ADVANCING A COMMUNITY'S CONVERSATIONS ABOUT AND ENGAGEMENT WITH CLIMATE CHANGE

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Thesis Prepared for the Degree of

MASTER OF SCIENCE

UNIVERSITY OF NORTH TEXAS

August 2018

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Hansen, Carla Grace. *Advancing a Community's Conversations About and Engagement With Climate Change*. Master of Science (Applied Anthropology), August 2018, 86 pp., 9 tables, 30 figures, references, 43 titles.

The goal of this project completed for the Greater Northfield Sustainability Collaborative (GNSC) was to understand how Northfield, Minnesota citizens are experiencing climate change. Thirty individuals were interviewed to find out what they know about climate change, what actions they are taking, what they think the solutions are to the problems, and what barriers they have to more fully engaging with climate change issues. The interview results are intended to promote and advance the community's discussion on climate change via social learning and community engagement activities such as town hall forums and community surveys. These activities encourage citizens in the community to have direct input into the development of the community's climate action plan (CAP). Analysis of the interviews showed that the interviewees are witnessing climate change, that most are taking at least some action such as recycling or lowering thermostats, that they can name barriers to their own inaction, that they say communication about climate change remains confusing and is not widespread in Northfield, and that they are able to provide numerous suggestions for what the local and broader leadership should be doing. The analysis also showed wide individual variation within the group. Interviewees who were less knowledgeable about climate were less likely to be taking action and do not participate in social groups where climate change is discussed. Conclusions are that the whole group would like more and better communication and education from our leaders, that they also expect our leaders to be part of creating solutions to climate change, and that the solutions the interviewees suggested provide a very thorough initial list of mitigation and adaptation strategies for the city's future CAP.

ACKNOWLEDGEMENTS

To all the professors I was privileged to meet at the University of North Texas. Each of you taught me something invaluable about being human and about my future employment possibilities. I whole-heartedly thank my committee members, Dr. Adrienne Falcon and Dr. Adam Dunstan, for devoting their precious time to pushing me to think more deeply about my thesis, and especially Dr. Lisa Henry who patiently served as my committee chair. She was always there to keep me on course. While the main goal of acquiring anthropological skills kept me attending classes, what made it easy to keep going was the 2015 Applied Anthropology cohort. This superb bunch of friends made the journey all the more enjoyable.

To my family, friends, and neighbors: you were my greatest cheerleaders, with the day in day out asking, "How is it going?" I couldn't have done it without you. To my kind and loving men: my husband, Marshall, my sons, Sam and Abe, and my dad, thank you for tolerating my quirky moods and for your never-ending support. To the talented individuals I met, learned from, and worked with in these groups: Northfield Energy Working Group, Northfield Area Community Solar, Environmental Quality Commission, Greater Northfield Sustainability Collaborative (GNSC), and Northfield Earth Day, without you I would still be struggling to come to personal terms with climate change. Two people to thank personally are MJ who showed me community activism at its best, and Kim at the GNSC who graciously provided direction for the project. To my thirty interviewees and other citizens of Northfield: thank you for sharing your incredibly useful and significant insights with me. Finally, I want to thank my to my editors who helped me strive for perfection: Al, Marshall, and Tereza at FirstEditing.

My sincerest thanks you to all: each of you has gifted me with a very pertinent and profound impression.

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CHAPTER 1

INTRODUCTION

With proper planning efforts, cities and their communities can make some of the biggest impacts – through mitigation and adaptation efforts – to offset both the local and global effects of climate change (American Planning Association 2011). Mitigation refers to the slowing of the rate of change, or attacking the causes of climate change; while adaptation refers to the local adjustment to the changes that are already underway, or treating the symptoms of climate change (Koski and Siulagi 2016). Cities can make some of the greatest contributions toward lowering greenhouse gases (GHGs) because they control decisions about land use and energy use as well as production, distribution and transportation, which are key sources of GHGs (Lindseth 2004). Cities around the world are waking up to this fact, as the City of Northfield and its community of citizens has, and are seeking to do something to help their communities become resilient and sustainable in a changing climate. A resilient community has "the ability to plan for, absorb, recover from, and more successfully adapt to actual or potential adverse events" (National Research Council 2012, 14) so as to sustain the community's existing features. Adaptation in this context is not simply coping with the changes that climate change will bring rather it means to make the adjustments to enable people to maintain livelihoods and welfare (Oliver-Smith 2013).

To become resilient and sustainable, a city and community – into which mitigation and adaptation efforts will be introduced and implemented – must understand how they are or will be affected by the social, ecological and economic impacts from a changing climate, how social practices contribute to climate change, and what kind of resources – including changes in behavior – are required to mitigate GHGs and achieve sustainable adaptation. That said, simply having this knowledge is not enough to prompt action. Real action is achieved when a

community is able to mobilize its citizens toward collective participation and invested engagement with climate change issues wherein social practices become modified.

This paper seeks to show 1) how a community's level of interaction with climate change issues can be assessed using anthropological ethnographic research methods, and 2) the steps a community can take to move toward invested engagement on climate change issues via social learning. Invested engagement means taking intentional action for change. Social learning is such a tool that can be used to influence social practices within a community that in turn can lead to intentional action or invested engagement to help a community become and remain resilient and sustainable against the effects of climate change. This paper includes a brief review of the progress the city and community of Northfield has made toward planning for climate change, and includes an analysis of the results of the interview data from 30 interviewees.

Climate Change in Minnesota

Climate change is described as a change in the average weather of a region that occurs over long periods. Weather is the short-term changes in temperature, precipitation, wind, clouds or humidity within a region. Minnesota's average weather is changing.[1] The average annual temperature has increased by 3 degrees since 1895. Most notable is that the average minimum winter temperature in Minnesota has increased by 6 degrees since 1895. Annual precipitation in Minnesota has also increased by approximately 3 additional inches per year since 1895. Additionally, more frequent and heavy rainfalls have punctuated annual precipitation. Figure 1 and Figure 2 summarize the Minnesota Pollution Control Agency (MNPCA) Interagency Department's (2017) current and projected hazards (impacts) beyond 2025 from Minnesota's

[1] These statistics came from the report http://www.dot.state.mn.us/metro/stateaid/train2017/climate.pdf

changing climate. Put simply, Minnesota is experiencing less severe winters, more precipitation and warmer annual temperatures.

Hazard	Observed Trend	Confidence Change is Occurring
Extreme cold	Rapid decline in severity & frequency	**Highest**
Extreme rainfall	Becoming larger and more frequent	
Heavy snowfall	Large events more frequent	**High**
Severe thunderstorms & tornadoes	Overall numbers not changing but tendency toward more "outbreaks"	**Moderately Low**
Heat waves	No recent increases or worsening	**Lowest**
Drought		

Figure 1: MNPCA Current Observed Trends

Hazard	Projections through century	Confidence in projected changes
Extreme cold	Continued loss of cold extremes and dramatic warming of coldest conditions	**Highest**
Extreme rainfall	Continued increase in frequency and magnitude; unprecedented flash-floods	
Heat waves	More hot days with increases in severity, coverage, and duration of heat waves	**High**
Drought	More days between precipitation events, leading to increased drought severity, coverage, and duration	**Moderately High**
Heavy snowfall	Large events less frequent as winter warms, but occasional very large snowfalls	**Moderately low**
Severe thunderstorms & tornadoes	More "super events" possible, even if frequency decreases	

Figure 2*:* MNPCA Projected Impacts through the Century

Planning for Climate Change in Northfield, MN

Sustainability issues have been important city and community discussion points in Northfield for a long time. Important efforts towards promoting sustainability were completed in Northfield in 2005, and then again in 2008. In 2005, the City of Northfield's Environmental Quality Commission (EQC) urged the city council to commit to the Cities for Climate Protection

Campaign (CCPC) goals. The CCPC goals are a creation of the International Council for Local Environmental Initiatives (ICLEI), and are a series of steps a city follows to reduce its greenhouse gas (GHG) emissions. Today, ICLEI continues to help cities around the world to contribute to worldwide sustainability. In 2008, the mayor of Northfield appointed the Mayor's Energy Task Force to follow up on the CCPC steps and requested that the Task Force provides the City of Northfield with even more specific steps to become energy resilient. The Task Force wrote the report *With Hope: A Resilient Community. An Action Plan for Northfield Area Energy Sustainability*. The 2008 *With Hope* report outlined the steps the City of Northfield should take to encourage an energy efficient approach with movement towards a zero-carbon-emission future.

The timeline in Figure 3 presents some of the efforts made toward greater sustainability in Northfield since 2005. Over the years, several other very important community efforts and events have contributed to helping the city and community think about long term sustainability.

Most recent activities suggest strong intentional movement toward action on climate change issues. Late last year, the City of Northfield's City Council voted to include, in its fiscal year 2018-2020 Strategic Plan, the goal to write a Climate Action Plan (CAP). A CAP is a guide consisting of strategies which outlines the steps to reduce (mitigate) greenhouse gas (GHG) emissions and adapt to the effects of climate change. The CAP will be developed by the Climate Action Plan Advisory Board (CAPAB). With input from city staff and community members, the CAPAB will build a CAP with a scope that fits what the community wants and matches its abilities. This formal commitment made by the City of Northfield shows that the city recognizes major effort is needed to keep Northfield resilient and sustainable to the effects of climate change and is willing to put forth such effort.

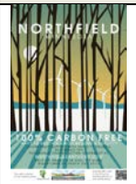
RENew Northfield and the Environmental Quality Commission (EQC) work to ensure the city participates in the Cities for Climate Protection Campaign (ICLEI) to reduce local GHG emissions.	 With Hope: A Resilient Community. An Action Plan for Northfield Area Energy Sustainability. A report written by a mayor appointed Northfield Energy Task Force.	 Northfield becomes a Minnesota GreenStep Cities to incorporate and monitor sustainability and quality-of-life goals. This program is ongoing.	 Summit, organized by Northfield citizen groups, featured local and regional meteorology, climate, environmental, agricultural and sustainability experts.	Northfield Energy Friends re-groups as the Northfield Energy Working Group (NEWG) to work with the EQC to continue work on 2008 With Hope energy and sustainability issues.	EQC and Northfield Energy Working Group (NEWG) submit information for the city council to consider climate action planning.	 One of the City of Northfield's 2018-2020 Strategic Plan goals is to write a climate action plan.	The City of Northfield City Council adopts resolution to create a Climate Action Plan Advisory Board (CAPAB).
2005	**2008**	**2010**	**2014**	**2016**		**2017**	**2018**
			 Summit leaders create Greater Northfield Sustainability Collaborative (GNSC) The GNSC is a place where the community and colleges can connect to combine efforts on sustainability issues and these connections are made publicly available.	 Community-wide carbon free petition sponsored by GNSC and Northfield Earth Day captures over 900 signatures.		The City of Northfield signs on to a Community Solar Subscription to obtain a portion of energy use as renewable energy.	Climate Action Plan Advisory Board (CAPAB) members are appointed by the mayor.

Figure 3. Sustainability Timeline for Northfield, Minnesota

Moving from formal commitment to CAP development and implementation requires intense and consistent effort. Climate adaptation research done by Smit (2006) advocates that the strategies for the mitigation of GHGs and adaptation to climate change must be community-centered and realistic for them to succeed. It can neither be singly a top-down city-led, nor a bottoms-up community-led approach. All groups, including the ordinary citizen, must have an opportunity to be on the agenda to create and implement workable strategies that will make the community resilient and sustainable in the face of climate change. The research discussed within this paper is an initial step toward understanding the community and moving the community toward collective invested engagement on climate change issues.

CHAPTER 2

PROJECT DESCRIPTION

Foremost, I wanted to practice socially relevant anthropology in my own backyard (Johnston 2010) and give something back my community could use (Fiske 2012). I wanted the applied research project results to contribute to awareness and action on climate change issues in my community. This project took significant time to develop because I was new to both environmental studies and community activism. Before I could enter the field (the community) to begin the applied research project, I needed to discover more about what was already happening in my community. In the summer of 2016, I called a friend who suggested I attend the next Northfield Area Community Solar (NACS) meeting to learn more about solar energy and the local solar gardens. Concurrently, I checked the City of Northfield website to ascertain when the Environmental Quality Commission (EQC) was meeting. The EQC is a city commission consisting of seven citizen volunteers, a youth representative, two city staff members, and a city council member liaison. The mayor makes these appointments to the commission. Its role is to advise the city council on matters related to the city's environmental quality and natural resources, including the implementation of environmental ordinances. The first EQC meeting I attended in August of 2016, coincided with the Northfield Energy Friends presentation (given to the EQC), which asked the EQC to resume action on some of the recommendations presented in the 2008 report *With Hope: A Resilient Community: An Action Plan for Northfield Area Energy Sustainability.* Thereafter, the Northfield Energy Friends shortly became the Northfield Energy Working Group (NEWG) – a temporary sub-commission of the EQC. What follows is a brief description of the activities I engaged in alongside these community groups to understand what was already being done in the community, and to begin to actively contribute to the climate

change issues at hand. These activities helped me understand the community, as well as find a client with whom to develop my research project. The following section describes how I entered the field, provides information on the purpose of the study, poses the study questions and describes the study deliverables.

Entering the Field, Finding a Client

My participation with Northfield Area Community Solar (NACS) began in September of 2016 and continues to the present day. The NACS sells solar garden subscriptions in the Northfield community and educates the community on renewable energy. I participated as an exhibitor at several NACS community events to educate people on solar gardens and to acquire subscribers for the gardens. I also knocked on doors and distributed NACS flyers in Northfield neighborhoods. The NACS, along with the Greater Northfield Sustainability Collaborative (GNSC), originated the petition *100% Carbon Free* (Figure 4) in Northfield, which in the end garnered nearly 1000 signatures.

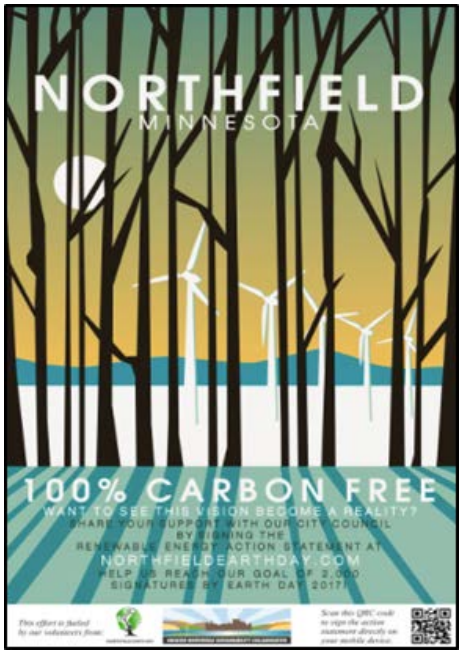


Figure 4: Petition

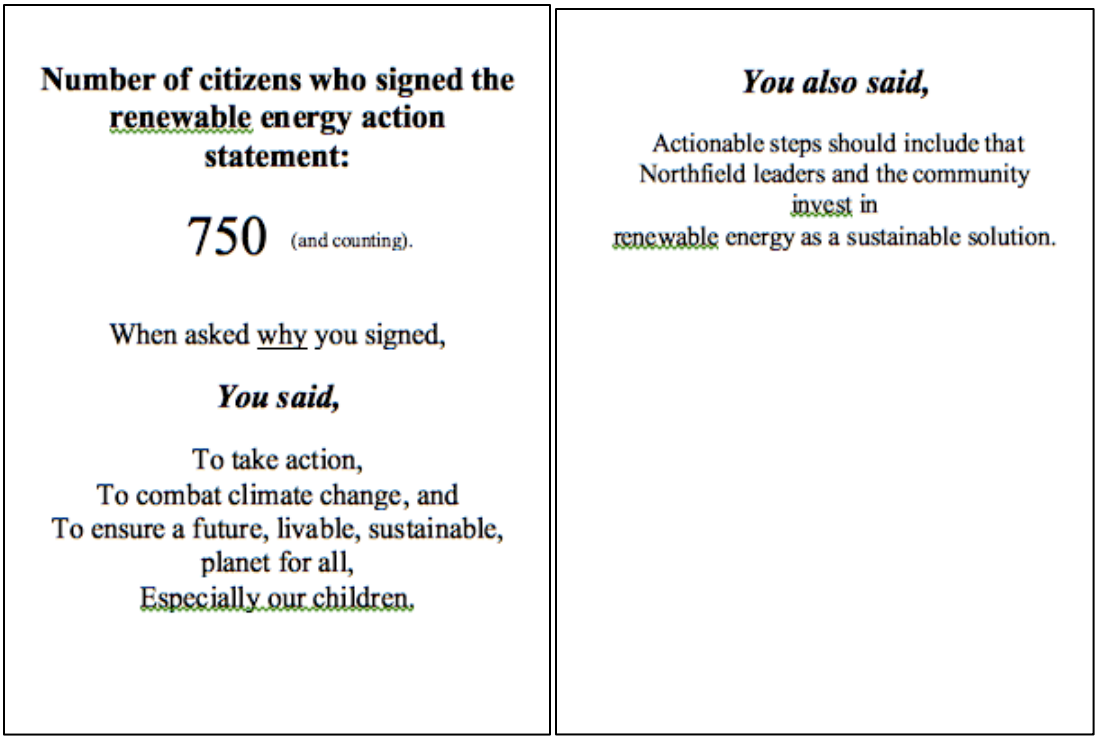


Figure 5: "Why Did You Signed the Petition?"

