of Respondents**

1	7
2	16
3	4
4	6

Other answers included: **a:** "Business with just under 500 employees." **b:** "2-5 depending on the time of year."

Note: There is a lack of respondents with larger families/people in their households.

8. **In which state do you live?**

State	Percentage
Montana	64.71%
Colorado	20.59%
North Dakota	5.88%
South Dakota	5.88%
Utah	0%
Wyoming	0%
Other (Illinois)	2.94%

One respondent stated they reside in Illinois, a state that is not included in the Region 8 area this study is focused on.

9. **What is your zip code?**
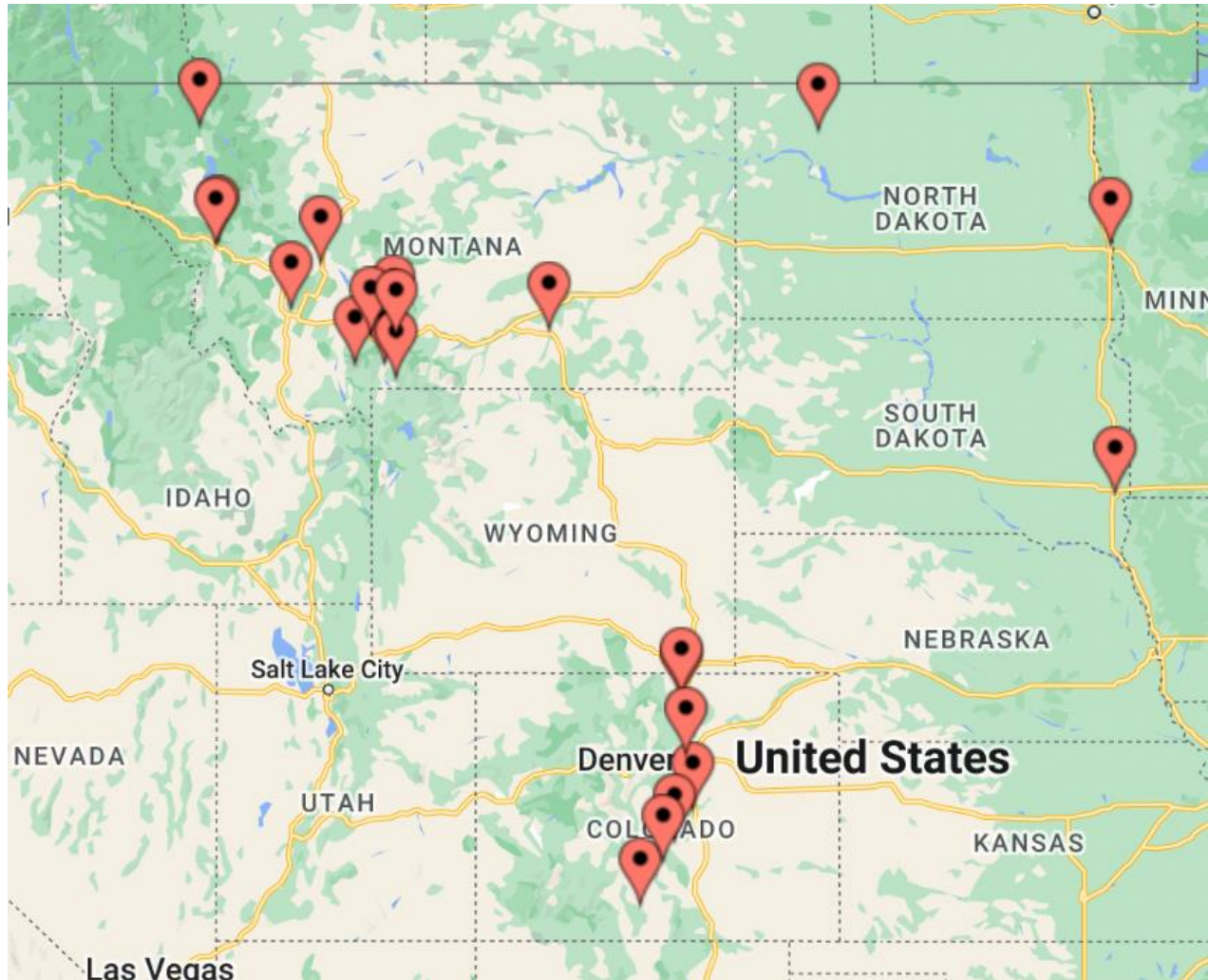
Respondent zip codes were mapped to show geographic diversity of data collected across FEMA Region 8.

10. **What is your age range?**

Age Range	Percentage
18-24	0.00%
25-34	11.43%
35-44	14.29%
45-54	28.57%
55-64	22.86%
65-74	20.00%
75-84	2.86%
85+	0.00%

11. How do you classify your gender identity?

Gender Identity	Percentage
Female	54.29%
Male	40.00%
Prefer Not to Disclose	5.71%

12. How do you classify your current relationship status?

Relationship Status	Percentage
Married	71.43%
Single	11.43%
Divorced	8.57%
Co-Habiting Relationship	5.71%
Domestic Partnership/Civil Union	2.86%
Widowed	0.00%
Separated	0.00%

13. How do you identify your race?

Race	Percentage
White	82.86%
Prefer Not to Disclose	8.57%
Multiracial/Biracial	2.86%
Hispanic or Latinx	2.86%
Other (American)	2.86%

There were no responses from the following races: **a:** Black or African American **b:** Asian or Asian

American **c:** American Indian or Alaska Native **d:** Native Hawaiian or Pacific Islander **e:** Middle Eastern

or North African. One notable response was an individual identifying their race as "American."

14. What is your resident status in the United States?

Resident Status	Percentage
US Citizen	100%

Other responses that had no responses included: **a:** Permanent Resident **b:** Temporary Resident **c:**

Refugee/Asylum Seeker **d:** Undocumented Immigrant/Migrant

15. What is the primary language spoken in your home?

Primary Language	Percentage
English	100%

16. What is the highest level of schooling that you have completed?

Highest Level of Schooling	Percentage
Master's Degree	42.86%
Bachelor's Degree	31.43%

Doctorate Degree	17.14%
Some College Experience	5.71%
Associates Degree	2.86%

17. What is your current primary employment status?

Employment Status	Percentage
Full-Time Employed	67.65%
Retired	11.76%
Self-Employed	5.88%
Part-Time Employed	5.88%
Freelance/Contractor	5.88%
Unemployed	2.94%

Other responses include **a:** "Work full time, and have my own business." **b:** "Retired."

