

Climate Change Communication Strategies for Urban Planners in Puget Sound, WA

Rachel Chen

A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Urban Planning

University of Washington

2023

Committee:

Christopher D. Campbell

Ann Bostrom

Program Authorized to Offer Degree:

Urban Design and Planning

©Copyright 2023

Rachel Chen

University of Washington

Abstract

Climate Change Communication Strategies for Urban Planners in Puget Sound, WA

Rachel Chen

Chair of the Supervisory Committee:

Christopher D. Campbell

Department of Urban Design and Planning

Effective climate change communication is crucial to ensure communities understand how climate change will impact their communities, can participate in decision-making regarding climate change, and have their local knowledge incorporated into the planning process. Though research on effective climate change communication methods has made significant progress over the past few decades, there still needs to be substantial efforts to relay practical and direct advice to practitioners, such as urban planners. To determine what research on climate change communications would most apply to community engagement in urban planning in Puget Sound, this thesis asks the following questions: What are the best practices for communicating climate science to non-experts? Which methods are most applicable to community engagement efforts by planners in Puget Sound, WA? The effective methods of communication identified from the literature review in this thesis were incorporated into a

toolkit to guide urban planners in Puget Sound as they create climate communication materials for community engagement efforts. A focus group was conducted to discuss the usefulness of this toolkit and learn more about how planners in Puget Sound currently discuss climate change with their communities. Utilizing the strategies outlined in this thesis allow for more meaningful communication on climate change between planners and their communities, and can ultimately lead to more resilient cities if accompanied by incorporating meaningful opportunities for the community to participate in decision-making.

ACKNOWLEDGMENTS

I would like to thank my thesis committee members, Christopher Campbell and Ann Bostrom, who were both instrumental in helping me design the focus group and develop this thesis. I am grateful for their time and guidance. Chris, for encouraging me from the beginning and meeting with me often. Ann, for lending her expertise and providing ample feedback throughout this process. I would like to thank Diana Siembor for assisting me throughout the program, Miriam Bertram for her guidance throughout the Climate Science certificate and capstone process, and Marty Curry, for being a fantastic mentor and assisting with my focus group, capstone project, and thesis. I would like to thank my friends in the program, Melissa Hom, Charlotte Hevly, Elena Arakaki, and Nick Edman, for the laughter and support they brought to my time at UW. Finally, I am grateful to my family for their love and encouragement.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	5
TABLE OF CONTENTS	6
LIST OF FIGURES	7
LIST OF ABBREVIATIONS	8
GLOSSARY	9
INTRODUCTION	10
PROBLEM STATEMENT AND CONTEXT	10
PURPOSE OF THESIS	11
STRUCTURE OF THESIS	12
LITERATURE REVIEW	14
PROBLEM CONTEXT: CLIMATE CHANGE AND CITIES	14
WHY COMMUNITY ENGAGEMENT IN CLIMATE PLANNING IS NECESSARY	18
Establish a Shared Knowledge Base	19
Increase Support for Climate Action	22
Incorporate Local Knowledge in Climate Planning	24
CURRENT PRACTICE IN COMMUNITY ENGAGEMENT	29
Levels of Participation and Decision-Making Power	29
Current Methods of Communication	32
Current Communication Methods in Climate Planning	35
Gaps in the Current Approach to Climate Change Communication in Urban Planning	42
BEST PRACTICES OF CLIMATE CHANGE COMMUNICATION	43
Field of Climate Change Communication	43
Guiding Principles for Climate Change Communication	46
METHODS	64
FINDINGS	70
FOCUS GROUP DISCUSSION	70
SURVEY RESULTS	75
DISCUSSION	79
LIMITATIONS + FUTURE STUDY	82
IMPLICATIONS OF RESEARCH	86
CONCLUSION	88
REFERENCES	90
APPENDIX	100

LIST OF FIGURES

Figure 1. Arnstein's Ladder of Citizen Participation

Figure 2. IAP2 Pillars of Public Participation

Figure 3. Complex Graphics from the 2022 IPCC Summary for Policymakers

Figure 4. Complex Sea Level Rise Projection Visualization

Figure 5. Simplified Sea Level Rise Visualization Tool

Figure 6. Climate Impact Group's Climate Mapping for a Resilient Washington Tool

Figure 7. Global Warming vs. Climate Change

Figure 8. Some Potential Co-Benefits of Climate Action

Figure 9. Seven Principles for Visual Climate Change Communication

Figure 10. Quick Reference of the 12 Strategies in the "Climate Change Communication Toolkit
for Urban Planners in Puget Sound, WA"

LIST OF ABBREVIATIONS

CBO: Community-Based Organization

CCC: Climate Change Communication

CIG: Climate Impacts Group

GHG: Greenhouse Gas

IPCC: Intergovernmental Panel on Climate Change

UHI: Urban Heat Island

GLOSSARY

- Climate communication: field of communication that relays the science of climate change
- Community-centered climate planning: climate planning that utilizes local knowledge and community participation in the development of climate strategies and can support climate justice
- Climate planning: planning activities that may include policies or actions to mitigate or adapt to climate change
- Local knowledge: knowledge gained through individual perceptions of the local environment rather than from scientific or data-driven sources. Local knowledge can significantly benefit climate planning by providing local context that bridges theory and practice.

INTRODUCTION

PROBLEM STATEMENT AND CONTEXT

Cities play a significant role in mitigating greenhouse gases (GHGs) or adaptation to climate impacts, especially as an increasing number of people live in cities. As more places begin to experience climate impacts, planners are more likely to discuss climate change with their community members. Planners should be able to discuss climate change with community members effectively to ensure climate planning goals are met. Climate planning includes planning policies or actions that mitigate or adapt to climate change. Community-centered climate planning is becoming increasingly crucial in our cities as we begin to experience climate impacts and prepare for future ones. Community-centered planning is valuable to give communities greater agency in determining their future and to increase the effectiveness of planning decisions. Urban planners play an essential role in preparing cities and communities for climate change. As part of this, they should be able to effectively communicate and discuss climate change and local impacts with the communities they are planning with so that community members understand why this work is important and their role in it. To address how planners can meaningfully engage with their communities on climate change issues, this thesis attempts to answer the following questions: What are the best practices for communicating climate science to non-experts? Which methods are most applicable to community engagement efforts by planners in Puget Sound, WA?

PURPOSE OF THESIS

This thesis explores best practices of climate change communication (CCC) from the literature that are most relevant to community engagement efforts in urban planning in Puget Sound, WA, specifically. Puget Sound was chosen as the region of focus to provide some regionally specific climate tools as part of the Toolkit, which was developed in Seattle, WA. This thesis is not meant to be a comprehensive set of recommendations or a step-by-step instruction manual for all community engagement efforts in climate planning or all forms of communication.

Instead, it provides crucial considerations and general advice for communication and engagement efforts that planners can refer to when designing communication materials for climate-related plans or policies. While the strategies presented in this thesis and Toolkit are most applicable to a PowerPoint presentation format, I am not suggesting that format is the best for community engagement in climate planning. Rather, because so much of community engagement in planning incorporates some form of presentation as part of outreach, I tailored the strategies in the Toolkit to be easily applied to a PowerPoint format in order to increase the effectiveness of such presentations. However, the strategies can be broadly applied to other forms of engagement as well, but planners should be able to distinguish which methods will be best for their communities.

Over the past few decades, there has been ample research surrounding CCC and how to convey climate change better to build public understanding, encourage support for climate planning, and stimulate climate action. Despite much progress in climate science communication, there remains a gap in relaying and translating these insights into practical

advice for communication practitioners such as urban planners (Moser, 2016). This thesis attempts to provide critical insights for planners engaged in CCC work, whether it focuses on basic climate science or mitigation or adaptation efforts specifically.

To this effect, I created a toolkit that outlines climate communication strategies for planners in Puget Sound, WA. The toolkit, "Climate Communication Toolkit for Urban Planners in Puget Sound, WA," includes 12 strategies for communicating climate change as identified through the literature review in this thesis, as well as an index of relevant climate planning resources and tools that planners can use to assist them in these efforts. I presented it as part of a focus group to four planners in Puget Sound to determine how to improve the Toolkit and gauge its potential usefulness in future communication efforts. The presentation also included an example presentation to discuss the climate impacts of heat waves and urban flooding in Seattle utilizing the strategies outlined in the Toolkit. This part of the presentation was created to fulfill the requirements of the Graduate Certificate in Climate Science capstone project of relaying an aspect of climate science to a non-expert audience. A more thorough discussion of this capstone project can be found in the capstone report in Appendix A. The final Toolkit is located in Appendix B.

STRUCTURE OF THESIS

This thesis is organized into four sections, starting with the Introduction. The Introduction begins with an overview of why climate communication is necessary for urban planning and why planners must be better equipped to communicate climate change effectively. The second

section further presents the need for effective climate communication in planning, outlines what climate communication and engagement can achieve in planning, reviews the literature on best practices for climate communication, and argues for the use of specific methods that can help planners achieve better outcomes in community engagement. The third section discusses how I compiled the Toolkit, organized the focus group, and outlines the findings of this thesis. It also includes an in-depth discussion of the focus group conducted to evaluate the Toolkit's effectiveness, the results of the focus group and the corresponding survey, and presents this thesis's limitations. To conclude the paper, I provide a summary of the thesis and outline the implications of this thesis for planning practice. Finally, additional information and the Toolkit itself are located in the Appendices.

LITERATURE REVIEW

PROBLEM CONTEXT: CLIMATE CHANGE AND CITIES

Cities were responsible for an estimated 67-72% of global CO₂ emissions in 2020 (IPCC, 2022), which presents a significant opportunity for cities to contribute to climate mitigation and reduce GHG emissions (United Nations Environment Program, 2017). Further, more than 80% of Americans live in urban areas (US Census, n.d.), and more than 50% of the world's population now live in cities (United Nations Department of Economic and Social Affairs, 2019). Though cities' contribution to GHG emissions is significant, a greater proportion of people living in cities than in rural areas can also contribute to lower per capita GHG emissions and other positive climate impacts through densification, among other factors (Bulkeley, 2010). Nevertheless, how we design our cities, buildings, and infrastructure plays a crucial role in GHG mitigation and adaptation efforts in cities and influences how people and communities at large are impacted by climate change.

Climate change is typically seen as a global problem requiring global solutions, but cities have been addressing climate change locally by adopting goals to reduce carbon emissions and adapt to local climate impacts (Bulkeley, 2010, p. 229). Despite limitations to widespread climate action, cities have begun to implement their own aggressive climate action plans, many of which have exceeded federal goals (Drevno, 2022, p. 27). As climate impacts vary by location, an effective response to climate change requires that adaptation is practiced locally through place-based approaches (Measham et al., 2011; Serrao-Neumann et al., 2015).

Similarly, mitigation capacity differs from place to place. Seattle, for example, has adopted bold climate goals to reach zero net GHG emissions by 2050 (City of Seattle, 2013). In support of this overarching goal, other goals and policies in Seattle's Comprehensive Plan relate to climate change in some way, namely the city's goal of "preparing for the potential impacts of climate change, including changing rain patterns, increased temperatures and heat events, shifting habitats, more intense storms, and rising sea level" (City of Seattle, 2020, p. 136). Many other goals throughout the Comprehensive Plan also relate to preparing for climate change, such as goals to implement low-emission and sustainable transportation (City of Seattle, 2020, p. 86), consider future climate impacts when siting and designing capital facilities (City of Seattle, 2020, p. 112), and ensure the provision of utilities is resilient to future climate changes and fluctuations of demand and technology (City of Seattle, 2020, p. 118), to name a few (City of Seattle, 2020). Given Seattle's broad goals for preparing for climate impacts and similar efforts across the Puget Sound region, planners in Puget Sound should know how to best communicate potential climate impacts to support achieving these climate-oriented goals.

Climate change poses many risks to cities and their essential functions. Climate impacts such as floods, droughts, and sea level rise, among several others, can impact cities in numerous ways, from damage or disruption of infrastructure, essential services, housing, transportation networks, or human health. As we have already begun to experience changes both globally and locally, it will become increasingly crucial for our cities and communities to understand and anticipate climate impacts to be more prepared and resilient (Rosenzweig et al., 2018). The International Panel on Climate Change (IPCC) has "identified cities as most suitably positioned to act faster and more easily innovate" because they are able to engage communities more

efficiently than is possible at higher scales (Drevno, 2022, p. 27). Cities are also leaders of climate action because they are the ones that coordinate first responses to hazards, provide infrastructure and public services, and are responsible for implementing community goals (Chu & Schenk, 2017, p. 6). Urban planning, because of its role in determining how urban development occurs, is crucial in increasing cities' resilience and adaptive capacity to allow them to become places where people, infrastructure, and vital services are resilient to climate impacts and hazards (C40 Cities, 2020).

Though many hazards labeled “natural disasters” affect cities and are becoming increasingly impactful due to climate change, urban planning highly influences the degree to which cities are affected by such climate risks. It does so by dictating components of the built environment such as the proportion of land covered by buildings and other impervious surfaces compared to open space and tree cover that can help mitigate climate impacts like flooding (C40 Cities, 2020). The primary role of local jurisdictions in adaptation includes “structuring responses to local impacts, ... mediating between individual and collective responses to vulnerability, ... and governing the delivery of resources to facilitate adaptation” (Measham et al., 2011, p. 890). Additionally, “municipal and other local-level planners, managers, and officials are often at the forefront of adaptation planning and implementation, and thus it is their ability to effectively communicate and engage with the public that matters most” (Moser & Pike, 2015, p. 112). As such, planners play a prominent role in determining how resilient the built environment and its residents are to climate impacts.

Better planning is needed to help communities *anticipate* and adapt to extreme weather events and other climate impacts rather than *react* to extreme events (Berke & Stevens, 2016). Urban planning is instrumental in helping guide community and urban growth away from known or predicted hazardous areas, overseeing post-disaster response and redevelopment to reduce future vulnerability, and assisting in relocating communities if necessary (Berke & Stevens, 2016). However, the greatest policies set in place by government institutions need to be accompanied by meaningful implementation. Likewise, the greatest efforts by communities to prepare for climate change will only be as effective with the support and guidance of well-designed policies (Moser, 2006).

Even though many planners already incorporate climate considerations into their work, they often need to convince the public, other stakeholders, and decision-makers that climate adaptation or mitigation measures are necessary and worthwhile (C40 Cities, 2020). To ensure climate planning efforts are implemented fully and backed by community support, planners need to meaningfully engage a range of stakeholders, including historically marginalized populations, in consideration of the policies and programs that will protect their communities and influence their resilience to hazards and climate impacts (Berke & Stevens, 2016).

Engagement in this context refers to the “purposeful deliberation processes of involving the public in matters of public concern and decision-making, in this case climate change, sometimes over an extended period of time,” and if done correctly, can lead to greater involvement and interest in the issue or process as a whole (Moser & Pike, 2015, p. 112). To explore how planners can effectively engage communities in their work to increase support and improve the outcomes of climate-related policies, I will address community engagement in

climate planning and apply best practices from climate science communication literature to a planning context.

WHY COMMUNITY ENGAGEMENT IN CLIMATE PLANNING IS NECESSARY

Some consider top-down approaches to climate change more impactful as urgent action is needed to avoid irreversible global warming (Shearman & Smith, 2007, as cited in Blue, 2017).

In the same vein, many people assume or believe that planners or other technical experts are the most equipped to handle climate change, and therefore the solutions should be left to them to develop. However, many of the barriers to climate action are political and policy-related, which require or are well-suited for stakeholder consultation and participation (Blue, 2017). Though the climate crisis requires immediate action to prevent further warming, the creativity of solutions and the *long-term effectiveness* of climate actions could be significantly enhanced by incorporating community expertise and gaining community support. Therefore, there is an urgent need to increase “public awareness and relate climate change information to personal experience, knowledge, and the balance of benefits and costs” (Chu & Schenk, 2017, p. 2). Community engagement in climate planning is crucial to establish a shared knowledge base before discussing climate policies, increase support for climate action by legitimizing the planning process, and incorporate local knowledge in climate planning processes. I will present an argument for each of these in the following subsections.

Establish a Shared Knowledge Base

Community engagement in climate planning is crucial to establish a shared knowledge base among planners and participants. A brief primer on climate science could help participants understand climate change and its implications, prevent or correct misunderstandings, and provide context for climate action. Some communities may need to become more familiar with climate change, and even within communities, there may be varying levels of understanding. Therefore, a brief primer on climate science could be helpful to ensure everyone has a shared understanding of climate science. At the very least, a high-level discussion of climate science should discuss evidence of climate change, the mechanisms behind global warming, and the primary sources of anthropogenic GHGs (Boswell et al., 2019, p. 130). Regardless of a community's knowledge level on climate change, a brief primer can help ensure a shared knowledge base among all participants. Once a shared understanding of climate science is established, planners can move on to discuss local implications and explain existing solutions and opportunities for the community to supplement or reinforce these efforts.

Establishing a shared knowledge base with a primer on basic climate science can also be beneficial to prevent misunderstandings or miscommunication on planning issues related to climate change. Oftentimes information from climate change organizations like the IPCC is not appropriately communicated to local communities (Reis & Ballinger, 2020). During climate education workshops conducted (in Wales), people were introduced to climate change science, potential impacts, local projections, and adaptation case studies. Through these workshops, Reis and Ballinger discovered that youth and adults alike found the IPCC's Summary for Policymakers too technical and overwhelming to understand (2020). Using climate information

meant for policymakers or other scientists is often not an appropriate way to discuss climate change with community members. Planners and other practitioners need to better “translate” the science and data of climate change into a more digestible format to allow for robust and meaningful discussion. Simplifying communications and clarifying what climate science tells us using communication strategies outlined in the section of this thesis on “Best Practices of Climate Change Communication” will likely be instrumental in increasing understanding and preventing misunderstandings on climate change.

Similarly, providing a primer on climate science can help clarify climate projection uncertainties. It is important to emphasize that 97% of scientists agree that human activity is contributing to climate change and that the science of global warming and climate change itself is not uncertain (Maertens et al., 2020). However, the exact magnitude and timing of climate impacts are uncertain. For instance, it is hard to accurately predict how much sea level rise an area will experience within a given timeframe because of compounding factors, their uncertainties, and various probabilities based on different greenhouse gas scenarios (Miller et al., 2018).

Communicating such uncertainties can be difficult and obstruct the clarity of climate change messaging (Chu & Schenk, 2017). Cities face many uncertainties in climate change projections, which can impede their ability to determine and garner support for the best actions. However, even though uncertainties may be present, cities should prepare for potential impacts regardless of whether or not they occur to the exact degree predicted. Planners can emphasize the many co-benefits of action as a reason to pursue climate preparedness despite not knowing exactly how climate impacts will unfold over time. Providing a climate science brief to ensure participants are on the same page provides a solid opportunity to prevent or combat

misunderstandings on climate change and introduce co-benefits of climate action amidst the uncertainties of the exact degree of future climate impacts.

Finally, establishing a shared knowledge base through a brief primer on climate change is also vital to help communities make connections between their experiences and climate change. Communities often “have intimate knowledge of local environmental changes” but are “less aware of the wider causes and effects of climate change” (Chu & Schenk, 2017, p. 17). They may not fully understand how the changes they are experiencing are related to climate change, how climate impacts will be exacerbated, and what climate change might mean for their community. Furthermore, not everyone fully understands the terminology used to discuss climate change, and even commonly used terms in climate science might be misleading or confusing to some. In particular, a study by Bruine de Bruin et al. found that participants, even those who were very concerned about climate change, were often unclear on what key terms related to climate change meant, such as “tipping point, unprecedented transition, carbon neutral, carbon dioxide removal, adaptation, mitigation, sustainable development, and abrupt change” (2021, p. 1). Clarifying terminology through a basic primer on climate science using communication strategies as outlined in the section of this thesis on “Best Practices of Climate Change Communication” will help community members to clearly understand the risks climate change poses to their communities. Altogether, providing a brief primer on climate science can effectively ensure a shared knowledge base of climate change among participants (Boswell et al., 2019), prevent misunderstandings, and allow people to draw personal connections between their lives and climate change.