These signatures helped move the City Council to vote to purchase a portion of the city's energy from a local solar garden. At the time, petition signers were asked why they signed the petition (Figure 5). One hundred fifty-two signers offered a reason why they signed the petition. These reasons were analyzed first to determine the most frequent words used and second to determine the context within which they were used in order to summarize why the signers of the petition signed it. Analyzing the petition responses in this way alerted me to the fact that the community has awareness of climate change, and that they think alternative energy is one solution to the problem.

Concurrently with NACS participation was my participation with the Northfield Energy Working Group (NEWG), which began in September of 2016 and lasted through August of 2017. The NEWG was created as a temporary sub-commission of the EQC. The purpose of the work done by NEWG was to provide information to the EQC, so the EQC could help Northfield

city staff, the city council, and the mayor understand what is needed to get a successful climate action plan (CAP) written and implemented. The NEWG provided several important documents to the EQC, which were instrumental in getting climate action planning adopted as a goal in the City of Northfield's 2018-2020 Strategic Plan. As a NEWG member, the tasks to which I contributed included developing a codebook for the extraction of data from specific cities' climate action plans, talking to city staff involved with CAP implementation in several of these cities to verify climate action plan data, and adding content to the final climate action plan comparison study titled *Community-Wide Climate Action Plans: An Initial Summary of Best Practices from Cities Similar to Northfield, MN*. This comprehensive study can be found on the GNSC website. As a NEWG member, I also participated in giving a group presentation to the EQC. The presentation reviewed climate action planning and the steps that were needed for moving forward to developing a community-wide CAP for Northfield.

My participation with the Greater Northfield Sustainability Collaborative (GNSC) began in February 2017 and is ongoing. The GNSC is committed to raising awareness and facilitating community engagement on climate change and sustainability issues in the Northfield area. The idea for the creation of the GNSC had been percolating at the same time a very successful climate summit was held in Northfield in 2014. One day around a community member's dining room table, the GNSC was born as key community members and sustainability-minded representatives from Saint Olaf College and Carleton College gathered to figure out how to work together to provide support for community-wide sustainability efforts. Today, members of the GNSC actively participate in local sustainability endeavors and maintain the GNSC website which features information about sustainability in these areas: water, energy, land, food, transportation, waste, and climate action planning. For the 2017 Northfield Earth Day

celebration, the GNSC hosted an informational table and posed this question to Earth Day participants, “How have you experienced climate change?” Respondents wrote their answers on a whiteboard shown in Figure 6. Interacting with the community in this way worked as a motivator for project development.

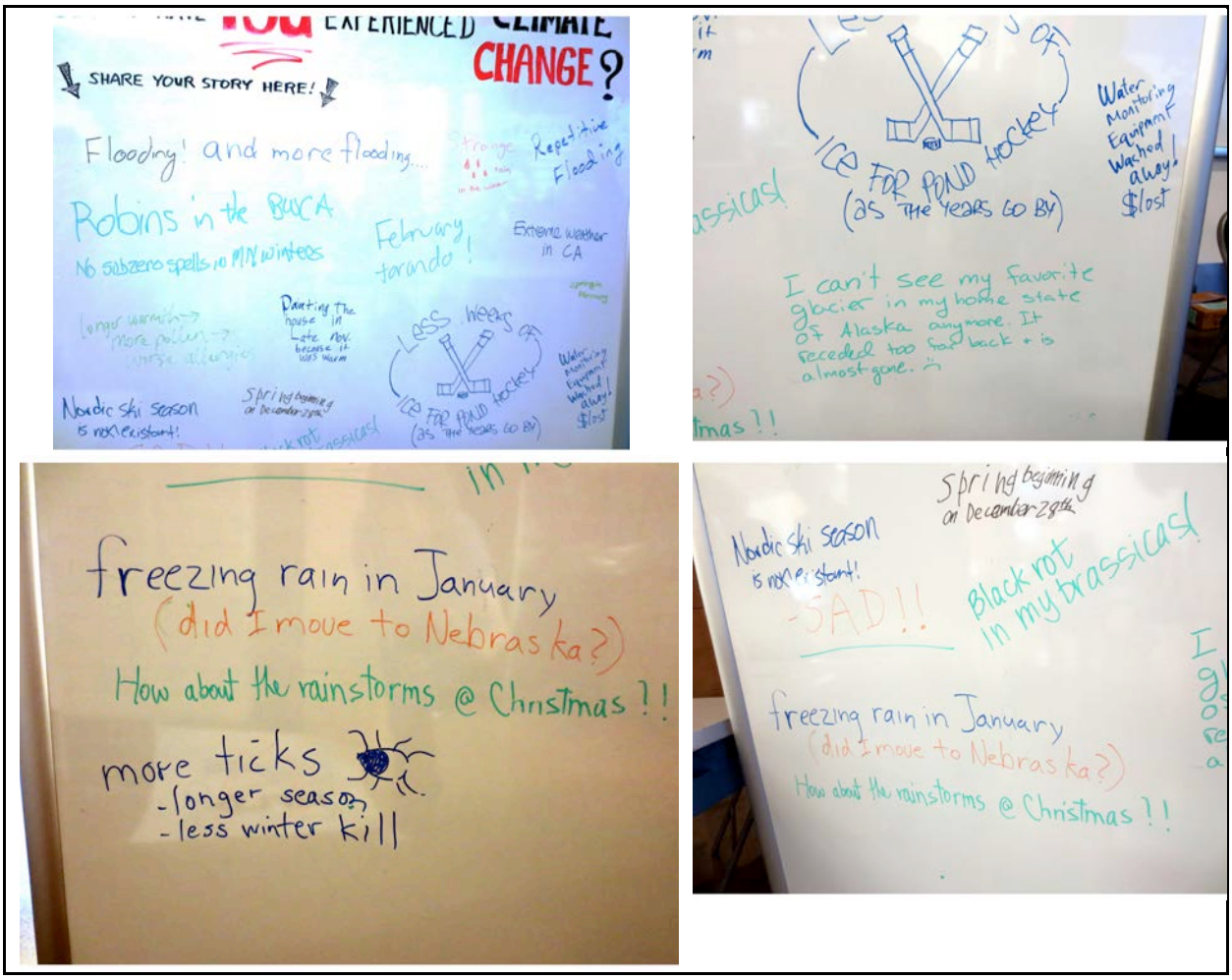


Figure 6: Earth Day 2017 Respondent’s Answers to, “How Have You Experienced Climate Change?”

After working with NACS, NEWG/EQC and GNSC for several months, my knowledge about climate change, climate action planning, and sustainability improved immeasurably, as did my understanding of local city and community knowledge, efforts, and activism. My interaction

with the Northfield citizens was very influential and inspired me to take the climate change conversation to them. In the end, the GNSC was considered the best choice as my client.

Study Purpose

Broadly, the GNSC wanted to understand how citizens of Northfield experience climate change issues. More specifically, the purpose of this study was to understand their knowledge of climate change, where they acquire their knowledge, what actions they are taking, their suggested solutions for climate change, and their barriers to knowledge and action. Participants were interviewed to gather each of their personal narratives regarding climate change. These narratives were gathered to be used in future community activities to begin building collective invested community engagement. This type of invested engagement requires citizens to care enough about an issue, in this case the current and foreseeable consequences of climate change, to become motivated enough to take action (Lorenzoni et al. 2007). The study questions fall into the following five parts: knowledge, action, social participation, leader solutions, and barriers to knowledge and action.

Study Questions

- Knowledge
    1. How does the group define climate change?
    2. How does the group observe climate change?
    3. What are the consequences of the observed climate changes?
- Action
    4. How is the group taking action (now)?

5. What actions do they expect to take later (in the future)?

- Social Participation

6. What groups do the study participants belong to?
7. Where does the group knowledge about climate change come from (trusted source)?
8. Where does the group hear others talk about climate change issues?
9. How does the group perceive the city is taking action (now)?

- Leader Solutions

10. What actions should our city leaders take in the future (later)?
11. What should our broader leadership be doing (future strategies)?

- Barriers to Knowledge and Action

12. What are the group's perceived barriers to gaining knowledge?
13. What are the group's perceived barriers to action?

Study Deliverables

The answers to the research questions the individual narratives captured generated a significant amount of information about the community. This information was aggregated to get a sense of where the community stands in thinking about and acting on climate change issues. Initial results from the applied research project will provide context for participatory scenario-based social learning exercises at town hall meetings, task force meetings, and council sessions. Later use of the narrative data will provide direct and local content for a community-wide survey on climate change and will provide content for a public awareness education dashboard (website) regarding climate change.

Initial study results were presented to the GNSC via a PowerPoint presentation. All GNSC members and the 30 interviewees were invited to attend the presentation. Six interviewees attended the presentation. At the time of the writing of this research report, the study results were used to provide context or content or both for a city council session, a city commission presentation, an Earth Day assembly, and for the development of a community survey. It is sincerely hoped that the results will continue to be used and built upon.

CHAPTER 3

CONTEXT OF WORK

The context of this paper centers on the work others have done to help cities successfully plan for climate change. Throughout this paper, “city” will mean the municipality or governing body of Northfield; “community” will mean the people who live and work in the Northfield area, and “community-wide” will include both city and community. Two major caveats of successful planning for climate change are that climate change adaptation and mitigation projects will not succeed if 1) communities in which they are to be implemented are not understood (Barnes et al. 2013), and 2) broad city and community involvement in developing and implementing mitigation and adaptation projects is not secured (Boswell et al. 2012).).

With those ideas in mind, the Context of Work chapter has been organized into five sections. The first section reviews climate change terms; the second section describes anthropological concepts related to the study of humans and their relationship to climate change; the third section describes how applied anthropology research applies the findings of the research by putting the findings back into use in the community; the fourth section describes the stages of climate action planning and discusses how two levels of community involvement – participatory and invested engagement – assist with successful climate action planning; and the fifth section presents the methodology for building community-wide collective action for social change.

Climate Change Terms

The following terms related to climate change and climate action planning are important to review: mitigation and adaptation, vulnerability, sustainability, and resiliency. Mitigation refers to slowing the rate of change. With climate action planning, mitigation usually refers to

reducing or eliminating the amount of GHGs which are being emitted into the biosphere, where biosphere encompasses air, water and land. Mitigation can also be a type of adaptation where mitigation activities seek to take GHGs out of the atmosphere to decrease the vulnerability and hazards that make adaptation necessary (i.e. carbon sequestration). Adaptation means adjusting locally to the climate changes that are anticipated or already underway. Vulnerability refers to knowing who or what will be affected by climate change: the social, ecological, and economic vulnerabilities related to a hazard that climate change brings. In Minnesota at the state level climate change hazards are identified, those hazards are ranked for their probable occurrence and mitigation possibilities, and studied alongside a vulnerability assessment to determine the priority of mitigation efforts. (MN Department of Public Safety 2014).

Once a community understands how it is vulnerable to and will likely experience climate change from the available state and county data, the community must decide how to strengthen its resiliency to remain sustainable. In the case of Northfield, its vulnerabilities include increasing precipitation, increasing annual temperatures, and less severe winters. Resiliency means to be able to bounce back from adverse events. Resiliency is tied to the capacity of existing social structures, human systems, and natural world (Oliver-Smith 2013). “Resilience in communities is embedded in the historical, social, and cultural constructions that govern social interactions and the material development of communities and attendant institutions pertaining to the management of growth” (Oliver-Smith 2013, 277). Understanding what community resiliency is and how it is built can help a community to understand what social and cultural constructions will have to change in order to be able to bounce back from future social, ecological and economic vulnerabilities. Sustainability refers to continuing to maintain a way of life and have the social structures to be able to support this way of life (Fiske 2012). Today, each

community must define sustainability since many geographical areas experience climate change differently. A community must ask the following: how much of the old way of life can be retained, how much will the community lose, and how can and should it adapt? The answers to any of these questions will determine how willing a community is to shift or adapt its social practices to accommodate a changing climate.

According to Aldrich (2016), there are three different levels by which humans adapt to climate change: simple coping with change, adapting by making adjustments to buildings and infrastructure, and transformational adaptation. Transformational adaptation is the highest level of adaptation. It requires cognitive, affective and behavior change (Aldrich et al. 2016). Lorenzoni (2007) understands human transformational adaptation to climate change similarly, but instead refers to it as invested engagement. Transformational adaptation or invested engagement can result in social practice change, usually for the better of the community.

Anthropological Concepts

Agency and structure are two anthropological concepts central to the study of people. Agency is the expressed ideas, wishes, desires and needs of individuals or groups that lead individuals and groups to influence events (Abbott and Wilson 2015) and to act (Abbott and Wilson 2012). Individual and group agency does not magically appear; it depends upon and is influenced by cultural and social structures (Ratner 2000). Cultural and social structures can be defined as structures that contain the predominant rules or arrangement of a given geographical area. Structures can be thought of as "The pattern or framework of relationships between social institutions such as markets, families, class and political factions. It includes rules of behavior associated, for example, with moral norms and hierarchies" (Abbott and Wilson 2015, 30).

Agency and structure influence one another. Together, agency and cultural and social structures produce a community's social practices (Whitmarsh et al. 2011). These current concepts of agency and culture grew out of important theoretical work done by others. For example in the introduction to her book *Anthropology and Social Theory: Culture, Power, and the Acting Subject*, Sherry Ortner (2006) gives an excellent summary of practice theory. She begins by highlighting the works of Pierre Bourdieu, Anthony Giddens, and Marshall Sahlins saying, "Each in its own way set out to conceptualize the articulations between the practices of social actors 'on the ground' and the big 'structures' and 'systems' that both constrain those practices and yet are ultimately susceptible to being transformed by them." (Ortner 2006, 2). In summary, how a community practices comes from the dynamic relationship and constraints of both agency and structure.

The structure and agency of the city and community of Northfield appear to be shifting. The community-wide agency and social structure began to shift in 2005 and 2008 when the City of Northfield committed to the Cities for Climate Protection Campaign (CCPC) goals to work on reducing GHGs, and then again in 2008 when a sustainable energy action plan was written. The community is continuing to shift today. In 2017, the city – along with community input – committed to writing a climate action plan. In 2018, the City of Northfield City Council unanimously adopted *Resolution 2018- 015 Establishing the Northfield Climate Action Plan Advisory Board* to oversee the process of developing a climate action plan. This marked the beginning of modifying individual and group agency, as well as social and cultural structure, and thereby – hopefully – the social practices of a community wherein the community is beginning to think about, plan for, and act on climate change. Some examples of social practice changes related to climate change and sustainability a community such as Northfield might under go are

more strict community-wide conservation efforts for water and energy, participating in public transportation programs to decrease the number single vehicle drivers, and handling waste in a more progressive fashion by turning waste into fuel.

Whitmarsh (2011) studied how individuals engage with the idea of reducing their personal carbon emissions. Whitmarsh (2011) found, "Achieving ambitious policy targets for carbon reduction depends on societal engagement with climate change and GHG mitigation." (63), In the concluding remarks of the study the authors say that creating societal engagement is a "process of individual learning (e.g., objectification, anchoring) and construction of situated knowledge, as well as engagement with systems of provision and governance and the complex agency-structure dialectic that co-produces social practices" (63). These findings collaborate nicely with how Pelenc (2015) understands functional change in communities with his Capability Approach model.

The Capacity Approach model outlines the collective agency and capability path by which social change can occur and a community can become resilient and sustainable to climate change. The first step is to construct a collective agency. Recall that agency is the individual or group ideas and choices. Pelenc (2015) has constructed a schematic (Figure 7), which describes the steps necessary for constructing collective agency.