18. Please indicate your household income level.

Household Income Level	Percentage
Under $15,000	2.94%
$30,000-$49,999	2.94%
$50,000-$74,999	5.88%
$75,000-$99,999	23.53%
$100,000-$150,000	41.18%
Over $150,000	23.53%

19. What is the industry in which you receive your primary source of income?

Industry	Percentage
Service Industry	22.86%
Nonprofit Organization	14.29%
Higher Education	14.29%
Tourism	8.57%
K-12 Education	5.71%
Research	5.71%
Farming	5.71%
Politics	2.86%
Other:	37.14%
Airline	2.69%
Ski Industry	5.39%
Retirement Program	5.39%
Savings	2.69%
Pension	2.69%
Public Service Work	2.69%
State Government	2.69%
Local Government	2.69%
Transportation	2.69%

20. Which geographical classification best describes where you currently live?

Geographical Classification	Percentage
Rural Community	62.86%
Urban/City Community	28.57%

Other:
    Mountain Town
    Wildland Urban Interface
    City in a rural area
	8.57%

Other answer choices that were not chosen included: **a:** Suburban community **b:** Tribal community

21. Which type of geographical location best describes where you live?

Geographical Location	Percentage
Urban Built-Up	34.29%
Rural Built-Up	25.71%
Rural Agricultural	25.71%
Vegetation	11.43%
Tundra	2.86%

22. Please select the group or population you identify with.

Group/Population	Percentage
Interested Citizen/Community Member	74.29%
Affiliated with a Non-Profit Organization	42.86%
Volunteer organizations associated with disasters	17.14%
Not Associated with any options	8.57%
Faith Based/Religious Organization	2.86%

Other:
    Helping with the Resilient Butte Project
    Emergency Management/Fire Department
    Regular Citizen
    Volunteer
    Higher Education Executive Leadership
	14.29%

Specific answers associated with "other" included: **a:** "We have volunteers and work in partnership with other volunteer groups." **b:** "We are helping coordinate the Resilient Butte project with the local government and university to understand and reduce future climate impacts." **c:** "Emergency management, LE Agency, Fire Department."

23. Please rank the top 5 climate/weather hazards that are common in your area.

Climate/Weather Hazards	Score
Wildfire	15.55
Drought	15.02
High Winds	12.88
Flood	12.00
Blizzard	11.98

Other top concerns included: **a:** Thunderstorm/Hail/Lightening **b:** Earthquake **c:** High Winds **d:** Air

Pollution **e:** Heat Wave

24. Please rank the top 5 Climate Change effects of most concern to you.

Climate Change Effects	Score
Increased Illnesses (allergies and other health risks)	13.90
Increased intensity and/or frequency of storms	13.75
Loss of environment/infrastructure (roadways, transportation systems, dams, waterways)	13.75
Loss of Food Sources	13.38
Loss of Access to Resources (water, fuel, utilities)	13.28

Other top concerns included: **a:** Increased intensity and/or frequency of storms **b:** Loss or damage of

home/residence **c:** Loss of recreational access **d:** Loss of income source

25. Please rank the top 5 challenges that prevent you from adapting to the effects of climate

   change.

| Challenges	Score
I have limited finances	7.95
I don't get any or enough information from authorities	7.60
My community is not active in adapting to the effects of climate change	7.46
I am confused by political messages	6.50
I have a serious health condition	6.29

26. Please rank the resources in your community that would help you adapt to the effects of

   climate change.

| Resources	Score
Environmental Protection/Ecosystem Preservation Organizations	11.75
Government Offices/Politicians	10.09
Colleges and Universities	10.00
Local Fire, Police, or Emergency Management	9.95
Utility Companies	9.60

Other top resources included: **a:** Environmental Protection/Ecosystem Preservation Organizations **b:**

Non-Profit Organizations **c:** Training/Education through my job

27. Are you familiar with the following websites about Climate Change Adaptions? Please select Yes or No for each one.

The following graphs show the 5 Climate Change Adaptation websites that received the highest number of "Yeses". Hence, these are the websites that can be considered the most popular among our respondents:
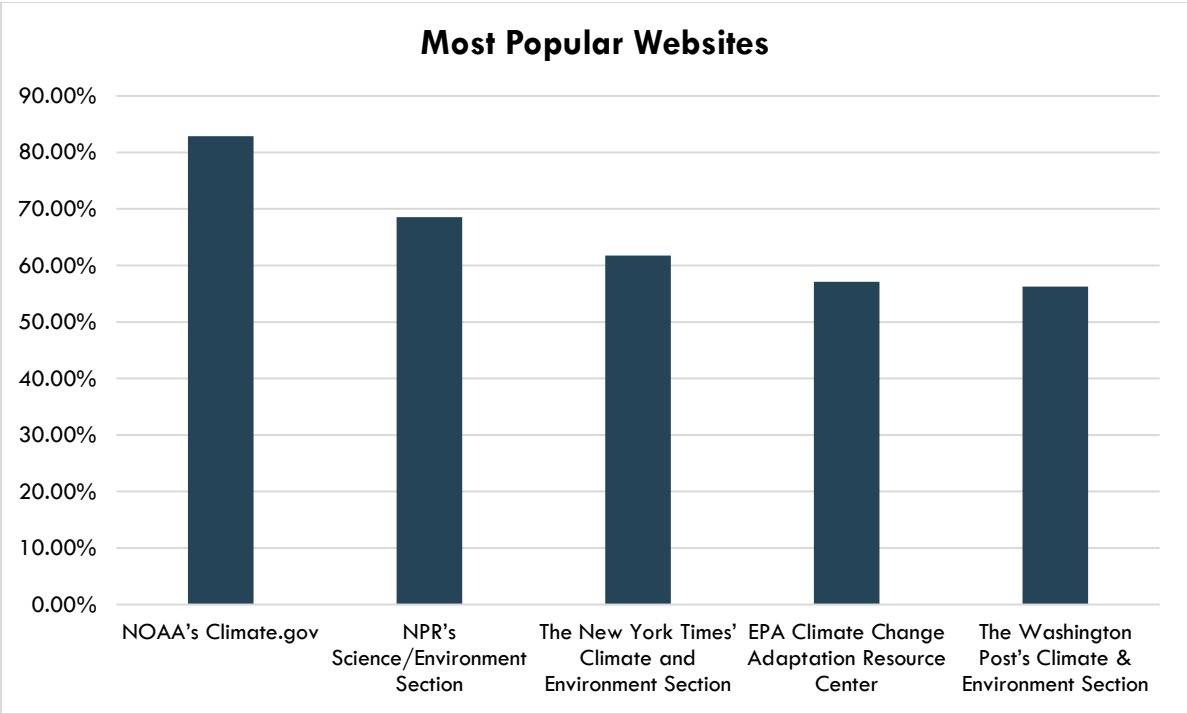

