FROM THE CLASSROOM TO THE FARM: A COLLABORATIVE ACADEMIC-PRACTITIONER DISASTER RESILIENCE PROGRAM

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ABSTRACT

An interdisciplinary team collaborated on a farm risk assessment activity initially learned in the classroom and then adapted to guide farmers and agricultural advisors. Activities built for an academic classroom can be shared with practitioners as a pathway to prepare for shifting climate risks. This is important for multiple reasons. First, these engagement pathways, built using resource capacity from higher education, are shared with practitioners who may have limited access to tools or bandwidth to develop risk assessment activities. Second, activities intended to drive adaptation to reduce vulnerability to climate risk need to be tested and used in practice. Using these tools in practice presses the theoretical concept, allowing the tools to evolve and improve. Finally, risk assessment activities provide a space for practitioners to connect, share ideas, and develop new strategies to address risk and manage change.

Keywords: *disaster, resilience, agriculture, risk, adaptation, farmers*

Climate change will likely increase the frequency and intensity of extreme weather events and, as a result, cause more severe disasters (Blaikie et al., 2014; Dobrowski et al., 2021; Intergovernmental Panel on Climate Change, 2022; Kemp et al., 2023; Stevens et al., 2023). Practitioners, whose lives and livelihoods are directly impacted by changes in environmental systems, are trying to manage the impact of these climate system shifts. The farming community is at the forefront of many of these disasters, and some struggle to anticipate these changes and plan for future disaster risks (Ahmed & Ahmad, 2023; Hayden et al., 2024; Sivakumar, 2021). One step to investing in resilience is building pathways for evaluating risk and informing climate adaptation, recovery, and mitigation strategies.

Cornell University, the University of Maine, the United States Department of Agriculture Northeast, Midwest, and Northern Forest Climate Hubs (USDA NECH), the Rutgers Climate Institute, the University of Vermont, American Farmland Trust, the USDA National Agroforestry Center, the Maine Organic Farmers and Gardeners Association, and other institutional partners worked together to build the Climate Adaptation and Mitigation Fellowship (CAMF). CAMF is a two-year program built to help farmers adapt to climate change and prepare for potential disasters (Climate Adaptation and Mitigation Fellowship, n.d.). The target cohort of the current CAMF program is farmers and agricultural advisors in the Midwest and Northeast regions of the United States. This adult education pathway bridges the gap between academia (both research and education) and practitioner communities (including farmers). Peer-to-peer and cohort-based, the program aims to build climate resilience on farms by empowering farmers and service providers to learn about climate change together, to create farm-specific climate adaptation and mitigation plans. Farmers and agricultural advisors participate in the learning and planning process in pairs, and participants gain social connectivity by engaging with their larger cohort group as they learn together.

The CAMF program was designed to help farmers and agricultural advisors address risks associated with a changing climate. One part of this multi-year program is a two-hour disaster preparedness and response module, which includes an engaged disaster risk matrix activity. This article discusses how the disaster risk matrix activity was taught in the classroom and then brought to the module so that practitioners could use it in daily activities. The primary collaborators on this module of the CAMF program were Cornell University, the USDA Northeast Climate Hub (NECH), and the University of Maine.

The overall goal of the CAMF program was to develop a tool for farmers to help them prepare for and respond to climate disasters. This program meets the mission of the USDA NECH, which is developing and delivering science-based, region-specific information to natural resource managers, including farmers, to enable climate-informed decision-making. Among 20 staff members and affiliates at the NECH, some are federal employees, and others are based at affiliated institutions. The University of Maine, through its School of Food and Agriculture in its College of Earth, Life, and Health Sciences, houses the State of Maine's land-, sea-, and space-grant programs and hosts over one hundred degree programs across its undergraduate and graduate colleges. Cornell University is New York State's land-grant institution, with 14 colleges and schools. Within Cornell, this project was a collaboration between the Brooks School of Public Policy and the College of Agricultural and Life Sciences' School of Integrative Plant Science.

One place where innovative tools are built and tested is in academia, where classrooms are a space to learn new methods to manage a changing environment. Also, institutes of higher education have a relatively high capacity to invest time, resources, and risk into innovation. A graduate-level Cornell University course, *Disasters, Vulnerability, and Resilience* is geared toward public policy, public health, public administration, and communications. It teaches

emerging leaders to develop policies that incorporate disaster planning into their respective fields. There are five learning objectives:

1. Describe, examine, and explain key trends in disaster prevention and recovery.
2. Identify the roles that different institutions play in disaster prevention and recovery.
3. Identify and evaluate obstacles to effective disaster prevention, recovery, and adaptation.
4. Examine key political, financial, educational, and technical questions that need resolution.
5. Describe and analyze innovative policy solutions to prepare for, adapt to, and mitigate disasters.

