

Enhancing Vulnerable Groups' Resilience to Climate Change: Lessons Learned from a Case Study with Older Adults

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Abstract

Certain groups are more vulnerable to climate change than others and will likely feel its effects more severely. These groups include children, older adults, refugees, minoritized racial and ethnic groups, and people living in poverty. To safeguard vulnerable groups, their knowledge and perspectives need to be integrated into climate change adaptation planning. Institutions of higher education have many resources to contribute to this effort. To inform and promote engaged scholarship focusing on adaptation planning in collaboration with vulnerable groups, this research presents a case study evaluation of a project conducted by researchers at Antioch University New England with the older-adult community of Bridgeport, Connecticut. The evaluation explores attributes of the project that contributed to both positive outcomes and challenges. Key themes include the value of developing a primary partnership with a local organization, fostering an accessible and inclusive process, connecting subject matter with participants' concerns, using an iterative process to build capacity, collaborating with multiple other local organizations, recognizing ongoing community efforts, and generating initial actions. This evaluation also explores potential transferability to other contexts.

Certain groups in society are especially vulnerable to climate change and will likely suffer greater hardships under an altered climate (Ebi et al., 2018). A group's degree of vulnerability is determined by the climate changes to which it is exposed, its sensitivity to those changes, and its capacity to adapt (Intergovernmental Panel on Climate Change [IPCC], 2007). Sensitivity and adaptive capacity depend on economic, social, cultural, institutional, and governance factors (IPCC, 2007). While vulnerability to climate change varies across regions, countries, and communities, it also varies within communities (Morello-Frosch et al., 2009). Those most vulnerable to climate change within a community will often belong to groups with specific characteristics that increase their sensitivity or reduce their adaptive capacity; in some contexts, the factors that make climate change so threatening for these groups are unlikely to apply equally across the larger community (IPCC, 2007). Examples of vulnerable groups include children, older adults, refugees, minoritized racial and ethnic groups, and people living in poverty (IPCC, 2014).

Because these groups face greater risks associated with climate change and have less capacity to protect themselves, it is essential for the communities and societies in which they live to undertake adaptation to promote their safety

(Lynn et al., 2011). While large-scale adaptation efforts at regional, national, and international levels are needed to set agendas and promote the safety of vulnerable groups writ large, local-level efforts are also needed to tailor adaptation responses to site-specific conditions affecting vulnerable groups within particular communities (IPCC, 2014).

It is important to consult the knowledge and perspectives of vulnerable-group members when developing local-level adaptation strategies that are intended to effectively safeguard these groups. Taking into account the groups' understanding of their own vulnerability can help planners develop informed strategies based on a more complete understanding of the given context (Jennings, 2009). Further, incorporating the values and priorities of vulnerable-group members helps planners develop culturally acceptable strategies that meet the groups' needs (Collins & Ison, 2009). Research has shown that facilitating public engagement in local-level adaptation planning is an effective way to integrate local knowledge, values, and priorities into the resultant plans (Albert et al., 2012; Cloutier & Joerin, 2012; Gero et al., 2011). In this way, participatory adaptation planning holds promise for giving voice to vulnerable groups.

Often, however, vulnerable groups may constitute only one or a few of many voices brought together in a community-wide planning process

(for examples see Albert et al., 2012; Frazier et al., 2010; Snover et al., 2007). Simply incorporating vulnerable groups into these larger proceedings may be an insufficient strategy for representing their interests at the planning table. Community-wide participatory planning can favor commonly held interests while marginalizing interests and concerns held by a minority of community members, likely including the concerns held by vulnerable groups (Kothari, 2001). Participatory planning has also been shown to result in outcomes that favor those with greater power and privilege to the disadvantage of those with less (Agarwal, 1997; Jennings, 2009; Strachan & Peters, 1997). Marginalized status, competing pressures, a lack of resources, and a lack of formal education can all contribute to limiting the voices of vulnerable groups in the participatory process (Kothari, 2001).

Practitioners in the broader field of participatory planning have addressed these challenges by holding separate planning meetings with members of specific vulnerable or marginalized groups (Figueiredo & Perkins, 2013; Guijt et al., 1998). These focused meetings help group members develop their understanding of the issue at hand and explore their own needs, thereby enhancing their voice in larger community-wide processes. In the context of climate change adaptation planning, holding separate meetings or initiating a separate planning process with a specific group of vulnerable community members could present opportunities for participants to learn about predicted climate changes and the risks they pose, develop their own understanding of their vulnerability to those risks, and design their own adaptation recommendations to enhance their climate resilience. Group members could then bring these recommendations to the larger community to advocate for their needs.

