

Title

Creating climate change adaption plans for rural coastal communities using Deliberation with Analysis as public participation for social learning.

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Abstract

Public participation can foster social learning, creating environments where diverse groups can come together to dialogue about multi-faceted societal and environmental issues and values. The case study uses Deliberation with Analysis, a process to integrate local residents' knowledge and values with local climate data, to create climate adaptation plans with two rural coastal Michigan communities. Iteration of the deliberative dialogue process sis critical for allowing enough time for meaningful change and constructive communication to occur. Understanding *where the community is starting* from is important when tensions are high or deeply held values are challenged. Older techniques may need to be used to prepare the community for full participation in a deliberative process. Case highlights include the importance of community identity, potential negative impacts of climate change proposals on land use rights, and importance of multiple public engagement opportunities, or iterative learning loops, in climate change plan development.

Introduction: Climate Change and Stakeholder Driven Adaptation Plans in Rural Communities

The latest National Climate Assessment demonstrates that rural coastal communities face greater threats from climate change than inland, more populated areas (U.S. Global Change Research Program, 2014; Winkler et al., 2012). In the Great Lakes region, communities bordering the Great Lakes have been impacted by more severe storms, warmer lake temperatures, higher nighttime winter temperatures, and, in some regions, less annual snowfall (GLISA, 2012). Added together, these impacts can negatively affect the tourism and agricultural economies upon which many of these communities rely. The Federal government has recognised that local governments are on the front lines of climate change impacts, and, since 2009, has used a variety of incentives and requirements to prod local units into creating adaptation and mitigation plans. The Environmental Protection Agency (EPA), for example, issues competitive grants and loans to local and tribal governments to install energy efficiency and conservation mechanisms in public buildings. The Department of Transportation requires, among other measures, that regional Metropolitan Planning Organizations (MPOs) include a climate adaptation plan in their long-term plans to receive federal funding. And in 2010, the National Oceanic and Atmospheric Administration (NOAA) established Regional Integrated Science and Assessment centres, RISAs, as boundary organizations to link climate research with end users. These efforts and measures have increased the ability of metropolitan and rural communities and their local government agencies to address climate change planning across the United States.

In this article, we describe the process and lessons learned in developing stakeholder-driven climate adaptation plans for two Michigan coastal regions using the Deliberation with Analysis approach. The process was a collaboration between two boundary organizations:

Michigan State University Extension (MSUE) and the Great Lakes Integrated Sciences + Assessment Center (GLISA). The community partners were local and regional planning departments who were including climate change plans in their master zoning plans. As is true with many planning issues, but especially true with climate change, critical technical and scientific issues were intertwined with political ideologies, competing priorities, limited resources, personal values, and group identities (Dilling and Moser, 2007; Nisbet, 2009; Pearce and Cooper, 2013; Pielke, 2007; Preston et al, 2011). This article outlines a process that integrates local residents' knowledge and values with local climate data to create a climate adaptation plan. This is an exploratory case study using Deliberation with Analysis as a type of facilitated dialogue to address knowledge gaps, bring together diverse perspectives and foster social learning to co-create knowledge (climate change plans).

Literature Review: Increasing Issue Complexity in Public Participation Practices

The role of public participation matures along with social development, paralleling changes in approach or philosophy towards issues such as civil rights, access to education or environmental responsibilities. The early goals of participation, such as agencies providing a public input opportunity to incorporating citizen input into decision making, remain valid techniques and create the foundation for current public participation approaches. With increasing issue complexity, such as addressing climate change, public participation practices take on the additional complexities of collaboration, negotiating competing values and co-creation of knowledge.