Increase Support for Climate Action

Community engagement in climate planning is also crucial to increase support for climate action by legitimizing the planning process, helping community members make informed decisions, and enhancing the overall resiliency of communities by increasing the likelihood of meaningful climate action. Engaging communities on climate change issues help “legitimize the process in the eyes of the public” (Boswell et al., 2019, p. 73). Fung argues that the “fundamental premise of representative democracy is that laws and policies are rendered legitimate because citizens have had opportunities to influence the politicians and parties that make those policies” (2015, p. 515). Participation in government by the governed is “in theory, the cornerstone of democracy” (Arnstein, 1969, p. 216). Therefore community engagement increases the democracy of the planning process as well, by allowing for greater participation and feedback as opposed to decisions being based purely on technical expertise (Corburn, 2003). Community engagement is essential for ensuring that local perspectives and needs are heard and addressed. It is made more meaningful when integrated throughout the planning process rather than at the beginning or end or separated entirely from it (Berke & Stevens, 2016; Serrao-Neumann et al., 2015). Viewing public engagement as a system, rather than separate meetings, can help to make engagement more meaningful and cohesive and can guard “against the tendency to expect too much of specific participatory initiatives” (Blue, 2017, p. 11). Providing opportunities for community members to make and influence decisions regarding the future of their community is empowering and may help them see the climate process in a more beneficial light while also improving the climate planning process by incorporating local knowledge. Broadly speaking, people are interested in participating and “deciding the future of their communities” and want assurance that their input is incorporated

into decision-making (Boswell et al., 2019, p. 74). Engagement throughout the process is crucial as the “highly technical and dynamic nature of climate change requires better relationships and improved trust between governments and the public...[as] the inclusion of the public can provide the necessary check on the value judgment of experts” (Serrao-Neumann et al., 2015, p. 1209). Furthermore, it allows for greater transparency in the planning process and increases public support.

Climate education as part of community engagement is also essential because it ensures that people understand the science well enough to make well-informed decisions based on relevant data once motivated to act (Stapleton, 2019). Moser asserts that it is now widely recognized that planning and policy actions must include opportunities for stakeholders and the community to discuss and “feel empowered to choose viable options” (Moser, 2016, p. 351). Additionally, adaptation planning is widely understood as a process that requires context-specific solutions grounded in local knowledge and resources (Paschen & Ison, 2014, p. 1085). Allowing communities to be a part of determining how their community will pursue climate mitigation or adaptation allows for greater capacity building, more equitable planning practices, and a smoother, potentially more successful, adaptation process (Gifford et al., 2011; Paschen & Ison, 2014). Populations that have a better understanding of climate change and are meaningfully involved in planning practice can make quicker policy responses and better decisions regarding climate change. Providing a primer on climate science is thus helpful to ensure communities have the information and tools they need to deliberate and make these crucial decisions to foster shared visions of a more resilient community (Chu & Schenk, 2017).

Finally, community engagement in the context of climate change can build social capital in communities to bolster the implementation of climate-resilient policies (Boswell et al., 2019, p. 73). Social capital is “a public good that can facilitate the exchange of resources and information among individuals integrated in the same community” (Dasgupta, 2003; Ostrom, 1994, as cited in Ingold, 2017, p. 414). Social capital contributes to a climate plan or policy’s long-term success and effective implementation and can significantly increase the benefits of climate action while reducing vulnerabilities (Ingold, 2017). Collaborating on climate change issues also provides an opportunity to build social capital by establishing community partnerships and networks, which can facilitate climate action (Ingold, 2017; Serrao-Neumann et al., 2015). Engagement throughout the process also contributes to increased trust and knowledge transaction, which greatly benefit communities that may later experience a natural hazard or similar phenomenon, as it would require the reactivation of and reliance on such trust and social connections to facilitate quick responses and recovery (Ingold, 2017). Therefore, engagement surrounding climate change provides an opportunity to increase the social capital of a community, simultaneously decreasing vulnerabilities and increasing the overall resilience of communities. Overall, if done mindfully, climate engagement will increase community awareness of climate change and its potential impacts, empower and inspire people to get involved, build social capital and resiliency, and improve the likelihood of approving climate-resilient policies.

Incorporate Local Knowledge in Climate Planning

Finally, community engagement in climate planning is essential to incorporate local knowledge to foster equity in climate planning and decision-making efforts and assist in a just transition to

a resilient city. Effective community engagement can improve planning outcomes by providing an opportunity for local knowledge to inform planning and ensuring planning practices are equitable. Local knowledge is “knowledge that does not owe its origin, testing, degree of verification, truth, status, or currency to distinctive... professional techniques, but rather to common sense, empiricism, or thoughtful speculation and analysis” and “can also include information pertaining to local contexts of setting, including knowledge of specific characteristics, circumstances, events, and relationships, as well as important understandings of their meanings” (Corburn, 2003, p. 421). In comparison, professional knowledge is knowledge held by practitioners or “members of a profession, discipline, university, government agency, or industrial association” (Corburn, 2003, p. 421). In the case of local adaptation planning, community knowledge, or local knowledge, is crucial to ensure that planning policies and adaptation strategies are tailored to the community. Local community knowledge can supplement professional knowledge by providing critical insight and context to climate planning issues.

More specifically, incorporating local knowledge in planning practices can help to identify culturally relevant policies that can increase community support and bolster implementation (Hahn et al., 2020). Incorporating local knowledge into planning processes through methods such as co-creation is critical to assist in achieving climate-resilient goals, adapting to climate change, and improving the accessibility of climate change information by making it relevant to the community (Yusuf & Burton St. John III, 2022, p. 5). Co-creation is an effective way to incorporate local knowledge in planning practices, as it involves efforts to empower stakeholders in helping to create and have ownership of solutions (Kirkhaug, 2016). Co-creation

strategies include activities like participatory mapping, where community members are asked to highlight areas on a map that are important to them or where they think additional investment is needed. Learning about climate impacts in this way is an excellent way for the community and planners to generate knowledge on climate change. Similarly, joint fact-finding can help stakeholders clarify risks and opportunities and determine how to respond appropriately and effectively. Additional examples of co-creation and incorporation of local knowledge are outlined in greater detail in the “Best Practices of Climate Communication” section; they can include community task groups, consultative bodies, committees, and activities implemented in community meetings. Community co-creation helps establish a sense of ownership in climate planning and is therefore important to address community concerns, build support for the successful implementation of planning policies, increase the effectiveness of planning decisions, and increase equity (Berke & Stevens, 2016; Chu & Schenk, 2017; Moser, 2006; Yusuf & Burton St. John III, 2022). Overall, incorporating local knowledge through methods such as co-creation can increase equity in planning processes by incorporating a greater range of perspectives and increase the effectiveness of planning decisions and outcomes.

Incorporating local knowledge using strategies such as co-creation provides critical context and insights often overlooked or unknown by professionals as they are acquired through life experience and cultural tradition (Corburn, 2003, p. 420). Community engagement that prioritizes and includes opportunities for local knowledge to be acknowledged, valued, and incorporated benefits not only from additional perspectives that may be more locally appropriate than solely relying on technical information, it also allows communities to feel

greater agency in determining their future and see that their opinions and lived experiences matter and are valued by planners (Kirkhaug, 2016). This can be especially meaningful for historically marginalized communities that are not always given a seat at the table. Additionally, with climate change engagement, “most of the affected parties, including nonhuman species and future generations, are not present to participate in decision-making processes and do not have the capacity to represent themselves or the issue in ways that align with their interests” (Blue, 2017, p. 10). While participatory planning can provide a place for those most affected by climate change to participate, they must be invited and empowered to influence decision-making (Blue, 2017). Chu and Schenk highlight that giving communities a strong sense of ownership over climate change decision-making and implementation can increase the effectiveness of such efforts, increase the potential for more equitable outcomes, and lead to greater social innovation (Chu & Schenk, 2020, p. 17). However, these benefits are only felt when ample effort ensures such populations are meaningfully engaged early and throughout the community engagement process.

Incorporating local knowledge is also crucial to ensure a just transition to resilient cities. Lieberknecht defines community-centered climate planning as “planning that seeks to better incorporate local knowledge and participation in [the] development of climate strategies” and supports climate justice (Lieberknecht, 2022, p. 99). Community engagement should be incorporated continuously and equitably throughout the planning process to “increase awareness and understanding, provide continuity, and constructively engage policy-makers, stakeholders, and the public” (Moser & Ekstrom, 2010, p. 22029). Similarly, engaging the community in climate planning is essential to avoid further exacerbating inequalities and

vulnerabilities (Berke & Stevens, 2016; Chu & Schenk, 2017; Ensor & Harvey, 2015, as cited in Yusuf & Burton St. John III, 2022). There might be specific intergroup vulnerabilities to different climate impacts and hazards that are disproportionately experienced by some groups in the community than others (Corburn, 2003, p. 428). Most professional models and risk assessments do not usually account for the heterogeneity of communities, but this is a crucial aspect of understanding a community's vulnerability and ensuring inequalities are not exacerbated through climate action (Corburn, 2003, p. 428). Utilizing local knowledge through strategies like co-creation can ensure these vulnerabilities are acknowledged, remedied, and guide climate action. Community engagement in climate planning is essential to ensure that the community's concerns and lived experiences are incorporated into creating and implementing climate plans or policies.

As discussed above, engaging the public in the climate planning process has multiple benefits. It can increase communities' knowledge of climate change by ensuring a shared knowledge base, combating misunderstandings, and allowing people to draw connections between their lives and climate change. It can also facilitate support for climate action by legitimizing the planning process, helping community members make informed decisions, and enhancing the overall resiliency of communities by increasing social capital. Finally, engaging the public in the climate planning process can incorporate local knowledge that better informs planning decisions and contributes to a more just society. I will now address current community engagement in urban planning and discuss how planners can improve their engagement approach to achieve their communication goals.

CURRENT PRACTICE IN COMMUNITY ENGAGEMENT

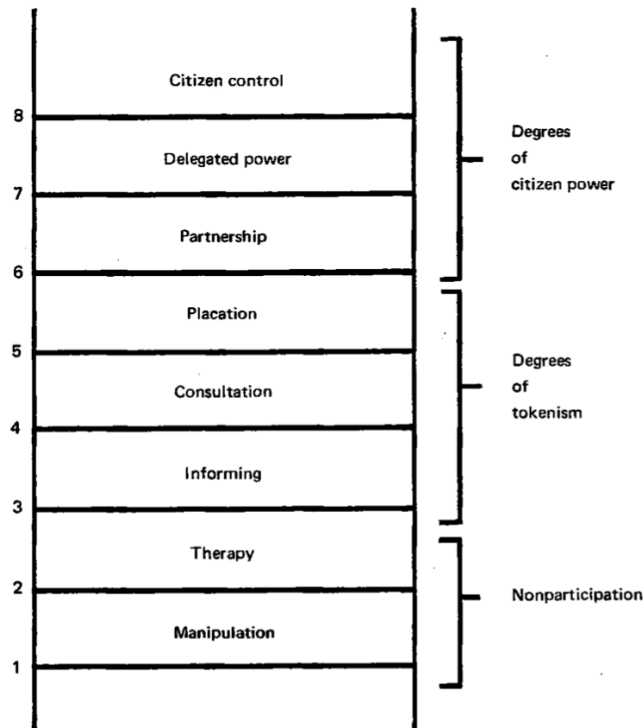
To discuss how planners can improve public engagement and communications related to climate change, I will first examine current planning practices in community engagement and how climate change is currently communicated to communities in urban planning. Then, I will identify the gaps in current climate communication methods to support my recommendations for effective strategies for planners to improve their communication efforts.

Levels of Participation and Decision-Making Power

Community engagement over the years has been shifting towards more meaningful participation by giving the public a more significant role in decision-making to foster more equitable solutions. Public participation can empower communities by disrupting existing power hierarchies (Blue, 2017, p. 5). Arnstein's Ladder of Citizen Participation, which many planners use to inform the design of their engagement methods, was developed in the late sixties to encourage more meaningful forms of community engagement that devolve greater power to communities. Arnstein's Ladder of Citizen Participation (Figure 1) shows eight rungs symbolizing different levels of participation, from methods of nonparticipation, such as manipulation and therapy, to degrees of tokenism, such as informing and consulting, and finally to degrees of power which include partnership, delegated power, and citizen control (Arnstein, 1969). Arnstein's work suggests that in order to have meaningful citizen participation, there must be a power shift that allows communities greater agency in decision-making (Arnstein, 1969).

Figure 1

Arnstein's Ladder of Citizen Participation



Note. From Arnstein, S. R. (1969). A Ladder of Citizen Participation. *Journal of the American Institute of Planners*, 35(4), 216–224. <https://doi.org/10.1080/01944366908977225>

Modern spectrums of participation have also built upon Arnstein's work. For instance, the International Association for Public Participation (IAP2) has outlined an engagement spectrum (Figure 2) that shows different categories of public participation ranging from purely informing the public to empowering the public (IAP2, 2018b). This framework also includes example tools for each category of participation to guide the implementation of these participation methods. For example, community engagement that purely informs the public often utilizes engagement methods such as fact sheets, websites, and open houses, which are characteristic of many current engagement efforts in planning (IAP2, 2018b). The engagement spectrum was developed based on these core values of the IAP2: that the public should have agency in

making decisions that affect their lives; their contribution should impact the final decision, and they should know *how* their input affected the final decision; participants should be involved in the design of the participation methods themselves; and they are given the information they need to “participate in a meaningful way” (IAP2, 2018a). To reiterate, as Arnstein stipulated, meaningful participation requires participants to be given some degree of power in decision-making (Arnstein, 1969).

The meaningful levels of participation in this framework include more significant opportunities for the public to collaborate and participate in decision-making through processes such as citizen advisory committees, participatory decision-making, citizen juries, or delegated decisions. Most public participation in urban planning today still aligns most closely with the “inform” and “consult” participation models. However, community engagement practice increasingly incorporates more collaborative forms of decision-making and engagement. The climate change communication methods included in this thesis and the corresponding Toolkit are suitable for all levels of participation. While the strategies will allow for more effective climate change communication in various contexts, they will not directly change power dynamics present in planning engagement today, especially as those dynamics are locally specific.

Figure 2

IAP2 Pillars of Public Participation

	inform	consult	involve	collaborate	empower
Public Participation Goal	To provide the public with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions.	To obtain public feedback on analysis, alternatives and/or decision	To work directly with the public throughout the process to ensure that public issues and concerns are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
Promise to the Public	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and issues are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
Example Tools	<ul style="list-style-type: none"> • Fact sheets • Websites • Open houses 	<ul style="list-style-type: none"> • Public comment • Focus groups • Surveys • Public meetings 	<ul style="list-style-type: none"> • Workshops • Deliberate polling 	<ul style="list-style-type: none"> • Citizen Advisory committees • Consensus-building • Participatory decision-making 	<ul style="list-style-type: none"> • Citizen juries • Ballots • Delegated decisions

Note: From International Association for Public Participation. (2018). *IAP2 Public Participation Pillars*. International Association for Public Participation.

https://cdn.ymaws.com/www.iap2.org/resource/resmgr/communications/11x17_p2_pillars_brochure_20.pdf

Current Methods of Communication

Similar to why engaging communities in climate change issues is crucial, community engagement in urban planning is a pivotal way to increase democracy in decision-making surrounding urban planning issues. However, many current engagement efforts do not allow the public to have a substantial or meaningful role in decision-making (Fung, 2015). Community

engagement in urban planning could be vastly improved to allow for meaningful participation incorporating climate action and resilience building. Most community engagement in planning today is characterized by several key methods that often blend technical expertise with local knowledge (Berke & Stevens, 2016). Planners often engage in in-person hearings or meetings where information is provided through expert presentations or handouts, followed by a group discussion or activity to get feedback from the community (Blue, 2017; Fung, 2015). Though many forms of communication have moved online due to the ongoing COVID-19 pandemic, many of these methods are still commonly used, sometimes in a hybrid format (simultaneously held in-person and online). For many projects, planners conduct community meetings to describe the project they are working on, solicit feedback, and gather information from the public. These meetings often begin with a short oral presentation with complimentary PowerPoint slides, followed by a question and answer session or a small group discussion or activity. Typical activities include using stickers or sticky notes to make observations on maps, highlight areas of concern, or envision the future of their community. These outreach efforts are often accompanied by a community survey to reach those who cannot attend the in-person meeting. These participatory methods work well but can be improved to facilitate better discussions and knowledge generation surrounding local climate change impacts, adaptation, and mitigation.

While consultative approaches in planning such as these assume equal representation, they are not truly representative, and the linkage between consultation of community members and decision-making processes needs to be stronger. Participants of these meetings are self-selected as they are open to the public, which often results in mainly engaging those who are highly interested in the topic at hand and who are “frequently more socioeconomically advantaged than the broader population” (Fung, 2015, p. 515). During these meetings, most

speaking is done by planners, invited speakers, or those with topical expertise, while participants mainly listen and provide feedback when prompted (Fung, 2015). Current engagement efforts, such as these meetings, can feel largely performative to participants as they often solicit community input without giving the community any explicit decision-making power (Rudge, 2021). While these participatory planning efforts overcome issues from top-down planning methods that simply do not involve the public, they could be implemented better to avoid inequity and give communities a greater role in decision-making (Rudge, 2021). The principles discussed in the “Best Practices of Climate Change Communication” section guide how to enrich current engagement efforts, but it is still up to jurisdictions to devolve decision-making power to the community.

Despite the well-intentioned efforts of planners to meaningfully engage their communities, current efforts are still lacking in their ability to equitably reach community members, namely vulnerable populations who have historically been excluded from and are highly impacted by planning processes and decisions. While time and staff constraints contribute to some of these shortcomings, repeatedly using the same engagement methods rather than thoughtfully tailoring engagement to the specific topics and communities involved results in monotonous engagement efforts that can cause burnout and engagement fatigue for planners and community members alike. Engagement activities “seem to come in at a point of the process where it is difficult to make changes to plans,” and opportunities to participate are often limited to meet the minimum legal requirements (Kirkhaug, 2016, p. 1). Some argue that true empowerment of stakeholders is only possible when they have ample knowledge of the subject rather than being involved towards the end of the planning process when most

decisions have already been made (Serrao-Neumann et al., 2015). Authentic engagement means accepting that the process could take longer than expected but will lead to more meaningful engagement, higher levels of participation, and greater outcomes (Lymn et al., 2010). Applying best practices of climate communication outlined in this thesis could greatly enhance planning engagement to ensure community members fully understand the climate issues at hand and feel empowered to discuss climate solutions and influence decision-making for the future resilience of their community.

Current Communication Methods in Climate Planning

Similar to climate communications in general, many current climate communication methods in urban planning focus on “providing more understandable information about the science,” based on the understanding that people are not acting on climate change or approving of climate policies because they lack knowledge of climate change (Moser, 2006, p. 5). This is known as the deficit model, a one-way communication model which argues that people will be motivated to take action once they possess more knowledge on the issue, where the speaker imparts knowledge to a lay audience to educate them and inspire them to take action. This model assumes that a lack of information causes public disinterest and disbelief and that the community is ill-equipped to make decisions without information from experts, in this case, planners (Ballantyne, 2016). There is a “sustained critique” of the deficit model, “given its inattention to power, its decontextual and ahistorical approach to science, and its tendency to shield dominant institutional claims and practices from public scrutiny” (Blue, 2017, p. 3). Communication practices are moving away from this model, especially in climate

communication, towards methods that build urban citizenship (Chu & Schenk, 2017, p. 16). Engagement in planning similarly acknowledges that people have general knowledge of climate change and are capable of making or influencing policy decisions. However, a brief discussion of the science behind climate change can help ensure that all participants are on the same page before discussing the primary topics of the event.