The following graphs show the 5 Climate Change Adaptation websites that received the highest number of "Nos". Hence, these are the websites that can be considered the least popular among our respondents:
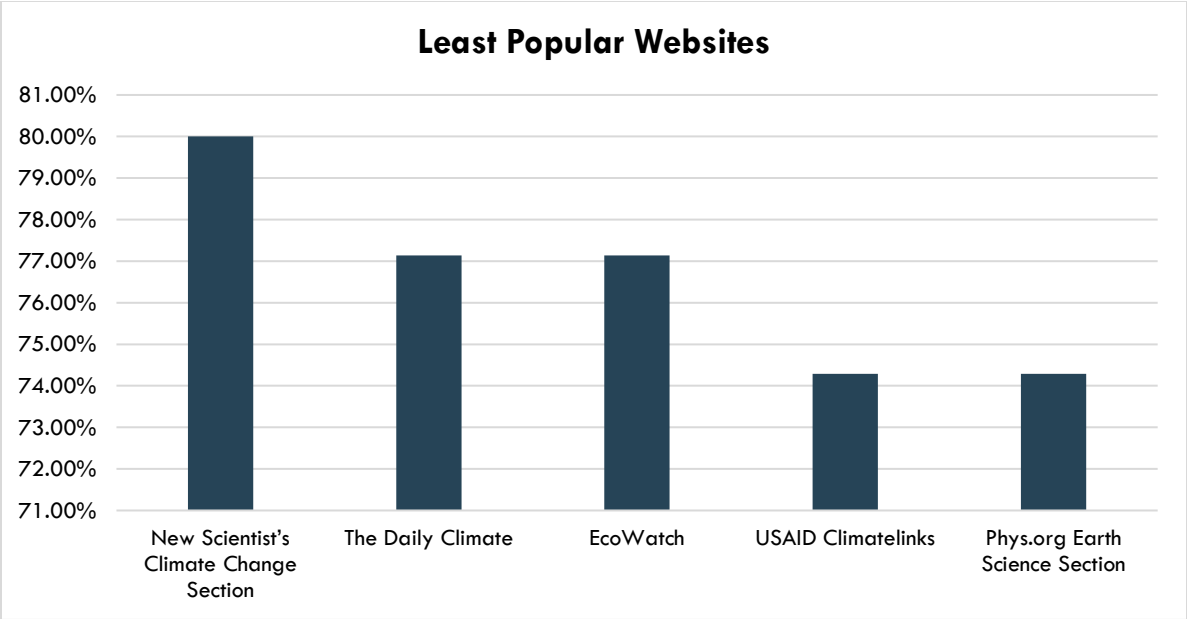
28. What resource(es) in your community would be most helpful to you to adapt to the effects of Climate Change?

This question was an open-ended question; hence each response has been grouped into categories as seen in the graph. The most popular theme amongst the responses is increased investment in education, training, transparency, and infrastructure. The second most popular theme among most responses involved increased government intervention. For example, one respondent urged leadership among the local government to take increased action/aid. The category titled "Other" included responses such as "The new Resilient Butte Partnership", "A local USDA Conservation District", and "Not reading the NYT or the WP…". The graph below shows each of these categories scored in terms of their popularity.
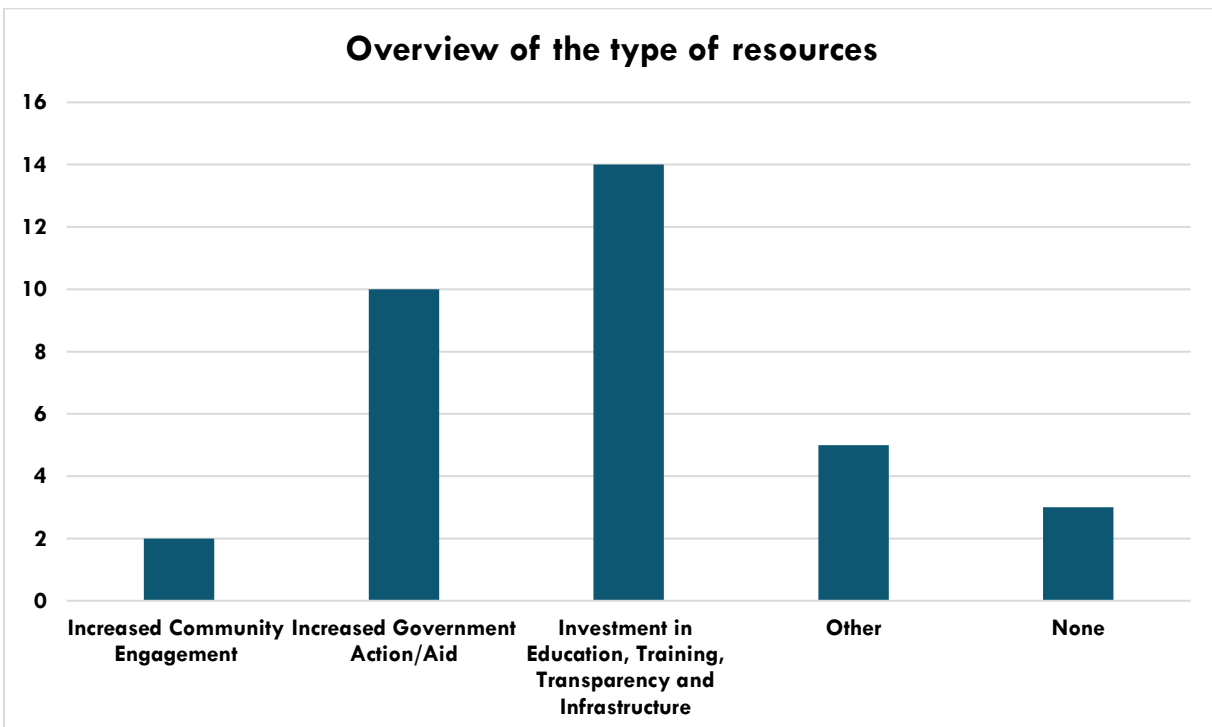
29. What communication (if any) have you received from FEMA on Climate Change adaption? State "None" if you have not received anything from FEMA.

Responses	Frequency
None	26
Yes[a,b]	26
Not Sure	3

a: One respondent answered that "FEMA showed up for their flood assessment on their property on 6/18/2022.", **b:** another respondent answered that "they have been part of multiple training and local exercises and planning for disasters with FEMA, and hence are exposed to FEMA on a regular basis."

30. Have you obtained any Climate Change Adaptation information from Ready.gov? Please Specify.

Responses	Frequency
None[a]	29
Yes[b]	5
No response	2

a: One respondent who answered "None", stated, "Unfamiliar with it, I know about it now". This comment was particularly interesting because it highlights how limited the reach of the information website is, and some people are unaware that such a website even exists. **b:** One respondent answered, "I think I recall getting air quality information there

31. What is your primary source of climate change and/or adaptation communication?

Responses	Frequency
Others	14
Official Websites (FEMA, EPA, NWS)	11
Email[a]	9
Social Media[b]	6
Web Videos (YouTube/streaming services) self-search[c]	4
Television Advertisements[d]	3
Direct Mailing	2

a: Some of the websites via which respondents received emails are GRIST, Climate Smart Missoula, Climate Smart Montana, Inside Climate News, League of Women Voters Environmental Action Team, Third Act, Green Biz, etc. **b:** Responses included Instagram, Facebook, and Citizens' climate lobby. **c:** Respondents mentioned YouTube, Frontline, and educational zoom videos from scientific/medical organizations as some of the web video platforms. **d:** Respondents mentioned Fox News, CNN, NPR, and BBC as sources for their television advertisements.