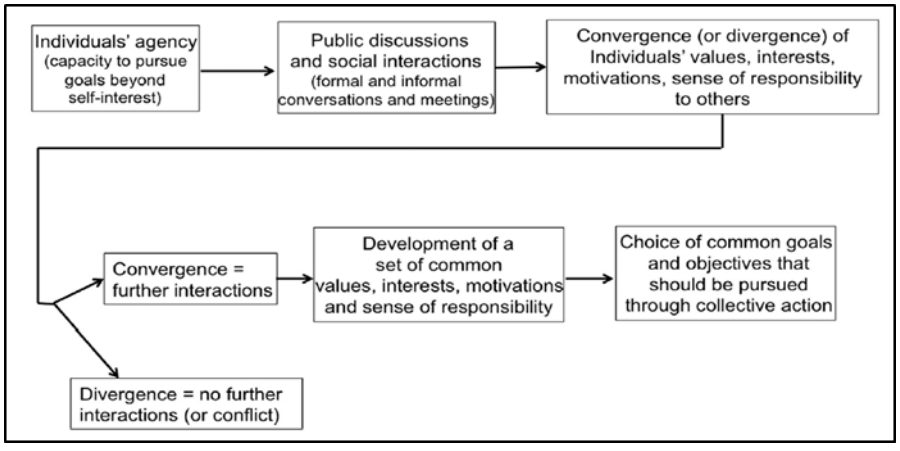


Figure 7*:* Pelenc (2015) Steps to Constructing Collective Agency

The second step is adding capability elements to the construction of collective agency. Capability is gathering the material resources such as time, people, money, goods, services, and social capital to help achieve individual or group goals. Pelenc (2015) (Figure 8) demonstrates how individual or group agency goals, along with capability, work together to achieve a functional collective social agency and action.

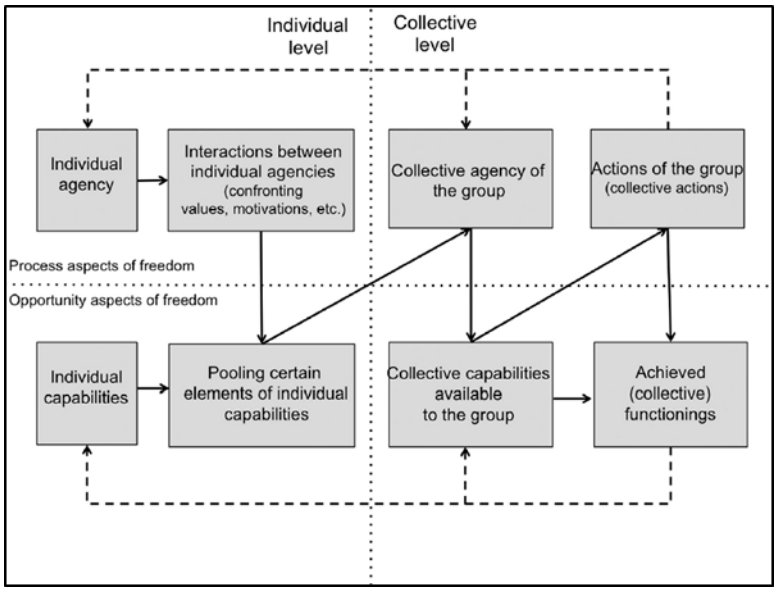


Figure 8: Pelenc (2015) Individual and Collective Agency and Capability Approach Model

Is collective agency and capability enough to promote the modification of social and cultural structures and practices? Whitmarsh (2011) affirms that, "Individual choices [agency] both shape and are shaped by a wider social structure" (59).

The capability approach is a powerful model which helps to assist researchers and communities in developing a collective (community) agency and capability that can lead to new or modified social structures and practices via collective functional social agency and action. Community-led action helps achieve a functional outcome. In the case of climate change, this means the community's willingness to adopt mitigation and adaptation strategies – likely by modifying social practices – that will make the community resilient and sustainable. The goal of

this research project was to collect personal narratives regarding climate change to assess and highlight the community's collective agency, thus beginning the process of invested engagement toward shifting community-wide social practices. The Capability Approach model shows how this process gets started.

Applied Anthropology

One of the preliminary activities a community completes to understand its vulnerability and changing conditions due to climate change is to conduct practical application research (Smit and Wandel 2006). For adaptation or mitigation interventions to occur, communities must understand not only the science of climate change, but also what that means in practical ecological, social, and economic terms (Smit and Wandel 2006). The Global Climate Change Task Force (GCCTF) created a guiding document for the American Anthropology Association (AAA) titled, *Change the Atmosphere: Anthropology and Climate Change* (Fiske et al. 2014). The document argues for a community-centered approach to studying climate change. A community-centered approach is place-based and facilitates community agency to adapt to the effects of climate change. While adaptation occurs most autonomously at the local level it is important to remember that, "Communities operate relative to regional, or even global, cross-scale linkages, [therefore] these larger relationships must also be factored in." (Fiske et al. 2014, 54). Applied anthropologists are poised to take on practical application community-centered research to study and analyze people (agency) and their social contexts (structure). Anthropologists are trained to understand how communities demonstrate their collective community agency and how community agency is influenced by wider social structures.

In depth anthropological analysis can inform multiple dimensions, such as individuals, groups, institutions, city management, and others. In the case of climate change, anthropologists can understand how different groups perceive and understand climate change, its impacts, and which diverse societal dynamics help or hinder as communities plan for mitigation of GHGs and adaptation to climate changes (Barnes et al. 2013). Next, the concepts of a community-centered practice and reflexivity that guide an applied anthropologist's work, and the responsibility a researcher has when conducting community-centered research will be discussed.

Rose Johnston's (2010) paper titled *Social Responsibility and the Anthropological Citizen* reminds practicing anthropologists what their ethical responsibilities are when conducting public advocacy-oriented research. Johnston (2010) elegantly describes that a public advocacy-oriented practice is, "Problem-focused, service-oriented anthropology where the 'field' is literally in your backyard and [where] the close engagement and outcome allows a stronger sense of responsibility and understanding of the social impact of doing anthropology" (S238). This close engagement allows for the practicing anthropologist to have greater understanding and responsibility and, therefore, can impact the outcome of the work and contribute to a meaningful remedy. This is collaboratively oriented and socially relevant action anthropology. Susan Crate, a well-known anthropologist who studies climate change, expresses somewhat similar sentiments by saying that the academic discipline of anthropology has a "moral responsibility to act and advocate"(Crate 2011, 185). The words of Rose Johnston and Susan Crate emphasize the need to be morally and ethically sound when working with people within their respective communities and second, the applied work or action anthropology should also be representative of the community and done for the community.

Merrill Singer (1994) describes the work related to applied anthropology research and where it should be practiced. He responded to Johannsen's (1994) article wherein she struggles to include a post-modern definition to applied anthropology. I chose these two authors to extend my discussion of applied action anthropology because their contributions center on reflexivity and a community-centered praxis (practice). Johannsen's post-modern approach is reflexive and non-imperialist. To her, the researcher records the other and resists inserting him or herself into the dialogue, so people can represent and propose initiatives themselves. She allows the community to reach its own conclusions. Singer agrees with Johannsen's need for this kind of reflexivity, but defends a community-centered approach wherein the anthropologist assists the conversation and inserts him or herself into the dialogue, making sure both agency and structure is represented. What he means here is that anthropologists study the human problem from the bottom up and with an eye at the top, meaning having the capacity to make or expose connections at the community ground level with the higher social structures to affect needed change.

To elaborate on the concept of reflexivity, Crate (2011) states that to transform our cultures and ways of being – to adapt to climate change – requires responsive reflection and action. This requires both the researcher and the participants to engage with one another to be able to see and act. Paschen (2014) reiterates by stating that when the researcher is placed in a dynamic social space, he or she becomes part of the action and is required to take responsibility for the mutually constructed knowledge. On the one hand, reflexivity allows us to objectively see the local place engaged with the other(s), while on the other hand, it allows us to look outward with the other(s) to aid in the transformation of climate change. For example, Western culture is

dependent upon energy intense consumptive practices that contribute to the problems associated with climate change (Crate 2011).

The goal of this research was to generate tangible information for the community to use. The project sought to understand what the community knows about climate change, what they are doing about it, where their barriers to taking action on climate change are, and what suggestions or solutions they have for our leaders. An applied anthropologist has the necessary set of research skills to capture this information from the community, and have the community reflect on what they know and do, or don't know and do. By returning this information to them, the community can then use it for climate action planning, as well as for decision-making processes. The bulk of the information was gathered to assist with future participatory community engagement projects. I am leveraging local community-centered knowledge of climate change to effect social change at the individual, group and institutional level; thereby, putting practice into use (Fiske 2012).

Planning for Climate Change

Simon-Rosenthal (2015) writes that cities are taking the lead and taking control of running their own cities regardless of Federal inaction on climate policy. They achieve this by understanding the reality of climate change in their own communities and are changing and enacting many local policies for the betterment of their communities even without state mandates or federal coordination. Cities and their community of citizens are recognizing it must be through their own agency and capability to find solutions to climate change. Later in this section the concept of the “creative class” is explained. It could very well be that a variant of the creative

class exists in Northfield where their agency and capability talents provide the necessary ingredients for the city to act on climate change at this time.

Every geographical area has its own social, economic, ecological and political constraints when initiating climate change adaptation and mitigation interventions. Therefore, local community-based adaptation and mitigation interventions are critical. Communities must come to understand their own vulnerability to climate change to initiate mitigation and adaptation interventions for a resilient and sustainable future.

Successful climate action planning requires climate action plans (CAPs) that 1) are developed collaboratively by a city and its community, and fit the community's expected goals and capacity (Smit and Wandel 2006); 2) have strategies to decrease GHG emissions and adapt to the changing climate that are incorporated into existing policies (Smit and Wandel 2006; APA 2011); and 3) have implementation strategies where citizens can modify social practices over time (Boswell et al. 2012). Boswell (2012) notes that climate action planning bodies, such as city staff, advisory boards, councilmembers, or consulting groups that take the time to know the community before, during, and after the generation of a CAP will encourage more community participation and have a better chance of successful implementation of the CAP. The next section first describes the three-stage climate action planning process for developing a CAP and is followed by a discussion about how public participation and invested community engagement assist with the planning process.

The Climate Action Planning Process

Planning for climate change is a lengthy process that usually culminates in the development of a CAP. A CAP is a guide or outline created for an institution, community, city,

state, or nation to follow in order to help contribute to the overall reduction in GHGs and create strategies to remain resilient and sustainable with future climate changes. Climate action planning is roughly a three-stage process with ongoing iterations within each stage. Figure 9 shows the timeline for Northfield's planning process. Northfield's planning mirrors Boswell's (2012) three-stage climate action planning process which consists of 1) preliminary activities that motivate the city and its community to begin the planning process, which sets the stage for CAP development, 2) the development of the CAP itself, and 3) the implementation and monitoring of the CAP.

STAGE 1 Preliminary Activities	STAGE 2 CAP Development	STAGE 3 CAP Implementation and Monitoring
2005 ---------- 2018	2018 --- 2020	2020 and beyond

Figure 9: Timeline for the Planning Process in Northfield, MN.

Stage 1, Preliminary Activities, establishes community commitment and partnerships, audits existing community policies, considers the logistics and funding of the plan, and assembles a planning team(s) to determine the role of the plan. While these preliminary activities do not a have a specific order, they all must be considered (Boswell et al. 2012). Community commitment toward future sustainability has been growing in Northfield since at least 2005 when the city took a symbolic step by signing onto the CCPC to reduce local GHGs. Given the amount of activity over the last 13 years, one would think a climate action planning would have gained traction earlier. However, establishing community commitment and partnerships requires several community characteristics to align.

Simon-Rosenthal (2015) describes three characteristics which indicate the likelihood that a city will act on climate change. These include professional municipal capacity, civic capacity

and political support. Professional municipal capacity at the city level is either represented by a strong mayor or a professional city manager. Currently, it is fair to say Northfield has both. In addition, there is currently at least some interdepartmental sustainability discussion within the municipal operations. Civic capacity is defined as active citizen participation with problem solving and educational attainment. Northfield boasts two popular private colleges, and it has a high level of per capita educational attainment. For example, comparing the population in the state of Minnesota with the population in Northfield, Minnesota, the population in Northfield has more people (46%) who have attained a bachelor's degree or higher than the population of the state (34%) (United States Census Bureau 2016). Portney (2010) more elaborately defines civic capacity as cities that have strong community participation (civic capacity) in local reform groups and neighborhood associations. He adds that this community participation is outside of the electoral (political) arena (Portney and Berry 2010).

The last of the three characteristics that Simon-Rosenthal (2015) describes is political support, meaning the community leans toward Democratic policies and has active environmental groups. While Northfield is a decidedly Democratic community, in the 2016 general election, Rice county –where most of Northfield's citizens reside – gave the Republican candidate more votes: Trump at 47.0% and Clinton at 44.8%. Minnesota is traditionally a Democratic state and voted Democratic in the 2016 presidential election. However, the 2016 vote was close with Clinton at 46.44% and Trump at 44.92% of the votes.

Closely related to the second and third characteristic is an emerging characteristic described by Simon- Rosenthal (2015) called the creative class. The "creative class", a term coined by Richard Florida (2002), describes individuals who can have influence at the local policy level because they are, "People who value diversity and culture, who prefer urban living

over suburban sameness, and who bike and run and therefore want 'amenities like traffic free bike-paths'" (Simon-Rosenthal et al. 2015, 542). Bringing in the idea of a creative class here is to illustrate that people regardless of political leaning may be becoming more interested creating a healthy community within which they live rather than emphasizing party affiliation. The creative class perhaps has recognized that they can affect local decision-making and policy and is why the city is writing a climate action plan at this time.

Figure 10 contains the last three general election political maps[2] for the state of Minnesota. At a glance, one can see the state's changing political demographics. Figure 10 helps to confirm the point that each type of capacity – professional, civic or political – plays a role in moving a city and its community of citizens toward or away from climate action planning (Portney and Berry 2010; Simon-Rosenthal et al. 2015). In this case, Northfield appears to have lost electoral Democratic political ground but is perhaps achieving a greater level of civic capacity, where civic means community participation and decision-making, and is perhaps acquiring a more local "creative class" that understands they can affect change at the local government level. Recall that together, agency and capability can create functional collective social agency and action, and can create new social practices. It appears that professional municipal capacity, civic capacity and perhaps the a new creative political class, have all strengthened or aligned around climate change and sustainability issues to put Northfield in the position to write a climate action plan at this time.

[2] Margin-by-County Election Statistics Maps were found on the Office of the Minnesota Secretary of State Steve Simon website https://www.sos.state.mn.us/search-results-master/?search-box=general%20election%20mpas

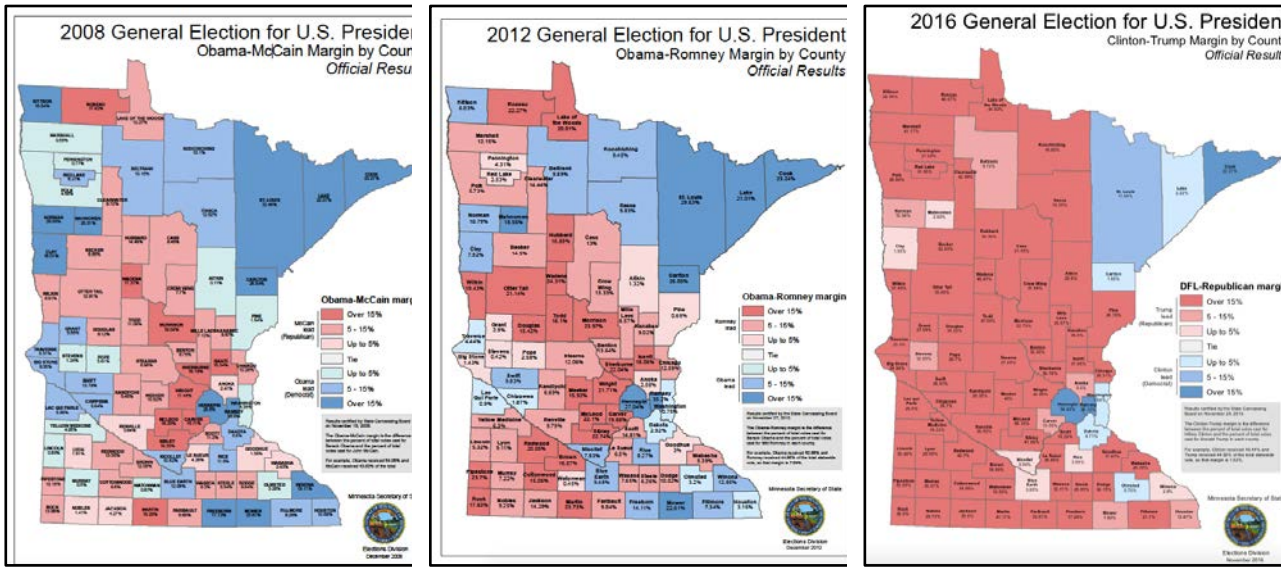


Figure 10: 2008, 2012, 2016 Minnesota General Election Margin-by-County Maps

Stage 2 includes the development of the CAP. There are four steps within this stage. The first step requires defining the scope of the CAP. Is the scope of the plan to simply decrease community-wide GHGs through energy conservation, or is the scope to more broadly re-write a city's comprehensive plan to make major policy changes? The latter scope would incorporate future climate changes, allowing the CAP to have broad strategies that will help the community adapt to long-term changes. Determining the scope of the plan says a lot about where a community is in thinking about what they realistically want to and think they can achieve.