Developing and executing such dedicated processes, however, takes time and resources that municipalities and other organizations undertaking local-level adaptation may not have. For example, in a survey of people working on local-level adaptation across the United States, respondents expressed that they needed assistance identifying vulnerable populations, engaging stakeholders, identifying the values and priorities of these groups, and facilitating planning processes (Abrash Walton et al., 2016).

Involving institutions of higher education can help planners meet these needs and take on dedicated adaptation efforts with vulnerable groups. One compelling way these institutions

can contribute is through engaged scholarship, an approach to education that seeks to address major social and environmental issues through academic and community collaboration (Byrne, 1998). Case studies in Minnesota and New Hampshire have shown that universities can make important contributions to collaborative local-level adaptation planning by supporting stakeholder engagement and conducting applied research (Gruber et al., 2017). Engaged scholarship in adaptation planning can also provide applied research opportunities to faculty, offer real-world experience to students, and strengthen town–gown relationships and university reputations (Gruber et al., 2017). Despite the potential benefits of such an arrangement, examples and research are scarce on the subject of how engaged scholarship can support efforts to meaningfully include vulnerable groups in local-level adaptation planning.

The Climate Resilient Seniors Project

The Climate Resilient Seniors project, which was conducted in Bridgeport, Connecticut, from 2014–2015, offers one example of engaged scholarship supporting adaptation planning conducted in partnership with a vulnerable group. The project was a collaboration between researchers at Antioch University New England, the city of Bridgeport, and the older adults of Bridgeport. Older adults—individuals age 65 and older—are especially vulnerable to climate change, and many of Bridgeport’s older adults faced challenges, as we described above, that could potentially limit their participation in a community-wide process of climate change adaptation planning (Ebi et al., 2018; U.S. Census Bureau, 2012). Climate Resilient Seniors sought to support the voices of Bridgeport’s community of older adults through a series of participatory adaptation planning meetings. The project’s overarching goals were to provide a venue for older adults to voice their concerns about climate change and to help them develop their adaptation recommendations.

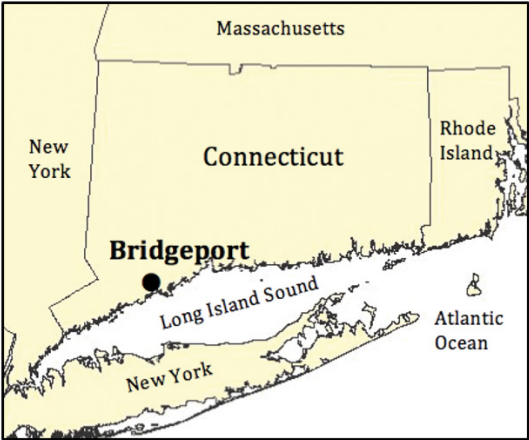
The city of Bridgeport, located along Long Island Sound in southwestern Connecticut, was chosen as the project site for multiple reasons (Figure 1). It has a large and socioeconomically diverse population of older adults, with more than 16,000 residents over 65 years of age (U.S. Census Bureau, 2010). Additionally, many of the city’s older adults are members of demographic groups that are especially vulnerable to climate change; many live on low incomes, have disabilities, have not had much formal education, or identify as

members of racial and/or ethnic minority groups (U.S. Census Bureau, 2012). Moreover, predicted climate changes—including more frequent heat waves, flooding, and storms along with heightened levels of air pollution and allergens—served as an effective basis for undertaking significant adaptation planning (Dupigny-Giroux et al., 2018).

The project meetings were open to any older adults in Bridgeport who wished to attend, and they were strategically promoted throughout the city by the Department on Aging (DOA) to attract a diverse group of community members. We held the meetings at the main senior center in Bridgeport because it is centrally located, can be reached by public transportation, and is a comfortable location for many older adults. To further enhance accessibility, meetings were held late in the morning on days when there were few conflicting events at the senior center. A total of 55 older adults participated in the project meetings.