**32. What is your primary source of news information?**

Options	Frequency
Local News Outlet[a]	21
Social Media[b]	10
Internet[c]	14
Other	12
Cable News Source[d]	9

a: The most popular local news outlets among respondents were PBS, NPR, Fox News, CBS, and local news channels such as Local Denver News, Montana Public Radio, etc. **b:** Twitter, Instagram, and Facebook were the social media platforms listed by the respondents who choose this option. **c:** Some of the online platforms listed by respondents were Apple News, Google News, Yahoo, NY Times, YouTube,

and Google Alerts. **d:** The most popular cable news sources were MSNBC, CNN, BBC, FOX, One American News, and News Max.

33. Please rank the top 3 News Outlets that you trust the most.

Respondents were asked to rank the top 3 outlets that they receive their News. The graph below shows the ranking of each of these news outlets. The five most popular news outlets are NPR, PBS, NBC Local, NBC Cable, and New York Times.
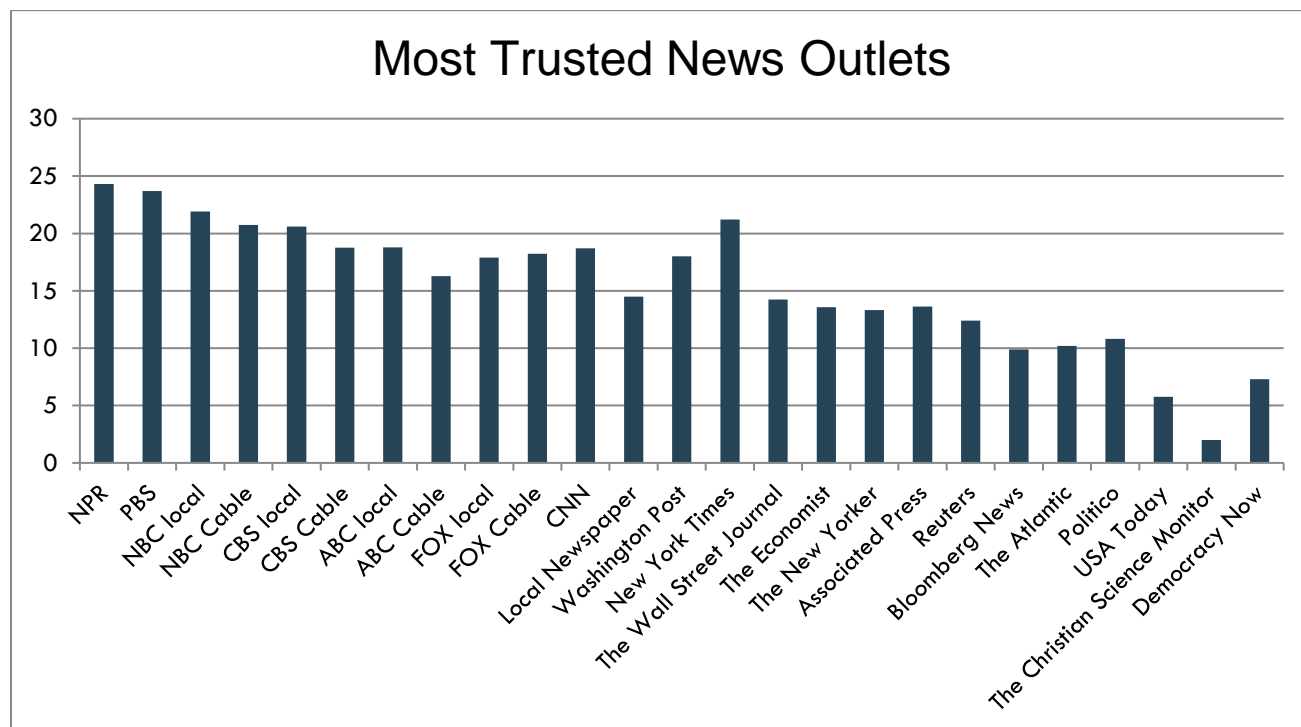

34. Would you like to receive climate change and adaptation information directly from the Federal Emergency Management Agency (FEMA)? Please indicate Yes, no, or I am not sure. Please state why.

Options	Frequency
Yes[a]	17
No[b]	12
Not Sure[c]	5

a: One respondent who answered Yes expressed his reasoning as "Because the information would be more credible coming from FEMA." **b:** One respondent who answered No wrote, "I think FEMA should have a more, action-on-the-ground focus. Let others provide information (other than that information directly related to FEMA actions). If FEMA is going to provide a bunch of information before disasters that could be a path, but then I would suggest we change the name to FEPMA, where the P stands for

Preparedness." **c:** One respondent who was unsure about receiving further communication commented, "How often will FEMA send these emails?".

35. How would you prefer to receive information on climate change and adaptation from the Federal Emergency Management Agency (FEMA)?
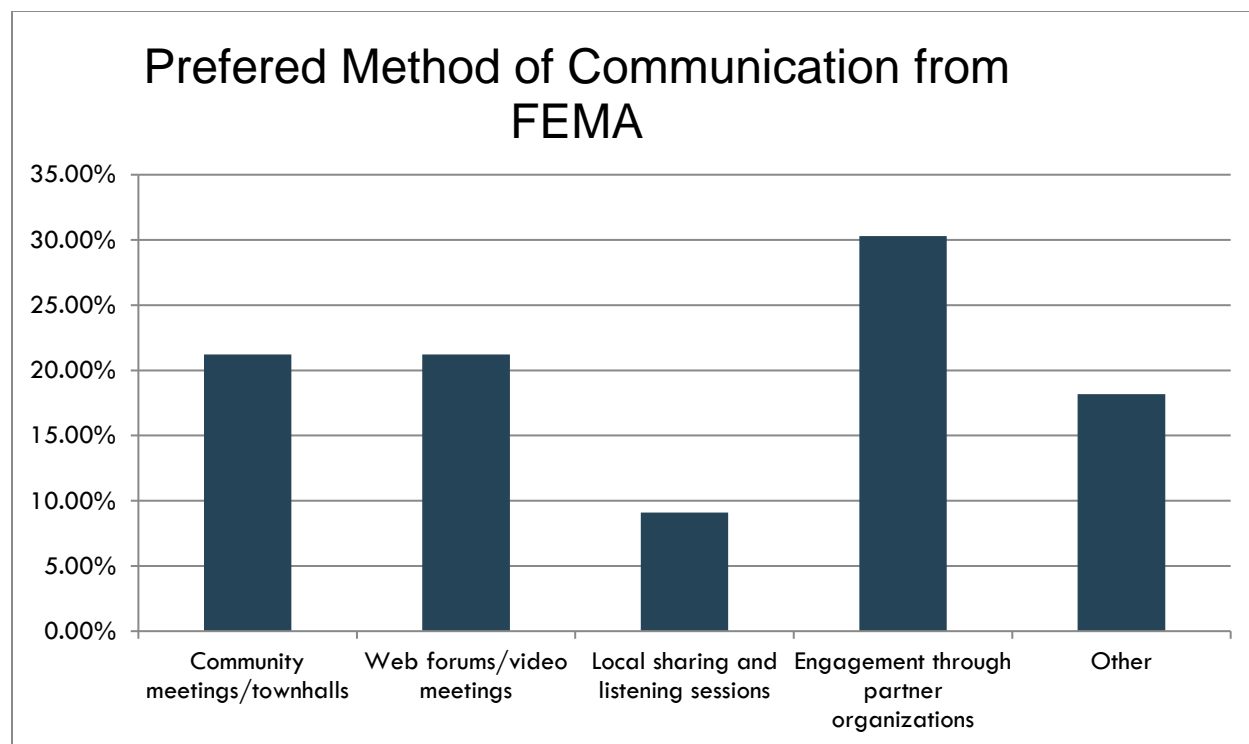
The graph above shows the preferences stated by respondents. The most preferred method of communication is via Engagement through partner organizations. Among those who choose the option "Other", two respondents commented email newsletters are preferred. Another suggested "Advertisement for easy-to-digest resources", as an alternative.