The second step in Stage 2, developing a CAP, is to conduct a baseline GHG emissions inventory. A GHG emissions inventory is usually divided into city and community emissions. Community emissions are much larger than city emissions. Measuring emission sources usually falls into categories such as energy, water consumption, agriculture, transportation, industry and waste. The third step is Stage 2 is to set measurable GHG reduction targets. A target forecasts how much GHG emission can be reduced and in what timeframe. For example, the energy

resiliency report, *With Hope: A Resilient Community* written by the Northfield Energy Task Force from 2008, set the target for Northfield to be "carbon free by 33" (NETF 2008, 2).

The fourth step includes developing, evaluating, specifying, and quantifying mitigation and adaptation strategies, projects, or interventions which can decrease GHGs or lead to adaptation solutions. Climate change mitigation and adaptation issues can be categorized as ecological, social or economic. Their strategies for intervention should be built per the city's ability to implement them (Boswell et al. 2012).

Stage 3 includes implementing and monitoring the CAP and requires developing an implementation program or project timelines – the what, how, and who. It requires continuous monitoring of the strategies and projects to determine if the stated target reductions are being reached. Strategies or projects that are not working (reaching targets) need to be modified and the plan updated Boswell et al. 2012).

Essential community characteristics are necessary before intentional climate action planning can begin. Many factors must align to get the climate action planning process started. To keep the planning process moving, both the community leaders and citizens must participate. Building collective community agency and capability to develop and sustain climate action planning requires an involved citizenry (Boswell et al. 2012).

Public Participation and Invested Community Engagement

In his book, *Planning for Climate Change*, Boswell (2012) states, "Best practice calls for establishing the opportunity for the public to participate in the planning process" (65). There are two ways a public can participate in the planning process: via public participation or invested engagement. A participating public helps to make decisions and acts, but an invested public is

engaged and makes an investment. It is a matter of degree. Participation is decision-making and action, whereas, “A state of engagement is understood here as concurrently comprising cognitive, affective and behavioral aspects. In other words, it is not enough for people to know about climate change in order to be engaged; they also need to care about it, be motivated and able to take action” (Lorenzoni et al. 2007, 446).

The International Association for Public Participation (IAP2)’s Public Participation Spectrum is shown in Figure 11. Movement on the spectrum towards the right promotes increasing public participation. Shifting right on the spectrum motivates individuals and others towards invested engagement. However, this type of public participation, as Tim Bonnemann from Intellitics points out, is more top-down where there is a convener, someone assisting the process.

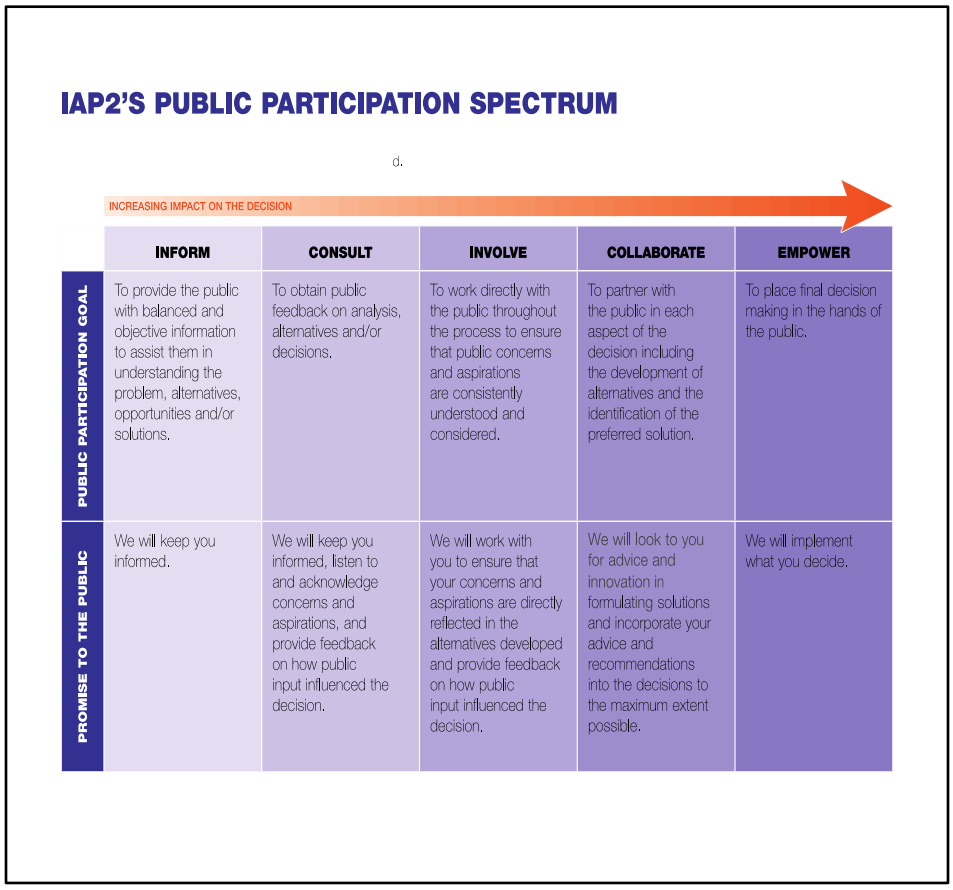


Figure 11*:* IAP2’s Public Participation Spectrum

While public participation is a very necessary beginning, to reach community-wide invested engagement, citizens need to move away from early participation, problem solving, and decision-making, and towards action. Citizens in communities that are planning for climate change need to move from individual agency to collective agency, from simple participation and action to invested engagement and collective invested community action that works toward modifying the social practices of a community. The IAP2's Public Participation Spectrum, Lorenzoni's (2007) definition of invested public engagement, and Pelenc's (2015) Capability Approach model provide guidance on how communities can reach invested engagement to modify social practices.

This project completed for the GNSC used parts of the public participation spectrum. The public was consulted via structured interviewing to understand what they know about climate change and what climate change issues they are actively pursuing. This work leads to the next two levels of public participation: involve and collaborate. At upcoming community meetings and workshops, the information gathered during the consulting level will be used to involve and collaborate with the public to continue to build collective agency.

Methodology for Social Change

How does the community get from collective agency to finally reaching invested engagement where the community is ready to take on intentional collective action? Collective agency, as Pelenc (2015) shows through his Capability Approach model, starts the process toward invested engagement and achievable action, but collective agency can never be imposed; rather, it emerges through the learning process (Pahl-Wostl 2006; Pelenc et al. 2015). Going into this project, I knew that collective community-wide invested engagement and action is the

necessary ingredient to successfully develop and implement climate change strategies in a CAP. Therefore, the goal of my project was to begin the process of moving toward invested engagement by collecting and understanding local knowledge, and gathering the data to reveal the overall knowledge of a group of thirty interviewees. Understanding the local knowledge of a community is an on the ground, bottom-up model of truth (Fiske et al. 2014). Local knowledge is an indirect measure of the lived experience or how individuals interpret their world, which may or may not hold truth (Paschen and Ison 2014); yet, it is what the community knows, thinks and acts upon.

Local knowledge is collective agency. Sharing gathered local knowledge about climate change with other local community groups promotes the climate change conversation; therefore, with each new conversation with other local community groups, the shared knowledge becomes more broadly known and additions are made to the body of knowledge. Sharing this information promotes social learning that can improve and build collective agency that can lead to invested engagement. The following section describes how one's lived experience contributes to local knowledge production, how the lived experience can be captured using narrative research methods, and how social learning can enhance community engagement efforts toward climate action planning.

Narrative Research and the Concept of the Lived Experience

Paschen (2014) describes the narrative research method as a method to "open up the process of social transformation in ways that shift the understandings and practices of those involved" (1089). The narrative research method must move beyond the extractive, which is simply objectifying the data where the, "Individual and collective narratives provide

understanding of where a particular community stands on the issue of environmental change, what kind of [climate change] adaptation measures they might consider necessary, feasible or desirable, and why" (Paschen and Ison 2014, 1087). While objectifying the data is certainly useful, the narrative research method can contribute much more to include viewing the social reality and knowledge embedded in the narratives, "As the social processes of how meaning is constructed and negotiated through narrative between social actors" (Paschen and Ison 2014, 1087). What this means is that narratives should be able to both inform and sustain public dialogue.

A narrative can simply be defined as one's story. A narrative embodies the lived experience of an individual. The lived experience is a social process that is shaped through both social structures (power relations) and individual and collective agency or positioning. Additionally, one has both personal narratives (from accumulated life histories, and social, economic and political confines) and collective narratives (shared experiences of the group such as emotions, beliefs, myths, indigenous knowledge) that lead to certain personal and collective actions (Abbott and Wilson 2012, 2015). When studying human interaction with climate change, lived experiences show the mechanisms by which climate change is happening and the actions that are taken in everyday life to adapt (Abbott and Wilson 2012). What a population knows comes from a multitude of lived experiences that have evolved over time. Through these narratives, others can uncover ecological, social, economic, and political conditions that are embedded in communities (Fiske 2014). Capturing the lived experience of individuals through the narrative research method creates "open knowledge" (Abbott and Wilson 2012,110), where the varied and diverse experiences and knowledge of others is used to build collective knowledge

and stimulate action (Hage et al. 2010; Johnson et al. 2012). With regards to this paper and research project, this open knowledge will contribute to local social learning.

Social Learning

Social learning is a process whereby individuals encounter and engage with the diverse perspectives, realities and experiences of others to build collaborative relationships and public deliberations that lead to collective action (Johnson et al. 2012). Social learning occurs when group interactions change individual knowledge and understanding. This individual learning then influences and informs other groups' knowledge and action (Johnson et al. 2012).

Participatory scenario-based social learning (PSBSL) is a type of social learning that throws local knowledge production wide open to explore all possibilities in an attempt for all to to understand one another (Murphy et al. 2016). As a narrative-driven assessment methodology used in this project, PSBSL (Murphy et al 2106; Johnson et al. 2012) first requires collecting lived experience narratives to generate a body of local knowledge. Using this local knowledge inspires reflexive learning to build "critical [community-wide] emancipatory knowledge" (Murphy et al. 2106, 44). This reflexive learning and emancipatory knowledge creates a space where individuals can participate in the process of developing plans for a sustainable future that works for their community. Reflexive learning in the PSBSL model means reflecting on all the contributed knowledge and iteratively adjusting it. Later, climate change scenarios are created from the gathered local narratives (knowledge). A scenario is built to visualize what the collective group has portrayed as the community's reality. The freedom (emancipation) to design and implement strategies for a sustainable future comes from combined reflective collaborative community thought and effort. The project results contained in this paper complete the first step

of the PSBSL methodology. Thirty lived experience narratives have been collected and have created the content that will be used by the broader community for reflection and visible thinking to begin moving toward collective agency and action. Sharing and combining individual lived experience narratives can help to visualize and grow individual and collective agency.

CHAPTER 4

PROJECT DESIGN

Participant Selection

Participants were primarily selected based on age and occupation. Sixty-nine individuals, 30 years of age and older, were asked to participate in the project in person (21), via email (20), postal mail (15), and by telephone (13). Individuals from each of the 22 Standard Occupational Classification System categories were invited to participate in the study. This way I created a stratified sample: the interviewees were differentiated from one another by occupation. Within each occupational category, I assumed each had its own occupational language and priority of topics discussed. Individuals may acquire or lean in the direction the occupational group norms and the group may influence their thinking and actions.. Of the thirty-seven individuals who initially agreed to participate 6 were known to the interviewer through church and 11 were acquaintances from other Northfield groups. This point is brought up because participant recruitment was no easy undertaking. Midway through the project while still selecting based on age and occupation I turned to recruiting people that I knew. Thirty individuals completed the interviews and most were recruited in person (14) and telephone (8). Fewer individuals agreed to participate when contacted via email (6) and postal mail (2). This proved to be an interesting finding – it can be assumed that people prefer human interaction when being ask to do something. Thank you notes were sent to every participant, thanking them for their participation. All participants were invited to attend the presentation of the study results given to the client in late October of 2017. Six participants attended the presentation.

All of the individuals who agreed to participate in this project were white. Three individuals of Hispanic origin were contacted. One agreed to participate, but a mutual time to

conduct the interview could not be found. One individual of Native American descent was contacted but declined to be interviewed. No individuals of African American, or Asian descent were contacted. An attempt was made to include participants from all origins, however demographic statistics from the United States Census Bureau (2016) show that Northfield, Minnesota is predominately white – 83.9%. The next largest population is the Hispanic at 7.7%, followed by African Americans at 2.3%. While the sampling strategy did attempt to represent individuals in Northfield, more emphasis was placed on age and occupation. The age group 30-49 was the most difficult to recruit. The United States government uses the Standard Occupational Classification System to collect occupational data. Eighteen of the twenty-two possible standard occupational classification system categories were represented. All thirty interviews were used when aggregating and analyzing the group interview data. However, only 29 of the interviews were used for the within the group or sub-group analysis because one interview was missing too much data. Tables 1, 2 and 3 provide demographic information about the group.

Table 1: Demographics

Demographic		%
Gender	Male	66
	Female	34
Age Average Age 58	30-49	21
	50-69	62
	70+	17
Percentage of each group that is a	Northfield Native	17
	Mn Native	49
	Midwesterner	24
	Other	10

Data Collection

A semi-structured interview guide was constructed from the research questions that were presented in Chapter 2. Each participant was asked similar questions about climate change. The interview questions generated data about the participants' personal knowledge and experience with climate change. In a few cases, a question may not have been asked or asked but not answered, as the conversations would sometimes get sidetracked. Every effort was taken to ask each participant all the questions. All interviews were audio recorded and transcribed. Transcribed interviews were loaded into MAXQDA –a qualitative data analysis software program. MAXQDA provides many features that can assist with coding, analysis and statistics.

Data Analysis

A codebook was constructed to help categorize the interviewees' responses to the semi-structured interview questions. The codebook helped the researcher sort the transcribed interview (text) for analysis. There were thirty original codes. As the analysis process evolved, some of these original codes were revised. Three different analysis strategies were used: deductive, inductive, and recursive. A deductive approach tags participant responses to predetermined categories called codes. In this way, the responses are tagged or coded. For example, the categories for observing climate change were winter, temperature, and precipitation. When an interviewee spoke about a change in winter, that portion of the text was tagged and inserted into the winter category or code. Often, the deductively coded responses needed revision to either collapse some codes together or rename the code. Collapsing means to combine codes together. The inductive approach allows for themes to emerge as the researcher became successively more familiar with the data. For example, these themes that arose from the barriers to action category –

personal preferences, political inertia, and economic livelihoods – only became apparent after reading and rereading the transcripts to understand the overall meaning of the group's responses. The recursive approach is revisiting the data and adjusting the codebook rules as new insights appear. For example, in measuring the degree of individual engagement, an insight that emerged later in data analysis, required using a ranking value system versus a categorical tagging system.

To measure the degree of individual variation within the data, a ranking system using 11 of the codebook measures placed individuals into one of the following three sub-groups: Minimals, Moderates, or Mosts, depending on how engaged they were with climate change. The three levels of engagement with climate change were determined by what the individuals know about it, how much action they are taking on it, and the amount of social effort put forth to advance awareness and action. The more knowledgeable or action-oriented a participant was when answering specific questions, the higher the ranking he or she received. For example, one of the 11 measures asked, "What are you doing to lessen or adapt to climate change?" The participant's answers would be placed into one of the following five categories: energy, transportation, consumption and waste, land, or advocacy/education. The participant was then ranked for that measure according to how many total categories of lessening or adapting to climate change in which he or she was participating. All 11 measures in the areas of knowledge, action, social participation, and solutions were ranked in this fashion. The 11 ranked measures were tallied to determine the level of total engagement of each individual. Group inclusion scores were determined for the Minimals, Moderates, and Mosts. The individual was placed in the group with the corresponding score. See the appendix for further explanation of the 11 measures.

CHAPTER 5.

FINDINGS

This research was designed to begin accumulating baseline community knowledge about climate change and for this initial knowledge to be used to build and sustain dialogue on climate changes issues. The hope is to create the beginnings of a community conversation intended to stimulate broad collective invested engagement. Recall that this project collected personal narratives from thirty Northfield citizens. These narratives have been aggregated. The data create a clear picture of the strengths of the group, while also showing the limitations of the group. Additionally, the data from the narratives illuminates which climate change issues the group is most concerned about; this can point to the climate change issues on which the community would likely be willing to start to act. Much of the narrative data has been summarized and can be found in the appendices of the report generated for my client, the Greater Northfield Sustainability Collaborative (GNSC). The report titled *How Northfield Engages with Climate Change: A Project Completed for the Greater Northfield Sustainability Collaborative* can be found on the Greater Northfield Sustainability Collaborative (GNSC) website: http://northfieldsustainability.org.