During the meetings, participants worked through a process that synthesized a community-based action research (CBAR) protocol with an adaptation planning model (see Table 1, derived from National Research Council, 2010, and Stringer, 2013). The spirit and principles of CBAR guided the project, with special emphasis

Figure 1. Map Showing the Location of Bridgeport, Connecticut



Base map prepared by the State of Connecticut Department of Energy and Environmental Protection in 2013.

on cooperation and equity, examining issues in context, incorporating multiple ways of knowing, and fostering action to address issues of concern to the participants (Stringer, 2013). Staff from the DOA and Office of Emergency Management and Homeland Security (OEMHS) attended and supported the meetings.

Table 1. Project Process and Associated Steps in the Stringer (2013) and NRC (2010) Models

Steps in Project Process	Associated Step in Stringer CBAR Model	Associated Step in NRC Adaptation Planning Model
1. Establish a relationship between researchers and older-adult community.	1. Establish a relationship between researcher and stakeholder group.	
2. Determine the relevant climate stressors.	2. Build a picture of the issue under investigation.	1. Identify current and future climate changes relevant to the system.
3. Gather data on the vulnerability of the older-adult community to those stressors.		2. Assess the vulnerabilities and risk to the system.
4. Analyze the vulnerability data and determine the most significant causes of vulnerability to address.	3. Interpret and analyze the issue.	
5. Develop and prioritize climate change adaptation plans.	4. Take action.	3. Develop an adaptation strategy using risk-based prioritization schemes.
6. Share adaptation plans with the municipality to look for opportunities for collaboration and implementation.		4. Identify opportunities for co-benefits and synergies across sectors.
7. Conduct evaluation and draft a formal report of the research.	5. Report.	

The lead researcher from Antioch University New England facilitated the first two vulnerability assessment meetings. During these meetings, participants discussed their current vulnerability to climate stressors and then considered the implications of climate change. They highlighted a variety of individual-level characteristics, including economic limitations, social isolation, chronic health conditions, and physical and mental impairments, that contribute to older adults' vulnerability. They also described a variety of contextual factors that could exacerbate or mitigate the effects of these individual-level characteristics. These contextual factors included the adequacy of emergency preparedness measures, transportation resources, and resources to aid in coping and recovery associated with climate stressors. Additionally, participants described how climate change could easily overwhelm some older adults' limited adaptive capacity.

Based on these discussions, participants collaborated with the lead researcher to design a survey to distribute among other older adults in Bridgeport. Using a five point scale, the survey asked respondents to rank their level of concern over various factors contributing to their vulnerability to climate change. Municipal, community, and faith-based organizations distributed the surveys in a targeted effort to reach a diverse group of Bridgeport's older adults. Through this survey, 164 respondents indicated a broad range of concerns related to preparing for, coping with, and recovering from climate-related stressors.

Over the course of two subsequent adaptation planning meetings facilitated by the lead researcher, project participants used the survey results to develop and prioritize adaptation strategies to enhance older adults' climate resilience. By the conclusion of the project, participants had developed six adaptation goals and seven adaptation recommendations that focused on encouraging preparedness, promoting warning mechanisms, increasing transportation resources, improving shelters, and enhancing the accessibility of resources to aid in coping and recovery. As part of a prioritization process, participants indicated that they believed all of their recommendations were likely to be effective and feasible to implement.

A summative evaluation involving interview and survey feedback from older adult project participants and city officials showed that the project achieved multiple benefits. Participants

indicated that the adaptation recommendations resulting from the project reflected the needs and concerns of older adults in Bridgeport and, if put into effect, would make them safer. The project also led to action: The city is working on implementing several of the program's recommendations. Participants indicated that the project increased their awareness of climate risks, raised their knowledge about how to protect themselves, and increased their ability to advocate for their needs. Additionally, city staff indicated that the project increased their awareness of the risks that climate change poses for older adults and improved communication among their agencies on these issues.

The project's approach and results are described in greater detail in Rhoades et al. (2018, 2019). This paper presents the results of a case study evaluation of the project and endeavors to draw insights from the participatory adaptation planning process itself. The project is worth evaluating due to its unique and successful approach to including older adults in participatory climate change adaptation planning. The purpose of this paper is to inform and encourage future engaged scholarship and collaborative climate change adaptation planning between institutions of higher education, communities, and vulnerable groups.

Methods

To gain insight into how institutions of higher education can collaborate on participatory adaptation planning to protect older adults, we conducted a case study evaluation at the close of the Climate Resilient Seniors project. The evaluation focused on two primary questions:

- What aspects of the project contributed to any beneficial outcomes?
- What were the primary challenges that made the project difficult and how were they addressed?