Furthermore, Chu and Schenk point out that governments often rely on mass communications to relay climate science more broadly, rather than tailoring communications to their specific audiences or considering how different sub-populations might process and use such information (Chu & Schenk, 2017, p. 9). While these methods are still widely used, there has been a shift in the past several years toward tailoring climate communications to address specific audiences' concerns and needs. As Ballantyne summarizes, "The conversation has shifted from informing and educating the ignorant masses to engaging people with the issue of climate change" (2016, p. 330). The paradigm shift from a knowledge-transmission approach to one of meaningful engagement recognizes that cultural and social contexts are instrumental in decision-making. It allows for a more equal power distribution among participants and practitioners by giving communities a voice and an opportunity to inform planning decisions (Ballantyne, 2016, p. 332). Furthermore, it encourages more meaningful discussions on climate planning by acknowledging and honoring what communities already know.

On the other hand, some current engagement in climate planning discusses the project or policy at hand without justifying why these actions are necessary due to climate change. For instance, planners may discuss implementing a climate action plan with their community and

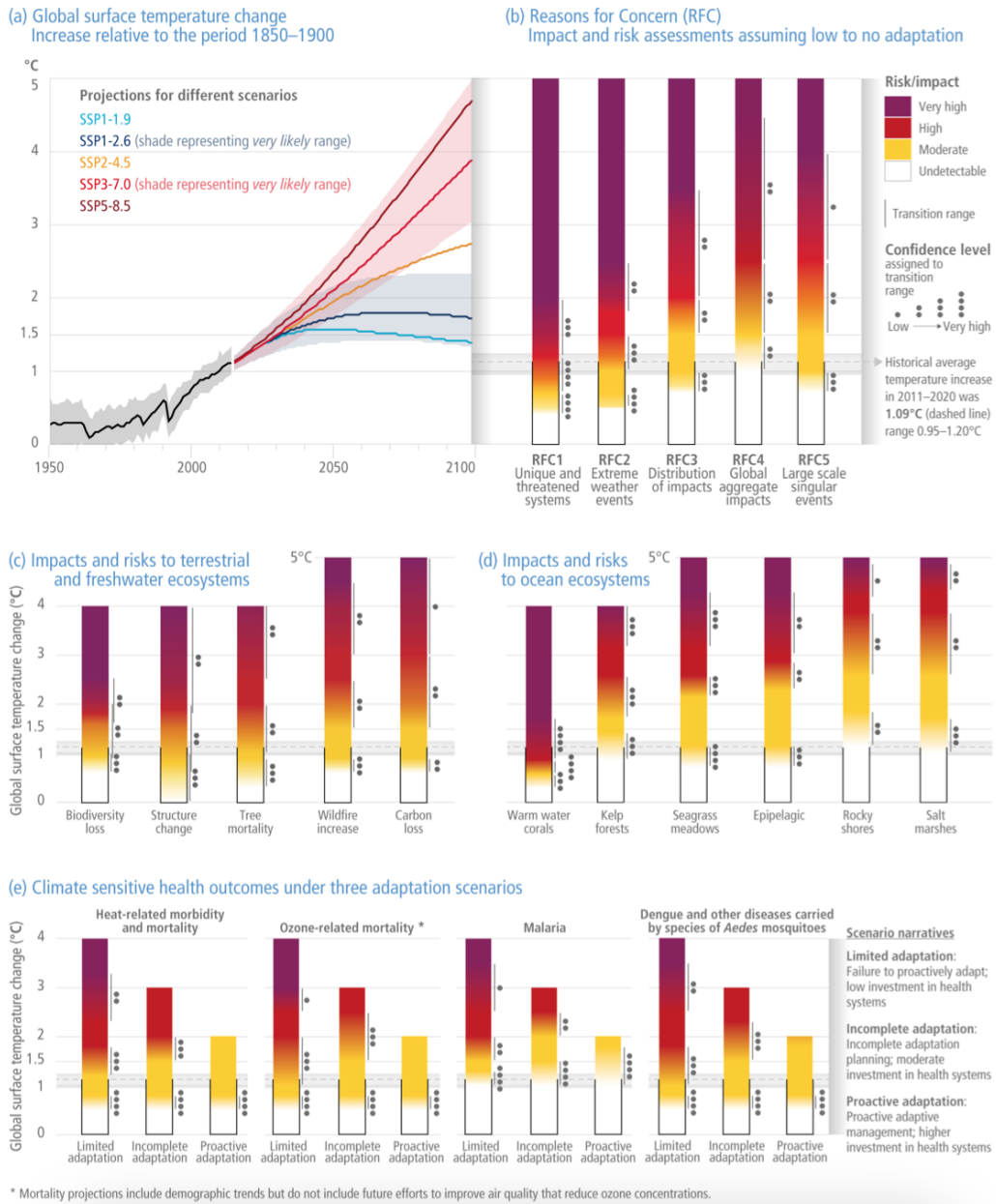
may not discuss climate science as part of this outreach. While it can save time and resources to minimize outreach to discuss the development or implementation of plans with communities, outcomes of engagement may be improved by including a primer on climate science or the specific climate impacts that will affect the community, which helps to justify why planning for these impacts is necessary. As discussed previously, a primer on climate science can enhance outreach efforts by ensuring the community has a shared knowledge base, which can enrich the development or implementation of climate-related plans or policies. After establishing a shared knowledge base to allow for everyone to participate in the conversation, planners can utilize “collective decision-making, in which a diverse range of people consider [climate planning] issues from multiple points of view, and through engagement and conversation, reflect on [climate planning] options in ways that broaden perspectives, opinions, and understandings” (Blue, 2017, pp. 3-4).

One effective way to discuss climate science is to craft a compelling argument using images. In many climate communication efforts today, the images or graphics used to represent climate change and present a case for climate action are often too complex for most audiences and can lead to confusion, fear, and misinterpretation. For example, climate change projections from the IPCC can be complex and challenging for people to understand, even if accompanied by an explanation (Reis & Ballinger, 2020). Figure 3 provides an example of such graphics often used in climate communications. While these may be useful for practitioners to inform their work, they might be unapproachable to the general public and are often irrelevant to individual communities as they discuss global climate change projections.

Figure 3

Complex Graphics from the 2022 IPCC Summary for Policymakers

Global and regional risks for increasing levels of global warming



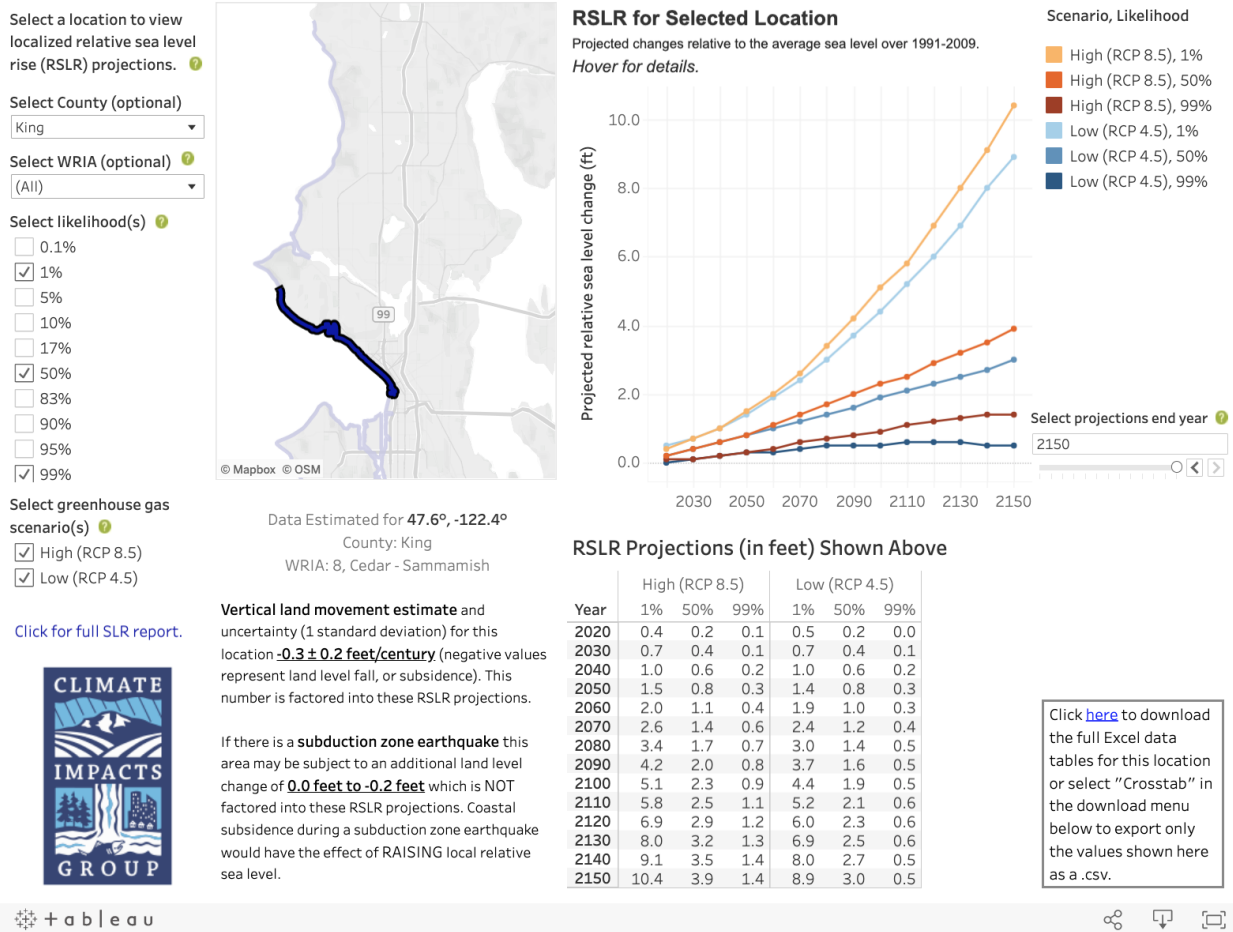
Note: From IPCC, 2022: Summary for Policymakers. In: *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. (2022). Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3-33. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/>

Additionally, some of the climate visualization tools planners may use, such as the Climate Impact Group's sea level rise viewer, may provide local information for planners to inform their work but may be confusing to the public (Figure 4). Utilizing visualization tools such as NOAA's sea level rise viewer may help to provide a clearer picture of what specific levels of sea level rise would look like in the community (Figure 5). The Climate Impacts Group has another visualization tool, Climate Mapping for a Resilient Washington (Figure 6). It provides a more straightforward representation of climate impacts that may make it easier for the general public to understand how their community will be impacted, especially compared to surrounding communities.

Figure 4.

Sea Level Rise Projection Visualization

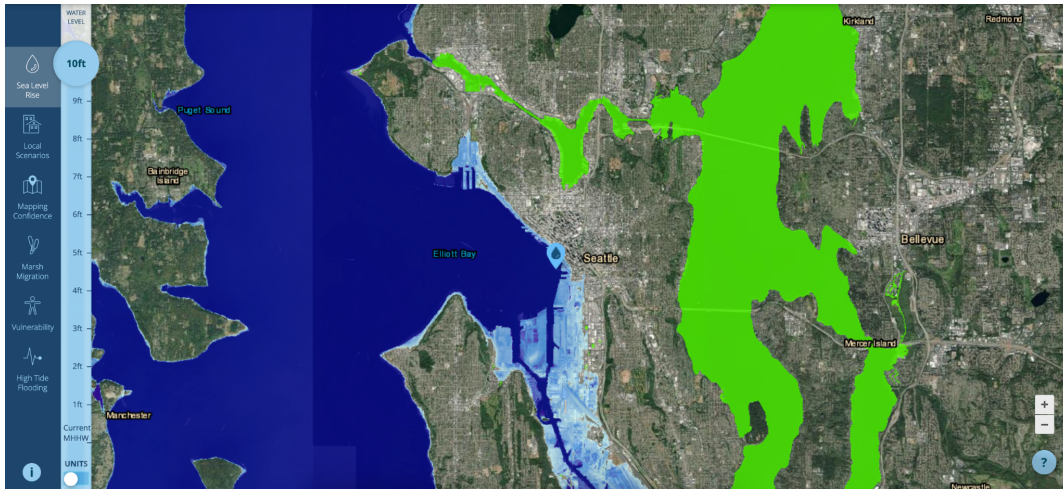
VISUALIZATION #1: Projected sea level change by year



Note: From Lavin, P., Roop, H.A., Neff, P.D., Morgan, H., Cory, D., Correll, M., Kosara, R., and Norheim, R., 2019. Interactive Washington State Sea Level Rise Data Visualizations. Prepared by the Climate Impacts Group, University of Washington, Seattle. Updated 7/20. <https://cig.uw.edu/projects/interactive-sea-level-rise-data-visualizations/>

Figure 5.

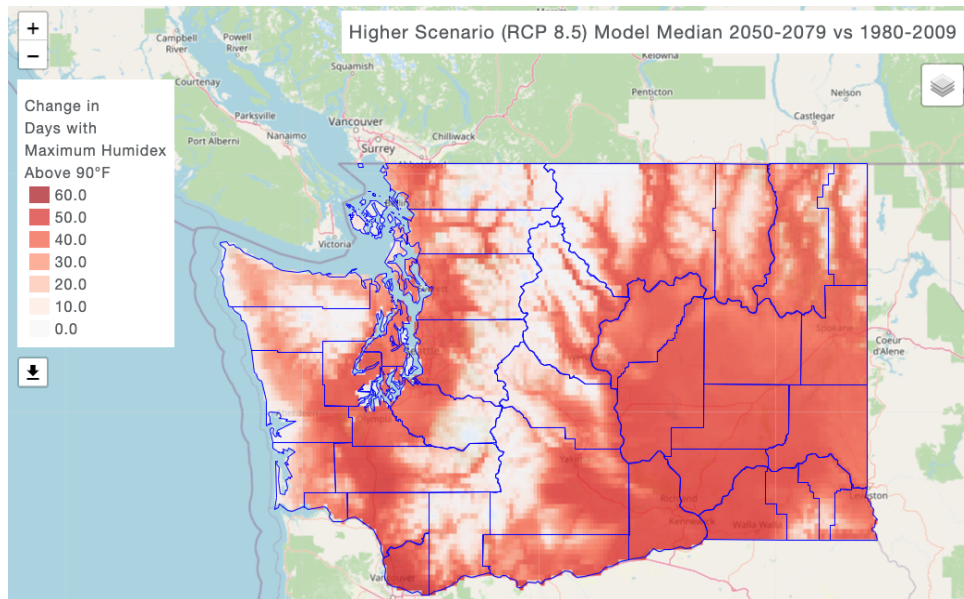
NOAA's Sea Level Rise Visualization Tool



Note: From NOAA. (n.d.). Sea Level Rise Viewer. Retrieved April 14, 2023, from <https://coast.noaa.gov/digitalcoast/tools/slr.html>

Figure 6.

Climate Impact Group's Climate Mapping for a Resilient Washington Tool



Note: From Raymond, C., & Rogers, M. (2022). Climate Mapping for a Resilient Washington. Prepared by the Climate Impacts Group, University of Washington, Seattle and Research Data & Computing Services, University of Idaho, Moscow. Retrieved April 8, 2023, from <https://cig.uw.edu/resources/analysis-tools/climate-mapping-for-a-resilient-washington/>

Furthermore, slides like those from Al Gore’s presentations on the climate crisis are not well-suited for use in a planning context as they discuss climate change more broadly and are not tailored to any specific community. Though some have found them to be effective and include strong explanations of climate science (Cook, 2016), the images used in the slides could be improved to center the human experience of climate change and include locally relevant impacts and climate action to encourage people to take action once they are informed. While communications that utilize graphics or slide decks such as these can effectively relay climate science, they are not well-suited for community engagement discussions in planning, as each community will experience different climate impacts and approach climate action in distinct ways. Additional insight into how planners in Puget Sound, specifically, communicate climate change in their communities can be found in the “Findings” section of this thesis.

Gaps in the Current Approach to Climate Change Communication in Urban Planning

Climate change poses unique challenges for community engagement, requiring reconfigured and revised engagement strategies to develop equitable, sufficient, and successful local solutions (Blue, 2017). For one, climate change is often characterized as a “wicked problem” or an “issue so complex in nature that it has no obvious solution” (Ballantyne, 2016, p. 329) and as a problem that requires “expertise and capacity across different disciplines...and even across public, private, and civic sector organizations” (Fung, 2015, p. 517). Blue argues that an implication of climate change as a wicked problem is “to shift the focus of participation from questions of empowerment to social learning and institutional reflexivity” and that “rather than assuming that ‘participation is a categorical term for power’ (Arnstein, 1969, p. 216), social

learning should be the goal of participation given the unprecedented political challenges posed by climate change” (Blue, 2017, p. 9). Furthermore, the uncertainties of climate change further complicate CCC efforts in planning; more effort must focus on addressing skepticism and any limitations to climate action (Chu & Schenk, 2017). These considerations require more time and care to develop communication materials, which is often not feasible due to limited staff capacity or expertise.

Professionals in governmental organizations attribute the lack of capacity to communicate climate change with communities as one of their biggest challenges to climate preparedness (Moser & Pike, 2015). Current methods of community engagement in urban planning may not be adequate for climate planning because of the complex nature of the issue and the limited capacity or expertise among planners to discuss climate change. Additionally, as Moser asserts, findings from climate communication research do not always reach practitioners (2016). To help planners communicate and discuss climate change with communities more effectively, I will now explore some of the best practices of climate communication and engagement from the literature on climate science communication.

BEST PRACTICES OF CLIMATE CHANGE COMMUNICATION

Field of Climate Change Communication

Climate change communication has progressed significantly over the past few decades as climate change has become more prominent in science communication, policy arenas, and the media. There has been a significant shift in recent years from simply persuading people that

climate change is happening to communicating climate change in a way that encourages people to take meaningful action (Nerlich et al., 2010). It is now widely understood by most Americans that anthropogenic activity is causing climate change. Therefore, communications have shifted to focus more on what will happen with climate change rather than simply convincing people that climate change is happening. Much of CCC research today relates to how to know your audience and tailor your communications accordingly to present meaningful and relevant information to those you are communicating with (i.e., Bostrom et al., 2013). Additionally, significant research has addressed how to communicate climate hazards in ways that address people's concerns, needs, and perceptions of risks in order to elicit action (Yusuf & St. John III, 2022, p. 116).

Another notable shift in CCC, as briefly discussed before, has been from the deficit model to communications that engage people with the issue of climate change and provide an opportunity for the co-creation and exploration of information through dialogue (Ballantyne, 2016). This transition recognizes that communication efforts are usually grounded in conversations between people. While planners might have more knowledge of climate change than the average community member, the community likely has a general understanding of the topic and knowledge of the social dynamics of climate change in society (Nerlich et al., 2010, p. 98). Particularly, communities have a strong understanding of what they have experienced in their community, whether they recognize the connection of these experiences to climate change or not. These shifts represent a movement from "one-way communication to dialogue and reflexive engagement" (Nerlich et al., 2010, p. 100). Research coming out of this transition has emphasized how dialogic and deliberative processes can deepen understanding of climate

science among participants, encourage empathy (Kearns, 2012), and strengthen support of climate-friendly plans and policies (Moser, 2016).