36. What information would you like to receive from FEMA about Climate Change and Adaptation? (Please select your top 5 choices).

The table below shows the choices most preferred by the survey-takers, arranged in descending order. Hence, the kind of information that survey-takers prefer the most is at the top of the table and the lower we move on the table the lesser the importance of that kind of information.

Options	Frequency
What to do when access to resources (food, fuel, utilities) is lost.	18
What to do when the environment/infrastructure (roadways, transportation systems, dams, waterways) are down.	16

The risks of increased intensity and/or frequency of storms in my area.	15
What to do when my home/residence is lost or damaged.	12
Dealing with Health risks	11
What to do about reduced or poor water quality.	11
How to address insurance costs	9
Other[a]	8
How to address more expensive food and supplies.	7
How to access food during a disaster.	7
How to address higher utility expenses.	5
How to address rising taxes.	4
How to address unbearable Outdoor Work (Construction, Mining, Firefighting, Agriculture)	4
How to address unbearable Outdoor Exercise and Recreation.	4
What to do to access recreational areas.	2
What to do if I lose my source of income?	2
How to address travel disruptions.	1

a: Among the respondents who chose the option other, one respondent said, "How to become more resilient so disasters do not impact as bad", another respondent said, "How to build partnerships to reduce risk before a disaster happens", and one respondent said, "How to grow your own food, build or modify my home to be energy efficient. How to be supportive of my friends and neighbors, and how to be a better steward of the blessings God has given each of us.".

37. For each of the following items, select a bubble on a scale of 0-10 indicating how confident you are during a crisis or disaster that you can:

Coping Self-Efficacy (CSE) is a measure of one's perceived capability of coping with certain life experiences. Anchor points on the scale are 0 ('cannot do at all'), 5 ('moderately certain can do') and 10 ('certain can do'). An overall CSES score is created by summing the item ratings (α = .95; scale mean = 235.47, SD = 45.76, Range = 103-300). Our standard scoring rule with summated rating scale scores is that respondents must answer at least 80% of the scale items. For respondents missing an item or items, we estimate an individual's score for the missing item(s) by adding in their mean for the items that they answered for each item that they skipped, resulting in a "corrected sum."

Correlations

		CSES Total Score
Q12Relationship Status: 1. Married 2. Single 3. Divorced 4. CO-Habitating 5. Domestic Partnership	Pearson Correlation	0.276
	Sig. (2-tailed)	0.115
	N	34

Q1GroupAffiliate Group or Population Most Affiliated With (Top 5): 1. Government 2. NPO 3. Private Sector 4. Higher Ed 5. Volunteer	Pearson Correlation	0.062
	Sig. (2-tailed)	0.722
	N	35
Q22GroupPop Organization Affiliated With: 1. Ordinary Citizen Wanting Info 2. NPO Volunteer/Employee 3. Faith-Based Org 4. Volunteer 5. None 6. (Other) Higher Education 7. (Other) Government	Pearson Correlation	0.118
	Sig. (2-tailed)	0.521
	N	32
Q23Top5Haz Top 5 Climate/Weather Hazards Common in Your Area: 1. Wildfire 2. Drought 3. High Winds 4. Flooding 5. Blizzard	Pearson Correlation	0.013
	Sig. (2-tailed)	0.943
	N	32
Q25Top5Challenges Top 5 Challenges Preventing Adaptation 1. Financial Issues 2. Lack of useful information 3. Inactive Community 4. Health Issues 5. Conflicting Political Messages	Pearson Correlation	-0.021
	Sig. (2-tailed)	0.914
	N	28
Q26ResourceHelp Top Resources to Help With Climate Change Adaptation 1. Environment Protection Orgs 2. Colleges/Universities 3. Government Agencies 4. Utility Companies 5. Non-Profit Orgs 6. Education from Job	Pearson Correlation	-0.182
	Sig. (2-tailed)	0.344
	N	29
Q27WebsiteKnowledge Climate Change Related Website	Pearson Correlation	0.103
	Sig. (2-tailed)	0.583

Knowledge/Use Top 3 include: 1. NOAA 2. NPR 3. NY Times	N	31
Q33NewsOutlets Top 3 Trusted News Outlets 1. NPR 2. PBS 3. NY Times	Pearson Correlation	-0.117
	Sig. (2-tailed)	0.570
	N	26

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In disaster studies, CSE has typically shown that people with high levels of CSE positively correlates with higher education, economic status, and accessibility to resources. This study was unable to determine significant CSE levels on any variables within this study nor with underserved populations it attempted to obtain. With most of the study's participants having the benefits of higher education, money, and resource accessibility, no statistically significant correlation was found in the CSE measure, although the scores appeared normally distributed within the obtained sample. Future studies should consider using a CSE or similar measure to understand how those in underserved populations perceive their capabilities of managing disasters with or without government support.

Tribal Focus Questions

1. What does Climate change mean to you? And do you believe it is a concern for your tribe?

The respondent seems to have a good understanding of what climate change is and how it impacts our everyday lives. Moreover, the respondent believes it is a concern for their tribe. Harsh weather in the spring results in not good conditions for animals giving birth and disruption of the planting season is the tribe's main concern caused by climate change.

2. How would you describe the health of your land? How has climate change impacted the health conditions of the land or community?

The respondent believes their community is blessed with healthy land conditions and the topography of the area gives them protection from wildland fires. The respondent believes that climate change has led to harsher weather conditions which have limited outdoor activity. This has caused health problems such as diabetes, depression, and drug addiction.