The findings chapter is organized into two sections. In the first section, the group level research results are presented according to the thirteen study questions, which are grouped into the following categories: knowledge, action, social participation, leader solutions, and barriers to knowledge and action. One main takeaway is that the group is aware of and knowledgeable about climate change. Another takeaway is that the group is aware of the barriers they face to become more knowledgeable about, and to actively participate in, climate change issues. Actively participating in climate change issues means taking personal or collective action to

reduce reliance on the things that contribute to the greenhouse gases (GHGs) that are changing the climate. A final important finding for the group is that they think they are already taking necessary actions, and they do not seem to anticipate the availability of future actions.

The second section presents the findings of the variation within the group. Late into the analysis of the narratives, it was noted that the group data could be examined to understand the individual variation in the group, and three distinct sub-groups emerged. While the whole group perspective gives a cumulative picture of the group's knowledge and interaction with climate change, a more in-depth analysis of each of the three sub-groups revealed that the group is not homogenous. Social participation seems to be key to one's level of involvement with climate change issues. Both group and within group variation results illuminate what the community thinks about and how it is acting on climate change and sets the stage for future social learning and invested engagement.

The Group

Group Knowledge

The group's knowledge about climate change was measured by 1) how the group defined climate change, 2) how many observations the group made about climate change, and 3) the number and type of climate change consequences/impacts the group could explain.

Definition of Climate Change

Participants were asked to define climate change.[3] Their responses were analyzed with

[3] Yale Climate Opinion Maps – U.S. 2016. Over 70% of the citizens of Rice County believe that the planet is warming. An assumption was made that the interviewees understood that climate change was occurring because they know the world is warming. http://climatecommunication.yale.edu/visualizations-data/ycom-us-2016/?est=happening&type=value&geo=county

consideration to the definition of climate change given on page 1 of this report, where climate change is defined as a change in any weather variable over time. Responses received were often not straightforward, so reading and re-reading of the passages was required to determine the meaning. Table 2 shows how this group most frequently defined climate change. Ninety percent could provide a basic definition of climate change as either a weather-related/storm event or change in temperature. The terms "storm" and "weather" were often used interchangeably, so these responses were grouped together. Thirteen of 30 (43%) participants included in their definition that human activity is causing climate change.

Table 2: Defining Climate Change (*N* = 30)

Definition	*n* (%)
Weather/Storms	23 (77)
Heat/Temp.	15 (52)
Humans	13 (43)

Observing Climate Change

While analyzing the group's responses to the question "How do you observe or experience climate change?" it became evident that the group was describing the same climate changes that the state experts also described. Therefore, Minnesota's top three projected climate changes became the main categories (see Figure 2). They include increased average annual temperatures, increased precipitation, and less severe winters. Everyone in the group observed at least one of Minnesota's climate changes. More specifically (Figure 12), 23 out of the 30 (77%) participants observed changes in both Minnesota's winters and an increase in precipitation, 22 out of 30 (73%) participants noticed temperature changes, and half of the group mentioned all

three of Minnesota's climate changes. How many times participants mentioned each climate change by giving an example is shown in Figure 13. Participants mentioned Minnesota's top three climate changes 154 times. Winter was mentioned 65 out of 154 times (42%) whereas precipitation and temperature were mentioned less often, 45 out of 154 (29%) and 44 out of 154 (28%) respectively. All three of Minnesota's top climate changes are being noticed. The climate changes associated with winter are discussed most often.

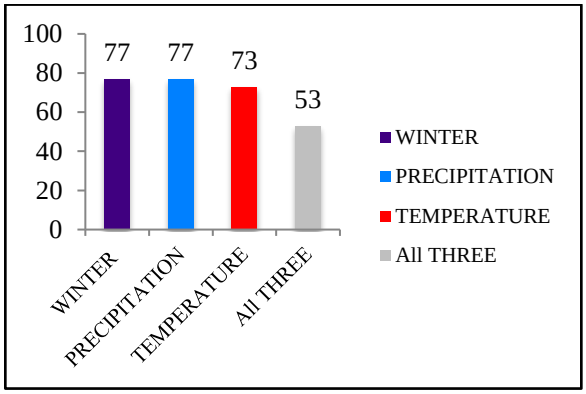


Figure 12: Percent Observering Climate Change

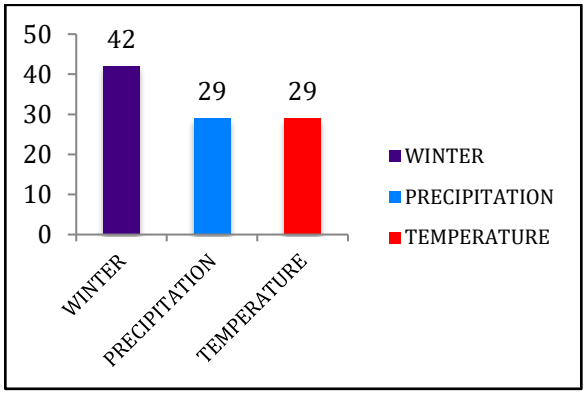


Figure 13: Percent Each Climate Change is Discussed

Impacts of Climate Change

All research participants provided examples of the ecological, economic, or social impacts of their observed climate changes. These terms come from the adaptation literature used

to describe the ecological, economic, or social impacts of climate change (Smit and Wandel 2006; Paschen and Ison 2014) Twenty-seven out of 28 (96%) participants provided social examples, 24 out of 28 (86%) gave ecological examples, and 23 out of 28 (82%) gave economic examples. Nineteen out of 28 (68%) participants gave examples of all three impacts. To illustrate both the group observations of climate change and its impact, a partial community model was created (Figure 14). The community model is modeled after the Community Model found in the adaptation research of Cone (2013). Community models are developed with input from community members. The observations and impacts in the partial community model in Figure 14 is a partial representation of the participant responses. Most, but not all, impacts were negative.

Certain impacts can be interpreted as having a positive outcome, such as warmer average temperatures, which allow for longer growing and construction seasons. To explain this further, Figure 15 is an illustration of how many examples the participants gave of the social, ecological or economic impacts of climate change. All of the examples each participant gave were written down. Each separate unique example was counted. Where 5 participants gave the same example, this example was counted only once. This highlights the breadth of knowledge about each impact versus simply acknowledging how many people mentioned the impact. Figure 15 reveals that the participants gave more economic impact examples than either social or ecological impacts. Of the 45 economic impacts to less winter, more precipitation, and warmer temperatures the participants described 36 (80%) of them as negative and 9 (20%) of them as positive outcomes. This finding is discussed more fully in the Discussion and Conclusion chapter.

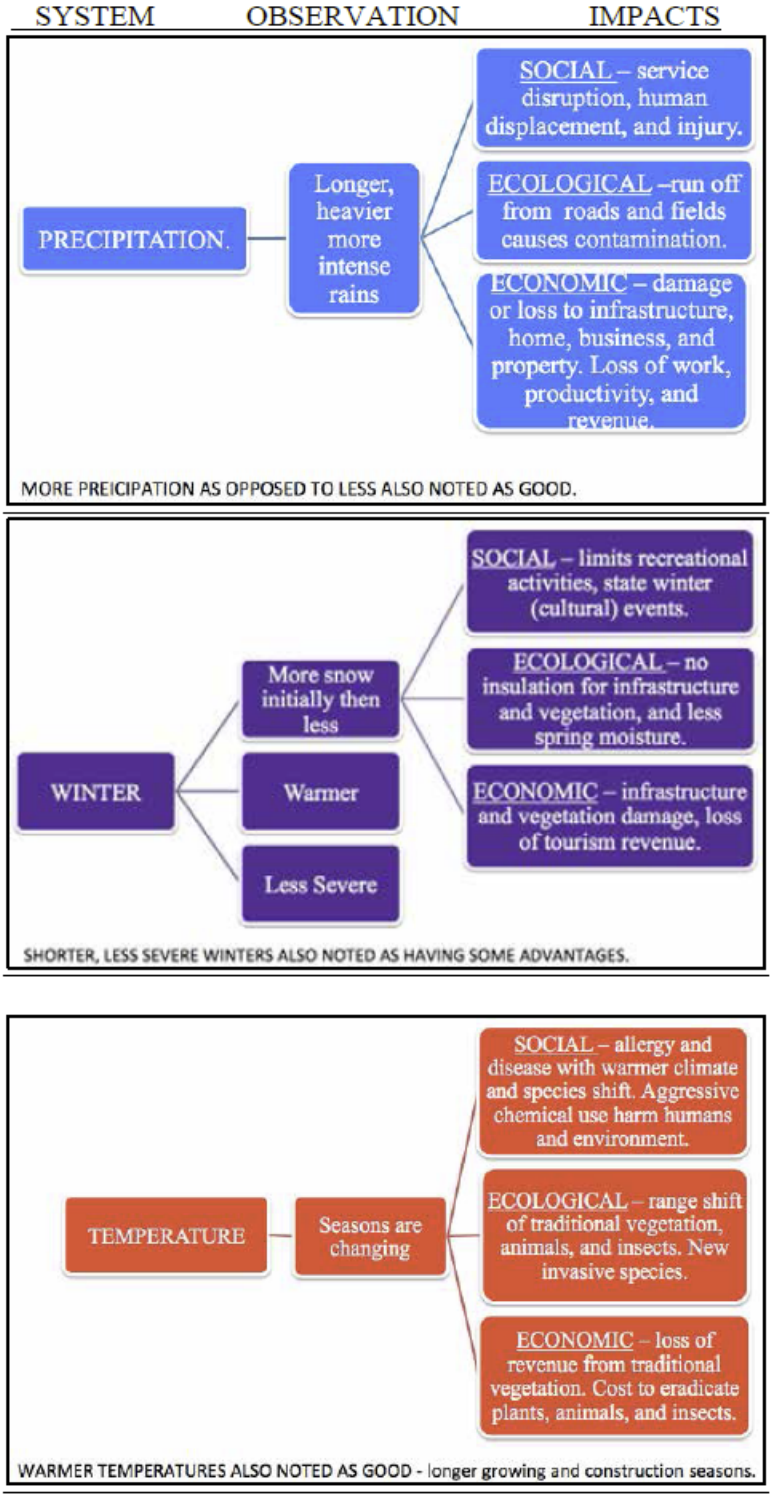


Figure 14: Partial Community Model of Observed Climate Changes and the Impacts of Those Changes

BREADTH OF IMPACTS		SOCIAL	ECOLOGICAL	ECONOMIC	
				-	+
	WINTER	12	8	14	2
	PRECIPITATION	9	9	11	1
	TEMPERATURE	10	11	11	6
Simple counts representing breadth of impacts.		31	28	**36**	9

Figure 15*:* Breadth of Impacts

Group Action Now and in the Future

Taking action is defined as making a personal contribution toward reducing and mitigating climate change in the following areas: energy, transportation, consumption and waste, land use, building, and agricultural practices, or helping to advance advocacy and education. The categories Energy, Consumption/Waste, Advocate/Educate, Transportation, and Land/Built Environment are similar to those found in the climate action planning literature. Typical participant responses in the Energy category include energy use, efficiency, and conservation. Responses in the Consumption/Waste category were almost unanimous regarding recycling, whereas changing consumption practices such as consuming less or buying locally were rarely mentioned actions. The Advocate/Educate category included responses such as educating children and others in one's social groups and participating with groups that advocate for sustainability. Transportation generally pertained to electric cars, carpooling, and public transportation options. Land/Built Environment is a very broad category. It pertains to land use, building and agricultural practices, and water use, access and treatment.

The two tables in Figure 16 show, from top to bottom, the type of actions people are taking now, and what action they are thinking about taking later in the future. The table on the left shows the actions that people are taking today. The frequency simply states how many people spoke about making a personal contribution within the respective category. From the table on the left in Figure 16, it can be assumed that people are taking the most personal action on energy, with 25 out of 28 (89%) participants, and consumption and waste, with 19 out of 28 (68%) participants. The least amount of action taken is attributed to land/built environment, with 8 out of 28 (29%) participants. The table on the right indicates the action people are thinking of taking in the future. Figure 16 indicates the following two results: the first is that making personal contributions to climate change mitigation and adaption efforts is not uniform across all the categories, and the second is that fewer people are talking or thinking about additional future personal actions.

SELF ACT NOW	
Category	**Frequency**
Energy	25
Consumption/Waste	19
Advocate/Educate	11
Transportation	10
Land/Built Environment	8
DOCUMENTS with code(s)	28

SELF ACT LATER	
Category	**Frequency**
Energy	13
Transportation	9
Consumption/Waste	6
Advocate/Educate	4
Land/Built Environment	1
DOCUMENTS with code(s)	24

Figure 16*:* Taking Action Now and Later

Social Participation

For the purpose of this research, the amount and type of social participation is measured by looking at the following four topics: trusted source of information, community conversation, type of social activity, and knowledge of city-level action. Knowing where and how individuals participate socially and what their preferred information sources are may point to possible

reasons why an individual is or is not engaging with climate change issues. This section summarizes the group's social participation characteristics. More detailed discussion comes later in this chapter in the Within the Group Variation section and the Discussion and Conclusion chapter.

Trusted Source of Information

Participants were asked about their primary source of knowledge and what source they trusted to learn more about climate change. Responses were categorized into mainstream media, scientific, social, or personal sources. Definitions of each source are provided adjacent the frequency charts below. The frequency chart on the left in Figure 17 indicates that people identified mainstream media sources as most preferred over other sources of information. Media is defined as mainstream print news, TV, and online sites. Scientific sources are scientific or technical journals, academic conferences or symposiums, and environmental groups, such as Citizens Climate Lobby. The frequency chart on the right shows what source people prefer when getting information about climate change. Mainstream media remains the most trusted source.

PRIMARY SOURCES OF KNOWLEDGE	
SOURCE	Frequency
1. MEDIA	23
2. SOCIAL	10
3. PERSONAL	6
4. SCIENTIFIC	5
Total (Valid)	28

TRUSTED SOURCE OF KNOWLEDGE	
SOURCE	Frequency
1. MEDIA	18
2. SCIENTIFIC	11
3. SOCIAL	9
4. PERSONAL	1
Total (Valid)	27

SOURCES OF KNOWLEDGE	
SOURCE	TYPE
MEDIA	TV, NEWSPAPER, RADIO, MAGAZINES, BOOKS, ONLINE SITES
SCIENTIFIC	SCIENTIFIC JOURNAL, TECHNICAL READING, PROFESSIONAL CONFERENCES AND SYMPOSIUMS, BIPARTISAN GROUPS LIKE CITIZENS CLIMATE LOBBY
SOCIAL	FAMILY, WORK, BROADER ASSOCIATES, FRIENDS, CHURCH, EMAIL GROUPS
PERSONAL	ACTUAL OBSERVATION, TRAVEL

Figure 17*:* Trusted Source of Information

Community Conversations

Participants were asked if they heard others talking about climate change while out and about running errands, eating dinner, or at social events in the community. Nearly 60% of the group answered they did not hear conversations about climate change when at social gatherings or in public spaces. Thirty-three percent of the group was encountering at least some conversations about climate change. Only 11% of the participants indicated that they did hear many or a lot of conversations about climate change while they were out and about in the community.

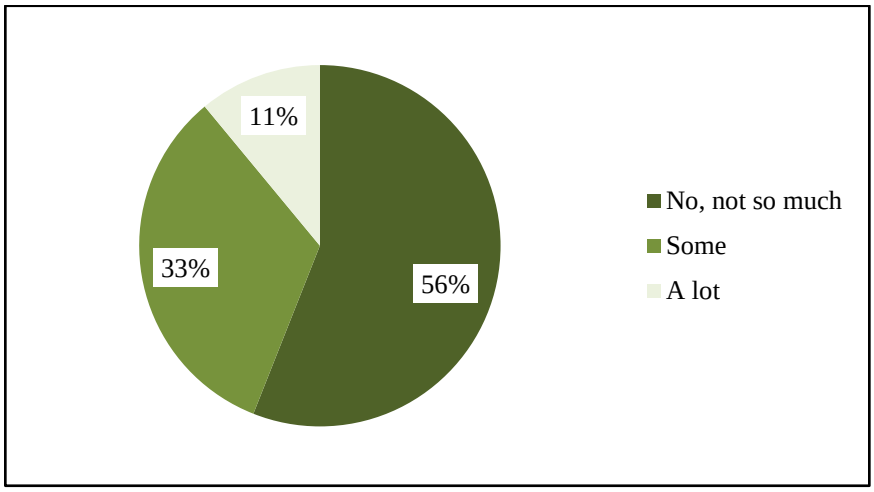


Figure 18*:* Hear Others Talking about Climate Change

Type of Social Activity

During the interview, participants were asked to describe the activities in which they partake. Knowing what kind of activities people participate in provides insight into where certain types of information may or may not be shared. Activities ranged from professional groups, such as the American Nurses Association, to music groups, local clubs, such as Rotary, and neighborhood book clubs or bike groups. When the interviews were completed, the process of consolidating these activities was executed. The following categories capture most of the

activities of the group: outdoor, business, spiritual, social, and civic. Twenty-six out of 30 (87%) participants partook in some form of outdoor activity, 21out of 30 (70%) associated with a spiritual or religious group activity, 18 out of 30 (60%) were connected to a business association, 15 out of 30 (50%) spent time on social causes, and 7 out of 30 (23%) are civically engaged, where the term "civic" refers to specifically participating in local government or political activities. Note: In the Context of Work chapter, civic refers to the educational attainment of citizens and citizen participation in community decision-making which could include political or government decision-making. Figure 19 clearly indicates that only 50% of the participants in this group belonged to a group that works for social good, and even fewer – 25% – are involved civically.