The course's disaster risk matrix activity cumulatively addresses these learning objectives. This activity identifies risk and builds resilience and adaptation-focused strategies to inform policy development. The CAMF program was modified from the classroom to be used as a tool for practitioners, such as farmers and agricultural advisors. The goal of implementing the activity was to identify farm assets, resources, on-farm hazards, and risks that can inform planning and decision-making; it allowed participants to assess the availability, accessibility, and quality of farm assets before, during, and after natural disasters.

Bridging academic resources with practitioners is key to building community resilience (Brenner, 2023). To be most effective, activities taught in the university classroom must be tested by practitioners and refined to allow learning to evolve. The lessons learned from applying concepts from the classroom to farm practices may serve as a foundation for future academic-practitioner partnerships, leading to stronger classroom experiences and more resilient farms. Modifying the disaster risk matrix activity from Cornell's Disasters, Vulnerability, and Resilience course allowed CAMF to build a connection between disaster planning research and practice; this paper describes the activity used in the classroom and its application for practitioners on the farm.

THE CLASSROOM

To meet the Disasters, Vulnerability, and Resilience course objectives, classroom activities include learning concepts of resilience, adaptive capacity, and vulnerability as defined by the Intergovernmental Panel on Climate Change (2022). The goal is to couple these concepts with the many toolkits that are available to communities for understanding their disaster risk (CARE International, 2023; CARE International, n.d.; Agency for Toxic Substances and Disease Registry, 2024; Freitag et al., 2014; Resilience Alliance, 2010; U.S. Climate Resilience Toolkit, n.d.). To engage with the challenges communities face, students were tasked with identifying localized disaster risks and articulating how these risks could damage property, disrupt social services, harm the environment, have disproportionate impacts on social cohorts, and threaten human life.

A disaster risk matrix activity served as an in-class exercise built from these concepts and resources. Because Disasters, Vulnerability, and Resilience is a graduate-level course, most

students have prior community-based work experience from which to draw. In teams, students selected a place they had experience with, identified its resources and assets (e.g., sanitation, soil, water quality and quantity, public resources), and brainstormed potential disaster events (e.g., flooding, drought, wildfire, extreme weather events). The students then practiced collaboratively ranking how at-risk each resource or asset was on a scale of 1 to 3, with 3 meaning the most at risk. This classroom activity was modified for farmers and agricultural advisors participating in the CAMF program.

THE FARM

As part of the CAMF program, farmers engaged with a Disaster Preparedness and Response module tailored to an agricultural practitioner audience. The two-hour module was divided into five sections—risk assessment, prevention, preparedness, response, and recovery—and was delivered to CAMF participants as part of an eight-week workshop on climate change, climate impacts, and adaptation and mitigation strategies. It was presented three times to three different CAMF cohorts in an online setting in March 2024. These cohorts included 22 vegetable growers and agricultural advisors who serve the vegetable-grower community (including personnel from university extension programs, federal and state agencies, and nonprofits), 31 diversified agriculture and agroforestry producers and advisors, and 10 dairy farmers and advisors—63 students total. The participants were from 13 states (Pennsylvania, New York, Vermont, Maine, Massachusetts, New Jersey, Connecticut, Ohio, Maryland, Illinois, Michigan, Wisconsin, Iowa). The disaster risk matrix activity was one activity within this module.

CAMF participants were asked to complete an on-farm disaster risk matrix activity modified from the classroom. The purpose of this activity was for farmers and agriculture advisors to practice identifying farm assets/resources and hazards that will impact the availability and quality of those assets. Farmers and agricultural advisors went into Zoom breakout rooms of four people and rated the perceived level of risk based on an asset/resource and disaster/hazard pairing. Figure 1 shows an example of the disaster risk matrix activity from the vegetable producer cohort on March 8, 2024. Farmers and agricultural advisors identified their agricultural assets and resources in the columns (e.g., livestock, roads, crops), and in the rows, they identified potential natural disasters (e.g., flooding, drought, false spring).

Climate change is increasing the risk of on-farm disasters, which can induce crop loss, diminish livestock health, lead to infrastructure damage, and, in extreme cases, cause the loss of human life (Bolster et al., 2023; Godde et al., 2021). Few resources and tools have been created for farmers to address these climate-enhanced on-farm risks. Post-disaster, rural communities, and farmers specifically, may be unable to access emergency management services or networks and may experience long delays in accessing recovery funding (Dockins & Lingerfelt, 2024; Jerolleman, 2020).