3. What are some of the key hazards that affect your land and community? What concerns you most about these hazards?

The respondent believes extreme weather conditions disrupt school, medical appointments, work, services to the people of their tribe, and daily activities. The biggest concerns about these hazards are medical care needs and general well-being. Another concern is safe driving conditions for commuters and school buses.

4. What are some of the strategies adopted by you or your tribe to address climate change?

The respondent replied by saying "We comply with all the safety standards and federal regulations protecting our communities".

5. What does the tribe feel needs to be protected? What resources can FEMA provide toward your adaptation planning efforts?

The tribe feels the lives of their community members, infrastructures, utilities, health center, roads, schools, elderly living quarters, homes, and public and private property. Some resources that FEMA can provide are Climate Change write-ups, situational disaster experts, and community planners.

6. What existing tribal efforts or programs are relevant to climate change adaptation and can be used as a foundation for action?

The respondent answered that their respective Agencies bares the responsibility of providing leadership with technical assistance to pass tribal regulations to protect their health and environment.

7. What are the funding and technical resource need of the tribe as it relates to adaption?

The respondent answered "Housing development funding and building codes to address duel heated housing, energy-efficient housing, green energy, and home built to withstand tornadoes due to climate change. The technical resources to sustain the above-mentioned."

8. What aspects of the community or resources the tribe depends on are being affected or are likely to be negatively affected by climate change in the future?

The respondent answered, "The above-ground power lines, livestock, farming, and safe communities from the elements and the unknown due to climate change."

9. Which resources, assets, or species are particularly critical to the community (consider cultural value, traditional value, social value, economic value, and ecosystem value)?

The respondent answered "human capital and experience, our state culture will help us to continue to have faith, which is human resiliency. Economically/Ecosystem value we have land and aquifers."

10. Are there key people, experts, or partners who need to be brought in to adequately evaluate and address the resources or concerns identified? If yes, then who do you think these people should be? If no, why not?

The respondent answered "Yes. We have a Natural Resource Department/Discipline at our Community College. We have a Tribal Fish/Wildlife Department. These departments have special training and job duties that give them a perspective on climate change."

11. What sacred knowledge needs to be kept within the tribe and what information can be, or has been shared in either written or other formats?

The respondent answered, "The creator will provide sacred knowledge for our people forever."

12. Are there current management programs or plans that are already designed to work on or manage the identified concerns? What are some examples of these?

The respondent answered "SL Planning, Tribal Health, and 4077/JOBS. These programs provide services to address the needs of our people on an annual basis and develop plans to address historical concerns."

13. What changes to climate or environmental patterns have tribal members observed?

The respondent answered "The weather is changing. The weather is not predictable due to climate change. The late winter storms, the drought conditions in the summer the early freezing cold."

14. Are there indicator species (specific plants, animals, and materials) being impacted that are altering cultural traditions?

The respondent answered, "Yes, are berries and more animals entering the endangered species list."

15. What are some existing stressors in your tribe or community that climate change could make worse?

The respondent answered, "There are high traces of mercury in our fish from our lake, high traces of arsenic in our water, and drought conditions that will definitely affect our fire season."

16. Who or what will be affected if a given impact occurs? How many people? What types of infrastructure? What natural systems? These consequences might include impacts to operations, or ecological, social, cultural, and legal impacts.

The respondent answered "I believe a ripple effect will occur that will reach all of us. I really couldn't imagine the effects our water was not safe to drink".

17. What are the cultural, social, environmental, and psychological effects associated with the key concerns being affected (e.g., mental health effects of losing homes, loss of income and employment from the destruction of businesses; how do decreases in species affect food availability, economic revenues, and tribal culture)?

The respondent answered, "If our water was not safe to consume, we would not be able to live."

18. Are there any final comments you'd like to provide on the tribe and climate adaptation that we haven't discussed?

The respondent answered "We need to protect our aquifers from pollution getting into are drinking water. We need to start regulating lakeside homes. We need to start a water purification plant for our wastewater".

Section 5 – Limitations & Challenges

COVID-19:

The COVID-19 pandemic presented one of the chief issues implementing this study. Safety of the research team is first and foremost. The team opted to conduct the study entirely virtual in light of the COVID-19 pandemic. This also ensured that risk of potential or actual harm to participants from the accidental exposure or transmission of the COVID-19 virus was eliminated. Special consideration for the safety of the unique populations and tribal nations in this study factored into this decision as well. The rise of multiple virtual engagement and collaboration platforms during the onset of COVID-19 made the virtual and remote option a safer alternative.

Participant Recruitment:

Furthermore, the most prominent issue during this study became participant recruitment, especially among tribal and selected special populations even with the support of FEMA Region 8. There had been difficulty in obtaining participation from faith-based and tribal populations within FEMA Region 8. We had requested that FEMA Region 8 Tribal Liaison team support for this project from the onset and built that mechanism for tribal outreach into our approach and process. We specifically requested the FEMA Region 8 Tribal Liaison Team to connect our team and distribute the climate survey across the region and with tribal contacts. We recognized from the onset that for this project to be successful and have greater responses to the survey portion we required FEMA Region 8 to serve as a trusted partner, distributor of the survey and liaison to connect us with the communities it serves. This approach was built on the assumption that 1.FEMA Region 8 had established robust relationships and good working partnerships with the tribal nations in the region and 2. Recent studies focused on minority, immigrant, and other special populations involving COVID-19 utilizing champions, cultural navigators, and trusted liaisons worked successfully for participant recruitment. During this study, only 3 of 29 federally recognized tribes in FEMA Region 8 responded to the initial inquiry, and among those three only one fully participated. Our first assumption proved to be false and the findings from our project implementation challenge recommendations notate and seek to correct this critical deficiency. Tribal nations have unique perspectives on climate change and as such it is vital that they be included and participate in regional emergency management and climate adaptation activities. Given the significant and unique history of tribal disenfranchisement, connecting with tribal populations and FEMA's partnership with tribal nations is critical.

Project Team Challenges: Disasters & Family Loss

A direct example of climate change impacts and increasing disaster frequency, both project principals Mr. Simental and Dr. Bynum were evacuated briefly due to an outbreak of four wildfires fires burning on the same day in the Colorado Springs, CO area during this study. It is of great importance and significance to note that the Marshall Fire in Boulder, CO also occurred during the study period in which 991 homes and businesses were destroyed and 127 more were damaged on December 30th, 2021.[2] This incident has become one of the most destructive wildland fires in the state's history.

Additionally, both principals Mr. Simental and Dr. Bynum experienced family deaths during the project period that caused some delays. Sadly, our FEMA Region 8 Project Manager also experienced family deaths caused by COVID-19. These losses are significant and speaks to the severity of the COVID-19 pandemic and its gravest consequences. Climate change impacts are not limited to just natural disasters but also can influence incidence of disease by creating seasons or conditions ripe for vectors of transmission.