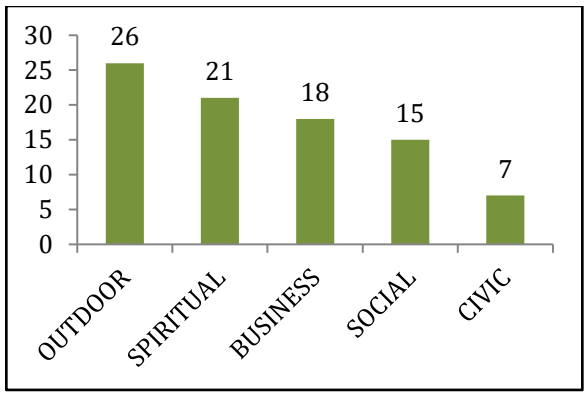


Figure 19*:* Number of Individuals Participating in Each Type of Social Activity

While participating with social groups is considered a healthy activity for humans, each social group comes with its own set of visible, or invisible, rules and agendas. For the purposes of this paper, I am ascribing to social group participation as a good socially moral activity versus a social group activity that is amoral and antisocial. Generally, belonging to a civic group puts one in touch with how political processes work and belonging to a social cause group tends to put one in touch with human issues. Individuals who are exposed more widely to different types of groups may have the ability to see more broadly, understand that one way is not necessarily

the right way, and quite possibly infuse their diverse thinking into the groups within which he or she does belong.

Knowledge of City-Level Action

How is the city taking action? This question was placed within the social participation section since having some form of knowledge with regards to the city's actions requires a certain amount of social or civic involvement. It is interesting to note that 12 out of 26 (46%) participants said they did not know what action the city was currently taking on climate change (Figure 20). Note that advocacy and education ranked as the most desired actions the group wants the city to take action on in the future

CITY ACTION *NOW*	
Category	**Frequency**
None	12
Land/Built Environment	10
Advocate/Educate	8
Consumption/Waste	7
Energy	7
Transportation	4
DOCUMENTS with code(s)	26

CITY ACTION IN THE FUTURE (LATER)	
Category	**Frequency**
Advocate/Educate	17
Energy	13
Land/Built Environment	9
Transportation	6
Consumption/Waste	4
DOCUMENTS with code(s)	26

Figure 20*:* Knowledge of City Action Now and in the Future (Later)

City of Northfield Leader Solutions

Each participant was asked what actions he or she thought the city should be taking to mitigate and adapt to climate change. Figure 21 shows a compilation of those suggested actions. Briefly, the group suggested that the city leaders provide more climate change/sustainable education in schools and within the community. Furthermore, the group suggested the city support and advocate for its citizens by initiating, updating, and enforcing policies, codes, and incentives that will ensure green or smart building practices, make renewable energy options available, require better land use practices, and provide additional public transportation options.

SPECIFIC SOLUTIONS FOR THE CITY OF NORTHFIELD LEADERS				
Energy	**Land Use (Built Environment)**	**Advocate/educate**	**Consumption and Waste**	**Transportation**
More **renewable energy** options: Rooftop solar, solar gardens, wind power, geothermal, use the river to generate energy. Have solar panels on the flat roofed buildings. Go solar as much as they can. More **energy efficiency** in existing buildings. Retrofit window, shades. Update building heating systems. Use high efficiency – LED. Regulate buildings using AI. Require uniform temperature settings. <u>Advocate/Educate</u> Collaborate with schools to experiment with river hydroelectric. Provide and support more options for community members to participate in energy efficiency programs like refrigerators. Make community-wide emissions data easily available to the community. <u>Legislation</u> Provide incentives for residential and business solar installation. Adopt policies that require using renewable energy. Better building codes to regulate energy (green or smart building). Require all new buildings or buildings being remodeled to be highly energy efficient, environmentally friendly. Get rid of the GHGs.	<u>Advocate/educate</u> Educate and support manure management program. Educate about chemical use on lawns and in parks. <u>Legislation</u> Restrict use of chemicals on lawns or allow only certain services. Ensure replacement program for trees. Have watering bans. Keep parks special – no spray zone. Use permeable pavement on the streets. Change codes to allow for use of alternative materials on roads, parking lots, and driveways to prevent run off. Assist with flood protection is needed for buildings along the river. Clean streets more often to reduce runoff. Emphasize a human scale community – walking and biking. Insist on stewardship for our groundwater.	Believe in the science to do the right thing for the community. Local action counts. Energy self-sufficiency should be possible. Lead by example. Be a leader. Policies to reduce pollution and poor farming practices. Make things easier – permits. Encourage smart decision-making. Affordable housing. Take the time to get the big picture. Partner more with colleges. Use the knowledge available in NFLD. Collaborate with schools to keep local climate records. Educate the community by holding more symposiums, forums, mail out information, put info in the newspaper, and place placards or informationals around town.	<u>Advocate/educate</u> Reinforce education about recycling and garbage (waste). <u>Legislation</u> Require community-wide composting. Impose fines. More recycling options (plastics).	<u>Advocate/educate</u> De-emphasize car culture, support less use of vehicles. <u>Legislation</u> Integrated transportation plan – ride share, buses, light rail. Restore passenger train service. Streets with more roundabouts, more accessible sidewalks and bike lanes. Roads should use AI for traffic flows. Provide charging stations for electric cars. City should acquire more hybrid vehicles.

Figure 21*:* Specific Suggestions for Local Leaders

Broad Leadership Solutions

The participants, in addition to providing suggestions for what they believed the local City of Northfield leadership should be doing to mitigate and adapt to our changing climate, also provided suggestions for what they believed our broad or the overall leadership should be doing. This was an inductive activity where reading and re-reading the participant texts defined the categories for overall leadership on climate change. These categories or solution areas emerged from the participants' responses: Leadership, Engaging Others, the Built Environment, Education, Energy, Transportation, and Agriculture.

Figure 22 indicates how many people talked about each solution area. Twenty-eight out of 30 (93%) participants say that the broad leadership at the state and national level need to see climate change as a significant problem and unite to take action. One participant says succinctly of the broad leadership: "First of all, they have to come to terms and agree that the science says there is climate change and that it is manmade." Twenty-three out of 30 (77%) gave suggestions for how leaders could engage individuals with climate change issues. One participant says leaders need encourage all to take "collective responsibility" another says, "Make the story real and personal."

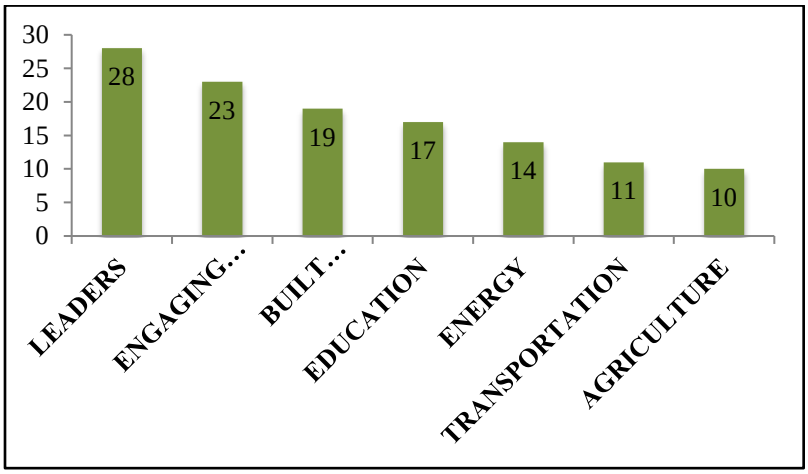


Figure 22*:* Solution Areas for Broad Leadership

Participants talked widely about the actions they want our leaders to take. They gave a total of 312 responses to the broad leadership question. While Figure 22 depicts where the group thinks the solutions lie and how many talked about each solution area, what the group believes broad leadership activity on climate change can be is summarized as:

- Stop the debate about climate change
- Educate the public to promote collective responsibility
- Extensively invest in climate-friendly sustainable practices
- Provide incentives and programs for individuals and businesses to be able to participate in sustainable practices
- Change and enforce legislation to mitigate and adapt to climate change
- Accelerate renewable energy technology
- Carefully transition to other energy sources
- Create a comprehensive transportation system
- Insist on the best agricultural practices

Barriers to Knowledge and Action

Discovering the barriers or challenges the group faced to gain knowledge and take action was another inductive analysis activity wherein reading and re-reading the responses from the interviewees showed sets of similar pieces of narrative. These similar narratives were grouped and labeled, and themes were attached to them. All responses from every interviewee were considered. An attempt was made to 1) find out what themes were most prevalent and 2) make sure each unique response was represented. An important concept in social learning theory is that all voices should have equal weight and opportunity to be heard (Johnson et al. 2012). For the

barriers to knowledge, the interviewees were asked two questions. First, what do they think their own barriers were to gaining knowledge about climate change, and second, what barriers do they think others encounter to gaining knowledge. For the barriers to action, interviewees were simply asked what kind of barriers they faced when taking action on climate change.

Barriers to Knowledge

For the two barriers to knowledge questions, the group provided 134 total responses. Of those, the group responded 81 times about the problems others have in gaining knowledge versus providing only 53 responses when talking about the problems they have themselves gaining knowledge. What this says is that the group may perceive "others" as having more barriers to gaining knowledge about climate change than they do. Misinformation, no information, too much information, or complicated information surfaced as the predominate barrier to knowledge for both themselves and others. This concept of a communication barrier is possibly connected to where people get their information from (see Figure 28), and with whom (see Figure 29) people spend their time.

Figure 23 shows the themes that emerged from the two barriers to knowledge questions. Beyond the concept of a communication barrier, the interviewees themselves felt they did not pursue knowledge about climate change for personal reasons such as lack of time or interest, whereas they felt others might be somewhat restricted from pursuing more knowledge because of lifestyle choice or particular group identity.

BARRIERS TO KNOWLEDGE	
For Themselves	**For Others**
A. Information Aware there is a need to verify information, scrutinize source. Figuring out if it is good information. Fact versus fiction. Biased. Bad science. Are there political or economic motives driving a slanted viewpoint. Someone's agenda. Subject to author's entrenched beliefs: picking facts to fit case. Others must make sense of CC confusion for me because it is so complicated. Don't know enough about CC to engage with others. Too political – tune it out. **B. Personal** 1. Lack of time and interest: Too busy with job, family, life… Having the time to sift through and engage with a complex subject. Doesn't occupy my attention. Other things would rather do. Government should deal with it not me. It doesn't seem urgent. 2. Lack of Skills: Having the computer skill and scientific knowledge to parse the volume of information to understand the real issues of climate change. 3. Believing in climate change. "Is that climate change? I don't know." When is it beyond normal variation?	**A. Information** Not sure others have access to or can recognize reliable information. Access to internet. Overwhelming amount of information exists. Unable to sort out information to make decision or come to a wrong conclusion. Trust in False information. Access to accurate information. Information is published that is funded to manipulate, discredit, and confuse the science. Information exists that denies CC exists. Mixed messages. **B. Cultural** (*Lifestyle or Group Belonging*) Entrenched beliefs and opinions of self, family and friends. Have the willingness to listen to other's point of view (self-righteous). Cultural identification with motor sports. Not open-minded. The path of least resistance. Distance self from problem by political affiliations. Political foot dragging, ineffectiveness in getting legislation passed and denying. **B. Personal** Change is inconvenient. Isolating your mind from it. Denying it. Not ready to say it is happening. Worried about just getting by. Busy with family and other activities. The individual is too small to make an impact. Don't value the environment. Not affected financially. No sense of urgency.

Figure 23: Barriers to Knowledge

Barriers to Action

The group provided 168 responses when asked what were their barriers to action. The following themes emerged as barriers to action: personal, political, and economic (Figure 24). Personal preference was the most frequently talked about barrier to action. Examples of the personal preferences that interfered with action included belonging to certain groups that do not promote action, not having the time, energy, and money to act, and wanting to maintain one's current lifestyle. The concept of personal preference directly connects with choice and social participation. Social participation is more fully explained in the Within the Group Variation

section. Political and economic barriers highlight the group's recognition that there are higher levels of social structures that influence one's ability to act.

BARRIERS TO ACTION	
Personal	Want to maintain **lifestyle** – comfort, habits, consumerism, motor and air travel. **Costs money** and takes **time/effort** to participate – day to day struggle to achieve work and life balance, understanding the overwhelming amount of confusing agenda strewn information, more convenient to stay ignorant or deny CC. Not ready to commit. Penalties for participation in programs. **Group belonging** - SES, job, political party, culture, or family contributes to lack of access to information or misinformation. Have to choose one side or the other. Government - **Anger** - don't want government regulation. Not enough options for the individual. **Fatigue** with politics.
Political	**Partisan** expert testimony and lobbying pits one side against the other. Intentional **misinformation** put out in the media, **not a world collaborator** - pulling out of Paris Accord, **mismatch** of environmental group agendas versus CC group agendas, balancing pressing world issues like housing, rights of the citizens, inability to provide accurate information and education for individual and industry. Regulations – **ineffective or non-existent** environmental, smart building or transportation or **non-uniform** state-to-state or community-to-community **interpretation** of codes, laws, and regulations, lack of incentives offered to participate.
Economic	Free market versus science, like the status quo, jobs, who pays – one country's wealth is another country's woes. Cost of technology. "Doesn't affect me and my business directly."

Figure 24: Barriers to Action

Other Perceived Barriers

Three unexpected recurring perspectives that can also be considered barriers emerged from the individual interviews. They included a sense of non-urgency, uncertainty, and agricultural practices. First is non-urgency or non-concern, which perhaps stems from some group members' perceived positive effects of climate change, such as Minnesota's shorter, milder winters that allow for longer growing and construction seasons, or the feeling that as one participant said, "I mean, we're in Minnesota, so frankly, time and change based on the models is not going to damage us as much as others." What the participant means is that Minnesota is not experiencing the worst of climate change.

The second perspective presented itself in the form of uncertainty when participants asked, “Is that part of climate change? I don’t know.” Finally, 26 out of 29 (90%) participants talked about farmers and agricultural practices, such as tiling the fields for better drainage, needlessly over-tilling the fields, not adhering to land and waterway buffering protocols, and chemical overuse and how these contribute to greenhouse gases, flooding, and other environmental problems. This final perspective points to group frustration over having no control over the action of others.

A more in-depth look at the group data revealed there was considerable individual variation within the group. Some participants in the group possessed more knowledge about climate change and made more individual contributions to lessen the impacts of climate change, while others had less knowledge and/or acted less robustly to lessen the impacts of climate change. Social participation, wherein one seeks, hears, and exchanges information about climate change, seems to contribute to the degree to which individuals acquire useful knowledge and act, or, in other words, determines how much one becomes involved with climate change issues.

Within the Group Variation

This section describes the variation within the group. Figure 25 provides a simple visualization of the three distinct sub-groups. These sub-groups have been grouped and labeled according to the degree to which they interact with climate change. They are hereafter referred to as the Minimals, Moderates, and Mosts. A description of the ranking system used to determine the subgroups is in the Project Design Chapter. Briefly, individuals were ranked according to how much they understood and observed climate change, what kind of actions they were taking on climate change, their level of community and social participation, and the suggested solutions

they provided for our leaders. Additional information about the ranking system is in Appendix A. This section begins with a description of sub-group demographics, and then continues with a presentation of sub-group differences or similarities by discussing nine themes. These nine themes, which fit into the previously determined categories of knowledge, action, and social participation, were chosen because they illuminate the connections between knowing and acting with social and civic participation and larger social structures. Note that some of the individual graphs in this Within the Group Variation section will differ from those in the Group section. This is because the data used in most of the graphs within this section comes from a system used to rank the individual interviewee versus simply showing frequencies or counts.