While we submitted an institutional review board (IRB) application, the IRB determined that the study fell under the definition of program evaluation and so did not constitute the kind of research with human subjects that falls within its purview. Despite this, we took care to follow ethical standards for human subjects research.

We collected qualitative data from a number of sources in an effort to gather multiple perspectives on the project's processes and outcomes (Davidson, 2005; Yin, 2009). After the project, the older-adult participants took part in semistructured focus group interviews (Patton, 1987). The focus groups were open to any older adult who participated in any aspect of the Climate Resilient Seniors project. Focus group attendees were asked the two primary questions noted above as well as additional questions that dug deeper into key topics. During the interviews, a concerted effort was made to hear from a broad range of participating older adults. In addition, semistructured interviews were conducted with city staff from the DOA and the OEMHS who had been involved in the program (Patton, 1987).

To highlight the perspectives of the interviewees, open coding was used to analyze the interview data (Strauss & Corbin, 1998). To capture a range of viewpoints, special attention was paid to divergent perspectives and minority views among the groups (Stringer, 2013). To add additional perspective on the project, the lead researcher noted observations during project meetings (Yin, 2009). Based on themes that emerged in the interviews and in participant observations, findings were organized into overarching categories focusing on the primary research questions. Throughout, an effort was made to highlight perspectives held in common by the various participants and partners as well as divergent perspectives. The older-adult participants and participating city staff then reviewed these categories and their related descriptions, and their feedback was incorporated into a final draft.

Results

Thirty-five older adults participated in the semistructured focus group interviews. Two staff members from the DOA and one staff member from the OEMHS participated in the semistructured interviews. No participants dropped out after initial recruitment. Based on the interview responses and participant observation, 10 major themes emerged, incorporating both the major challenges faced by the project and the approaches that contributed to the project's beneficial outcomes (Table 2). In order to protect the anonymity of the participants, respondents' names have been replaced with pseudonyms.

We now explore these themes in turn, highlighting the perspectives of the older adults and city staff and the beneficial approaches and challenges associated with each theme.

Develop a Primary Partnership With a Local Organization Trusted by the Target Participants

"You need to have a good rapport with the seniors," suggested Steve, a DOA staff member. Older-adult participants and staff from the DOA both commented that it was important for the researchers from Antioch University New England to partner with the DOA to help lead the project because of the department's strong ongoing relationship with Bridgeport's community of older adults. The DOA knew when, where, and how to arrange the meetings and had the ability to encourage participation among the community. As Ida, an older-adult participant, commented, "I trust the senior center, so when they asked me to come, I came." The DOA also had the needed experience working with older adults to effectively facilitate the

Table 2. Themes from the Climate Resilient Seniors Project Incorporating the Major Challenges Faced by the Project and Approaches that Contributed to Beneficial Outcomes

1. Develop a primary partnership with a local organization trusted by the target participants.
2. Host meetings in locations and times accessible for target participants.
3. Connect issues with the day-to-day concerns of participants.
4. Use an iterative process.
5. Accommodate the unique needs of the participants.
6. Recognize the diversity within the participant community and foster inclusivity.
7. Collaborate with multiple organizations and recognize their ongoing efforts.
8. Consult with and produce information that is useful to local support organizations.
9. Balance the needs of the planning process with the time constraints of the participants.
10. Generate initial action based on recommendations.

meetings. Another older-adult participant, Frank, touched on this sentiment, sharing, “It was nice to have the staff there to help explain the questions to us and work with us during the meetings.” Acting in isolation, the researchers from Antioch University New England would not have had the trust and expertise necessary to effectively engage older adults in the project. As a complement to the DOA, the researchers were able to offer expertise in project design and facilitation, climate change adaptation, and social science research.

Host Meetings in Locations and Times Accessible for Target Participants

Financial and time constraints, difficulty traveling, and a lack of comfort with formal processes all could have limited participation among older adults. Participants noted, however, that holding the project meetings at Bridgeport’s main senior center helped them overcome these barriers. They highlighted its central location, accessibility via public transportation, and familiarity as important factors that enhanced its accessibility. Furthermore, many of the participants often traveled to the senior center for other reasons, so they could combine travel for the project with additional activities. The timing of the meetings—in the morning, which fit well with most participants’ schedules, and on days when there were few conflicting events at the senior center—also facilitated accessibility. In addition, morning meetings could be followed by free lunches to partially compensate participants for their time and effort.