Every study has a number of challenges, despite these the Simental Industries team was able to overcome them and successfully complete the project. By staying in close communication with our FEMA Region 8 Project Manager throughout the study we were able to build trust and further request and be granted a 90-day extension to the project in response to the unforeseen circumstances. The additional time was used to gather additional information and survey respondent data for the study which in turn allowed the team to provide greater quality, insights and recommendations from the results of this project.

FEMA Region 8 – Internal Climate Change Adaptation Program Evaluation

One limitation of this project is that we were unable to conduct an internal evaluation of FEMA Region 8's policies, programs, and activities engaged in climate change adaptation. This is an important area of evaluation and is highly desirable for future projects to gain a more comprehensive picture and understanding of FEMA's processes. The outcomes of this type of evaluation is to identify ways in which FEMA can better posture itself with climate activities, outreach, and partnerships.

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[2] Prentzel, O., Gilbert, D., and Vo, T. (2022). Marshall fire officially becomes Colorado's most destructive, with 991 homes and businesses burned, officials confirm. https://coloradosun.com/2022/01/01/marshall-fire-snow-displaced-residents-power-outage/

Section 6 – Findings & Discussion

The concerns noted by survey respondents are in line with FEMA's current priorities in Region 8 with both FEMA (according to the Region 8 Planning Overview, 2020) and respondents concluding that mitigation of impacts and recovery from drought, wildfire and floods should be a priority for the region. These priorities and concerns reinforce that FEMA's recovery efforts are targeted and aligned with the concerns of the constituents of Region 8.

FEMA Region 8 has had 414 Major Disaster Declarations, 21 Emergency Declarations and 49 Fire Management Declarations between 2013 and 2019. Of particular interest is the fact that the region had 76 major fire incidents of which 49 resulted in a FMAG rate of 64%. The incidence of wildland fires in the Western US has increased and vegetation damage resulting from these has contributed to the increased incidents of flooding. This cyclic impact resonates deeply with both FEMA planners and the respondents. Given that even though the annualized frequency of these hazards is low as compared to tornadoes during this time frame, these events are a high impact in terms of both recovery costs, displacement, and psychological impacts due to property damage and increased cost of rebuilding increasing the vulnerability of the population.

The respondents also noted that cascading events are a major concern for the community. Resource depletion can have major impacts on community lifelines. Such impacts can in turn have a cascading influence on complex interdependencies thus hindering emergency operations, stabilization, and delaying community recovery. For example, Major wildland fires can lead to resource depletion. For example, wildland fires can impact energy needs due to their impact on the supply chain. Lacking the ability to resupply fuel can in turn impact emergency response and community evacuations. Such cascades are often seen during major events such as Hurricanes Katrina and Sandy.

The FEMA community lifelines program and toolkit provides an excellent tool for planners at state, local, and tribal levels of government as well as non-government partners. This allows for the assessment of needs for critical resources and allows for the development of contingencies to meet the needs of the community. Given that "resource depletion" is rated as one of the highest concerns by respondents, FEMA must increase awareness of the tools that are available to the whole community through the use of workshops and seminars. FEMA should also encourage cross-jurisdictional planning, especially when it relates to community lifelines. As often seen during a disaster and as seen during the COVID – 19 pandemic, multiple jurisdictions impacted by the same disaster often compete for the same limited set of

resources. For example, if a wildland fire occurs between the City of Billings and the Crow Reservation and impacts both simultaneously, limited resources such as fuel would need to be shared, the situation would be more dire if the I – 90 and the I – 94 corridors were impacted due to the fire and major supply chain corridors would be impacted.

Respondents also stated that limited finance was of concern during major disasters. FEMA should conduct a broader program on educating the whole community on the Public Assistance, Small Business Administration, and Individual Assistance programs. Financial concerns and knowing how to access federal assistance was also cited as a major concern by the International Association of Emergency Managers. In addition, FEMA could also consider front funding a disaster and making funds immediately available to State, local, and tribal agencies as well as other sub-applicants.

In addition to recovery, hazard mitigation is a major concern for respondents. FEMA does have a robust Hazard Mitigation assistance program that is available to several agencies within the whole community paradigm. These include four specific grants: Hazard Mitigation Assistance Program, Building Resilient Infrastructure and communities, Flood Mitigation Assistance, and HMGP Post Fire Assistance. An issue identified several times has been that there is a lack of awareness of the program or the application process. FEMA does have a YouTube channel that provides videos on competitive applications for Hazard Mitigation funds. However, the channel does not necessarily provide in-depth training on Hazard Mitigation, its relationship to emergency operations, and its impacts on community recovery. FEMA should consider a Hazard Mitigation-specific training curriculum that allows communities to directly engage in Hazard Mitigation much like Recovery.

Given that climate change is a driver for both wildland fires and drought, FEMA should undertake community education programs that focus on sustainability and mitigation. These could be community education programs around protecting homes from wildland fires by integrating defensible space design in high-fire danger areas, water conservation efforts, habitat restoration, or requiring sustainability planning as a part of access to FEMA grants and other funding opportunities.

The common climate change effect that is most concerning to Region 8 respondents is increased illness and the common challenge preventing them from adapting to climate change is finances. These communities may require more help in accessing funds, education, and resources to alleviate their challenges and concerns, particularly in rural areas.

Section 7 – Recommendations

This section details the recommendations of this project stemming from the findings, challenges and limitation sections, and further recommendations to support and address regional climate change adaptation activities in an equitable approach.

- Fund an expansion of this project, focused on in-person data collection activities with the 29-federally recognized tribes within FEMA Region 8.
- Future evaluation studies should include action-research and systems learning approaches looking at FEMA Region 8 processes, policies, and programs engaged in climate change adaptation activities.
- Establish and create various collaborative forums, symposiums, competitions, research, and engagement opportunities with various public, private, academic, non-profit groups and individuals including students, minorities, immigrants and disenfranchised populations including tribal nations to partner on climate change adaptation activities.
- Establish partnerships to facilitate climate adaptation communication to a variety of audiences including, but not limited to individuals, faith-based organizations, for-profit enterprises, state, local and tribal governments.
- Provide equitable access and means to gather perspectives, lived experiences and data from various populations such as students, minorities, immigrants and disenfranchised populations including tribal nations to identify the full extent of impacts, hazards and risks of climate change upon the residents of FEMA Region 8.
- Develop outreach strategies that are equitable and accessible to a wide variety of audiences, including those with disabilities, limited English proficiency, varying cultural backgrounds, historically underserved populations, socially vulnerable areas.
  - Identify community champions, cultural navigators and establish robust partnerships to communicate and engage these populations in climate change adaptation activities.
- Establish robust programs and partnerships with tribal nations across FEMA Region 8 to identify specific aspects of tribal culture and tribal government that that will be impacted by climate change and proposed solutions.
  - One model is the U.S. Forest Service Liaison Partnership Coordinator/Community Engagement program where liaisons live and support communities across a region, both in rural and urban areas to better engage communities in emergency preparedness, mitigation and partnership activities.