To guide the shift from the deficit model to more engaging and meaningful forms of CCC, researchers have been exploring how various activities, such as gaming and interactive tools, co-learning techniques, and certain types of visualizations and imagery, can aid CCC (Moser, 2016). Though this research is crucial in improving CCC efforts, Moser argues that few researchers “appear to be engaged in sharing with practitioners their social scientific insights on how to communicate climate change most effectively” (Moser, 2016, p. 365). Regarding adaptation communication efforts, in particular, communicators are not well-equipped with guidance (Moser, 2014). Although “communicating adaptations is thought [by some] to be easier than communicating the science of climate change or mitigation policies because it offers some immediate co-benefits” (338), research suggests communicating adaptation is not so different from climate change mitigation, climate science, or other risks more generally (Moser, 2014, p. 338, 349; Moser, 2017). The lack of practical guidance for planners on effective CCC, whether for mitigation or adaptation purposes, contributes to lost opportunities to advance climate action or resilience efforts and can increase vulnerability.

This thesis attempts to provide concrete guidelines for planners engaged in climate communication with their communities to apply the climate communication literature to a planning context. The recommended strategies were drawn from the following literature review, and were chosen based on their widespread applicability to many engagement formats, how well they summarized research in CCC, and how memorable they are. The Toolkit also

provides specific climate visualization tools and resources to assist planners in Puget Sound specifically.

Guiding Principles for Climate Change Communication

To more effectively communicate climate change in order to increase public support and community-wide efforts to mitigate and adapt to climate change, planners should incorporate the following communication strategies into their communication efforts. These strategies can be applied to virtually any form of communication, whether an oral presentation, flyer or handout, PowerPoint presentation, website, report, or another form of communication.

Planners should know their communities well and be able to determine which of the following strategies would be most helpful to incorporate for discussing climate change with their communities. The Toolkit, which provides a distilled overview of these strategies and includes an index of some of the climate visualization tools and resources available to planners, can be found in Appendix B.

Language

Language greatly impacts how the message is received or interpreted when communicating with others. Planners should use as plain language as possible and avoid technical jargon in order to be approachable to wide audiences and increase the likelihood that people will understand and recall information (Bruine de Bruin et al., 2021, p. 3). It is widely suggested that using shorter words and sentences and avoiding jargon make communication more approachable and clear to a wide audience (Bruine de Bruin et al., 2021, p. 18). Not everyone has a detailed understanding of climate science or climate impacts and may not be familiar

with many of the scientific concepts or terms being discussed. Even if communities are well-educated and have a greater understanding of climate change, it is still important to communicate in everyday language that communities can better relate to and understand (Bruine de Bruin et al., 2021, p. 18). Simple, everyday language allows your audiences to understand the issues better and remain engaged.

To further increase participant understanding, planners should clearly define any potentially confusing vocabulary or jargon used so participants have a shared understanding of the terms used. Even those who are very concerned about climate change can still be unclear on what key terms related to climate change mean, such as “tipping point, unprecedented transition, carbon neutral, carbon dioxide removal, adaptation, mitigation, sustainable development, and abrupt change” (Bruine de Bruin et al., 2021, p. 1). Even if participants understood a word, they did not always know what it meant in a climate context. Thus, it is crucial to contextualize any terminology used to clarify how your words relate to climate change and prevent misunderstandings and misinterpretations.

For instance, in the same study, some participants thought “carbon dioxide” removal referred to carbon monoxide, the gas responsible for many household deaths due to carbon monoxide poisoning. Other participants believed climate change is caused by air pollution, similar to the hole in the ozone, and assumed that if emissions are reduced to zero, the atmosphere will clear a few days after (Bruine de Bruin et al., 2021, p. 2). People seem to misunderstand that GHGs, namely carbon dioxide, can remain in the atmosphere for centuries. The more widely understood terms were “adaptation” and “abrupt change.” However, it is still recommended by the authors to clearly define terms and make their connection to climate change explicit at the outset of engagement (Bruine de Bruin et al., 2021). This can help ensure everyone is on

the same page and can participate more effectively. Continuing with the carbon dioxide examples, the authors suggest “spelling out ‘carbon dioxide’ [to] avoid confusion about the type of carbon involved” and to make clear what carbon neutral means - “no net increases in carbon dioxide in the air,” as well as what carbon dioxide removal means - “taking carbon dioxide out of the air’ [or] ‘removing carbon dioxide from the air’” to make it these terms clear (Bruine de Bruin et al., pp. 10, 14). Additionally, some terms like “enhanced” might have completely different meanings in a climate context; usually, “enhanced” means to make something better, but “enhanced global warming” means global warming is getting worse (Nerlich et al., 2010, p. 104). Therefore, it is essential to prevent misunderstandings by clarifying any potential jargon, complicated terms, or words that might mean different things in a climate context.

Climate change and global warming are often used interchangeably but have distinct meanings (Figure 7). Climate change refers to the broad, long-term changes in the average weather patterns on Earth due to anthropogenic GHG emissions. Global warming is the long-term increase in Earth’s surface temperatures due to anthropogenic GHG emissions. It is important to clarify the differences between potentially interchangeable or confusing terms and ground them in a local context. For instance, providing a local example of climate adaptation and one of climate mitigation can help people distinguish between adaptation and mitigation (Bruine de Bruin et al., 2021, p. 15). Providing specific, local examples of climate change adaptation in your community will help participants visualize what adaptation can look like and can encourage them to join in existing efforts. Overall, using simpler words and sentences, clearly defining terms, and providing local examples to demonstrate climate concepts in practice significantly increase people’s comprehension of climate change science.

Figure 7.

Global Warming vs. Climate Change

GLOBAL WARMING VS. CLIMATE CHANGE

Global warming: the long-term increase in *Earth's surface temperatures* due to increased concentration of greenhouse gasses in the atmosphere

Climate change: the broad, long-term changes in the *average weather patterns* on Earth due to anthropogenic greenhouse gas emissions



Note. Graphic made by Chen, R. Icons from: Social Issues Thesis: Climate Change | Google Slides & PPT. (n.d.). Retrieved May 23, 2023, from <https://slidesgo.com/theme/social-issues-thesis-climate-change>

Narratives

Narrative theory is grounded by beliefs “that human experience, cognition, and values are organized around culturally specific plots and archetypal narrative structures, and second, that relating an experience through story-telling is already doing ‘knowledge work,’ or learning, through the reflective reworking and development of knowledge content” (Paschen & Ison, 2014, p. 1086). The human experience is “organized around specific narrative structures”; utilizing narrative forms of communication that emphasize the human impacts of climate change appeal to the human experience and allow people to make personal connections to climate change (Paschen & Ison, 2014, p. 1083). As Veselková summarizes, “humans are *homo narrans* and narratives play a central role in how they process information, communicate, and reason,” and individuals “are more likely to respond to narratives than to expert-based information” (Veselková, 2017, pp. 178, 181). This is because, as humans, we organize our thoughts into narratives, which are how we interpret and make sense of what we experience

(Veselková, 2017, p. 181). Narratives are helpful, especially in communicating “wicked problems” like climate change, “which are characterized by an intense value-based conflict between policy coalitions and that resist resolution by appealing to facts” (Veselková, 2017, p. 178).

Furthermore, narratives can help planners determine how communities understand and practice adaptation (Paschen & Ison, 2014, pp. 1083-1084). Specifically, “a community in a [flood-prone] coastal town...constructs individual and collective stories about their historical experiences, their coping strategies, and problems encountered, which are passed down as intergenerational local knowledge” (Paschen & Ison, 2014, p. 1084). Planners can elicit these types of narratives from community members using broad questions to better understand how climate impacts are affecting a community, how communities are adapting, and learn how a diversity of community members understand climate change from their specific social, historical, place-based, cultural, and communal experiences (Paschen & Ison, 2014, p. 1086). Community members in one study “responded well to discussions about their own direct personal experiences of events such as heat waves and flooding” (Reis & Ballinger, 2020, p. 6). Because people communicate their experiences “in the form of stories, narrative theory argues that stories *transport* knowledge but also *constitute* ways of knowing” (Paschen & Ison, 2014, p. 1086). As people tell stories, they “re-work and order experience, evaluate events, and construct meaning and knowledge as they communicate with others” (Paschen & Ison, 2014, p. 1086). As applied to CCC, narratives can help people learn more about climate science and climate impacts by telling their own stories about climate change and can provide a clearer presentation of otherwise complex scientific data. Listening to community narratives is also beneficial to discover what kinds of adaptation techniques they are involved in, would be interested in, or could pursue with government support (Paschen & Ison, 2014). The City of

Tacoma provides a great example of how to include narratives in climate communications. Tacoma incorporates multiple narratives in the form of “stories” in their Climate Action Plan that paint a picture of their community’s future with a climate-resilient vision (City of Tacoma, 2021). Incorporating stories such as these can help inspire community members to see how climate action could improve their lives and might provide ways for them to get involved.

Finally, utilizing personal stories in community engagement can help others think about how climate change has impacted their lives and understand why urgent climate action is necessary. In my personal discussions surrounding climate change, I often start by providing an example of observing climate change in my own life. I tell a story about growing up in San Francisco, where I never had a sunny and warm birthday celebration. My birthday is in July, often depicted as the coldest time of year in San Francisco because of the thick fog, grey skies, and ice-cold wind that typically characterize our summers. As I got older and visited home in the summers throughout college, I began to notice that our summer weather was much more sunny and warm than it used to be. I finally had a warm birthday celebration! However, along with warmer summer temperatures, San Francisco also began to experience some intense summertime heat waves, which the city was vastly unprepared for. We also began to experience extreme air quality impacts from wildfire smoke from unprecedented fires in surrounding counties. After telling my personal story, I invite others to share their experiences. Hearing an example of how climate change has impacted someone personally can help others draw connections between their experiences and climate change that they might not have made previously.

Know Your Audience

Some communities are more amenable to discussing climate change than others. However, most communities would probably agree that they want their cities to be protected from hazards and remain safe places to live. Targeting and tailoring messaging to specific audiences is imperative to increase the likelihood of achieving CCC goals (Bostrom et al., 2013, p. 5).

According to the authors, targeting refers to “identifying a specific subpopulation for communications, whereas tailoring involves including individuating personal information within the design of the communication” (Bostrom et al., 2013, p. 2). Planners may not have extensive time or resources to create highly customized communication materials, especially since communications in planning generally attempt to reach the broadest audience possible. Nonetheless, targeting and tailoring planning communications to different subpopulations could effectively garner widespread support for climate policies among communities.

Additionally, some people do not like the term “climate change” but may be more open to discussing solutions if those discussions are framed around public health concerns. Similarly, Moser found that using the word “preparedness” rather than “adaptation” increased the effectiveness of communication efforts (2014). Some communities might be more receptive to discussing how to implement their hazard management plan or increase their community’s resilience. In this case, planners can emphasize how planning actions can enhance the community’s resilience to local natural hazards, foster safer communities, or improve infrastructure. This way, potential mitigation efforts or adaptation to climate impacts are still addressed but from a lens of enhancing community resilience rather than exclusively climate mitigation or adaptation, which may not be well-received by all communities. As community

members begin to understand the many co-benefits of these plans or actions, they may become more trusting of planning processes and eventually be willing to address climate change directly.

Framing

Framing theory outlines how to present your information to craft a certain message. The information you present and how you present it is crucial to influence how people interpret and respond to it. Framing is a persuasion technique that can dictate what people find important and can impact how they choose to respond. Specifically, it entails emphasizing certain aspects of an issue over others “as a way to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the” issue or situation described (Entman, 1993, as cited in Gustafson & Rice, 2020, p. 617). For instance, those opposed to climate change action often emphasize the uncertainties of climate change as a way to convince people that climate action is not justified. Thus, in the face of climate change, how you frame climate information is crucial to how people respond to it and whether they choose to act.

In Stapleton’s argument for a climate justice education approach, she argues that framing climate change stories and images around human impacts of climate change and climate justice was more effective than stories or images of impacts on animals or landscapes, as it allowed people to feel solidarity with those already affected by climate change, and helped them understand how they might be similarly impacted in the future (Stapleton, 2019). In the high school program Stapleton studied, students visited Bangladesh to see and learn from a

community already impacted by climate change. The students, regardless of how much they already knew about climate change before the program, all came away from the experience with not only more knowledge of climate change but a firsthand understanding of how power disparities lead to disproportionately experienced climate impacts in places that have historically contributed the least to climate change (Stapleton, 2019, p. 732). The students became more emotional and sympathetic, which did not scare or prevent them from acting, but inspired them to want to act in order to advocate for equity. This study highlighted the importance of framing climate change education to emphasize the impacts on humans rather than solely on ecological systems. Furthermore, “without a critical analysis of how power and oppression operate within the climate change global social system, we may perpetuate injustice through climate change mitigation (Endres & DuPoint, 2016, as cited in Stapleton, 2019, p. 746). While trips to other countries like this study discusses are not feasible for planning purposes, discussing local climate impacts and climate justice issues can help people understand the dynamics of climate impacts in their community. In all, framing is a crucial aspect of climate communication that planners should consider when discussing climate change to prevent perpetuating unjust outcomes from climate action and to increase sympathy and understanding towards those most affected by climate change.

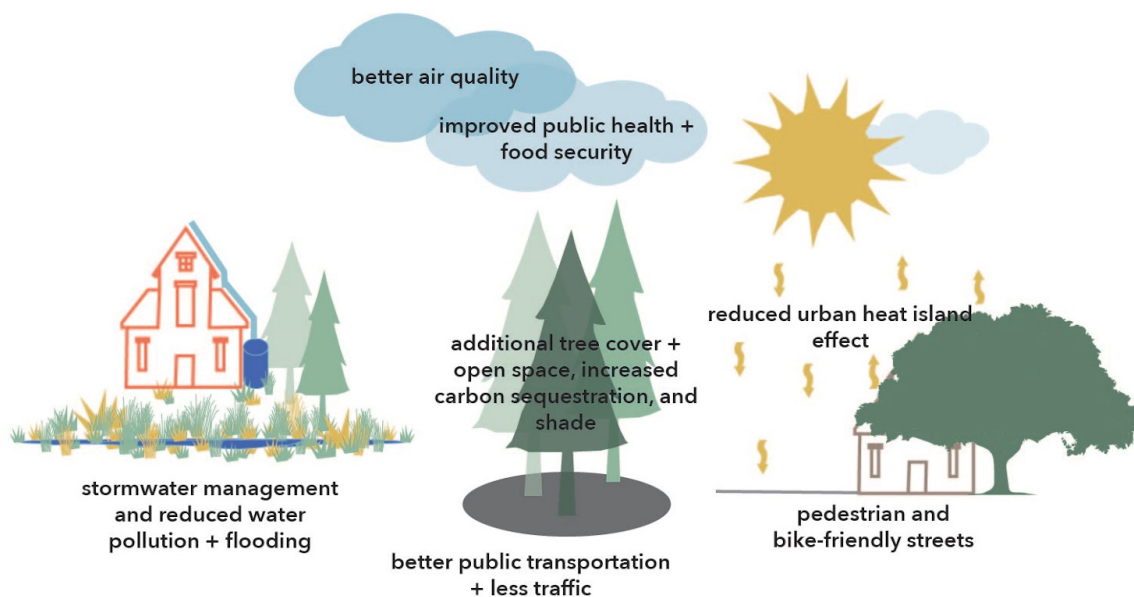
Planners can also frame climate change in terms of the co-benefits (Figure 8) climate action has on public health, air quality, housing affordability, public transit improvements, and other everyday concerns of community members (Lieberknecht, 2022). People may not be able to see the real-life, tangible benefits of climate action without these connections being drawn. Some people also tend to view such co-benefits as more important than climate change action, despite believing climate change will significantly affect their future (Lieberknecht, 2022, p. 106). Using a public health frame is especially effective as understanding climate impacts on

human health is “one of five key climate change beliefs that are strongly associated with [the] likelihood to support a societal response and to personally take actions that encourage a societal response” (Sarfaty & Maibach, 2015, as cited in Weathers et al., 2017, p. 10). Myers et al. also found that a public health frame was the “most likely to elicit emotional reactions consistent with support for climate change mitigation and adaptation” (Myers et al., 2012, p. 1105). Using framing to highlight co-benefits allows stakeholders to see how climate action can benefit their everyday lives in more tangible ways.

Figure 8.

Some Potential Co-Benefits of Climate Action

POTENTIAL CO-BENEFITS OF CLIMATE CHANGE ACTION



Note. Graphic made by Chen, R.

Another important framing technique is to emphasize the potential benefits of acting as soon as possible rather than potential future losses from inaction, which helps people perceive

climate action as a worthwhile endeavor (van der Linden et al., 2015, pp. 760-761).

Psychological insights such as these underlie widespread suggestions to shift climate policy conversations from potentially negative impacts to the positive benefits from immediate action (van der Linden et al., 2015). Similarly, the cost of implementing climate-friendly policies and investments now is significantly lower than paying for disaster recovery efforts following a natural disaster (Nuccitelli, 2020). Therefore, explaining how changes are low-cost, easy to implement, and will help make the city more efficient and resilient over time is crucial.

Emphasize the co-benefits of immediate climate action like increased green space and healthier communities rather than the potentially devastating effects of inaction like species extinction or damage to city infrastructure and services. Although these can also be motivating, they might make some people feel hopeless. Emphasizing the benefits of climate action rather than the potential negative impacts of climate change from inaction is often more effective as it can draw on people's desire to live in more resilient and healthy cities.

Imagery

When discussing complex scientific information like climate science, it is important not to overwhelm your audience. The use of images can be helpful to provide examples of what you are discussing and break up bodies of text to make things easier to read. Studies suggest that imagery greatly increases understanding of climate change and encourages people to act (O'Neill et al., 2013). More broadly, visual communication, in general, has been found to enhance learning and engagement and strengthen the conceptualization of complex issues, especially since climate change is often hard to see directly (Moser, 2016; Sheppard et al., 2011). For climate change imagery specifically, "fear-inducing images," though they catch

people's attention, they also "tended to distance or disengage individuals, rendering them feeling helpless, overwhelmed, and not empowered to act" (O'Neill et al., 2013, p. 414). Many of the images we have commonly seen depicting climate change feature animals, such as polar bears, showing how climate change is leading to animal extinction or habitat changes or feature broad landscapes in other parts of the world that might be affected by climate change, but often have no tangible connection to people personally. Furthermore, as previously mentioned, many graphics currently used to discuss climate change, such as graphs or climate projections from the IPCC, are often complex and difficult for the average person to understand (Reis & Ballinger, 2020).

On the other hand, images demonstrating solutions to climate change were found to be encouraging and inspiring (Wang et al., 2017). While most images in CCC efforts have lacked human representation until recently, images showing human-scale impacts and solutions are becoming more common and effective in encouraging action (Sezen-Barrie et al., 2020; Wang et al., 2017). Wang et al. offer additional suggestions for using visuals in climate communications, as shown below in Figure 9 (2017, p. 8). Generally, it is important to choose images that depict climate change in terms of human-centered, local impacts and solutions (Altinay, 2017; Wang et al., 2017). Additionally, "images showing what people can do personally about climate change have the greatest positive impact on generating engagement" (O'Neill & Nicholson-Cole, 2009, as cited in Yusuf & St. John III, 2022, p. 60). Rather than providing images of relatively unidentifiable landscapes from across the globe, showing local impacts and causes of climate change at scale paints a compelling and relatable story that helps people connect to their personal lives (Wang et al., 2017).

Figure 9

Seven Principles for Visual Climate Change Communication

1. **Show “real people,” not staged photo-ops.** Discussion groups favored “authentic” images over staged photographs, which were seen as gimmicky or even manipulative.
2. **Tell new stories.** Familiar images are quickly and easily understood, but they also prompted cynicism and fatigue. Less familiar, thought-provoking images can help tell new stories about climate change, and remake the visual representation of climate change in the public mind.
3. **Show climate causes at scale.** When communicating the links between problematic individual behaviors and climate change, it is best to show these behaviors at scale, for instance, a congested highway, rather than a single driver.
4. **Climate impacts are emotionally powerful.** Images of climate impacts can prompt a desire to respond, but because they are emotionally powerful, they can also be overwhelming. Coupling images of climate impacts with concrete behavioral actions may help overcome this.
5. **Show local (but serious) climate impacts.** When images of localized climate impacts show an individual person or group of people, with identifiable emotions, they are likely to be most powerful. It is also important to strike a balance, to show local, relatable impacts, and simultaneously avoid trivializing the issue.
6. **Be careful with protest imagery.** Images of “typical environmentalists” only resonated with people who already considered themselves activists and campaigners. Images showing people directly affected by climate change impacts were seen as more authentic and compelling.
7. **Understand your audience.** Reactions to climate imagery differ according to level of concern, scepticism, as well as political affiliations. For instance, images of distant climate impacts produced flatter emotional responses among those on the political right than the left, whereas solutions images produced positive emotions for both sides.