Connect Issues With the Day-to-Day Concerns of Participants

The project faced the potential challenge of engaging the older-adult participants in discussion about an issue—climate change—that could be viewed as a problem for younger generations and irrelevant to their concerns. Steve, a DOA staff member, commented, “It can be hard to get seniors to care about this kind of stuff. They have a lot of pressing concerns and don’t necessarily want to have to think about something else.” To address this possible difficulty, the focus of the project was presented as larger than climate change, including an emphasis on extreme weather and the safety and well-being of older adults in Bridgeport. Further, an initial focus on the personal impacts of extreme weather allowed participants to directly connect the project with their own lived experiences and individual concerns.

During presentations and in project materials, relevant scientific information was presented clearly and succinctly. The focus of the project was continually connected to the perspectives and experiences of the participants. This allowed participants to develop their understanding of the issues and focus on their areas of interest within the subject. As the project continued, the participants were able to shape every stage of its evolution to ensure that it was responsive to their interests. As a result, participants indicated that they remained engaged throughout the project and, in the end, strongly agreed that the project reflected the needs and concerns of the older-adult community of Bridgeport.

Use an Iterative Process

Few of the participants had any expertise in climate science or emergency management, so using an iterative process was instrumental in building their understanding and capacity to act. First, participants considered their current challenges and explored the potential impacts of climate change. Next, they designed a survey to allow other community members to register their level of concern over the variety of factors that participants had identified in their initial exploration. Then, based on the survey results, participants developed a set of overarching goals for the adaptation planning process and used these goals to develop specific adaptation recommendations. Participants then prioritized the recommendations. Each of these stages also included a process of review, comment, and revision among participants. Participants explained that this iterative process allowed them, as individuals and as a group, to develop their understanding and then utilize that understanding in the following steps. To allow this process to unfold, it was important for all involved to resist the urge to jump to solutions and instead wait until a full picture of the challenges developed before proposing interventions.

Accommodate the Unique Needs of the Participants

Factors such as sensory and cognitive limitations could have potentially affected the engagement level of older adults in the adaptation planning process. The Climate Resilient Seniors project employed multiple approaches to accommodate the unique needs of older adults and enhance their ability to participate. Project materials, including agendas and surveys, were printed in large font with clear language to allow older adults with limited vision, little

formal education, or cognitive impairments to comprehend and contribute to various aspects of the project. Under the guidance of the DOA, presentations were also limited in duration and delivered in slow, clear speech to ensure that all participants could comprehend the material being covered. Finally, throughout the meetings, the lead researcher and DOA staff regularly checked in with the participants to answer questions and help them work through the tasks at hand. Many participants highlighted how these supports helped them engage in the process.

Recognize the Diversity Within the Participant Community and Foster Inclusivity

While the above measures were taken to accommodate challenges generally associated with advancing age, it is important to note the diversity that exists within the older-adult population. Older adults are a very diverse group in terms of education, health, economic security, culture, ethnicity, race, disability, and frailty. It became evident in early project meetings that the interplay of these factors influenced older adults' ability to participate in the project as well as their interest in doing so. This variation in interest and ability to participate could also have resulted in outcomes that failed to represent a diversity of older adults' perspectives.

In response to this challenge, the project used four approaches to encourage the participation of a diverse range of older-adult community members. First, the lead researcher and DOA staff worked with groups and individuals during meetings to help answer questions and encourage participation. Second, connecting the issues with participants' day-to-day concerns allowed diverse participants to focus their engagement on personally relevant topics. Third, the project's iterative process built in multiple opportunities for engagement. In addition to discussion-based sessions, older adults were able to contribute through surveys, comment periods, and informal feedback mechanisms, some of which could be completed from their homes without traveling to the senior center or attending a meeting. Fourth, at each stage of data synthesis and reporting, the diversity of participant responses was highlighted, and no minority perspectives were discounted.

Collaborate With Multiple Organizations and Recognize Their Ongoing Efforts

Multiple organizations were engaged in this project, including the DOA, the OEMHS, and the Office of Sustainability from the city of Bridgeport.