In the US, calls for public participation in government decision-making rose with the 1960s civil rights, women's, and environmental movements. (Arnstein, 1969; Boone, 1972; Buck & Stone, 1981). The movements were responding to situations such as minority displacements from urban renewal initiatives, Jim Crow laws, discrimination of women in access to work, health care and education, and unchecked industrial production of water and air pollution. The early responses by government agencies and planners focused on how to involve minority or disenfranchised groups in government processes. (Bolan, 1967; Burke, 1968; Davidoff & Reiner, 1962; Peattie, 1968). Success was measured by how many meetings were held and head counts of participants. Moving into the 1970s and 1980s, the conversation shifted towards conflict resolution (Connor, 1988) and enhancing government interactions with citizens (Potapchuk, 1991). For the participation process itself, issues included the importance of clear goals (Rosener, 1978), reaching a diversity of participants (Boone, 1972), and tapping into local knowledge (Friedman, 1973; Hester, 1984). An emphasis, however, is on addressing the agency, sponsoring group, or planners issues and goals (Beierle, 1999; Crewe, 2001; Creighton, 1998). How-to manuals and descriptive case stories of participation techniques began appearing in the 1980s and proliferated in the early 2000s (Creighton, 1992; Environmental Defense Fund, 1983; Sanoff, 2000; Crawford & Yabes, 2000). The manuals offer a wealth of information about how to plan and execute public participation with the inherent value being in and of the process itself. Jim Creighton defined public participation as "the process by which public concerns, needs and values are incorporated into decision making," (1992, p.10). This reflects the US approach to public participation, where the power and decision making control is maintained by the government or sponsoring agency.

In the 1990s, two important changes occurred in the public participation dialogue. The first is a change in how citizens perceive public participation – to become informed consumers of public participation, rather than beneficiaries of services (Day, 1997). The agency attitudes and clear input-decision linkages influenced how participants viewed the effectiveness of the process (Crawford, 2001; McShane and Krause, 1995). The second change is formation of the International Association of Public Participation (IAP2) and their call for increased authenticity in public participation. The IAP2 spectrum of participation includes five points along the continuum,

with increasing citizen impact in the decision making. The spectrum ranges from Inform, Consult, Involve, and Collaborate, to Empower (IAP2, 2017). The spectrum allows for the idea that depending on the stage and needs of the situation, different degrees of involvement are appropriate. The early techniques developed, such as public information forums, aren't necessarily inferior just because they are older, and can have a place in the process when appropriate. Authenticity is in the acknowledgment and transparency of why a particular technique is used and how it will be included in the decision making process.

Moving into the 21st century brought new challenges for communities, governments and agencies. The issues to be addressed became more complex and interconnected across social, economic, environmental and political arenas. The public participation conversation expanded to include planning with complexity and collaborative rationality (Innes & Booher, 2010), using deliberative dialog to advance discussions of science, technology and NIMBYism (Not In My Back Yard) (Sciencewise, 2017, Hart-Karp, 2005) and navigating trust between the public, scientist and government (Cvitanovic et al, 2016; Fairbrother, 2016).

A critical issue for decision makers addressing climate change adaption and resilience is the need for scientific and technical information that is communicated in accessible ways, with potential connections to planning and policy, and is grounded in their context-specific environment (Berthome & Thomas, 2017; Cvitanovic et al 2016; Donatti, et al, 2017; Krawchenko et al, 2016). Changes in snowfall, for example, has different impacts depending on the community. Decreased snowfall can impact the tourism and recreation industry for northern communities and the availability of fresh water for downstream communities. The complexity of environmental issues requires public participation that "balances scientific findings with multi-faceted input from a range of stakeholders and decision-makers, many of whom have different values, perspective and objectives," (Kotir et al, 2017, p.106). The experiential knowledge of community members and businesses, expertise of scientists and special interest groups, and applied context knowledge of local government and community service providers are all needed to understand the dynamics of social-ecological systems (Gray et al, 2017). A complicating factor is that the range of expertise needed to address complex climate change issues is a large contributor to stakeholder differences (Kaplan, Kaplan & Ryan, 1998; Rosener, 1981). Crafting public participation to address expertise gaps (experiential, scientific and applied) and bringing these together to create new knowledge to inform decision making, is one of the significant challenges in addressing complex community issues, such as climate change (Cvitanovic et al, 2016).