Note. From Wang, S., Corner, A., Chapman, D., & Markowitz, E. (2018). Public engagement with climate imagery in a changing digital landscape. *WIREs Climate Change*, 9(2), e509. <https://doi.org/10.1002/wcc.509>

Show Local Impacts of Climate Change

The emotions that arise with human-scale imagery and narratives make it hard for people to deny climate change is happening and increase their support for climate-friendly policies (Stapleton, 2019). While emotions can be in the form of despair and hopelessness, following

examples of human impacts of climate change with examples of local climate action can help combat these emotions and inspire individual action or support for climate action (Stapleton, 2019). Showing that the solutions to climate change are available and already being implemented locally helps inspire hope rather than fear by giving people agency and helping them see they can impact climate change. Local examples are also helpful in discussing the impacts of climate change to reduce the “psychological distance” people have to climate change (Jones et al., 2017; van der Linden et al., 2015). Presenting climate change as a local phenomenon that is currently happening not only holds people’s attention but helps people to make personal connections between things they might have observed in daily life, such as shifting weather patterns, to climate change (van der Linden et al., 2015, p. 759). While some uncertainty remains about the direct “attribution of these changes to human-made climate change, the lived experience of change is tangible” (Moser & Pike, 2015, p. 113). Providing opportunities for people to make these personal experiences and connections to climate change can positively impact support for climate change policy and increase overall comprehension of climate change (van der Linden et al., 2015).

Visualization Tools

Many visualization tools can be useful in planning communications, such as 3D landscape visualizations that realistically depict local places under various potential states due to climate change (Sheppard et al., 2011). These types of visualizations help people make connections between their lived experiences, possible future experiences, and valued community or environmental resources (Sheppard et al., 2011). In Seattle, a partnership between the Climate Impacts Group, the Seattle Public Library, and community partners has led to the creation of virtual reality technology where participants can learn about climate change and visualize sea

level rise in South Seattle (Climate Impacts Group, 2021). The virtual reality experience begins with an introductory climate science lesson before exploring what different scenarios of sea level rise would realistically look like. An immersive experience like this not only helps people to understand what is causing climate impacts such as sea level rise, but it also allows people to visualize what specific levels of sea level rise would feel like and look like in their communities on a human scale (Hickey, 2022). Other benefits from such visualization tools could include opportunities to gauge community opinion on mitigation or adaptation strategies or integrate impacts, adaptation, and mitigation choices in plausible scenarios that can be used for decision-making or deliberation (Sheppard et al., 2011). The type of visualization tool or image chosen to accompany the facilitation of climate change discussions should be relevant to the community and able to convey the appropriate information for communication goals. Whereas most climate communication materials from organizations such as the IPCC or the Climate Reality Group show complex graphs and climate projections to communicate future climate impacts, simple images or localized visualizations can be more impactful and memorable and contribute to greater comprehension.

Other Participatory Strategies

Planners can use several hands-on strategies during community engagement events to further increase learning and collaboration. One is participatory mapping, which “can be defined as ‘the creation of maps by local communities - often with the involvement of supporting organizations including governments...and other actors engaged in the development and land-related planning” (IFAD, 2013, as cited in Yusuf & St. John III, 2022, p. 80). Participatory mapping is used widely in planning, as it can help community members understand complex problems and visualize risks and potential changes to their community (Roth, 2021). Participatory mapping can also help identify more effective adaptation responses by

incorporating local and traditional ecological knowledge (Hemmerling et al., 2020; Kamaci, 2014, p. 13; Yusuf & St. John III, 2022, p. 81). One specific example of this is to have participants “plot a transport route through a local interactive map with flood risk areas highlighted, or [explore] how they might retrofit an existing local building to cope with changing climate conditions” (Reis & Ballinger, 2020, p. 7). Participatory mapping creates usable knowledge to help improve understanding of complex problems and identify solutions (Robinson et al., 2016, as cited in Yusuf & St. John III, 2022, p. 81). In all, participatory mapping is a valuable tool to be included as part of a broader engagement strategy to incorporate local knowledge and provide opportunities for co-learning, but it should not function as the sole form of engagement (Yusuf & St. John III, 2022).

The ASERT Model is another participatory engagement strategy that involves gamification, participatory mapping, or other hands-on activities through several stations where community members can complete various learning activities and receive a reward for completing them all. These stations could have activities that provide information about various climate risks and vulnerabilities, offer space for community members to share their experiences, and invite them to voice their preferences for different solutions (Yusuf & St. John III, 2022, p. 37). The authors argue that “enabling stakeholders to collectively define problems and identify relevant adaptation strategies collectively allows stakeholders to co-produce both practice- and policy-relevant knowledge grounded in stakeholders’ values and local contexts” (Yusuf & St. John III, 2022, p. 38). Co-production of knowledge is crucial to build capacity and establish trust in climate decision-making and provides an opportunity to support marginalized voices (Ensor & Harvey, 2015, as cited in Yusuf & St. John III, 2022, p. 38). The ASERT Model, linked in the Toolkit, utilizes various activities that engage participants and incorporate co-learning opportunities. Implementing a more hands-on strategy with gamification elements in

community engagement can enhance participation and learning and incorporate local knowledge into planning efforts (Pfirman et al., 2021). However, care should be taken to ensure the activities do not diminish the importance or serious nature of the topic at hand or come off as belittling, especially if the community you are working with has recently experienced collective loss or trauma.

Climate education can also be implemented in many other formats throughout the built environment. For instance, some CCC is done in places that might get overlooked in climate education research, such as parks, museums, and zoos (Rousell & Cutter-Mackenzie-Knowles, 2020). This method of communication could be in the form of static or interactive exhibits that utilize narratives and images to allow people to see how climate change has occurred over time and what future impacts might look like in their community. Planners could incorporate such lessons on climate change throughout the built environment by providing localized and interactive climate change exhibits at parks, piers, or other important gathering spaces in cities.

To incorporate additional local knowledge into planning processes, planners can also reach out to more community-based organizations (CBOs). CBOs work intimately with communities and can provide a good bridge between the public and planners. Planners should also involve CBOs throughout the planning process to increase transparency and enrich planning outcomes. As Rudge argues, “by enabling CBOs to be more powerful actors, local governments can draw on organizations that already understand community priorities and can advocate for necessary, contextual solutions” (Rudge, 2021, p. 15). Partnering with CBOs can build stronger community relationships and contribute to more meaningful engagement (Rudge, 2021). Planners should continuously engage CBOs so they are aware of opportunities

to participate in planning and in order to improve relationships with communities and increase equity in climate planning processes.

Overall, the principles and strategies explained in this section provide a solid starting place for planners to create or refine CCC materials. Planners should know their communities best and be able to determine which practices will enhance community engagement efforts to achieve communication goals specific to their jurisdictions. There are plenty of additional ways for planners to improve their communications to further garner support for climate action and invigorate their communities in the just transition to resilient cities. The strategies outlined in this section and the Toolkit can provide a starting place for planners to be mindful of how they design their engagement opportunities for climate planning purposes.

METHODS

Using the methods outlined in this section, this thesis attempts to answer the following research questions: What are the best practices for communicating climate science to non-experts? Which methods are most applicable to community engagement efforts by planners in Puget Sound, WA?

A literature review was conducted to better understand planners' role in communicating climate change and effective CCC methods, as identified by leading climate communication researchers, scholars, and organizations. Strategies were identified by a literature review on effective climate communication methods and their applicability to urban planning community engagement processes and communication formats, such as flyers, PowerPoint presentations, public meetings, or community events. I chose methods that are easy to remember and that represent general themes of effective climate communication. While they are most suitable for PowerPoint formats, the strategies can provide a good starting place for learning how to tailor your communications to fit communication goals in general.

To ensure the strategies recommended by my literature review would be useful in practice, I developed a brief and targeted toolkit called "Climate Communication Toolkit for Urban Planners in Puget Sound, WA," referred to as the Toolkit throughout this thesis. The Toolkit includes 12 strategies planners can reference when designing communication materials and discussing climate change with their communities (Figure 10). While other guides outline climate communication (i.e., ecoAmerica's *Connecting on Climate: A Guide to Effective Climate*

Change Communication), these toolkits are often too long for planners to use in their day-to-day work and do not include many tools or explicit guidance for using the methods in practice. As such, I narrowed the Toolkit to several memorable strategies that incorporate much of the research that has been done in the climate communication field. I also included a one-page list of the strategies so planners can easily reference them without reviewing the whole Toolkit every time (Figure 10). The Toolkit also includes a section on communication resources, climate planning handbooks, climate science resources, and climate visualization tools to assist planners in discussing climate change with their communities. These were organized by topic and curated to include tools specific to the Puget Sound region. Some of the tools included are specific to Puget Sound or Washington State, while others are more general and can be used in other regions as well. This section of the Toolkit was created to provide a simple index of climate tools for planners to reference in their day-to-day work easily.

Figure 10

Quick Reference of the 12 Strategies in the “Climate Change Communication Toolkit for Urban Planners in Puget Sound, WA”

1. Know your audience + tailor your communications
2. Use plain language + avoid using technical jargon
3. Clearly define + contextualize terms used
4. Prioritize the use of narrative forms of communication
5. Emphasize the benefits from acting now vs. the potential future losses from inaction
6. Emphasize *what* will happen, not *when*
7. Frame climate action to address the everyday concerns of your community
8. Focus on solutions to climate change that are being implemented
9. Provide specific, current, and local examples of mitigation + adaptation efforts
10. Use simple + local visuals rather than complex data visualizations
11. Present climate change as a local + current phenomenon
12. Incorporate opportunities + activities to co-produce knowledge + explore various climate solutions with your community

Note. From Chen, R. (2023). Climate Communication Toolkit for Urban Planners in Puget Sound, WA.

A cross-sectional approach was used to conduct a focus group with four planners in Puget Sound to evaluate the Toolkit and the recommended strategies. The planners were selected through a non-probabilistic sampling method, where two professional mentors in the MUP program advised me to reach out to planners they knew to be active in climate planning or community engagement for climate-related projects. Twenty planners who work in climate planning throughout various counties in Puget Sound were contacted to participate. After

coordinating schedules with interested planners, four were available to participate in the focus group. The planners who participated worked for public agencies and were involved with various climate planning efforts. They worked in various sustainability and climate action roles for Pierce, Thurston, Snohomish Counties, and the City of Tumwater in Thurston County.

The focus group was held over Zoom for an hour and a half and was recorded after receiving verbal consent. The focus group was held over Zoom due to the geographical spread of the participants, though an in-person focus group was initially preferred. It began with a brief explanation of my background, thesis, capstone project, and the structure of the focus group. Following the brief introduction, a discussion was facilitated to better understand their work in climate communication and community communication efforts. Guiding questions were asked, such as “How does your work relate to climate change?” and “What are your current climate change communication methods?” I also asked them what they found challenging about communicating with their communities and what they believed would assist them in their engagement efforts or supplement their current communication materials.

I then presented the Toolkit to them in PowerPoint format, as Appendix C shows. The presentation began by outlining why the Toolkit was created and briefly explaining each of the 12 strategies. There was an opportunity to ask questions and discuss the Toolkit before moving on to the next part of the presentation, which provided an example of these strategies in practice by discussing the climate science behind two climate impacts: heat waves and urban flooding. This part of the presentation was developed to demonstrate the communication strategies I was recommending and fulfill the requirements for the graduate certificate in

Climate Science capstone project, which required creating and presenting a communication resource to a non-expert audience and a subsequent evaluation of the presentation.

To utilize the strategies I was recommending in my own climate communication effort, I avoided using numerical data and complex graphs and focused on a narrative version of climate change with localized images and simple visualizations of climate projections. Any terms used in the presentation were clarified and contextualized to ensure everyone was on the same page about the subject. The presentation was approachable for multiple knowledge levels and provided an example of how to discuss climate change in plain and clear language with community members. Following the presentation, an opportunity to ask questions was offered before introducing the survey. The survey was distributed to gauge their understanding of the climate science presented, evaluate my communication effectiveness to fulfill the capstone requirements, solicit feedback on the communication strategies, and collect suggestions on how to improve the Toolkit. A copy of the survey is located in Appendix D.

Following the focus group, I rewatched the Zoom recording to take notes on the discussion and determine common themes. After receiving survey responses, I incorporated any recommended edits to the Toolkit. A couple of respondents indicated an interest in the Toolkit including example PowerPoint presentations about climate science basics, a glossary of climate-related terms to reference quickly, an index of climate planning and visualization tools to aid in their communication efforts, and sample handouts or flyers of simple climate science information that they can distribute at community events. Some of these were incorporated as appendix items in the Toolkit for planners to reference as examples while creating their

communication materials, namely, example PowerPoints on basic climate science, heat waves, and urban flooding, and an index of climate visualization tools.

FINDINGS

FOCUS GROUP DISCUSSION

The focus group provides an example of how planners in Puget Sound communicate with their communities on climate change. To start the focus group discussion, I asked: "How does your work relate to climate planning, or what kinds of projects do you work on that relate to climate change? Are they climate adaptation or mitigation focused, or both?" Most participants reported being involved in climate adaptation work, with one planner mentioning she is primarily engaged in climate mitigation work because climate adaptation is more controversial in her county. The rest of the group and I were surprised by this as adaptation is usually easier to discuss with community members because of the many co-benefits adaptation efforts can bring. Within climate adaptation, the participants' work varies greatly. Participants, generally speaking, are involved in implementing climate action, resiliency, or sustainability plans, improving tree cover, facilitating interdepartmental coordination, and implementing GHG mitigation efforts, among other responsibilities.

In response to the question, "How do you discuss climate change with community members? What format is this communication in, or what does this communication usually look like?" respondents primarily mentioned formats such as website pages, broad-based community meetings and events, and specialized outreach efforts to meet community members where they are as the main ways they reach community members and engage them on climate change issues. All four planners who participated in the focus group described community

engagement efforts for climate change as similar to broader community engagement efforts in their communities, such as open houses, public hearings, or meetings with a presentation or activity and room for discussion. They all mentioned diverse ways they reach audiences that are not typically engaged in these outreach efforts. One planner, in particular, goes to various community gathering places such as the food bank to table and discuss climate impacts and preparedness with community members. Though the exact methods might differ between jurisdictions, they all make conscious efforts to meet underrepresented communities where they are to ensure they have a say in climate action and are aware of the various efforts by their jurisdictions in their community.

To determine if the planners felt prepared to discuss climate change with their communities and learn about the tools they currently use, I asked the following questions: “Do you feel like you have sufficient knowledge of climate change science? Where do you get your information on climate change? What data do you use to make assumptions of climate impacts in your community?” Responding to this set of questions, respondents stated they were overall comfortable with climate science but that other people on their teams might not feel the same way; some respondents attributed this knowledge primarily to their undergrad education. In addition to previous knowledge, respondents frequent similar websites and climate data sources to inform their communications and discussions of climate impacts. For instance, the University of Washington’s Climate Impacts Group (CIG) is a popular source of information for participants to stay current on local climate projections; all planners agreed that this is where they get information specific to Puget Sound. Other platforms include MIT’s Climate Interactive En-Roads tool, IPCC reports, and Yale’s Climate Connections and climate communications

resources, as well as local sources of news from local organizations such as Clean and Prosperous Washington, Long Live the Kings, Urban Sustainability Directors Network (USDN), and the local bioregional Cascadia Network within the USDN. A couple of planners who work in the same county mentioned receiving climate change articles through a daily email from an involved community member. Another participant explained that she rarely has to do additional research as the information she needs is almost always available within her department or from other departments in the county. The remaining participant highlighted Al Gore's slide deck as a valuable resource and the jurisdictions' climate vulnerability plan as her primary sources of communication guidance and information.

The planners all had a good grasp of climate science, where to get information, and specific ways they engage with their communities. However, to assess the challenges with these communication efforts, I asked: "Are there aspects of climate communication that are difficult for you? What kinds of things, i.e., materials, might make it better for you/easier for you to do your job?" The participants all had very different answers to this question, but some common communication challenges include general public misunderstandings of the subject at hand, whether that be electric vehicles, electrification and grid capacity, or climate impacts; challenges discussing climate change with people who have different political views or are fearful; and challenges with clarifying how climate impacts could affect their community. One planner also mentioned that having a more cohesive approach to climate resiliency would be helpful, specifically regarding infrastructure resiliency and including standardized language across departments within and between counties to provide consistency in outreach and education efforts. The planners agreed that overall, community members in their jurisdictions

are well-informed, and climate policy is widely accepted and relatively well-known. This is especially significant compared to two of the planners' previous experiences working in Florida, where discussions on climate change are not as widely supported. It is clear that engaging communities in Washington, and Puget Sound specifically, is relatively less polarizing and difficult work than in other states. Despite this, planners still face challenges in effectively conveying the severity of climate impacts and the urgency required to address climate change, especially with those with more conservative values.

This consensus among participants of their communities being relatively well-informed led me to ask, "Are your communities well-informed across the board, and if not, how do you reach other sub-populations or those who are more vulnerable to climate change and might not be as well-informed or able to attend conventional public meetings and events?" There was a variety of specific methods discussed, but the central theme present in their answers was to "meet people where they are." Some specifics were discussed, such as going to food banks and other community gathering places and meetings that help reach some who cannot make climate-oriented events, such as a "Climate Change 101" workshop or meetings to discuss a climate action plan. Meeting people where they are often involves getting in touch with other local organizations, compensating participants, circulating surveys (although some participants preferred in-person engagement), and building trust with communities through sustained engagement. Some planners reported the use of community climate advisory committees, which included efforts to increase outreach efforts to underserved communities, prioritize the recruitment of frontline community members (those that will likely bear a disproportionate share of climate impacts) to participate, or financially compensate members of these

committees for their time and participation. One planner also mentioned a recently hired new planner whose primary job is to build trust in the community by attending community events, listening to community members, and getting involved without a particular agenda. Though these efforts are often more time and resource intensive, the planners all agreed they were well worth it to enhance climate outcomes and build strong relationships with their communities.

Several high-level takeaways emerged from this discussion, which are instrumental to understanding how these planners in Puget Sound practice climate communication. For one, the participating planners all are engaged in climate work, whether through direct climate mitigation or adaptation planning or in more sustainability-focused roles such as increasing tree cover or improving landscaping, managing water resources, coordinating land conservation programs, or improving waste management practices. Another important finding is how much cross-departmental coordination was already occurring or beginning in their jurisdictions, as well as how crucial it was for them to help supplement the work of other organizations in their community. Ensuring efforts are coordinated is essential to ensure goals and efforts are aligned and can reinforce each other. The participants also expressed how helpful and inspiring it was to hear about one another's work. While most of them knew each other before participating in this focus group, a couple exchanged contact information to keep the conversation going.

Participants discussed that more work is needed to help planners communicate the reality of climate impacts with community members, clarify misunderstandings, and convey how imperative it is to act on climate change to people with different political views by focusing on co-benefits rather than the politics of climate change. Building relationships with their

communities to advance climate action was necessary, but greater capacity is needed. Overall, the participants had ample knowledge of climate science and local climate impacts, but they noted that this is not as common with all the planners they work with. They expressed their belief that a standardized approach to climate change within counties and departments would be useful to provide a consistent message surrounding overarching climate issues, mainly in terms of the language and terminology used. However, they all recognized the importance of tailoring their communication efforts based on the specific communities or populations they are engaging with. Following the presentation of the Toolkit, they all mentioned it would be helpful in their practice and were excited to share it with their teams; one participant, in particular, was excited to use the final Toolkit.