Community and faith-based groups such as the local hospital, the local Visiting Nurses Association, Meals on Wheels, and the Bridgeport YMCA were also involved. The lead researcher made a concerted effort to learn about, acknowledge, and incorporate the ongoing efforts of these groups into the project. This broad approach to engagement helped foster a positive working relationship between the project and the participating partners, increased older-adult participants' awareness of the resources available to keep them safe, informed the development of adaptation strategies, and raised awareness and communication among the collaborating organizations. Leon, a staff member from the OEMHS, noted that his organization's involvement in the project also served to improve its relationship with the older-adult community. As he explained, "It builds trust between seniors and the city if the city can be present and responsive to their concerns. Even if [their problems] can't be solved immediately, we can work jointly to develop a solution."

Consult With and Produce Information That Is Useful to Local Support Organizations

While the research team from Antioch University New England felt it was important for the project's results to reflect the needs and concerns of the older-adult participants, it was also important for the results to be of practical use to the support organizations that work to keep Bridgeport's older adults safe. Lily from the DOA indicated that the quantitative data collected during the surveys and as part of the demographic tracking of participants was "definitely beneficial because everyone wants to see the percentage and what population it is helping out as well." Leon from the OEMHS commented that he appreciated the level of specificity in the adaptation recommendations. "We have done emergency preparedness training sessions for the seniors in the past," he explained, "but these recommendations are great because they specify exactly what seniors would like to have included in those trainings." Having representatives from these city agencies present at the meetings also helped ensure that the project produced information that was relevant to their efforts.

Balance the Needs of the Planning Process With the Time Constraints of the Participants

Throughout the project, there was tension between participants' time constraints and the amount of time needed for a meaningful participatory process. As Francie, an older adult

participant, explained, “I am involved in a lot of activities at the center, so sometimes meetings would conflict with something else I wanted to do.” Multiple approaches allowed participants to engage with the process in a meaningful way while limiting the demands placed on their time: Presentations were limited in length; meeting output was summarized between gatherings and presented for review in a clear, synthesized format; meeting facilitators followed clear agendas and employed strict time management; and occasional breakout groups allowed participants to focus on different topics and then report out what they discussed. Despite all of these approaches, the project still required a significant commitment on the part of participants and their effort deserves recognition. As Steve from the DOA noted, to make a project like this work, “You need a strong core group that sees the importance of the project and is dedicated.”

Generate Initial Action Based on Recommendations

At the end of the final project meeting, staff from the OEMHS provided an emergency preparedness training for the participants. This was one of the project’s high-priority recommendations, and the training directly reflected the participants’ input. As Ralph, an older adult participant, noted, “It was great to have the training and great to see the city acting on our ideas.” In this way, the training provided a satisfying close to the planning process for participants and also helped focus the group’s attention on the implementation of additional suggestions. As Lily from the DOA stated, “We are not going to let this fade away.”

Discussion

The themes described above highlight key challenges of the project as well as important factors that contributed to the project’s successes. Because this evaluation consists of a single case study, its results cannot be considered generalizable to other adaptation planning projects. Focusing on a single case, however, allowed the research questions to be explored in great detail, and it produced results that more fully reflect the nuances at play. Additionally, aspects of these results may be transferable to adaptation planning projects conducted with older adults or other vulnerable groups in similar socioeconomic or community contexts.

One goal of this paper is to encourage and support additional efforts to incorporate vulnerable and marginalized groups in participatory climate change adaptation planning. It is thus important

to consider the potential transferability of the each of the study’s themes. These themes will likely be most applicable in working with other older-adult communities, as these groups will be most similar to the participants of this study. However, because vulnerability derives from a variety of factors that put specific groups at a greater risk of being affected by climate change, it is reasonable to assume that different vulnerable groups may share certain common traits, such as racial or ethnic minority status, marginalization, little formal education, and lack of financial resources. These factors can also pose challenges for engaging vulnerable groups in participatory processes. Insofar as the underlying factors contributing to vulnerability bear similarity across certain vulnerable groups, so might the themes apply to a range of contexts.

For example, vulnerability is associated with multiple factors that could make it difficult for participants to attend meetings. This challenge could be as significant for other vulnerable groups as it was for the older-adult community in this research. Members of a range of vulnerable groups may not have flexibility in their schedules to attend meetings at certain times of the day, or they may not be able to afford to travel to certain locations. Although the specific barriers to participation may be different across vulnerable groups, and so would require different solutions, issues of accessibility will likely be an important consideration.

The challenges and hardships facing members of a vulnerable group could also compete for their attention. While the specific challenges may be different for each group, finding ways to connect the impacts of climate change with participants’ day-to-day concerns may help engage them in the project and may expand the project’s potential impact. Additionally, members of a range of vulnerable groups may not initially possess expertise in climate science and may benefit from an iterative process, as was the case in the Bridgeport example.