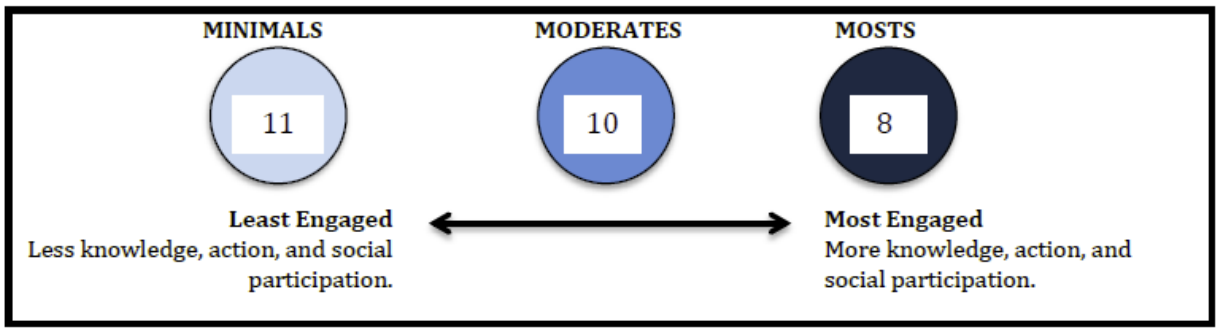


Figure 25: Three Sub-Groups

Demographics

Table 3 reflects the gender and age demographics of the group. Overall more male participants participated than females and most of the participants were in the 50-69 age group. Of the three sub-groups, the Mosts were more evenly distributed on gender and age than the Moderates or Minimals.

Table 4 reflects where the participants originally come from. Overall most participants are Minnesota (MN) natives. Of the three sub-groups, the Minimals are made up of mostly MN natives, and the Mosts have the least MN natives. The Mosts are evenly distributed among the

origin categories. They have lived the longest in Northfield, an average of 33 years.

Table 3: Sub-Group Gender and Age

	GROUP n=29	MINIMALS n=11	MODERATES n=10	MOSTS n=8
GENDER				
Male	66%	72%	70%	50%
Female	34%	28%	30%	50%
AGE				
30-49	21%	18%	20%	25%
50-69	62%	64%	70%	50%
70+	17%	18%	10%	25%
AVERAGE AGE				
	58	59	57	59

Table 4: Sub-Group Origin of Participants

	GROUP n=29	MINIMALS n=11	MODERATES n=10	MOSTS n=8
PERCENTAGE OF EACH GROUP THAT IS A				
Northfield Native	17%	9%	20%	25%
MN Native	49%	73%	40%	25%
Midwesterner	24%	18%	30%	25%
Other	10%	0%	10%	25%
AVERAGE YRS IN NORTHFIELD				
	26	23	21	33

Table 5 reflects the number of social groups within which each sub-group participates. The Moderates and Mosts participate more broadly than the Minimal group. Beyond simply stating within which how many groups each sub-group participates, information was also collected about what type of social activity with which each sub-group participates (Figure 29). Figure 29 shows that the Minimals, Moderates, and Mosts participate in different types of social activities. The number of groups and type of social activity reveal that the Moderates and Mosts are somewhat more diverse in terms of how they participate in life. They participate in more groups and a wider range of groups, especially social cause and civic groups. Perhaps because of

these wider diverse life experiences and not being singularly MN natives, they are hearing about and seeing the broader effects of climate change.

Table 5: Social Activity

PERCENTAGE OF SOCIAL ACTIVITY				
Number of Groups*	GROUP n=29	MINIMAL n=11	MODERATE n=10	MOST n=8
1	3%	18%	0%	0%
2	20%	27%	20%	25%
3	52%	46%	40%	38%
4	21%	9%	40%	25%
5	4%	0%	0%	12%
*Type of social activity: Outdoor Activity, Spiritual, Business, Social Causes, and Civic.				

Knowledge and Action

Knowledge of climate change and action on climate change point to some of the first differences between the three sub-groups. The Minimals show both less knowledge and action, the Moderates show more knowledge but less action, and the Mosts show the most knowledge and action (Figure 25). Social participation, where one seeks, hears, and exchanges climate change information, may be the mediator of knowledge and action.

Knowledge

What the three sub-groups know about climate change was measured by how they define climate change, how many observations about climate change they could make, and how many climate change consequences they could name. Each column in Figure 26 represents the percent of total knowledge within each respective knowledge area for each group. For example, the Minimals only accumulated 40% of the total number of points toward robustly defining climate change. From Figure 26, one can see that the Minimals fall shorter on all measures of

knowledge, while the Moderates and Mosts are more like each other on these measures of knowledge. In providing a definition of climate change (see Table 1), 13 out of 29 (45%) participants stated that human activity is causing climate change. Interestingly, the Moderates spoke the most often about human activity in their definition of climate change: 70% of the Moderates, 36% of the Mosts, and only 27% of the Minimals spoke about relationship between human activity causing climate change.

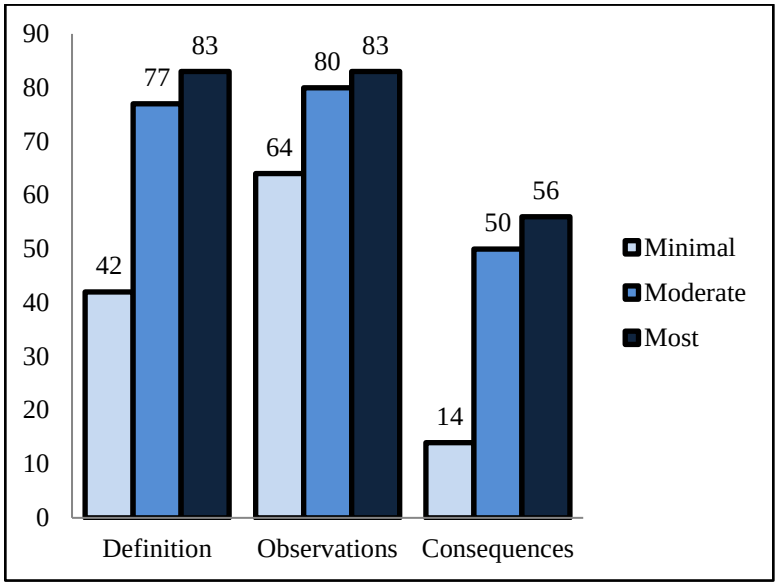


Figure 26: Percent of Total Knowledge

Action

Figure 27 indicates how completely each of the three sub-groups takes action now and expects to take action in the future. Taking action means contributing in some way toward reducing and mitigating climate change in the following areas: energy, transportation, consumption and waste, land and the built environment, agricultural practices, or helping to advance advocacy/education. The Mosts (88%) are participating in more of the action now categories, while the Minimals (67%) and Moderates (63%) lag slightly behind. As was noted earlier in Figure 16, energy and waste are the most often talked about taking action now actions,

however consumption within the consumption and waste category is rarely mentioned as a self-action. As a personal action, consuming less of anything requires a change in behavior. It can be supposed that consumers are not yet willing to change their behaviors.

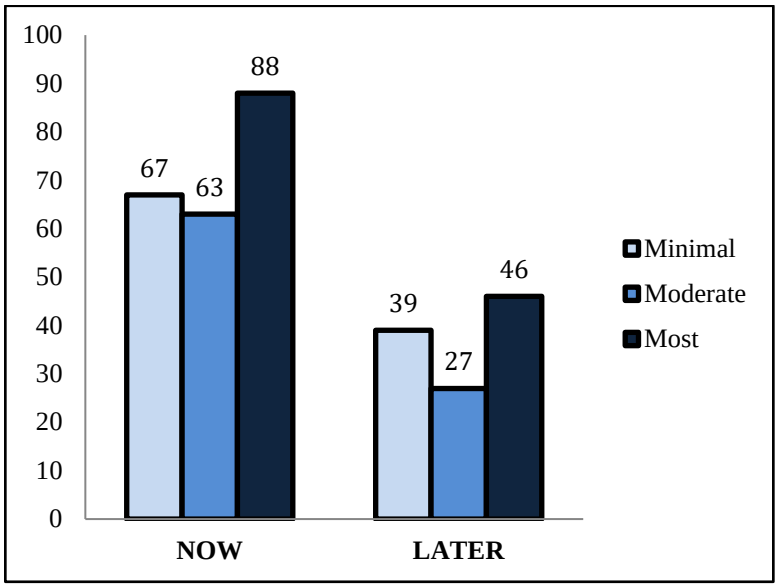


Figure 27: Percent of Current and Future Action

The taking action later percentages are low in all sub-groups. This may indicate that all groups think they have run out of options, do not know what other options there are, do not have access to the other available options, or cannot participate for economic or other reasons. The sustainable consumption literature decidedly points out that individual sustainable consumption actions are hard to achieve without higher-level social and cultural structural change: "individuals are but a part of a process that creates and maintains prevailing patterns of unsustainable consumption and, as such, 'the individual' may not be the best or primary unit of analysis. Other elements of the larger social-technical-cultural-institutional system that prestructure or normalize prevailing consumption patterns may be more deserving of attention." (Maniates 2014, 202) In other words, individual consumption is promoted by many interacting systems.

Social Participation

How and where these three sub-groups get knowledge uniquely suggests why levels of interaction with climate change are encouraged or limited. Social participation is measured four ways: trusted source of climate change information, type of social activity, knowing what actions the city is taking, and community conversations,

Trusted Source

Participants were asked, “What source would you trust if you wanted to learn more about climate change?” Figure 28 indicates the source each group would most likely trust: mainstream media or a scientific source. All sub-groups trust the media, but the Minimals (82%) stand out as placing the most trust in media sources. Participants in all sub-groups mentioned repeatedly how difficult it is to discern accurate information from any source.

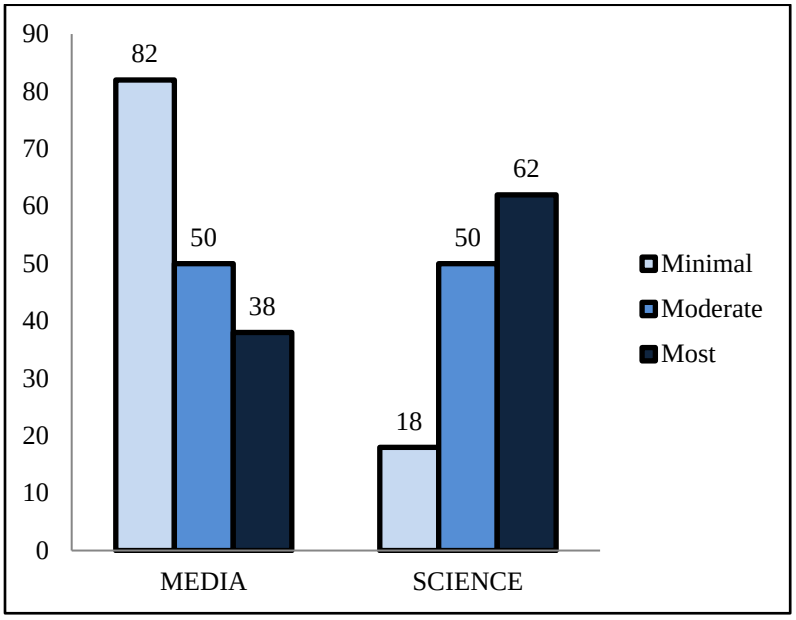


Figure 28: Percent of Trusted Source

Type of Social Activity

All sub-groups have good participation rates in both outdoor and spiritual activities (Figure 29). At least, seven out of 8 of the Mosts (88%), 6 out of 10 of the Moderates (60%), and 8 out of 11of the Minimals (73%) participate in both outdoor and spiritual activities. Where the sub-groups begin to differ is with the amount of their participation in business, social cause, and civic groups. The Moderates and Mosts appear more similar in the social cause and civic activities, yet these two sub-groups differ quite a bit with how much they participate in a business group. The Moderates and Minimals are more similar to each other with the number of business groups they participate.

Seventy-five percent of the Mosts and 70% of the Moderates participate in social cause groups whereas only 18% of the Minimals do. Thirty-eight percent of the Mosts and 40% of the Moderates participate in civic groups whereas no Minimals (0%) do. Civic activity is specifically defined as participating in local government or political activity versus simply as citizen participation in community decision-making as was defined earlier. The Moderates and Minimals have high participation rates in business groups 73% and 70% respectively whereas only 30% of the Mosts participate in a business group.

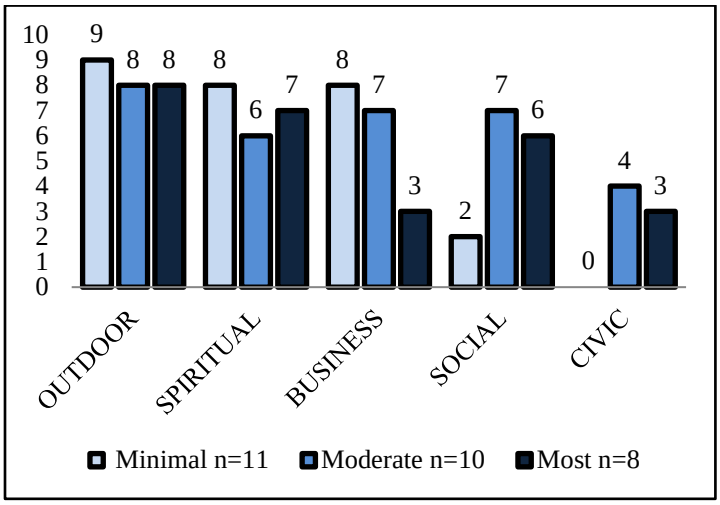


Figure 29: Number in Each Type of Activity

Knowledge of City-Level Action

Participants were asked if they knew what the city was currently doing about climate change. Table 6 spells out how many participants in each sub-group had something to say about what kind of action the city was taking in the categories of land/built environment, advocate/educate, consumption/waste, energy, and transportation. It is interesting to note that 12 out of 26 (46%) participants either said they did not know what the city was doing or had delayed responses in answering the question (Table 6). The Minimals (70%) and the Moderates (50%) knew the least about what the city was doing. Another interesting note is that the Moderates and Most talked somewhat more evenly about all of the categories whereas the Minimals empahisized the Land/Built Environment category.

Table 6: City Taking Action Now

	GROUP n=26	MINIMALS n=10	MODERATES n=8	MOSTS n=8
None or Delayed Response	46%	70%	50%	13%
Land/Built Environment	39%	40%	38%	38%
Advocate/Educate	31%	10%	38%	50%
Consumption/Waste	27%	10%	38%	38%
Energy	27%	20%	25%	38%
Transportation	15%	10%	13%	25%

Table 7 represents the views of the participants regarding where the city should be taking action in the future. The top responses from the Minimals (44 and 56%) and Mosts (75 and 63%) are in the Advocacy/Education and Energy categories, and the top responses from the Moderates (67 and 44%) are in the Advocacy/Education and Land/Built Environment categories. The Mosts (50%) mention the need for action on Transportation options more than the other sub-groups. From Table 6 one can see that the Mosts mention all categories more often than the Minimals

and Moderates except where 44% of the Moderates mention Land/Built Environment. A suspiscion may be that because the Moderates have good participation rates in both businesss, social, and civic groups they understand how much land use and the built environment contribute to greenhouse gas in the atmosphere and are able to translate this into what the city needs to do in the future.

Table 7: City Taking Action in the Future

	GROUP n=26	MINIMALS n=9	MODERATES n=9	MOSTS n=8
Advocate/Educate	62%	44%	67%	75%
Energy	50%	56%	30%	63%
Land/Built Environment	31%	11%	44%	38%
Transportation	23%	11%	11%	50%
Consumption/Waste	15%	11%	11%	25%

Community Conversations

The last of the four social participation measures aims to find out how much talk about climate change the participants encountered when they were out and about doing everyday activities in the community. Figure 30 shows that the Minimal and Moderate groups answered "No, not much" most often. This may point to where one spends time and with whom. Certain activities in certain spaces lend themselves to discussions about climate change.

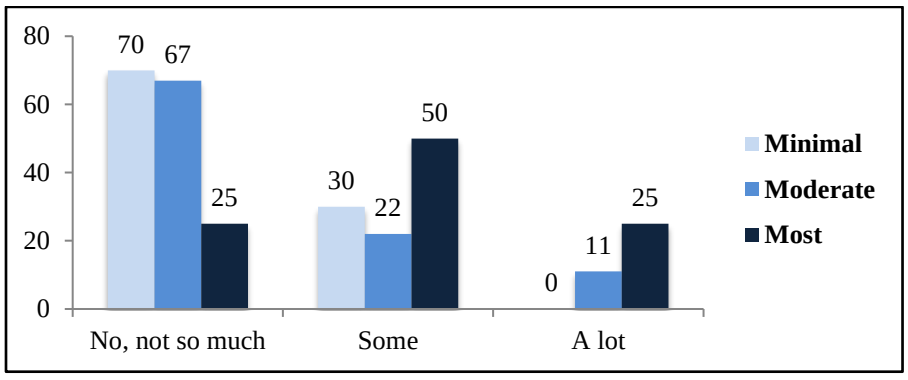


Figure 30: Percent of Hear Others Talk

To illuminate where individuals from the group might be, or might not be, acquiring knowledge about climate change, I looked to find out if there was an association with one hearing other people talk about climate change to either one's preferred information source or what type of social activities they engaged in. To undertake this investigation I turned the results from the Hear Others Talk question into a dichotomous yes or no response. Yes means the participants are hearing conversations about climate change in the community whether it is either some or a lot. No means that the participants are not hearing much at all about climate change in community conversations. Looking at the group level percentages in Table 8, it shows that most participants are not hearing conversations about climate change in the community. However, there is one exception. Fifty-eight percent of the participants in the Social Cause activity category do hear, versus 42% who do not hear, conversations in the community about climate change. Another percentage from the group level data worth recognizing in Table 8 is the large difference between the NO (67%) and YES (33%) group in the Civic activity category. Although there are not a large number of participants in the Civic activity group, it does point to the possibility that there may be fewer conversations about climate change occurring in civic groups.