SURVEY RESULTS

The survey results show that overall, the presentation of the Toolkit was effective, and participants found the Toolkit applicable to their work and helpful to reference it in practice. In response to the question, "What is the main takeaway for you from today's discussion?" respondents listed "rely on storytelling more," "communicate in plain language and make it relevant to your audience," and "benefits of having commonly accessible language regarding public-facing climate change information." In response to the question, "What, if anything, did you learn that was new or useful for your job from the discussion today?" respondents listed "the encouragement to only share graphics that are human-centered," "examples from other communities that are engaging with partner organizations, particularly those working with vulnerable communities," and "unsure." In response to the question, "Which strategies do you

think will be most useful or would you incorporate in your work?" participants responded, "I will incorporate all of them," "4) know audience and tailor communications, 5) frame climate action to address everyday concerns of [communities], and 7) focus on solutions that are being implemented," and "personalization of climate issues would [undoubtedly] be highly effective for public education on climate issues." When asked if anything would limit their ability to use the recommended strategies in their work, the survey participants responded with "nothing," "n/a," and "limited staff capacity to do public engagement." The full survey results can be found in Appendix E for further reference.

Based on these survey responses, it is reasonable to conclude that the Toolkit would be helpful for the participating planners to reference in their future communications work. As for whether the sample communication presentations on heat waves and urban flooding effectively conveyed climate science, the results could be more apparent. Generally, the open-ended questions on the climate science mechanisms influencing heat waves and urban flooding were all answered correctly, demonstrating their knowledge of these climate impacts – either from prior knowledge or as reinforced through the presentation, as the way they answered the open-ended knowledge test questions reflected the specific language I used in my presentation. However, the multiple-choice questions seem to have been broadly misunderstood. For instance, the correct answer to the question "The Urban Heat Island (UHI) effect is exacerbated by...(select all that apply)" was to select all of the choices, which were "Impervious surfaces like concrete," "Increased greenhouse gas emissions," and "Heat waves," except for the choice "Tree cover." However, all survey respondents selected only "Impervious surfaces like concrete." This could be because they did not read the question

thoroughly, as “Select all that apply” was in the second line of the question, or because my presentation mentioned how impervious surfaces in cities contribute to the UHI effect, though UHI was discussed in full and touched on all of the correct answers to this question.

Similarly, for the question “Climate change is causing more precipitation to fall as rain rather than snow,” with response choices “True,” “False,” and “Don’t know,” two out of three respondents got the question right by choosing “True,” but one respondent chose “Don’t know.” Furthermore, for the question “Which of the following statements is false,” with choices including “Climate change is increasing snowpack globally,” “The timing of snowmelt in the PNW is shifting earlier in the year,” “With climate change, relatively wet areas will get wetter, dry areas drier,” and “Precipitation events are becoming stronger with climate change,” the correct answer is the first choice; two out of three respondents answered correctly, while the same respondent who got the previous question wrong also incorrectly chose the last choice for this question. These two incorrect answers could be due to misunderstanding the question or because that is the focus group participant that had to leave halfway through this portion of the presentation for a prior engagement.

Despite the mixed results, respondents answered relatively positively to “How well did I present today? Identify any strengths or weaknesses” with feedback such as “You did well. The images and the stories stayed with me,” “Very well overall, clear and simple explanations with good visuals. There were some slightly jargony words, however (impervious, albedo, etc.),” and “Great job, slide show might be pared down a bit?” highlighting that overall my presentation was effective. Even though I intended to clarify terms throughout my presentation, some terms

were still seen as “jargony,” further highlighting the importance of using clear language and defining and contextualizing any potential jargon or confusing terminology in climate communications as outlined in the literature review. Finally, from the survey questions related to how the Toolkit could be improved, survey respondents expressed a desire for “any and all” additional materials, an index of climate planning or visualization tools, a glossary of climate change terms, and access to the slides on the climate communication methods (which is the Toolkit but in a very simplified PowerPoint format). The full survey results are located in Appendix E.

Although these findings cannot be used to generalize the usefulness of the Toolkit for all planners in Puget Sound, let alone planners more generally, it provides valuable direction to improve the Toolkit and some validation that the strategies included in the Toolkit would be applicable to their work and further highlights the need for such materials to complement and assist these planners’ and their teams’ work in climate communication.

DISCUSSION

This thesis sought to determine the best practices of climate change communication for planners to use in their community engagement efforts. Though the research conducted in this thesis was of necessity limited in scope, the communication strategies identified in this thesis are supported by other empirical research and should be useful to guide planners in Puget Sound in creating CCC materials. To ensure community engagement surrounding climate change is effective, planners should ensure their communication is clear, simple, and grounded in local context while visually represented in a compelling and personal way. Through the creation of the Toolkit and subsequent focus group, it became clear that while great efforts to communicate climate change to specific communities are occurring throughout Puget Sound, greater dialogue between climate science communication researchers and practitioners is needed to relay communication strategies. While the planners who participated in the focus group were fairly well-versed in climate science, that is not the case among the planners on their teams or planners in general. This suggests that the science of climate change could be better communicated to planners as well, especially if they face increasing expectations to discuss climate change with community members.

Greater opportunities for planners to share knowledge and exchange ideas among themselves could also help increase climate communication efforts. Planners were able to share their efforts through the focus group and be inspired by others' CCC and engagement efforts. Creating more opportunities for planners in Puget Sound to discuss their work with one another

may help identify what communication methods work well or do not in different contexts.

Across departments within jurisdictions, there could be increased efforts to ensure communication methods are coordinated and consistent. This would lessen confusion amongst community members, prevent redundancies, and reduce gaps in communication efforts.

Though communication efforts should be tailored to specific communities, the general intent and approach of communications should be consistent within jurisdictions to prevent misunderstandings or misinterpretation of information and to ensure that planners within jurisdictions are aligned in their communication goals.

The focus group discussion further highlighted the need for climate communication researchers to relay their findings in an accessible and tangible way for practitioners, such as planners.

Future efforts by CCC researchers must convey effective communication strategies practically and clearly for practitioners to follow and integrate into their work. As previously mentioned, while researchers have made progress in determining what makes CCC effective, there needs to be additional effort put into communicating the findings themselves to practitioners in a more explicit way (Moser, 2016). This thesis attempts to do so by creating a climate communication Toolkit for planners in Puget Sound. However, more explicit work must be done by researchers to ensure planners are aware of ways to effectively communicate climate change with their communities, especially in multiple contexts. The strategies in this thesis and Toolkit primarily assist planners in creating more effective engagement. Though they are most relevant to PowerPoint presentations, they can be broadly applied to other means of engagement as well. This thesis identifies and applies climate science communication research for a planning

context and recommends strategies for urban planners to effectively communicate climate change with their communities.

While this Toolkit can help planners better communicate about climate change with their communities, the community's level of power in decision-making largely depends on larger power dynamics and politics. Although public participation in planning processes has evolved and become more meaningful over time, as Serrao-Neumann argues, "one of the barriers to effective public participation still rests with the reluctance of governments to devolve power and control of decisions to the public" (2015, p. 1205). This thesis can help planners communicate climate change with their communities more effectively; no matter what degree of citizen participation is used, the Toolkit provides guidance for how to best communicate the complex information of climate science with communities. However, it is still up to jurisdictions how much power they devolve to community members for decision-making. Similarly, effective engagement through improved communication skills is essential, but the ability to truly listen to communities should also be encouraged (Kearns, 2012).

Furthermore, effective communication and meaningful forms of engagement do not necessarily lead directly to greater climate action or climate-resilient cities. However, they *can* increase the chance of a city attaining better climate outcomes than cities without community-wide deliberation on climate policy (Hobson & Niemeyer, 2011). As Moser and Pike remind us, "better communication and more effective engagement alone will not overcome other barriers communities face with adaptation planning and implementation (e.g., financing)," but "greater communication and engagement skill, capacity, and effort can help overcome the many

political, organizational, institutional, and social challenges that currently hinder or unnecessarily slow down adaptation” (Moser & Pike, 2015, p. 112). Though many barriers to effective climate action and increasing citizen power remain, effective climate change communication with communities is instrumental in bolstering support for climate action and policies.

LIMITATIONS + FUTURE STUDY

This thesis is limited in its findings and application to planning practice due to time constraints, reliance on a single, small focus group, and because only three out of four participants completed the survey. While the focus group was limited in its attendance to only four people, it still provided valuable insight into the planners' work in climate planning and community engagement and provided qualitative feedback that informed the final Toolkit. Focus group participants held diverse job titles, duties, and varying levels of experience, with some being fairly new to Washington and others being born and raised in the state. With more time, it would have been ideal to run additional focus groups with more planners throughout Puget Sound to reach a more representative sample of planners in the region. All of the focus group attendees were women, which was not intended. This could be due to women being more involved with community engagement efforts because they wanted to help a fellow woman with her thesis or because they happened to be available to help. Regardless, the men I reached out to recommended I reach out to women on their team instead. Additionally, most of the participants were planners in relatively high-level positions in their department instead of a more representative mix of planner positions and levels of experience.

Due to time constraints, I grouped the focus group discussion and capstone presentation into a single focus group. It was helpful to show planners an example of the communication strategies in practice, and the participating planners believed the strategies in the Toolkit would be useful to their work. However, with more time and better coordination, I would have given the capstone presentation on climate impacts to members of a community in Puget Sound. With appropriate pre- and post-test survey evaluation, this would have been useful to test if the communication strategies in the Toolkit were effective in improving a community's knowledge of climate change and if they influenced attitudes toward climate policies.

To reduce the length of the focus group, I did not conduct a pre-test survey before my capstone presentation on the impacts of heat waves and urban flooding. After discussions with my thesis committee, I decided to prioritize discussing how the planners communicate climate change with their communities and eliciting their responses to the demonstration of the strategies in the Toolkit. Since the survey also asks questions about their opinion of the Toolkit and to determine if they learned about heat waves or urban flooding from the capstone presentation, we thought testing their change in knowledge of climate impacts from the presentation would be unnecessary. Moreover, we expected the focus group participants to have a strong understanding of climate change already, and participants did report having a solid understanding of climate change. Consequently, with more time, I would have conducted separate focus groups with local communities for the capstone presentation of climate impacts to gauge the effectiveness of the strategies in discussing climate change with communities.

Other limitations are inherent in this thesis, namely that the strategies in this thesis and Toolkit are not widely applicable to all communication formats. PowerPoint presentations are often used in planning engagement, and while they are not the most engaging or empowering for participants, because they are so widely used, I tailored the Toolkit to include strategies that would primarily be applicable to PowerPoints and similar contexts. The strategies can still be broadly applied to most other forms of communication, but not all. For instance, they are not the most useful for communication formats that don't include images, i.e., conversations or group discussions without any visuals present. Additionally, they are not the most useful for discussing uncertainties in climate science, including the attribution of individual natural disaster events to climate change. These strategies, for the most part, assume that the uncertainties of climate impacts are not discussed in detail as a way to keep people engaged and inspired and to keep communications approachable for all audiences rather than to provide room for extensive debate on climate action given the uncertainties present.

Furthermore, the selected strategies are not as helpful in situations where more detailed information or data needs to be presented, such as for discussing different scientific scenarios for sea level rise and how that informs adaptation efforts. The strategies presented in this thesis are more geared towards conveying general climate change science or high-level discussions on climate impacts rather than specific climate mechanisms or large amounts of data. Future research would be useful to determine the best ways to convey complicated and detailed scientific information in planning engagement. Similarly, future research would be helpful to understand when conveying simple information is better than explaining all the details of a complicated issue like climate change. This thesis and Toolkit have been designed from the

understanding that simplifying information and localizing it helps people overcome the psychological barrier to climate change to allow for deliberation on climate policy (van der Linden et al., 2015).

On the other hand, there might be some circumstances where these strategies might be too focused on the effectiveness or outcomes of communication, and simplifying the details or framing climate change in one way over another may be unethical or not the most effective way to discuss climate policy with the public. For instance, there are challenges with knowing when it is sufficient to discuss climate change so people can make their own decisions or when to frame the discussion in a way that favors one course of action over another (Lamb, 2017). Though there are tradeoffs either way, communicators should be aware of potential ethical issues that arise from communicating, such as “blurring the distinction between persuasion and manipulation” and “generating distrust among audiences” (Lamb, 2017, p. 2). Persuasion is where a speaker presents ideas and arguments in a way that allows others to make their own informed decision on how to act, while manipulation involves presenting ideas and arguments in a way that prevents others from having all the information they need to make their own decision (Lamb, 2017). Moreover, “should climate communicators communicate only in ways that maximize the best consequences, or should they also consider what they owe to audiences as a matter of respecting their rights and agency?” (Lamb, 2017, p. 13). While there are many more ethical concerns related to communicating climate change, the main goal of communications should be relaying scientific information so communities can make their own informed decisions on climate policy; part of this may involve planners acknowledging the values they bring with them to the conversation (Lamb, 2017). While the strategies in this thesis

can help planners effectively communicate climate change science, it is crucial to be mindful of how to ethically communicate climate change using these strategies in a way that does not manipulate audiences and withhold information for the sake of convincing people.

Overall, this thesis provides only limited evidence that the Toolkit includes the most effective or appropriate strategies for planners in Puget Sound, or urban planners in general, to use in various planning community engagement contexts.

IMPLICATIONS OF RESEARCH

This thesis outlines climate communication strategies that can be used to bolster community engagement efforts in urban planning. The strategies outlined in this thesis relay findings from the CCC literature to help planners clearly communicate climate impacts, discuss adaptation and mitigation options, and localize their discussions on climate change more effectively. Similarly, the Toolkit created as part of this thesis provides a practical guide to climate communication for planners in Puget Sound that is short, easy to reference, and links to local climate visualization tools and guidance. Through the focus group conducted to test how applicable the Toolkit was for planners in Puget Sound, I found that the strategies identified in the Toolkit would be useful in the participating planners' work. The focus group findings also confirmed the need for additional resources for planners, as participants expressed interest in various additional climate communication materials, such as basic climate science handouts or PowerPoint slides on climate impacts that they could reference and tailor to their communities.

While the strategies outlined in this thesis and Toolkit alone cannot increase community power in decision-making or necessarily lead to more meaningful engagement, they give planners a good starting place and quick reference for designing their own climate communications. More effective communication in climate planning can improve long-term outcomes of community engagement by establishing a shared knowledge base before discussing climate policies, increasing support for climate action by legitimizing the planning process, and incorporating local knowledge in climate planning processes. If planners are to be part of a just transition to climate-resilient cities, they will need to be able to more effectively communicate climate change with the communities they work with; this thesis and corresponding Toolkit can provide a good starting place for them to do so.

CONCLUSION

Climate change poses varying risks to cities, and because of their influence on how the built environment affects and responds to these risks, urban planners play a large role in determining how prepared cities and their inhabitants are for climate impacts. Urban planning involves and often requires engagement with the public to legitimize planning decisions, but the level of community participation can vary. Engagement that allows for greater community member participation and more meaningful discussions of climate change's local impacts is instrumental in increasing the scope of climate action and improving the long-term effectiveness of climate policies. With improved engagement and locally-relevant methods of climate communication, planners can increase community members' understanding of climate change and also ensure climate policies are informed and supported by the community.

The many strategies presented in this thesis and the corresponding Toolkit can help ensure climate communications are clear, visually engaging, inspiring, and relevant to community members. The strategies also provide some direction for planners on targeting their communications to better fit their communities and can contribute to an engaging and well-informed climate planning process. This thesis can help planners better understand why effective climate change communication is imperative, their role in communicating climate change, and what methods from CCC literature they could use in their work. Regardless of the limitations of this thesis, the focus group survey results suggest that the Toolkit will be useful to planners in their work, especially as a quick reference guide, to help make their communication efforts more clear, approachable, and supportive of deliberation. Planners in Puget Sound have

a breadth of visualization tools available to assist them in this work, as exemplified in the Toolkit. I hope that, together, the Toolkit and this thesis can increase the effectiveness of climate communication by planners in Puget Sound and provide some direction on developing communication materials to bolster climate action in Puget Sound communities.

REFERENCES

- Altinay, Z. (2017). Visual Communication of Climate Change: Local Framing and Place Attachment. *Coastal Management*, 45(4), 293–309.
<https://doi.org/10.1080/08920753.2017.1327344>
- Arnstein, S. R. (1969). A Ladder Of Citizen Participation. *Journal of the American Institute of Planners*, 35(4), 216–224. <https://doi.org/10.1080/01944366908977225>
- Ballantyne, A. G. (2016). Climate change communication: What can we learn from communication theory? *Wiley Interdisciplinary Reviews. Climate Change*, 7(3), 329–344.
<https://doi.org/10.1002/wcc.392>
- Berke, P., & Stevens, M. R. (2016). Land Use Planning for Climate Adaptation: Theory and Practice. *Journal of Planning Education and Research*, 36(3), 283–289.
<https://doi.org/DOI: 10.1177/0739456X16660714>
- Blue, G. (2017). Participatory and Deliberative Approaches to Climate Change. *Oxford Research Encyclopedia of Climate Science*.
<https://doi.org/10.1093/acrefore/9780190228620.013.397>
- Bostrom, A., Böhm, G., & O'Connor, R. E. (2013). Targeting and tailoring climate change communications. *WIREs Climate Change*, 4(5), 447–455.
<https://doi.org/10.1002/wcc.234>
- Boswell, M., Greve, A., & Seale, T. (2019). *Climate Action Planning: A Guide to Creating Low-Carbon, Resilient Communities*. Island Press.
- Bruine de Bruin, W., Rabinovich, L., Weber, K., Babboni, M., Dean, M., & Ignon, L. (2021). Public understanding of climate change terminology. *Climatic Change*, 167(3), 37.
<https://doi.org/10.1007/s10584-021-03183-0>

- Bulkeley, H. (2010). Cities and the Governing of Climate Change. *Annual Review of Environment and Resources*, 35(1), 229–253.
<https://doi.org/10.1146/annurev-environ-072809-101747>
- C40 Cities. (2020). *Integrating Climate Adaptation: A Toolkit for Urban Planners and Adaptation Practitioners*.
<https://www.thegpsc.org/knowledge-products/climate-change/integrating-climate-adaptation-toolkit-urban-planners-and>
- Chu, E., & Schenk, T. (2017). Communicating About Climate Change with Urban Populations and Decision-Makers. *Oxford Research Encyclopedia of Climate Science*.
<https://doi.org/10.1093/acrefore/9780190228620.013.413>
- City of Seattle. (2013). *Seattle Climate Action Plan*.
https://www.seattle.gov/documents/Departments/Environment/ClimateChange/2013_CAP_20130612.pdf
- City of Seattle. (2020). *Seattle 2035: Comprehensive Plan: Managing Growth to Become an Equitable and Sustainable City 2015-2035*. Office of Planning and Community Development.
<https://www.seattle.gov/documents/Departments/OPCD/OngoingInitiatives/SeattlesComprehensivePlan/ComprehensivePlanCouncilAdopted2021.pdf>
- City of Tacoma. (2021). *2030 Tacoma Climate Action Plan*.
https://www.cityoftacoma.org/government/city_departments/environmentalservices/office_of_environmental_policy_and_sustainability/climate_action/2030_climate_action_plan
- Climate Impacts Group. (2021). *Exploring Sea Level Rise in South Seattle with Virtual Reality*. Climate Impacts Group. <https://cig.uw.edu/projects/vr-slr-south-seattle/>

Cook, J. (2016, May 30). *Ten years on: How Al Gore's An Inconvenient Truth made its mark*. The Conversation.