As with the older-adult participants, members of different vulnerable groups may face challenges engaging in a participatory process, but these challenges will vary depending on the groups and the underlying factors that contribute to their vulnerability. For example, while the older-adult participants faced challenges associated with advancing age, participants from other groups may not speak, read, or write the researchers’ language may not be comfortable with formal participatory processes; or may face significant financial challenges. Each of these circumstances

will require different approaches, but each will need to be addressed in order to fully include the participants. Therefore, in working with other vulnerable groups, it will be important to consider potential challenges that might limit their ability to participate and to accommodate their unique needs.

Additionally, as was the case with Climate Resilient Seniors, any vulnerable group will be internally diverse. This diversity will inform group members' relative vulnerability to climate change as well as their individual needs, concerns, and preferred manner of contributing to the project. In working with any vulnerable group, it will be important to gain a strong understanding of the diversity within that group and to foster an inclusive and equitable process.

Similar to this case study, some vulnerable groups may be served by a range of municipal and community-based organizations. When this is the case, university partners may gain advantages by collaborating with these groups, recognizing and incorporating their ongoing efforts, and producing information that is useful to them.

As mentioned earlier, members of a range of vulnerable groups may face challenges that compete for their attention and make it difficult for them to dedicate time to adaptation planning. Staffers working for municipal and community partners are also likely to have little expendable time and energy. Therefore, in a variety of contexts, it may be helpful for project facilitators to devise strategies to use participants' time as efficiently as possible, balancing the needs of the process with the time constraints of those involved. Finally, crossing the bridge from planning to action could be a potential challenge for any project. Helping to start this momentum by generating initial action based on the project's recommendations could help foster additional effort by participants and the larger community in a variety of contexts.

The similarity of these themes to other recommended best practices developed within the broader field of participation supports their potential transferability. For example, in the context of participatory environmental management, Reed (2008) has highlighted best practices that include understanding the diversity among potential stakeholders, fostering an inclusive process, emphasizing equity among participants, and choosing methods and levels of engagement that accommodate participants' needs. In the context of participatory climate change adaptation planning, Dodman and Mitlin (2011) also

recommend connecting climate change with the day-to-day concerns of participants, representing and addressing the heterogeneous needs of participants, and engaging multiple partners in planning projects at a range of scales.

While this evaluation has focused on strategies that institutions of higher education can use to support vulnerable groups, and there are advantages and considerations unique to higher education's involvement in this endeavor, many of these recommendations have broader relevance to any adaptation practitioner hoping to engage vulnerable community members with whom they do not have a strong preexisting relationship. For example, regional planners and municipal staff working on preparedness and adaptation may find some of these recommendations useful in the context of their work as they seek to safeguard those most vulnerable to the impacts of climate change.

Conclusion

The Climate Resilient Seniors project represents one model for university–community collaboration to safeguard vulnerable groups from the impacts of climate change. To enable other researchers and practitioners to assess the potential transferability of this project, we have endeavored to describe the project context, process, and findings in sufficient detail to facilitate close comparison. Rather than a definitive list of best practices, however, the findings can be best understood as the collective observations of a single process put forward to inform and encourage additional participatory adaptation planning conducted in partnership with vulnerable groups.

While the themes from this case study are potentially transferable to collaborations with other vulnerable groups, project facilitators will need to be responsive to the specific nature of the group they are working with and the context of their vulnerability. This will require extensive pre-project planning and ongoing sensitivity to the unfolding needs of the participants during the process. As a result, the specific approaches that facilitators employ will vary from one project to the next. Future research should focus on additional case study evaluations of participatory climate change adaptation planning projects with vulnerable groups in a variety of settings to further our understanding of effective project design and facilitation within the context of community-specific factors.

Despite the inevitable differences between projects, these themes may be worth considering at the outset of a project as a partial checklist of issues to consider. In this capacity, they may help project planners foster a representative process that equitably gives voice to the needs and concerns of vulnerable groups and further engages their larger communities in efforts to reduce their vulnerability to climate change. By thoughtfully and committedly undertaking additional participatory adaptation planning projects in partnership with society's most vulnerable groups, we can build the awareness, knowledge, coordination, and momentum needed to prevent climate change from disproportionately burdening those least capable of withstanding its effects.

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