Table 8: Hear Others Talk and Type of Activity

	Group n=27		Minimal		Moderate		Most	
	NO	YES	NO	YES	NO	YES	NO	YES
Outdoors n=23	52%	48%	63%	37%	63%	37%	29%	71%
Spiritual n=19	58%	42%	71%	29%	80%	20%	29%	71%
Business n=16	58%	42%	67%	33%	57%	43%	33%	77%
Social Cause n=12	42%	58%	0%	100%	60%	40%	33%	77%
Civic n=6	67%	33%	0%	0%	100%	0%	33%	77%

Turning to the sub-group data in Table 8, the sub-group percentages were calculated to reflect how many participants within each sub-group and within each activity category said,

"yes" or "no" to hearing climate change conversations in the community. Two interesting outcomes are reflected in the sub-group data. First, is the consistency of the percentages in both the Minimal and Most sub-groups. The Most sub-group is likely consistently hearing climate change conversations in all of the activity groups they participate while the Minimal sub-group is likely not consistently hearing climate change conversations except for the one individual who participates in a Social Cause activity. The second point is the inconsistency within which activity group the Moderate sub-group is hearing conversations. For the Moderate sub-group it is not a clear-cut yes or no as it is with the Minimal and Most sub-groups. This inconsistency perhaps stems from the Moderate profile: they are quite knowledgeable about climate change (Figure 26), all are active in at least 2 activity types (Table 5), and as is revealed in Table 9 they prefer the mainstream media as a trusted source of information. According to communication literature on the mushy moveable middle (Movement Advancement Project and GLAAD, 2008), the Moderate group would be where significant change can occur because of its inconsistency.

Table 9: Hear Others Talk and Trusted Source

	Group n=27		Minimal n=10		Moderate n=9		Most n=8	
	NO	YES	NO	YES	NO	YES	NO	YES
Trusted Source - Media (63%)	41%	22%	90%	0%	23%	33%	0%	37.5%
Trusted Source – Science (37%)	22%	15%	0%	10%	44%	0%	25%	37.5%
Total	63%	37%	90%	10%	67%	33%	25%	75%

Table 9 summarizes the results from my query, "Does whether or not one is hearing others talk about climate change in the community have any association to their preferred trusted source or information?" Overall, 63% of the group rely on mainstream media as a source of information and are not hearing about climate change in everyday settings. Looking within each of the sub-groups, it can be found that 90% of the Minimal and 67% of the Moderate sub-group

participants are not hearing conversations about climate change and 90% of the Minimal and 56% of the Moderate sub-group participants prefer mainstream media as a trusted source of information versus scientific sources. Seventy-five percent of the Most group does hear about climate change in their everyday conversations, yet those who are hearing about climate change have equally split opinions about what is their trusted source of information. Whether or not the Most group is encountering conversation about climate change in the community, more of them (62.5%) trust scientific sources over the mainstream media (37.5%). Parsing the data by trying to understand who is hearing talk about climate change issues and where they are hearing it can indicate where to initiate or strengthen future communication strategies.

The next chapter provides a discussion of the main findings: where the group's strength is, what are the group's limitations, some unexpected findings of the group, and how the individual variation within the group led to thinking about agency: how the journey to change starts with the individual.

CHAPTER 6

DISCUSSION AND CONCLUSION

This paper sought to show the level of interaction a community has with climate change issues and the collective agency, capability identification, and social learning processes through which a community can move toward invested engagement on climate change issues. The data was aggregated and analyzed to begin to understand a community's knowledge about climate change issues. Collecting the baseline information about a community is the first step within a series of steps that can ultimately move a community to invested engagement with climate change, where individuals or groups are motivated to take action because they have been able to change their hearts, minds, and behavior (Lorenzoni et al. 2007).

Social learning, as described in the Context of Work Chapter, is a method that can be used to move people toward collective thinking and action. It is a process from which individuals learn and influence one another. The first step in social learning is to collect the baseline knowledge to begin a dialogue that can enhance group knowledge and action, also referred to as collective agency and action. Agency is the overriding concept of this project. There is individual agency: what one knows about, cares about, what kind of choices he or she makes, and what one does.

There is also group or collective agency: what the group knows about, cares about, and does. The combined dialogue or narratives of the interviewed group from this project and their collective agency, points to the strengths and the limitations the group has with regards to their interaction with climate change issues. Northfield's community level of interaction with climate change issues has been summarized as the group's collective agency. Building collective agency is also the first step in the Capability Approach model (Pelenc et al. 2015). This model was

introduced in the Context of Work Chapter and outlines the two-pronged process of reaching functional collective social agency and action or building both collective agency and capability.

So, what kind of collective agency does the group possess? What are they doing well and what are the troublesome areas that may interfere with broad collective community agency? Both the group and the sub-group level data revealed that substantial progress is being made towards collective community agency which the City of Northfield has recently enhanced by committing to write a CAP, yet there are still potential problematic areas that might interfere with continued movement forward.

Analysis of the data at the group level shows three strengths and display of agency: 1) The group is knowledgeable about climate change. The group possesses shared local knowledge that provides evidence that temperatures are warming, winter is changing, and precipitation is increasing. They are observing and identifying the impacts of climate change. 2) The group has provided an overwhelming number of suggested solutions to the problems of climate change for both the local and broader leadership, which demonstrates they are aware of the climate change issues and are aware of the actionable steps that are needed to mitigate and adapt to climate change. While they understand that local effort is very important, local effort can be more effective when tied into broad collaboration with state, regional and national systems. 3) They have identified and are very aware of their own barriers to acquiring knowledge and taking action on climate change issues. These barriers to knowledge and action are highlighted in the Findings chapter (see Figures 23 and 24).

Two somewhat unexpected barriers kept surfacing in the conversations with the participants: a lack of a sense of urgency and uncertainty. Uncertainty about the climate changes Minnesota is experiencing was expressed by the participants questioning changes in Minnesota's

precipitation, temperature, and the winter season. One participant said about the changes in precipitation, “We’ve seen just a dramatic amount of floods, but you also remember, there’s different thoughts on that, well the farmers are tiling their land, so it’s storm water run-off. Is that part of it? I don’t know, it’s like the topography has changed, what do you think?” Another participant wondered if the warmer temperatures contribute to the lakes that are around Northfield becoming so green, saying, “Either it's from climate change or being so warm so early. No ice, or something like that. I don't know I guess why they're so green so fast. Maybe it's farm runoff and nitrogen in them.” A third participant questions the change in Minnesota’s winters: “I find myself saying at 44, ‘When I was little, I remember the snow being so much deeper.’ I don't know if it was because I was shorter or what?”

Several participants conveyed why Minnesotans may not have a sense of urgency about the problems that will arise from climate change. One participant says, “…we’re actually on the better side of some of it here in Minnesota.” Similarly another says, “…we are probably a lot safer here” from super storms. It was what they taught us in school way back then that climate change “would probably almost be an advantage to Minnesota.” Two final sentiments are, “More temperate weather would be ok with me” and, “I think that, if we have a rise in the temperatures, it’s going to make farmland in Minnesota more valuable.”

Simply being able to verbalize these barriers shows potential for change in behavior in the future. The first step to removing or working with these barriers is long-term sustained communication and education, and of course accessible affordable options for mitigation of and adaptation to climate change that the City of Northfield and broader leadership can provide for its citizens to help them move past these real and perceived barriers.

Two problematic areas were noted for the group. The first was discovered during the complete group analysis. It centers around the idea that awareness and knowledge about climate change issues are often not enough to stimulate action (Whitmarsh et al. 2011) Taking personal action on climate change does not seem to be a priority for the group. However, all members of the group are taking at least some action, or are participating in what options they see as available to them, to mitigate and adapt to climate change. Robust action, however, is not the norm. Most of the group had very good suggestions for what could be done, but still few seemed to be willing to go above and beyond, to independently consider, seek out, and make individual behavior changes for the sake of the community or global sustainability. It must be noted however, not many easily accessible options for action currently exist, such as public transportation, renewable energy, mainstream education about consumption, and others. Participating would require one to make significant individual effort such as monetary effort to go above and beyond.

The second problematic area was discovered when analyzing the data to understand variation within the group. It was noted that individual interaction with climate change issues varied greatly. A cluster of four social participation variables showed that the type and degree of social participation seemed to be a contributing factor to both knowledge and action. A connection has been made in the data between knowing and acting in which social participation is the bridge that connects what one knows and how much they interact with or act on climate change issues. How and where people get their knowledge seems to be a key link for individual involvement with climate change. The interviews revealed that individuals most engaged with climate change are more involved in more diverse social activities. Conversely, individuals who were least likely to participate with climate change issues, the Minimals, relied on mainstream

media as their preferred source of information, did not experience others in the community talking about climate change in their day-to-day activities, rarely participated in groups with a social cause, did not participate at all in government or political activities, and had difficulty naming an action the city was taking to mitigate or adapt to climate change. Social participation, where and with whom people spend their time, can be either a barrier or a bridge to knowledge and action. Therefore, introducing effective communication and engagement activities broadly into the community is necessary to boost the current local knowledge and action on climate change.

To come full circle, the capability approach model (Pelenc et al. 2015) will be used to conclude the paper and highlight not only the strength of the agency of this group of Northfield citizens but also its capability – the other part of the two-pronged Capability Approach model. Capability is bringing assets and resources together, or structural support with agency to help accomplish the group goals. Earlier in this paper, the historical sustainability milestones that the City of Northfield has reached were discussed. These sustainability milestones have uniquely coincided with the three characteristics that signal the likelihood that a city will act on climate change (Simon-Rosenthal et al. 2015). The city has the professional capacity, the civic capacity, and the political support. These three characteristics are considered assets or resources. The Capability Approach model supports the progress Northfield is making on tackling climate change. In Northfield, a decent amount of collective agency and capability exists, and it continues to grow. An example of the collective agency and capability in Northfield is the idea of the creative class and how collectively this group may not be affecting political will but is affecting local policy by way of demand for a particular quality of life. This growth indicates

progress toward invested engagement – or the functional collective social agency and action – and the ability to achieve.

Analyzing the group data to study the variation within the group led me back again to the concept of agency and how the process starts with the individual. Dedekorkut-Howes (2011) argued in her article titled *Individual Action versus Collective Action* that "collective social action on the individual level" (no page number given) is needed. In other words, it will only be through the individual participation in collective action that we can achieve global sustainability. It all starts with individual agency or choice.

CHAPTER 7

REFLECTION

Completing the applied project and the thesis has been an incredible learning experience. I have had the opportunity to travel into so many circles within my community where I met and learned from so many incredibly selfless, hard-working people. This experience enormously improved my organizational and interpersonal skills. I have learned how to use technology for recording and transcribing interviews; learned how to generate charts, graphs, and tables for visual representation of my data; learned how to use a qualitative software program; and learned how to begin to write academically.

Being objective, however, as much as pulling together this applied project and writing my thesis had exhilaratingly positive aspects such as spending time with people, constructing codebooks, and coding and analyzing transcripts, there were some less positive aspects. One aspect of this project I would change would be to undertake a project of this magnitude collaboratively. The depth of this project required more time than I ever imagined it would and the project required a substantial amount of self-learning. Self-learning is definitely valuable, yet it can also be a danger. No one can be good at everything, especially so early in the learning process. Admittedly, it was I myself who created a project that was too broad with too many questions. I was intent on being an advocate for and giving something useful back to my community, which I think I have accomplished if the information generated from this project can get to the people who want to use it. As writing my thesis progressed, it became apparent to me that so much more analysis of the data could have been achieved if I have made better coding decisions early on, and I had more technical skill using the MAXQDA software.

One last thought about reflection, as this is a self-reflection section. By inserting myself into the process of understanding my community, I may have intentionally or unintentionally lead the conversations I had with my research participants toward my perspective of the issue of climate change. I am very cognizant of this fact. Earlier in this paper I spoke about Merrill Singer's (1994) quest to be at the same time a reflexive researcher and a researcher that helps the community to see the issues that are facing them. His mantra is to help the community know themselves and to help the community see the others. To move people to action they need to understand their own individual and group strengths and limitations and the societal helps and harms, the things that get in the way of community goals. If I have created even a tiny spark of greater awareness during my discussions with the many people I have met along this remarkable journey, then I have used the reflexive advocacy-oriented lens appropriately.

APPENDIX

INDIVIDUAL SCORES FOR THE 11 MEASURES

	MINIMALS n=11											MODERATES n=10										MOST n=8							
Knowledge																													
1. Defining CC	2	0	2	0	3	2	0	1	1	1	2	1	3	3	3	3	1	1	3	3	2	1	3	3	2	3	3	2	3
2. Observations	1	2	2	2	3	3	1	2	3	1	1	3	2	1	3	2	3	3	2	2	3	1	2	2	3	3	3	3	3
3. Consequences	0	0	0	2	0	1	0	0	0	0	0	1	1	0	1	1	1	1	0	1	2	2	1	1	1	0	1	1	2
Action																													
4. Self Act Now	2	3	2	1	3	2	3	2	0	3	1	1	1	2	0	3	3	3	2	3	1	2	3	2	3	2	3	3	3
5. Self Act Later	0	1	1	0	2	2	1	2	1	2	1	1	1	0	0	2	0	2	1	0	1	1	1	2	2	2	1	1	1
Social Participation																													
6. Type of Social Activity	1	0	1	1	0	0	2	1	1	1	2	0	2	2	2	1	1	1	1	1	1	2	2	1	1	1	0	1	1
7. Trusted Source	0	0	0	0	0	0	0	0	0	2	2	2	0	0	2	0	2	0	2	2	0	2	2	0	2	2	0	2	0
8. Community Conversations	0	0	0	0	0	0	1	0	1	1	m	0	1	0	m	1	0	0	0	0	2	2	0	1	0	1	2	1	1
9. City Act Now	2	1	0	1	0	0	2	1	2	1	0	2	1	3	m	0	2	3	2	2	1	0	1	3	2	1	2	3	3
Solutions																													
10. City Act Later	m	1	1	2	1	1	1	2	1	1	2	3	1	2	2	2	1	1	2	1	2	3	1	2	2	2	3	3	3
11. Broad Leader	2	2	2	2	1	2	2	2	3	1	3	2	2	2	3	2	3	2	3	3	3	3	3	2	2	3	3	3	3
GRAND TOTAL	10	10	11	11	12	13	13	13	13	14	14	15	15	15	16	17	17	17	18	18	18	19	19	19	20	20	21	23	23

1. Defining CC: 0 = uncertain; 1 = 1 weather or weather variable or anthropogenic; 2 = weather and variable; 3 = define and anthropogenic causes.

2. Observations: 1 = 1 observation (winter, temperature, and precipitation); 2 = 2 observations; and 3 = 3 observations.

3. Consequences: 0 = 0-7 observations (ecological, economic and social); 1 = 8-14 observations; 2 = 15 and above observations.

4. Self Act Now: 0 = 0 categories (energy, transportation, consumption and waste, land, or advocacy/education energy); 1 = 1 cat.; 2 = 2 cats.; 3 = 3 or more cats.

5. Self Act Later: 0 = 1 categories (energy, transportation, consumption and waste, land, or advocacy/education); 1 = 2 cats.; 2 = 3 or more cats.

6. Group BLNG: 0 = 0 -1 category; 1 = 2 cats.; 2 = 3 or more cats.

7. Trusted Source: 0 = media; 2 = science.

8. Others Talk: 0 = no, not much; 1 = some; 2 = a lot.

9. City Act Now: 0 = none.; 1 = delayed response; 2 = 1- 2 categories(energy, transportation, consumption and waste, land, or advocacy/education); 3 = 3 or more categories.

10. City Act Later: 1 = 1 category (energy, transportation, consumption and waste, land, or advocacy/education); 2 = 2 cats.; 3 = 3 or more cats.

11. Broad Leader: 1= 1-2 categories.; 2 = 3-4 cats.; 3 = 5 or more cats. Categories emerged as better leadership, engaging others, better land use and building practices, more education, transition to other energy sources, create a comprehensive public transportation system, and use the best agricultural practices.

m signifies missing data.

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