<http://theconversation.com/ten-years-on-how-al-gores-an-inconvenient-truth-made-its-mark-59387>

Corburn, J. (2003). Bringing Local Knowledge into Environmental Decision Making: Improving Urban Planning for Communities at Risk. *Journal of Planning Education and Research*, 22(4), 420–433. <https://doi.org/10.1177/0739456X03022004008>

Drevno, A. (2022). Chapter 2: Integrating Equity and Justice into Climate Action Planning: Beyond Mere Symbolism. In B. Petersen & H. B. Ducros (Eds.), *Justice in Climate Action Planning* (pp. 25–42). Springer Nature Switzerland AG.

https://doi.org/10.1007/978-3-030-73939-3_2

Fung, A. (2015). Putting the Public Back into Governance: The Challenges of Citizen Participation and Its Future. *Public Administration Review*, 75(4), 513–522.

<https://doi.org/10.1111/puar.12361>

Gifford, R., Kormos, C., & McIntyre, A. (2011). Behavioral dimensions of climate change: Drivers, responses, barriers, and interventions. *WIREs Climate Change*, 2(6), 801–827.

<https://doi.org/10.1002/wcc.143>

Gustafson, A., & Rice, R. E. (2020). A review of the effects of uncertainty in public science communication. *Public Understanding of Science (Bristol, England)*, 29(6), 614–633.

<https://doi.org/10.1177/0963662520942122>

Hahn, M. B., Kemp, C., Ward-Waller, C., Donovan, S., Schmidt, J. I., & Bauer, S. (2020). Collaborative climate mitigation and adaptation planning with university, community, and municipal partners: A case study in Anchorage, Alaska. *Local Environment*, 25(9), 648–665.

<https://doi.org/10.1080/13549839.2020.1811655>

- Hemmerling, S. A., Barra, M., Bienn, H. C., Baustian, M. M., Jung, H., Meselhe, E., Wang, Y., & White, E. (2020). Elevating local knowledge through participatory modeling: Active community engagement in restoration planning in coastal Louisiana. *Journal of Geographical Systems*, 22(2), 241–266. <https://doi.org/10.1007/s10109-019-00313-2>
- Hickey, H. (2022, June 14). UW, Seattle Public Library, Seattle Public Utilities collaboration uses VR goggles to visualize sea level rise in Seattle. *UW News*.
<https://www.washington.edu/news/2022/06/14/uw-seattle-public-library-seattle-public-utilities-collaboration-uses-vr-goggles-to-visualize-sea-level-rise-in-seattle/>
- Hobson, K., & Niemeyer, S. (2011). Public responses to climate change: The role of deliberation in building capacity for adaptive action. *Global Environmental Change*, 21(3), 957–971.
<https://doi.org/10.1016/j.gloenvcha.2011.05.001>
- Ingold, K. (2017). How to create and preserve social capital in climate adaptation policies: A network approach. *Ecological Economics*, 131, 414–424.
<https://doi.org/10.1016/j.ecolecon.2016.08.033>
- International Association for Public Participation. (2018). *IAP2 Public Participation Pillars*.
International Association for Public Participation.
https://cdn.ymaws.com/www.iap2.org/resource/resmgr/communications/11x17_p2_pillars_brochure_20.pdf
- International Association for Public Participation. (2018). *IAP2 Spectrum of Public Participation*.
IAP2 International Federation.
https://cdn.ymaws.com/www.iap2.org/resource/resmgr/pillars/Spectrum_8.5x11_Print.pdf
- IPCC, 2022: Summary for Policymakers. In: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the

- Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: [10.1017/9781009157926.001](https://doi.org/10.1017/9781009157926.001).
- Jones, C., Hine, D. W., & Marks, A. D. G. (2017). The Future is Now: Reducing Psychological Distance to Increase Public Engagement with Climate Change. *Risk Analysis*, 37(2), 331–341. <https://doi.org/10.1111/risa.12601>
- Kamacı, E. (2014). A Novel Discussion on Urban Planning Practice: Citizen Participation. *Iconarp International Journal of Architecture and Planning*, 2(1).
<https://iconarp.ktun.edu.tr/index.php/iconarp/article/view/43>
- Kearns, F. R. (2012). From science communication to relationship-building: Contemplative practice and community engagement in the environmental sciences. *Journal of Environmental Studies and Sciences*, 2(3), 275–277.
<https://doi.org/10.1007/s13412-012-0083-y>
- Kirkhaug, T. R. (2016). *Communication in Urban Planning How quality of communication can facilitate constructive citizen participation*.
<https://www.semanticscholar.org/paper/Communication-in-Urban-Planning-How-quality-of-can-Kirkhaug/4c1641499552fae43f15e8ea87f245e12176b251>
- Lamb, M. (2017). Ethics for Climate Change Communicators. In *Oxford Research Encyclopedia of Climate Science*. <https://doi.org/10.1093/acrefore/9780190228620.013.564>
- Lieberknecht, K. (2022). *Community-Centered Climate Planning: Using Local Knowledge and Communication Frames to Catalyze Climate Planning in Texas*. *Journal of the American Planning Association*, 88(1), 97–112. <https://doi.org/10.1080/01944363.2021.1896974>

- Lymn, N., Bednarek, A., & Kearns, F. (2010). Making information meaningful. *Frontiers in Ecology and the Environment*, 8(10), 507–507.
<https://doi.org/10.1890/1540-9295-8.10.507>
- Maertens, R., Anseel, F., & van der Linden, S. (2020). Combatting climate change misinformation: Evidence for longevity of inoculation and consensus messaging effects. *Journal of Environmental Psychology*, 70, 101455.
<https://doi.org/10.1016/j.jenvp.2020.101455>
- Measham, T. G., Preston, B. L., Smith, T. F., Brooke, C., Gorddard, R., Withycombe, G., & Morrison, C. (2011). Adapting to climate change through local municipal planning: Barriers and challenges. *Mitigation and Adaptation Strategies for Global Change*, 16(8), 889–909. <https://doi.org/10.1007/s11027-011-9301-2>
- Miller, I.M., Morgan, H., Mauger, G., Newton, T., Weldon, R., Schmidt, D., Welch, M., Grossman, E. 2018. Projected Sea Level Rise for Washington State – A 2018 Assessment. A collaboration of Washington Sea Grant, University of Washington Climate Impacts Group, Oregon State University, University of Washington, and US Geological Survey. Prepared for the Washington Coastal Resilience Project.
https://cig.uw.edu/wp-content/uploads/sites/2/2019/07/SLR-Report-Miller-et-al-2018-updated-07_2019.pdf
- Moser, S. C. (2014). Communicating adaptation to climate change: The art and science of public engagement when climate change comes home. *WIREs Climate Change*, 5(3), 337–358. <https://doi.org/10.1002/wcc.276>
- Moser, S. C. (2017, September 26). Communicating Climate Change Adaptation and Resilience. *Oxford Research Encyclopedia of Climate Science*.
<https://doi.org/10.1093/acrefore/9780190228620.013.436>

- Moser, S. C. (2006). Talk of the city: Engaging urbanites on climate change. *Environmental Research Letters*, 1(1), 014006. <https://doi.org/10.1088/1748-9326/1/1/014006>
- Moser, S. C. (2016). Reflections on climate change communication research and practice in the second decade of the 21st century: What more is there to say? *WIREs Climate Change*, 7(3), 345–369. <https://doi.org/10.1002/wcc.403>
- Moser, S. C., & Ekstrom, J. A. (2010). A framework to diagnose barriers to climate change adaptation. *Proceedings of the National Academy of Sciences*, 107(51), 22026–22031. <https://doi.org/10.1073/pnas.1007887107>
- Moser, S. C., & Pike, C. (2015). Community engagement on adaptation: Meeting a growing capacity need. *Urban Climate*, 14, 111–115. <https://doi.org/10.1016/j.uclim.2015.06.006>
- Myers, T. A., Nisbet, M. C., Maibach, E. W., & Leiserowitz, A. A. (2012). A public health frame arouses hopeful emotions about climate change. *Climatic Change*, 113(3), 1105–1112. <https://doi.org/10.1007/s10584-012-0513-6>
- Nerlich, B., Koteyko, N., & Brown, B. (2010). Theory and language of climate change communication. *Wiley Interdisciplinary Reviews. Climate Change*, 1(1), 97–110. <https://doi.org/10.1002/wcc.2>
- Nuccitelli, D. (2020, November 30). *Fighting climate change: Cheaper than “business as usual” and better for the economy* » *Yale Climate Connections*. Yale Climate Connections. <http://yaleclimateconnections.org/2020/11/fighting-climate-change-cheaper-than-business-as-usual-and-better-for-the-economy/>
- O’Neill, S. J., Boykoff, M., Niemeyer, S., & Day, S. A. (2013). On the use of imagery for climate change engagement. *Global Environmental Change*, 23(2), 413–421. <https://doi.org/10.1016/j.gloenvcha.2012.11.006>

- Paschen, J.-A., & Ison, R. (2014). Narrative research in climate change adaptation—Exploring a complementary paradigm for research and governance. *Research Policy*, 43(6), 1083–1092. <https://doi.org/10.1016/j.respol.2013.12.006>
- Pfirman, S., O’Garra, T., Bachrach Simon, E., Brunacini, J., Reckien, D., Lee, J. J., & Lukasiewicz, E. (2021). “Stickier” learning through gameplay: An effective approach to climate change education. *Journal of Geoscience Education*, 69(2), 192–206. <https://doi.org/10.1080/10899995.2020.1858266>
- Reis, J., & Ballinger, R. C. (2020). Creating a climate for learning experiences of educating existing and future decision-makers about climate change. *Marine Policy*, 111. <https://doi.org/10.1016/j.marpol.2018.07.007>
- Rosenzweig, C., Solecki, W. D., Romero-Lankao, P., Mehrotra, S., Dhakal, S., & Ali Ibrahim, S. (Eds.). (2018). *Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network*. Cambridge University Press. <https://doi.org/10.1017/9781316563878>
- Roth, R. E. (2021). Cartographic Design as Visual Storytelling: Synthesis and Review of Map-Based Narratives, Genres, and Tropes. *The Cartographic Journal*, 58(1), 83–114. <https://doi.org/10.1080/00087041.2019.1633103>
- Rousell, D., & Cutter-Mackenzie-Knowles, A. (2020). *A systematic review of climate change education: Giving children and young people a “voice” and a “hand” in redressing climate change*. *Children’s Geographies*, 18(2), 191–208. <https://doi.org/10.1080/14733285.2019.1614532>
- Rudge, K. (2021). Participatory climate adaptation planning in New York City: Analyzing the role of community-based organizations. *Urban Climate*, 40, 101018. <https://doi.org/10.1016/j.uclim.2021.101018>

- Serrao-Neumann, S., Harman, B., Leitch, A., & Low Choy, D. (2015). Public engagement and climate adaptation: Insights from three local governments in Australia. *Journal of Environmental Planning and Management*, 58(7), 1196–1216.
<https://doi.org/10.1080/09640568.2014.920306>
- Sezen-Barrie, A., Miller-Rushing, A., & Hufnagel, E. (2020). “It’s a gassy world”: Starting with students’ wandering questions to inform climate change education. *Environmental Education Research*, 26(4), 555–576. <https://doi.org/10.1080/13504622.2019.1610158>
- Sheppard, S. R., Shaw, A., Flanders, D., Burch, S., Wiek, A., Carmichael, J., Robinson, J., & Cohen, S. (2011). Future visioning of local climate change: A framework for community engagement and planning with scenarios and visualization. *Futures: The Journal of Policy, Planning and Futures Studies*, 43(4), 400–412.
<https://doi.org/10.1016/j.futures.2011.01.009>
- Stapleton, S. R. (2019). *A case for climate justice education: American youth connecting to intragenerational climate injustice in Bangladesh*. *Environmental Education Research*, 25(5), 732–750. <https://doi.org/10.1080/13504622.2018.1472220>
- United Nations Department of Economic and Social Affairs, Population Division. (2019). *World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420)*. New York: United Nations. <https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf>
- United Nations Environment Program. (2017, September 26). *Cities and climate change*. UNEP - UN Environment Programme.
<http://www.unep.org/explore-topics/resource-efficiency/what-we-do/cities/cities-and-climate-change>
- US Census Bureau. (n.d.). *Urban Areas Facts*. Census.Gov. Retrieved February 23, 2023, from <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/ua-facts.html>

- van der Linden, S., Maibach, E., & Leiserowitz, A. (2015). Improving Public Engagement With Climate Change: Five “Best Practice” Insights From Psychological Science. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 10(6), 758–763. <https://doi.org/10.1177/1745691615598516>
- Veselková, M. (2017). Narrative Policy Framework: Narratives as heuristics in the policy process. *Human Affairs*, 27(2), 178–191. <https://doi.org/10.1515/humaff-2017-0016>
- Wang, S., Corner, A., Chapman, D., & Markowitz, E. (2018). Public engagement with climate imagery in a changing digital landscape. *WIREs Climate Change*, 9(2), e509. <https://doi.org/10.1002/wcc.509>
- Weathers, M. R., Maibach, E., & Nisbet, M. (2017). Communicating the Public Health Risks of Climate Change. *Oxford Research Encyclopedia of Climate Science*. <https://doi.org/10.1093/acrefore/9780190228620.013.428>
- Yusuf, J.-E. (Wie), & St. John III, B. (Eds.). (2022). *Communicating Climate Change: Making Environmental Messaging Accessible (1st ed.)*. Routledge. <https://doi.org/10.4324/9781003037378>

APPENDIX A: CAPSTONE REPORT

Climate Communication Strategies for Urban Planners in Puget Sound, WA

Graduate Certificate on Climate Change

Capstone Report

Rachel Chen

Masters of Urban Planning

Spring 2023

Advisors

Christopher Campbell

Ann Bostrom

ADVISOR + PARTNERS

My thesis and capstone advisor is Christopher Campbell (College of Built Environments, Chair of the Department of Urban Design and Planning). My thesis committee member is Ann Bostrom (Evans School of Public Policy and Governance). Both were instrumental in helping me develop the presentation and focus group for this GCeCS capstone project; I am deeply grateful to both of them for their time and guidance.

I would also like to thank Miriam Bertram, who provided foundational advice and feedback throughout the development of the capstone project, and Marty Curry, for her guidance throughout my time in the MUP program, especially during the thesis and capstone process.

PROJECT BACKGROUND

This capstone project was developed as part of a master's thesis for the Master of Urban Planning (MUP) program. The thesis, titled "Climate Change Communication Strategies for Urban Planners in Puget Sound, WA," sought to answer the following research questions: What are the best practices for communicating climate science to non-experts? Which methods are most applicable to community engagement efforts by urban planners in Puget Sound, WA? The thesis informed the creation of a climate change communication toolkit, "Climate Communication Toolkit for Urban Planners in Puget Sound," for Puget Sound planners to use to guide their climate communication efforts with communities. The Toolkit was presented in conjunction with an example of how to use the Toolkit in practice for this Graduate Certificate in Climate Science (GCeCS) capstone project. To fulfill the requirements of the GCeCS capstone, a presentation of the Toolkit that provided examples of how to use the Toolkit to discuss the climate science of heat waves and urban flooding with community members was created and presented to planners in Puget Sound as part of a pilot focus group — planners who attended the focus group presentation work in Puget Sound on climate change-related projects.

PROBLEM STATEMENT

Climate change is already causing widespread impacts across the world. While climate change is seen as a global problem requiring global solutions, cities have been and need to continue addressing climate change at the local level, as climate impacts differ from place to place. As the world is becoming more urbanized and a more significant percentage of people live in cities, cities play an increasingly prominent role in the mitigation of greenhouse gases or adaptation to climate impacts. Climate change also poses many risks to cities and their essential functions. Impacts like floods, sea level rise, and drought, among others, can cause damage to or disrupt essential services, infrastructure, housing, transportation networks, and human health. Cities are the ones that coordinate first responses to impacts such as these, as well as other hazards, and are responsible for providing public services and other critical infrastructure and implementing community goals (Chu & Schenk, 2017).

Due to its role in determining how urban development occurs, urban planning critically influences a city's resilience and adaptive capacity. It can foster places where people, infrastructure, and vital services are resilient to climate impacts and hazards (C40 Cities, 2020). Though many "natural hazards" affect cities and are becoming more intense due to climate change, urban planning highly affects the degree to which cities are affected by such hazards by influencing the built environment, such as the proportion of land covered by buildings and impervious surfaces compared to open space and tree cover that can mitigate climate impacts like flooding (C40 Cities, 2020, p. 4). Urban planning plays a significant role in the extent to which cities are impacted, how they respond, and who is most vulnerable in the face of climate change (Measham et al., 2011). In short, planners influence how resilient the built environment and its residents are to climate impacts.

As more regions experience climate impacts, planners are more likely to discuss climate change with their community members. They should be able to do so effectively to ensure climate planning goals are met. Community-centered climate planning, which utilizes local knowledge and community participation in developing climate strategies to support climate justice, is increasingly becoming more crucial in our cities as we begin to experience climate impacts and prepare for future ones. Community-centered climate planning is valuable to give communities greater agency in determining their future and increase the effectiveness of planning decisions. As part of this, urban planners should be able to effectively communicate and discuss climate

change and local impacts with the communities they are planning with so that community members understand their role and why this work is essential.

Though the climate crisis requires immediate action to prevent additional warming, the long-term effectiveness of climate actions could be significantly enhanced by incorporating community input and gaining community-wide support. Community engagement in climate planning is crucial to establish a shared knowledge base, increasing support for climate action by legitimizing the process, and incorporating local knowledge in climate planning decisions.

Establishing a shared knowledge base on climate science helps participants to understand climate change and its impacts better, prevents misinformation, and provides additional context for climate action. Communities may have different levels of knowledge about climate change and may misunderstand parts of climate science, especially regarding uncertainty. Discussing climate science through a brief primer can help clarify potential misunderstandings and ensure a shared knowledge base before discussing climate actions. Furthermore, community members might have observed environmental changes but might have yet to explicitly connect those changes and climate change. Providing a primer on climate science helps people better understand how climate change will impact their community and may help them make connections between their past experiences and climate change.

Community engagement in climate planning is also crucial to legitimize the planning process increase overall support for climate action, and help community members make informed decisions. Engaging communities on climate change legitimizes the planning process by giving the public an opportunity to influence decisions that will affect their community (Boswell et al., 2019; Fung, 2015). In this way, community engagement increases the democracy of the planning process by allowing for greater transparency, feedback, and participation rather than planning decisions being made purely based on technical expertise (Corburn, 2003). Including the public throughout the process helps the community feel greater ownership over the solutions, and can increase the social capacity of communities in their response to climate change (Ingold, 2017; Kirkhaug, 2016; Serrao-Neumann et al., 2015). Furthermore, a strong understanding of climate science can help community members make well-informed decisions once motivated to act (Stapleton, 2019). Including the community in decision-making and planning processes allows for greater social capacity and more successful climate action (Gifford et al., 2011; Paschen & Ison, 2014).

Finally, community engagement in climate planning is essential to incorporate local knowledge in the planning process as a way to foster equity and ensure a just transition (a fair and inclusive process where no one is left behind or excluded) to resilient cities. Local knowledge is gained through individual perceptions of the local environment and setting rather than from scientific or other professional sources (Corburn, 2003). It is crucial to ensure that planning policies and actions are tailored to the community and include culturally-relevant policies that can increase community support and bolster implementation (Hahn et al., 2020). Incorporating local knowledge as part of the climate planning process also helps support climate justice (Lieberknecht, 2022). In all, effective climate communication is crucial to incorporate local knowledge, legitimize the planning process, and establish a shared knowledge base.

While there has been plentiful research in recent decades on effective methods of climate communication, there remains a gap in translating these findings into practical advice and recommendations for communication practitioners like urban planners (Moser, 2016). The corresponding thesis and Toolkit attempt to provide some critical insights for planners engaged in climate communication, though more work can still be done to this effect.