The complexity of the climate system and the still-developing research on downscaled models of climate projections means that many decision-makers are left to operate within an envelope of uncertainty (Balint et al., 2011). Recent research in cognitive psychology, behavioral economics, and communication (Kahneman, 2011; Ariely, 2008; Moser and Dilling, 2004) reveals that people filter and interpret new data and information based on prior experiences and deeply-held values and beliefs. For example, it is very common for people to make snap judgments and decisions about complex problems based on the trustworthiness of the messenger and the degree to which the data confirms or disconfirms their prior knowledge. In addition, 'climate change' is value-charged, often polarizing public opinions no matter the contents of information presented to them on the topic (Akerlof, 2013; Leiserowitz et al., 2012; Myers et.al, 2012; Hoffman, 2012). Schreck and Vedlitz (2016) review of public opinion and participation in public forums on global warming found a strong association between strength of opinion and participation in public dialog. The association suggests a polarised situation as the starting point for public deliberations and policy discussions. US citizens are also considered more polarised on climate change than any other wealthy country (Kennedy, 2015). Related research from cognitive psychology reveals that people are influenced by group values and will lean their positions towards ones that reinforce their connections with others in social groups (Kahan, 2010). For this reason, and others, a solid body of literature recommends using a

process called 'Deliberation with Analysis' when communities are collectively addressing complex, value-laden issues such as climate change (National Research Council, 2008, 2010). This participatory process is closely related to other participatory environmental decision-making frameworks, such as using geographic information systems (GIS), and scenario visioning (Jankowski, 2008; Olabisi et al., 2010).

Research supports that social learning allows groups to challenge norms, integrate knowledge from different perspectives, negotiate new ways of thinking, and propose actions, policies or programs that address multi-dimensional issues (Brown et al., 2016; Gray et al., 2017; Henly-Shepard et al, 2015). Social learning can bring about new ways of thinking and behaving through interpersonal interaction and observation (Bandura, 1977) that can be important for successful public participation, especially when the issues are complex or contentious. The learner is seen as an active participant, with mutual influences of the environment and social behavior, impacting what they accept as knowledge or valid information.

Public participation designed to foster social learning, such as Deliberation with Analysis, creates environments where diverse groups can come together to dialogue about multi-faceted societal and environmental issues and values. The social learning benefits for the participants include:

- 1) learning information related to the issue being addressed,
- 2) learning about possible solutions and consequences of different scenarios,
- 3) learning about other's interests, values and viewpoints,
- 4) learning ways to integrate diverse information and views in a holistic ways, and
- 5) learning methods to enhance communication and dialogue, support integrative thinking and reach consensus or agreement. (Evers, et al, 2016; Webler et al 1995).

Over time, the ideas about what public participation is for, and what it can achieve have changed. The success of public participation in the US has moved from head counts, to achievement of agency goals, to participant satisfaction and perceived transparency of government decision making processes. The increasing complexity of issues, knowledge gaps, rates of change, and the importance of engaging diverse groups of people around an issue, is bringing another evolution to how we approach participation in public planning and decision making. The move is from making decisions to learning collaboratively in a complex, rapidly changing, environment.

Case Study Method: Deliberation with Analysis in Climate Change Planning

This is an exploratory case study using Deliberation with Analysis as a type of facilitated dialogue to address knowledge gaps, bring together diverse perspectives and foster co-creation of knowledge (climate change plans). In the process, participants review the science and facts of a community problem (the analysis) and then share their expertise and their values to collectively decide 'what should be done' (the deliberation). Science and research are necessary to build a clearer picture of the trends and threats, but facts alone cannot reveal what should be done to address a complex social problem. (Bidwell et al., 2013; Dietz, 2013). The objective of a deliberative process is not necessarily consensus, which is the minimum amount of agreement needed for action, but rather a shared understanding of the community's values and the nature of the problem (London, 2017).

The study team engaged a variety of stakeholders, including local officials and citizens involved in a wide spectrum of interests: tourism, forestry, transportation, regional foods, electric utilities, agriculture, public health, marinas, and planning and zoning, to create a model process to increase rural and coastal resilience in the face of climate change. The tangible outcome promised to these communities at the end of this project was a climate adaptation plan specific to each community.