Group Name: Carrot

Assets ↓

Hazards→	Extreme Cold/Heavy Snow	Flooding	Drought	Late/Early Frost (False Spring)	Heatwave	Deluge	High Wind Storms/ Tornadoes	Wildfires
Livestock	4	4	4	2	5	3	4	5
Roads	4	5	2	2	2	5	4	3
Barns/ Buildings	3	5	2	2	2	2	5	5
Tractors/ Implements	4	3	1	1	4	3	5	5
Perennials	3	5	5	5	5	5	5	5
People	5	5	5	5	5	5	5	5
Annual Crops	5	5	5	5	5	5	5	5

Figure 1. Example Disaster Risk Matrix Activity

Traditionally, expert-based top-down programs have dominated agricultural outreach and education programming. However, contemporary outreach programs that target adult learners are often informed by pedagogical frameworks such as adult learning educational theory (Mezirow, 1981) and andragogy (Merriam, 2001) to engage a farmer and agricultural advisor audience better (Schattman et al., 2019). These theories underlie the development of CAMF, which has been a collaborative effort between researchers, farmers, faculty and extension specialists, and federal and state agency scientists. These interdisciplinary teams focus on farmer experiences and educational and practical needs while developing curricula and program implementation. By bringing an educational activity designed by researchers to a practitioner audience (the farmers), the authors underscore the importance of using pedagogically grounded resources in the field.

LESSONS LEARNED

The team made minor operational updates to improve the activity between the classroom and this engaged exercise. One minor but impactful modification was changing the ranking from a 3-point to a 5-point scale of risk, with 5 being the greatest perceived risk. In comparison to the disaster risk matrix activity developed for graduate students, it was evident that the farmer matrices needed to be more individualized, more specific, and less community-based. Farmers identified natural disaster risks specific to their farms, shifting the activity's scale to a particular piece of land and an individual business.

Another learning layer for students was achieved through intentionally developing cohorts for breakout groups. It was important to ensure collaborative groups had enough in common to have an iterative conversation but included enough differences to learn from each other about shifting environmental systems. It was also important for participant groups to work as independently as

possible so that they felt empowered to replicate the activity outside the formal workshop. One simple yet effective means of empowerment was to ask each group of four to assign roles such as notetaker or timekeeper.

Through these processes, the authors found that coupling academic and practitioner-focused disaster resilience planning can be mutually beneficial. Research-based educational activities can be tested in the classroom and verified by applying them in practitioner training, showing a transdisciplinary pathway to empowering the farming community (Kupietz et al., 2023). Further, the feedback loop created by using theory-based teaching resources in the field and gathering feedback is critical to improving and informing resources studied in a classroom, which can improve resources provided to practitioners. This allows stakeholders to fill knowledge gaps and create more equitable access to disaster planning research, education, planning, and toolkits. When reviewed collaboratively by both academics and practitioners (farmers), pedagogically grounded resources for multiple audiences are efficient and help train the next generation of professionals while also confirming that pedagogical tools are helpful in the field.

By taking this paired approach, we hope to provide a tool that farmers and community climate leaders can use to identify risks and assets effectively, invest in strategies to prevent disasters, develop preparedness plans, respond quickly and calmly during disasters, and recover after disasters. Engaging and educating future disaster and climate leaders (such as graduate students in the Disasters, Vulnerability, and Resilience course) as well as farmers working to mitigate and adapt to climate change (such as those participating in CAMF) can be done by building interactive risk identification activities that help learners examine their environment with qualitative peer discussion and a quantitative matrix system.

Participants in the CAMF session were invited to submit feedback on the session through a short survey. Of the 20 participants who completed the survey and evaluated the Disaster Preparedness and Response module, only three considered themselves very knowledgeable prior to the session (seven considered themselves slightly knowledgeable, 10 moderately knowledgeable, and one extremely knowledgeable). When asked how important they felt the topic was, the average importance ranking (out of 5) for the group was 3.66. Although these findings are anecdotal, they still have value. This demonstrates a need for and interest in disaster preparedness education among farmers.

CONCLUSION

This example of collaboration between researchers and practitioners demonstrated how disaster and resilience planning activities can be adapted to teach different learners about the relationship between assets, resources, natural disasters, and risk. It also demonstrated the benefits of sharing activities learned in the classroom with practitioners to continue improving disaster planning resources for communities on the front lines of climate-related disasters. It provides practitioners with much-needed capacity and innovation from relatively higher-capacity institutes of higher education. It also provides a space for activities to be tested in practice and continuously

improved. An additional benefit for community members and practitioners is the opportunity provided by intentional networking spaces. Activities designed in the classroom and applied in practice can be a launchpad for engaging with multiple audiences about natural disaster planning and, ultimately, building resilience for vulnerable communities.

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