- Creation of regular tribal nation engagement activities, calls, forums, collaborations, research initiatives, and partnerships with FEMA Region 8.
- FEMA Region 8 is recommended to develop student and youth programs to better engage these groups with emergency preparedness and mitigation activities. This includes K-12 students and higher education communities.
- FEMA Region 8 should continue to partner with and engage in various thought leadership activities with colleges, universities, professors, adjuncts, research teams, and independent researchers across region 8.

Section 8 – Opportunities

Tribal Nation Climate Change Adaptation Collaboration

Due to the widespread availability of vaccination and therapeutics for COVID-19, and the lifting of a majority of COVID-19 restrictions including travel and in-person visitation across the United States and many tribal nations, it is strongly recommended that this study be repeated focusing on gathering tribal nation perspectives from the 29 federally-recognized tribal nations across FEMA Region 8. We recommend that FEMA Region 8 provide another round of funding and travel for in-person visits to meet with tribal leadership, conduct tribal interviews as originally envisioned in this study and further disseminate the survey in-person to tribal members. This project expansion would be accomplished in-partnership with FEMA Region 8 Tribal Liaisons. The ability to gather information and data from the tribes in-person would provide a more equitable means for tribes to participate and collaborate in this project and provide vital perspectives on climate change adaptation.

FEMA Region 8 Partnerships, Innovation, & Collaboration Activities

It is recommended that FEMA Region 8 continue to fund a variety of studies and projects exclusively within the region to harness the thought leadership, innovation, and expertise from the academic, industry, public and private sectors withing FEMA Region 8. Micro grants, research projects, research topic white paper solicitations and presentations, prize competitions, problem solving workshops, collaborative forums, symposiums, and local partnership and collaboration activities are strongly encouraged as a means to engage diverse groups within the region. Activities should be designed to incorporate and facilitate cross-cutting partnerships between various groups, populations, academia, students, youth, and industry with the emergency management community.

Establish FEMA Region 8 – Climate Resilience Center of Excellence

To better coordinate regional resilience and climate change thought leadership cultivation, climate change adaption innovation, and multi-sector, interdisciplinary partnerships, the establishment of a FEMA funded, University and Private-industry lead Center of Excellence should be established to allow for multiple entities, colleges, universities, researchers, interdisciplinary research teams, private sector entities, emergency mangers, individuals, students, and FEMA Region 8 to synergize efforts along key lines of research and inquiry. There are a number of models and means to accomplishing this including the creation of a non-profit organization and advisory board to serve as the executor of the center of excellence as an example. Another model is a university housed/hosted Center of Excellence. Membership should be open and non-restricted to invite wide participation and equitable access to collaborate with FEMA Region 8 on climate adaptation activities across the West.

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Appendix A: Special Population Definitions

These special populations were selected by FEMA Region 8 for surveying: **(These populations will have the opportunities to self-identify which group they identify as on the survey. No identifying or specific information regarding any status/condition/group was collected).**

Special Populations:

o   Refugees

Refugee - Any person who is outside his or her country of nationality who is unable or unwilling to return to that country because of persecution or a well-founded fear of persecution. Persecution or the fear thereof must be based on the alien's race, religion, nationality, membership in a particular social group, or political opinion. People with no nationality must generally be outside their country of last habitual residence to qualify as a refugee. Refugees are subject to ceilings by geographic area set annually by the President in consultation with Congress and are eligible to adjust to lawful permanent resident status after one year of continuous presence in the United States.

Reference: DHS. (n.d.). Definition of Terms. https://www.dhs.gov/immigration-statistics/data-standards-and-definitions/definition-terms#18

o   Immigrants/Migrants

Permanent Resident Alien - An alien admitted to the United States as a lawful permanent resident. Permanent residents are also commonly referred to as immigrants; however, the Immigration and Nationality Act (INA) broadly defines an immigrant as any alien in the United States, except one legally admitted under specific nonimmigrant categories (INA section 101(a)(15)). An illegal alien who entered the United States without inspection, for example, would be strictly defined as an immigrant under the INA but is not a permanent resident alien. Lawful permanent residents are legally accorded the privilege of residing permanently in the United States. They may be issued immigrant visas by the Department of State overseas or adjusted to permanent resident status by the Department of Homeland Security in the United States.

Reference: DHS. (n.d.). Definition of Terms. https://www.dhs.gov/immigration-statistics/data-standards-and-definitions/definition-terms#8

o   Access and functional needs

People with access and functional needs includes individuals who need assistance due to any condition (temporary or permanent) that limits their ability to act. To have access and functional needs does not require that the individual have any kind of diagnosis or specific evaluation.

Reference: FEMA. (2021). FEMA Reaches Out to People with Disabilities, Access and Functional Need. https://www.fema.gov/press-release/20210318/fema-reaches-out-people-disabilities-access-and-functional-need

o   Disabilities

A disability is any condition of the body or mind (impairment) that makes it more difficult for the person with the condition to do certain activities (activity limitation) and interact with the world around them (participation restrictions).

Reference: CDC. (2020). Disability and Health Overview, Impairments, Activity Limitations, and Participation Restrictions. https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html

Appendix B: Participant Outreach

Faith-Based Outreach

Colorado Faith Based Organization	N = 10
Utah Faith Based Organization	N = 10
Wyoming Faith Based Organization	N = 9
North Dakota Faith Based Organization	N = 10
South Dakota Faith Based Organization	N = 11
Montana Faith Based Organization	N = 10
Total	**60**

Emergency Management Outreach

Colorado Emergency Managers	N = 130
Utah Emergency Managers	N = 6
Wyoming Emergency Managers	N = 21
North Dakota Emergency Managers	N = 18
South Dakota Emergency Managers	N = 1
Montana Emergency Managers	N = 32
Total	**208**

Tribal Organization Outreach

All States	N = 21
Total * *Does not include FEMA Region 8 Liaison Contacts*	**21**

Colleges & University's

North Dakota	N = 7
South Dakota	N = 6
Montana	N = 10
Wyoming	N = 2
Colorado	N = 8
Utah	N = 1
Total	**34**

VOAD Outreach

VOADs (all states)	**N = 6**
Total	**N = 6**

LinkedIn Outreach

LinkedIn Groups	**N = 15**
Total	**N = 15**

**Immigrant, Refugee, and
Minority Organization Outreach**

All States	**N = 24**
Total	**N = 24**

All Outreach Groups = 368

Appendix C: Acronyms

Acronyms

SHIELD Initiative - Strategic Homeland Security Enterprise Research Initiative. The initiative is a voluntary research collaborative.

CBA - Community-Based Adaptation

BRACE – Building Resilience Against Climate Effects

CDC – Center for Disease Control

CRSCI – Climate-Ready States and Cities Initiative

OCCRI – Oregon Climate Change Research Institute

CSE – Coping Self-Efficacy

VOADs – Volunteer Organizations Assisting in Disasters

IRB - Institutional Review Boards

CITI - - Collaborative Institutional Training Initiative