For the purpose of this study, spread over one year, Deliberation with Analysis was implemented in six steps:

Step 1: Recruit and choose two Michigan coastal communities

A request for proposals was sent to rural Michigan communities, asking them how they could use MSU Extension and GLISA's assistance with climate adaptation planning. Telephone conference call interviews with the six applicants were conducted and applicant reviews were based on the following criteria:

1. Access to historical climate data
2. Pressing policy need to create a climate adaptation plan

Two Michigan Great Lakes coastal communities with a pressing need for public input on climate change adaptation planning were selected. The first, the Southwest Michigan Planning Commission (SWMPO) is located in Berrien County, in the city of Benton Harbor, on the southwest corner of the Michigan's Lower Peninsula, bordering Lake Michigan. The SWMPO was required by the Federal Department of Transportation to include a climate adaptation plan as a component of its long-term transportation plan. The County's transportation infrastructure, including portions of major highways and numerous marinas, allow for the transport of commuters and tourists, and for the export of produce and other goods. Berrien County also comprises a key part of the Great Lakes Fruit Belt, which stretches roughly from LaPorte, Indiana, north to Traverse City, Michigan. The microclimate made possible by Lake Michigan is ideal for growing the grapes, apples, peaches, pears, asparagus, and berries that make Berrien County the second most agriculturally diverse county in the nation. MSU Extension did not have a previous relationship with the SWMPO.

The second application selected was from the City of Marquette, which is the largest city in the Upper Peninsula on the shores of Lake Superior. The City of Marquette was updating its 10-year Master Land Use Plan and wanted to incorporate climate adaptation into it. The region's climate vulnerabilities included record high surface water temperatures in Lake Superior, declines in ice cover, and record low water levels, which affect Great Lakes shipping. Marquette is a key port, especially in the export of iron ore and gravel. The City and surrounding region also depend on winter tourism, including sled dog races and skiing. One member of the study team, a land use educator, had an established relationship with the City's planners and community development specialist.

Step 2: Facilitate two community-wide public meetings in each location

These meetings were advertised by their local partners, held a few months apart. The objectives of the community meetings were to:

1. Gather and share diverse local perceptions about the local climate.
2. Identify risks and opportunities brought by climate change.
3. Prioritise climate change risks.

This information was gathered via several methods, largely written. First, participants were asked to respond to questions posed on flip chart pads posted around the room, asking for personal responses about climate change's possible impacts on family, local businesses and natural resources. Then participants self-selected into table groups that seated 6-8 people. Here, they responded to questions first by individually writing on notecards, which were shared with group members afterwards. The following questions were asked:

1. What do you perceive to be the risks or hazards posed by climate change in this region?
2. What could be some possible benefits of climate change to this region?

Table groups discussed their responses among themselves, and then reported out to all participants present in the room. Responses were recorded on either a flip chart pad or a projector screen. Concerns were then categorised, and used as a starting point for the next meeting.

The second meeting was split into three activities: For the first activity in Marquette, participants were asked about their climate change attitudes using three of the 'Six Americas' survey questions conducted by the Yale Project on Climate Communication. Turning Point technology (<https://www.turningtechnologies.com>) was used to capture responses quickly and anonymously. In Benton Harbor, where tensions ran high because of the presence of the local patriot group, participants asked questions via notecards handed to the facilitator. Questions were answered by acknowledging where there was uncertainty and being straightforward where there was not. This strategy seemed to ease the tension in the room for the Benton Harbor participants.

The second activity was a brief climate change presentation on region-wide impacts, focused on the priority issues identified in the first community meeting. This included historical climate data on lake levels, precipitation, snow and ice cover, lake temperature and stratification, and temperature. The information was also summarised in a one-page handout/slide to community members with simple graphs.

The third activity included approximately 30 strategies for intervention based on concerns recorded in the previous community meeting. Participants self-selected into small groups by category of concern, discussed the recommendations, brainstormed tradeoffs, and chose their top adaptation measures.

Step 3: Conduct telephone interviews with local stakeholders

Technical experts and local officials were interviewed to obtain feedback on the publicly identified adaptation priorities, and to assess their climate change information needs and attitudes. In all, phone interviews with 13 experts in Marquette and 10 in Southwest Michigan were conducted and the interviews lasted from 30-45 minutes. The questions covered three broad themes: climate change adaptation priorities, level of risk climate change posed to them personally, and information-seeking behavior.

Step 4: Formulate GIS maps

The study team collaborated with MSU's Remote Sensing and Geographic Information Science Research and Outreach Services (RS&GIS) to develop specific, detailed GIS maps of the defined community containing land use and development details and other features of the built environment, as prioritised by the community members.

Step 5: Distribute self-audit tool

The self-audit tool is essentially an inventory with yes/no questions about infrastructure, water resources, and natural resources. An existing survey tool created by Minnesota Sea Grant specifically for Great Lakes Communities (Destoello, 2012) was used. Partner agencies distributed the tool to relevant departments. Once completed, the assessment provided the community and region with a low, medium, or high rating for nine critical areas.

Step 6: Interview key community contacts to evaluate project success

In the fall of 2016, a key contact in each community was asked to fill out an online survey and participate in a phone interview. (Approved protocol by Michigan State University, Human Subjects Internal Review Board, x16-1169e). The goal was to learn if and how the community used the resources developed during this study and assess to what extent the project in the community helped to spur other climate change adaptation initiatives.

Discussion: Insights from the Process and Follow up Interviews

Insights from Community Meetings

As the process unfolded, some similarities between the two communities emerged. For example, both Marquette and Southwest Michigan (Benton Harbor) identified the same five broad areas of climate change concern: land use, water, public health, agriculture and food, and tourism and the economy. The Marquette participants also identified forest health as an important issue, given its regional importance.

However, differences between the two communities quickly surfaced during the community meetings. In Marquette, this first public meeting revealed a stronger level of concern for the risks, rather than benefits, that climate change represented to the region. What emerged was a concern for loss of a unique sense of place: the winters with snowfall and residents who liked to participate in 'silent winter sports.' Participants were concerned this would be a loss to the local economy, but even stronger was a fear that a changing climate meant losing their community identity. This is consistent with place attachment theory, in which residents keenly identify with the natural and cultural features of a region (Stedman, 2002). In other words, they were concerned that the loss of seasonality, especially snowfall, would signal that Marquette would no longer be Marquette. They also were concerned that, as temperatures increased in the southern U.S., more people would move to the Upper Peninsula and overpopulate it.

These residents, with their concern over the risks posed by climate change, appeared to hold the values and attitudes of the 'alarmed' group in Yale's Six America's study. In 2013, the alarmed cohort made up about 16% of America's population. (Leiserowitz et. al, 2013). Responses to the questions asked via electronic voting platform (Turning Point), confirmed this:

1. Is the Earth's climate changing? (94% said yes)
2. Is the climate changing primarily because of human activities, or natural causes? (94% said human activities)
3. Most scientists think global warming is happening (84% agreed)

In Benton Harbor, a completely different dynamic unfolded. About half of the 80 participants objected to the assumption that climate change was taking place, and/or that humans were to blame for any climate change, and used the report-out time to voice this. These attitudes are consistent with the 'Doubtful' and 'Dismissive' cohorts of the Six Americas. But the study team was unable to test this theory, as the community partner was adamant that these attitude questions not be asked of participants during the meetings. The study team believed it was important to openly surface values and attitudes, which is consistent with the methodology of Deliberation with Analysis (Dietz, 2013; National Research Council, 2008, 2010) but the community partner believed that surfacing these tensions would only inflame the debate.

In the Southwest (Benton Harbor), instead of asking the Six Americas survey questions, participants were given the chance to vote not only on their top adaptation practices, but also to vote on actions they opposed. Almost all of the adaptation practices in the categories of Tourism and the Economy, Agriculture and Food, and Public Health and Water were favored by the

participants. Land Use and Development practices had more opposition votes than supporting. This is likely because this category limits and regulates individual choices, more so than the other categories.

The two communities started from very different places in respect to their views on the issue of climate change. One perceived climate change as a risk while the other was doubtful or dismissive that it exists. While the different community perspectives were not a surprise, it does highlight the importance of knowing *where the community is starting from* when designing the participation events. Benton Harbor may have benefited more by starting with techniques that focus on clarifying agency goals, informing the public, and building community trust. In terms of the evolution of public participation in the US, each of the growth phases are important, and the community also needs to progress through each phase. For example, for collaboration to occur, diverse groups of people need to participate (Bolan, 1967), with clear goals (Rosener, 1978), and as informed participants in the process (Day, 1997). Then they can begin to tackle complex and value laden issues such as climate change through social learning processes.

Insights from Interviews with Local Experts

The interviews with local experts from both communities revealed that they generally agreed with public priorities. While they usually had more refined ideas about implementation, they did not have many suggestions for collaboration. This reflects their expertise in the planning and science side of the issues, but lacking expertise or experience in the social community building side. Responses to the questions about the level of risk climate change posed to them personally varied widely by profession and by location. Those in Marquette who worked with sustainability or planning felt at greater risk for climate change impacts than those in Southwest Benton Harbor. As for responses to information-seeking behavior, answers varied, but most answered climate change was relevant to them. The majority of respondents from both communities sought out climate change information from government agencies, if they worked for the government, and by trade magazines and radio, if they worked in business. Many of them said they decided if climate change information was credible by gut instinct or intuition.

Common GIS map themes included: drought/flash flood risk, floodplains, lake levels, and fire susceptibility. The local officials and community partners reported that the GIS maps provided a valuable tool to analyze critical infrastructure and habitat against the identified vulnerabilities and respond accordingly with relevant solutions in both communities. (See Figure 1: Drought and Flood Risk Maps for a sample GIS map provided to the Southwest.)

[INSERT FIGURE 1 HERE Drought and Flood Risk Maps]

As for the self-assessment tool, the stakeholders and local leaders reported that they found it to be an effective means of providing an honest, self-reflective review of critical areas that could be affected by climate change. Both community groups identified: critical infrastructure flooding, built environment & infrastructure, ecosystems & habitats, and tourism and recreation as high priority areas (i.e., low or medium level of readiness, see Figure 2: Levels of Readiness for Marquette).

[INSERT FIGURE 2 HERE Levels of Readiness for Marquette]

A few months after the project's conclusion, both communities integrated the climate adaptation recommendations into their long-term plans. In the City of Marquette, the Adapting to Climate Change and Variability plan has been integrated into the updated City Master Plan, a document that will guide land use for the next twenty years. In Southwest Michigan, the Southwest Michigan Planning Commission incorporated the recommendations into its Long

Range Transportation Plan for the region. The transportation plan establishes funding priorities for the entire region. Incorporating technologies such as GIS Maps and the Self Audit Tool built upon perceptions and values captured have given the two communities meaningful planning documents.

While the process was perceived as positive by the local experts, it may be from the lens of older models of participation that consider success as achieving the agency goals (Crewe, 2001). The interviews surfaced the experts focus and comfort zone in implementation, rather than ways to continue or expand collaboration. Like the community members, the local experts have a learning curve to become comfortable with using deliberative and collaborative processes to deal with the knowledge gaps in complex issues such as climate change (Cvitanoivic et al, 2016).

Insights from 2016 Follow-up Interviews

In fall 2016 follow up online surveys and phone interviews were conducted with two key local contacts who participated in the local climate adaptation planning processes to identify long-term impacts. The online survey focused on questions regarding the recommendations made in each respective report. The phone interviews followed with questions regarding the process, meeting dynamics and overall impacts and challenges.

In Benton Harbor it was reported that the community meetings provided a high awareness of how climate change may affect the community. The local meetings played a major impact in the way in which people with different opinions regarding climate change listened to each other in the community. While some “people were skeptical but wanted to learn” it was reported that by the second meeting, people were listening, and participating and “did find some common ground.” Overall, major impact was reported in strengthening existing partnerships or collaboration in the community.

Several positive outcomes were identified including the sharing of good information and data. The respondent noted that while none of these outcomes could be attributed solely to our work in Benton Harbor, he/she felt that our work contributed to the momentum and energy that helped initiate and complete these projects. Specific examples of action steps were noted including new local and regional policies and initiatives. These include a new regional complete streets ordinance, an adoption of a local master plan with climate adaptation data and recommendations, a grant for a food truck for underserved areas, recommendations to increase buffer zones for flood plains, regional sustainable tourism initiatives to increase bike paths and transit connections, and a study of migratory bird patterns. After more than three years, it was reported that there is still a focus on adaptation plans and “a lot of things aligned around the same time” with the completion of the climate adaptation process.

However, several challenges were recorded both during and following the process. The differing views regarding climate change resulted in ‘push-back’ from some participants who attended the community meetings with the perception that these individuals had already made up their minds on climate related issues before the process began. In addition, it was reported that the large turnout for the meetings (especially the initial gathering) coupled with the realisation that some participants came with the specific agenda to disrupt the meetings highlighted the need for additional trained facilitators and better use of technology for voting, reporting, etc. Others reported that better use of the GIS data visualization tools during and after the process could have been more effective regarding decision-making along with funding options to assist in implementing the recommendations. Suggestions were offered to provide GIS capabilities in an interactive format (not a static pdf) for updates and to manipulate multiple scenarios.

In Marquette, it was reported that the community meetings were very influential in starting and helping advance existing conversations on climate change in the community.

Discussions during or after the public meetings regarding the adaptation strategies were reported to have a major impact in helping form and strengthen new and existing partnerships or collaborations in the community. Overall, the community meetings were reported to be very influential on bringing awareness to how climate change may affect the city and surrounding area.

Several outcomes reported were attributed to the planning process and climate adaptation plan. Most notably, the county was “inspired to form a Climate Adaptation Task Force” which has been “quite active” in the past year with a series of educational initiatives and sub-committees formed to further the recommendations. One example is a pilot initiative that resulted with NOAA and university researchers to work with rural communities on climate related threats along with resources and tools available to address local concerns.

A major weather event in 2014 heightened awareness of climate adaption concerns with the destruction of a lakeshore roadside embankment and the need for coastline regeneration. Recommendations were drafted to pursue a storm water system (although not adopted) and work began on dune restoration in the area. In addition, climate adaptation recommendations developed as part of the process were incorporated and adopted as part of the local master plan update in 2015. Since the plans adoption there has been a reported increased emphasis in the local food network and the farmers market continues to grow.

However, continual challenges have been reported towards “forming the long-term collaborative relationships that will be necessary to accomplish the objectives.” Also, maintaining ‘the political interest and will’ and staffing “beyond the normal workload” both pose challenges to accomplishing the climate adaptation recommendations. In addition, it was reported that there was not a clear sense that the community meetings impacted the way in which people with different opinions regarding climate change listened to each other in the Marquette area.

Overall, both communities reported that the process was effective in terms of the communication techniques and encouraging participants to write and participate in small groups. In addition, several clear examples of local and regional initiatives inspired by the climate adaption process were noted including continued dialogue on specific recommendations outlined in the reports. Both communities documented multiple instances of strengthened partnerships or collaboration. However, the way in which people with different opinions regarding climate change listened to each other and reacted in each setting was viewed as drastically different. While the Marquette community appears to have the most success in implementing outcomes, the Benton Harbor community may be the community that moved the needle the most in terms of learning about differing values and how to integrate these ways of thinking.

Conclusion

Climate change discussions are often focused on the environmental aspects, both potential hazards and recovering from past events. This case study revealed that community identity is also an integral part of the discussion for many community members and businesses, such as winter tourism in Marquette. The Benton Harbor case brought out that sometimes potential climate change adaption measures meet resistance due to perceived limitations of individual land use rights brought with a proposed action. Local expert interviews and follow up interviews highlighted the need to provide multiple engagement opportunities and community building techniques (iterative learning loops) to navigate community dialogues and move initiatives forward for adoption and implementation. The agencies are well versed on how to advance implementation of input but need assistance with identifying ways to continue collaboration and dialogue within their communities.

The Deliberation with Analysis process created an environment for social learning with both communities. The differences may be attributed to the citizen attitudes, with Marquette being more aligned with the “alarmed” Six Americas group and Benton Harbor more in the “Doubtful” or “Dismissive” Six Americas groupings. An important lesson from this experience is to understand *where the community is starting* from when designing the participation process. When tensions are high or deeply held values are challenged, then other techniques may need to be used to prepare the community for full participation in a deliberative process. .

The part of the process that has caused the study team to re-consider its approach were the two community meetings. The community meetings were intended to foster collaborative knowledge construction, or social learning, to create a dynamic experience that supports building social trust and empowering diverse stakeholders. Overall, conducting only two public meetings did not allow for enough engagement for participants to benefit in all five of the potential social learning benefits identified by Evers et al (2016) and Webler et al (1995). The Deliberation with Analysis process did provide opportunities for learning information about climate change and the possible solutions and consequences. The latter three benefits of learning from and respecting their differences, integrating diverse views and enhancing communication were not fully realized in both communities. This study reinforces the findings of Brown et al (2016), Henly-Shepard et al (2015), and Gray et al (2017) which identify the importance of iterative learning loops to achieve meaningful change through social learning in public participation venues. The two meetings may have actually hardened positions on both sides of the climate change debate, especially in the Southwest. Since their core identity and belief system differences were never aired, the patriots and the environmentalists seemed to cement their connection with own groups (Hoffman, 2012). At its heart, the differences between the patriot group members and those who were alarmed about climate change (the environmentalists) were centered on identity (Wondolleck, 2003). Increasing the number of meetings to four or five meetings, with a smaller set of selected participants, may have allowed participants to know each other enough to dispel stereotypes (McCoy and Scully, 2002).

Use of the term ‘climate change’ when recruiting the public may have influenced participation and how they approached the tasks. In both communities, the term resonated with the ‘Six Americas’ groups at both ends of the attitude spectrum: the alarmed and the dismissive. In Marquette, only the ‘alarmed’ showed up; in Benton Harbor, both groups were about equally represented, judging from observation. Should some other term have been used (such as ‘resiliency’ or ‘sustainability’) to describe the objective of the long-term planning? Wong-Parodi et al (2015) identified differences in response to the same images of a flooding scenario when participants were tasked with assessing measures identified as resilience or adaptation. The resilience labeled scenario was associated with a larger, unmanageable situation and proposed actions were assessed as less effective than when the same image and measures were labeled adaptation. The adaption labeled scenarios evoked more of a sense of manageability and the ability for individual actions to make a difference. Extrapolating from this study, use of the term adaptation plan may have increased the willingness of citizens to participate.

The idea of what constitutes public participation in the United States has changed significantly since the 1960s. Head-counts and public information meetings are no longer considered sufficient levels of participation to grapple with the complex issues of today, such as climate change. Public participation now has a role in fostering collaborative social learning, creating environments where diverse groups can come together to dialogue about multi-faceted societal and environmental issues with both scientific data and social values. Deliberation with Analysis as a public participation planning process creates an environment to bring together scientific data and stakeholder values. It can allow hardened positions to be softened, provided values are allowed to be aired, and opposing interest groups have an opportunity to express their concerns beliefs, and deepest values. Iteration of the deliberative dialogue processes, or

learning loops, is critical for allowing enough time for meaningful change and constructive communication to occur.

Limitations of the Study and Future Work

The study is limited by the case approach, with only using two communities. Other techniques could also have been used to foster social learning and bringing together diverse community members. Some research has questioned the use of an 'all call' to public planning around climate change, and has suggested using a more targeted approach to inviting participants (Few, Brown, and Tompkins, 2007). On the one hand, using facilitation tools such as subgroup dialogue, where one homogenous group speaks while the other side listens, and then switches, may have helped positions to soften and for the groups to find common interests and values (Weisbord and Janoff, 2010). On the other, creating a steering committee comprised of two different interest groups so they are forced to work together more closely and develop a shared mission also might have advanced social learning. Integrating techniques to specifically capture and measure the social learning outcomes identified by Bandura (1977) could enhance the study design. Additional topics worthy of further exploration include the connections of community identity and climate change; how non-environment related issues, such as private land ownership and rights, impact citizen responses to climate change adaption proposals; and how framing language choices, such as adaptation, resilience or sustainability influence people's perceptions and responses to climate change scenarios.

A follow-up study using 'ripple effect mapping' (Kollock, et al, 2012), a participatory, facilitated process using interviews, mind-mapping, and other tools, is in the works to determine medium-term impacts of the project, including which adaptation methods have been implemented, and to see if the community engagement process resulted in other spin-off measures.

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