PURPOSE

To address how planners can meaningfully engage with their communities on climate change issues, the corresponding thesis attempts to answer the following questions: What are the best practices for communicating climate science to non-experts? Which methods are most applicable to community engagement efforts by planners in Puget Sound, WA? As part of this thesis, a "Climate Communication Toolkit for Urban Planners in Puget Sound, WA," was created to outline effective climate communication strategies. This capstone project for the GCeCS provides an example of using the Toolkit in practice to discuss the climate impacts of heat waves and urban flooding on cities, using Seattle as an example. This presentation aimed to provide an example of how to effectively discuss the climate science of heat waves and urban flooding, as identified by a literature review of effective communication strategies in the corresponding thesis. Heat waves and urban flooding were chosen because they are both climate impacts already heavily affecting cities throughout the Sound and are highly influenced by urban planning.

METHODS

As part of the MUP thesis, I created a toolkit called “Climate Communication Toolkit for Urban Planners in Puget Sound, WA,” which I refer to as the Toolkit throughout this report (Appendix A). The Toolkit includes strategies planners can reference when designing communication materials to discuss climate change with their communities. The strategies were determined through a literature review and in terms of their applicability to urban planning communication efforts such as community meetings or presentations. The end of the Toolkit features a section on communication resources and handbooks as part of an index of some of the climate visualization tools available that planners can use to help their communities better visualize and understand potential climate impacts.

A focus group was conducted with four planners in Puget Sound to present the Toolkit and provide an example of its use in practice. The planners were selected based on whether they worked in climate planning or on climate-related projects in Puget Sound, WA. They were chosen through a non-probabilistic sampling method, where two professional mentors in the MUP program advised me to reach out to planners they knew to be active in climate planning or community engagement for climate-related projects. I initially reached out to 10 planners, who either agreed to participate or connected me to others who might be interested. Ultimately, I asked 20 planners to participate; four could participate in the focus group after coordinating schedules.

Those who participated in the focus group work for public agencies such as the City of Tumwater (Thurston County) and Pierce, Thurston, and Snohomish Counties. The participants are involved in various climate planning activities, with job titles including Sustainability Program Lead, Sustainability Coordinator, Energy and Sustainability Manager, and Climate Mitigation Senior Program Manager. The focus group was held for an hour and a half over Zoom and recorded after receiving verbal consent for notetaking purposes.

The focus group was primarily used to inform the thesis and discuss planners' current climate communication efforts in their roles and communities. Following a discussion on their climate planning and communication work, I presented the Toolkit in PowerPoint format, which can be found in Appendix B. The presentation started with an overview of why the Toolkit was created

and an explanation of each of the communication strategies included in the Toolkit. The next part of the presentation, starting with slide number 16, was specifically created for this capstone project. It explains the climate science behind the climate impacts of heat waves and urban flooding. It also incorporates an introductory discussion on how these impacts relate to urban planning and how planners can apply the recommended communication strategies to discuss these particular climate impacts. To utilize the strategies I recommended in the Toolkit, I avoided using numerical or complex data or graphs to discuss climate change and the science behind heat waves and urban flooding. Instead, I tried to provide an example of a more narrative version of climate science with localized images and simple visualizations of climate projections and impacts. Additionally, any potentially confusing terms used during the presentation were explained and contextualized to ensure everyone was clear on the subject.

Based on feedback from the focus group and survey, I updated the Toolkit to include a 1-page version of the Toolkit for quick reference. I also updated the Toolkit to include any additional research and climate tools. I added visualization tools for wildfires, as the Toolkit resources initially prioritized heat waves and flooding, but I wanted to include tools for other common climate impacts in Puget Sound. I added more images to the Toolkit to break up the text and changed the citations from in-text to endnotes to eliminate unnecessary text. Finally, in the appendix, I included additional resources I made for planners to use or tailor to their communication efforts.

To distribute this toolkit and example slides to planners, I will link it in the corresponding blog post for this capstone project. A presentation on this thesis and capstone project will also be presented to practicing planners who are part of the MUP program's Professionals Council, and my email will be distributed during this presentation if they are interested in receiving a copy of the Toolkit. The planners who participated in the focus group wanted to distribute the Toolkit to their teams, so a copy of the final Toolkit will also be sent to them. To encourage them to use it, I created a 1-page version of the Toolkit that is at the beginning of the Toolkit. It provides all of the strategies on one page for quick reference, and planners can refer to the other pages in the Toolkit if they want to learn more about the individual strategies or reference the climate resources and visualization tools.

EVALUATION

Following the discussion and presentation, a survey was distributed to gauge their understanding of the climate science presented, evaluate my effectiveness as a communicator, and solicit feedback on the Toolkit. A copy of the survey can be found in Appendix C, and survey results can be found in Appendix D. The survey began with questions to gauge whether the communication methods would be helpful in their work and determine what might limit their implementation of these methods. The rest of the survey was used to fulfill capstone requirements for evaluating the presentation's effectiveness and my communication skills. The survey results show that the presentation effectively relayed the climate science behind heat waves and urban flooding. Open-ended questions were included in the survey to test whether the planners learned something about heat waves or urban flooding through the presentation. Though the participants mentioned in the discussion that they were reasonably confident in their knowledge of climate science, primarily due to their educational backgrounds, they also pointed out that many of their colleagues do not understand climate science as well.

Though I only received 3 out of 4 survey responses from participants, the knowledge test questions provided insight into how effective my presentation of heat waves and urban flooding was. Some of the questions were open-ended, while a few were multiple-choice; most of the survey questions were answered correctly, namely the open-ended questions, but a couple of multiple-choice questions were perhaps misunderstood. This is most likely because the questions asked participants to "Select all that apply," as they all answered a correct answer but did not select all of the possible correct answers. For example, the correct answer to the question "The Urban Heat Island (UHI) effect is exacerbated by...(Select all that apply)" was to select all of the choices, which were "Impervious surfaces like concrete," "Increased greenhouse gas emissions," and "Heat waves," except for the choice "Tree cover," which helps *decrease* UHI. However, all survey responses selected only "Impervious surfaces like concrete." This is probably due to participants misreading the question, as "Select all that apply" was in the second line of the question, or because the presentation more explicitly described the impact of impervious surfaces on UHI. At the same time, the other correct answers might not have been as well-explained throughout the presentation.

Additionally, for the question "Climate change is causing more precipitation to fall as rain rather than snow," with responses "True," "False," and "Don't know," two out of three

respondents got the question right by choosing "True." However, one respondent chose "Don't know." Finally, for the question "Which of the following statements is false" with choices including "Climate change is increasing snowpack globally," "The timing of snowmelt in the PNW is shifting earlier in the year," "With climate change, relatively wet areas will get wetter, dry areas drier," and "Participation events are becoming stronger with climate change." The correct choice is the first answer, as climate change is causing a decrease in global snowpack. However, only two out of three respondents answered correctly; the same respondent who answered the previous question with "Do not know" also got this question wrong. These two incorrect answers could be due to a misunderstanding of the question or because that focus group participant is the one that had to leave the focus group halfway through this presentation for another meeting. The open-ended questions testing respondents' knowledge of climate science were all answered correctly, some with more details than others.

Respondents indicated that my presentation was effective and clear despite potential misunderstandings of the multiple-choice questions. For example, in response to the question, "How well did I present today? Identify any strengths or weaknesses", participants responded, "You did well. The images and the stories stayed with me", and "Very well overall, clear and simple explanations with good visuals. There were some slightly jargony words, however (impervious, albedo, etc.)", and "Great job, slide show might be pared down a bit?". These responses indicate that my presentation was effective overall but could have benefited even more from utilizing the communication strategies. I thought I was mindful of defining all terms that were used. However, this feedback further highlights the importance of clearly defining any terms or potential jargon used in climate communications to avoid potential miscommunication. Overall, the presentation effectively relays the climate science behind heat waves and urban flooding but could have provided additional clarity to define climate science terms. This could be remedied in future presentations by adding slides to explicitly define any jargon used rather than just verbalizing the definitions.

LIMITATIONS

This capstone project is limited in scope and widespread applicability primarily due to time constraints and a small sample size. The focus group discussion provided an excellent

opportunity to discuss climate planning efforts with planners throughout Puget Sound and to provide an example of how to use the toolkit in practice. However, it only included four planners and did not fully represent planners throughout Puget Sound. It would have been ideal to conduct multiple focus groups with various planners for the discussion portion, and give the presentation on climate impacts to community members to test the effectiveness of the communication strategies. While the participating planners believed the strategies in the toolkit would be helpful in their work, it would have been great to test the strategies with a real community to see if their knowledge of climate change improved through the presentation. Due to time constraints, I grouped the discussion of planners' role in climate communication with the example of utilizing the toolkit into one focus group.

The focus group participants were also not fully representative of planners in Puget Sound. First, all participating planners were women, though this was not my intention. This could be due to women being more involved with community engagement efforts, because they wanted to help a fellow woman with her thesis, or because they happened to be available to help. Regardless, no men were available to attend the focus group. Most were not directly involved with community engagement; they all recommended women on their team to reach out to instead. Furthermore, most focus group participants were planners at relatively high-level positions in their department rather than a mix of planner positions.

Another limitation of this focus group is that I did not conduct a pre-survey before the presentation. Through discussions with my thesis committee, we decided to prioritize the focus group to cover the discussion on planners' role in communicating climate change and demonstrating how to utilize the strategies, as we expected the planners to have a strong understanding of climate change. Had I done another focus group with community members, I would have done a pre- and post-survey to assess a change in knowledge. This particular focus group was more interested in if planners themselves felt these methods would be helpful in practice; we assumed they would already have a solid understanding of climate science. However, based on the survey results, it is possible the planners themselves learned something from the presentation or the presentation refreshed their knowledge on climate impacts because the way they answered the open-ended knowledge test questions reflected the specific language I used in my presentation. Overall, the focus group had multiple limitations that affect the validity of how effective the strategies in the toolkit are in increasing understanding. Regardless, it is clear from the focus group survey results that the Toolkit will be

useful to these planners in their work, and future studies could investigate how effective they are in increasing the knowledge of a community or improving outreach efforts.

REFLECTION

Overall, this capstone experience was a great learning experience to put into practice the communication strategies I was researching as part of my thesis. I have not only learned a lot about effective climate communication methods as part of my thesis research, but I have also been able to apply them to my focus group presentation and discuss their usefulness and applicability to urban planning with current practitioners. With the capstone project, I could practice the strategies I hope to incorporate into my professional work. Communicating climate change effectively is a great way to encourage swift climate action in communities we desperately need. I plan to communicate climate change well in my future work by learning from my experiences through this project.

Through the focus group, I was inspired by all the great work and communication efforts already occurring throughout Puget Sound. It was great to hear that the planners I spoke to are making conscious decisions to try and reach everyone in their community to ensure people are aware of climate impacts and how their community might be impacted in the future. Their communication work mainly focused on community meetings to discuss implementing climate action plans and other resilience efforts. It was encouraging that this work was being done on multiple scales of local government, and many of them were already using a few of the visualization tools linked in the Toolkit to assist with localizing, clarifying, and simplifying climate visuals. I was glad they thought the Toolkit would be helpful to their work and for their teams, especially in learning more about effective communication and having an index of climate tools to easily reference.

If I did this capstone project again, I would still present the Toolkit to planners and discuss their communication efforts. However, I would hold multiple focus groups and give the climate impacts presentation to a community to test the effectiveness of the communication strategies and further tailor my presentation to a specific “non-expert” audience, such as a specific community in Seattle, rather than present to current practitioners who already have a relatively strong understanding of climate science. I would also add slides to define all jargon or

potentially confusing terms. Though there are a few things I would have done differently had I had the time and foresight to do so, this capstone project provided a great opportunity to put into practice the communication methods I had been researching as part of my thesis. I hope my research and capstone project can provide a strong example for planners engaged in climate change communication.

FINAL TIMELINE + TASK BREAKDOWN

Winter Quarter: 1cr Capstone; 5cr Thesis

Spring Quarter: 4cr Capstone; 6cr Thesis

DATE	DELIVERABLE or GOAL (<i>italicized</i> - thesis; <u>underlined</u> - capstone; normal text - applies to both)
Jan 31, 2023	<i>Literature review</i> : current communication practices in planning, planners' role in communicating climate change
Feb 28, 2023	<i>Literature review</i> : communication theory <i>Literature review</i> : communication methods for community engagement in planning Toolkit: research for toolkit - narrow down impacts the focus group presentation will cover (<u>10 hours+</u>)
March 1-31, 2023	<i>Thesis</i> : write/organize research Toolkit: research for the toolkit and develop the toolkit, climate impacts research for presentation (<u>10 hours+</u>) Focus Group: schedule focus group date + send invites (late March, early April); develop the presentation (<u>~1-2 hours</u>)
April 1-13	Toolkit: finalize toolkit + incorporate feedback from committee (<u>40 hours+</u>) Focus Group: develop the focus group presentation (<u>~15 hours</u>) Survey: prepare draft + review with Ann, revise (<u>~5 hours</u>) <i>Thesis</i> : writing
April 14	Focus Group: hold the focus group on April 14, 12-1:30 pm, and collect survey responses during the workshop (<u>~3 hours</u>)
April 15-30	<i>Thesis</i> : methods, results, discussion, and conclusion drafts; analyze survey data, identify qualitative conclusions to incorporate into the thesis
April 21-30	<i>Thesis</i> : finalize the draft
May 1-31	<u>Capstone Report</u> : analyze survey results, write up the report, + submit a draft by mid-May (<u>40 hours</u>) <i>Thesis</i> : schedule defense, submit thesis draft for review, work on edits + incorporate feedback from my thesis committee
End of May	<u>Capstone</u> : any final revisions, write the blog post (<u>~5 hours+</u>) <i>Thesis</i> : defense + revisions if needed
June 1	<i>Thesis</i> : defense 2-3:30 pm in Gould
Early June	<i>Thesis</i> : additional edits, submit to graduate school and department by June 9 <u>Capstone</u> : submit final report and blog post to Miriam (<u>1 hour</u>)

Total hours 130+ (minimum 120 hours required).

REFERENCES

- Boswell, M., Greve, A., & Seale, T. (2019). *Climate Action Planning: A Guide to Creating Low-Carbon, Resilient Communities*. Island Press.
- C40 Cities. (2020). *Integrating Climate Adaptation: A Toolkit for Urban Planners and Adaptation Practitioners*.
<https://www.thegpsc.org/knowledge-products/climate-change/integrating-climate-adaptation-toolkit-urban-planners-and>
- Chu, E., & Schenk, T. (2017). Communicating About Climate Change with Urban Populations and Decision-Makers. *Oxford Research Encyclopedia of Climate Science*.
<https://doi.org/10.1093/acrefore/9780190228620.013.413>
- Corburn, J. (2003). Bringing Local Knowledge into Environmental Decision Making: Improving Urban Planning for Communities at Risk. *Journal of Planning Education and Research*, 22(4), 420–433.
<https://doi.org/10.1177/0739456X03022004008>
- Fung, A. (2015). Putting the Public Back into Governance: The Challenges of Citizen Participation and Its Future. *Public Administration Review*, 75(4), 513–522.
<https://doi.org/10.1111/puar.12361>
- Gifford, R., Kormos, C., & McIntyre, A. (2011). Behavioral dimensions of climate change: Drivers, responses, barriers, and interventions. *WIREs Climate Change*, 2(6), 801–827.
<https://doi.org/10.1002/wcc.143>
- Hahn, M. B., Kemp, C., Ward-Waller, C., Donovan, S., Schmidt, J. I., & Bauer, S. (2020). Collaborative climate mitigation and adaptation planning with university, community, and municipal partners: A case study in Anchorage, Alaska. *Local Environment*, 25(9), 648–665.
<https://doi.org/10.1080/13549839.2020.1811655>

Ingold, K. (2017). How to create and preserve social capital in climate adaptation policies: A network approach. *Ecological Economics*, 131, 414–424.

<https://doi.org/10.1016/j.ecolecon.2016.08.033>

Kirkhaug, T. R. (2016). *Communication in Urban Planning How quality of communication can facilitate constructive citizen participation*.

<https://www.semanticscholar.org/paper/Communication-in-Urban-Planning-How-quality-of-communication-Kirkhaug/4c1641499552fae43f15e8ea87f245e12176b251>

Lieberknecht, K. (2022). *Community-Centered Climate Planning: Using Local Knowledge and Communication Frames to Catalyze Climate Planning in Texas*. *Journal of the American Planning Association*, 88(1), 97–112. <https://doi.org/10.1080/01944363.2021.1896974>

Measham, T. G., Preston, B. L., Smith, T. F., Brooke, C., Gorddard, R., Withycombe, G., & Morrison, C. (2011). Adapting to climate change through local municipal planning: Barriers and challenges. *Mitigation and Adaptation Strategies for Global Change*, 16(8), 889–909.

<https://doi.org/10.1007/s11027-011-9301-2>

Moser, S. C. (2016). Reflections on climate change communication research and practice in the second decade of the 21st century: What more is there to say? *WIREs Climate Change*, 7(3), 345–369. <https://doi.org/10.1002/wcc.403>

Paschen, J.-A., & Ison, R. (2014). Narrative research in climate change adaptation—Exploring a complementary paradigm for research and governance. *Research Policy*, 43(6), 1083–1092.

<https://doi.org/10.1016/j.respol.2013.12.006>

Serrao-Neumann, S., Harman, B., Leitch, A., & Low Choy, D. (2015). Public engagement and climate adaptation: Insights from three local governments in Australia. *Journal of Environmental Planning and Management*, 58(7), 1196–1216.

<https://doi.org/10.1080/09640568.2014.920306>

Stapleton, S. R. (2019). *A case for climate justice education: American youth connecting to intragenerational climate injustice in Bangladesh*. *Environmental Education Research*, 25(5), 732–750. <https://doi.org/10.1080/13504622.2018.1472220>

Climate
Communication
Toolkit for Urban
Planners in
Puget Sound, WA

Rachel Chen
Created as part of a Master's of Urban Planning Thesis
University of Washington, Seattle

PURPOSE

This toolkit was created as part of a Master of Urban Planning thesis and a capstone project for the Graduate Certificate in Climate Science. The purpose of this toolkit is to outline various climate communication strategies that would be practical for urban planners. It can be used by planners in Puget Sound, WA, as a guide for how to communicate climate change effectively to the community members they work with. Additional climate science education and planning resources are provided in the "Climate Resources" section.

CONTENTS

PURPOSE	2
STRATEGY QUICK REFERENCE	4
PROBLEM STATEMENT	5
CLIMATE COMMUNICATION STRATEGIES	6
CLIMATE RESOURCES	16
APPENDIX	18

STRATEGY QUICK REFERENCE

1. Know your audience + tailor your communications
2. Use plain language + avoid using technical jargon
3. Clearly define + contextualize terms used
4. Prioritize the use of narrative forms of communication
5. Emphasize the benefits from acting now vs. the potential future losses from inaction
6. Emphasize *what* will happen, not *when*
7. Frame climate action to address the everyday concerns of your community
8. Focus on solutions to climate change that are being implemented
9. Provide specific, current, and local examples of mitigation + adaptation efforts
10. Use simple + local visuals rather than complex data visualizations
11. Present climate change as a local + current phenomenon
12. Incorporate opportunities + activities to co-produce knowledge + explore various climate solutions with your community

PROBLEM STATEMENT

Community-centered climate planning is increasingly becoming more crucial in our cities as we begin to experience and prepare for climate impacts. Community-centered climate planning is climate planning that utilizes local knowledge and community participation in the development of strategies. It can support climate justice, is valuable to give communities greater agency in determining their future, and increases the effectiveness of planning decisions.

Urban planners play an important role in preparing for climate change, and as part of this, should be able to effectively communicate and discuss climate change and local impacts with the communities they are planning with so that community members understand why this work is important and what role they play in it. Current engagement materials in urban planning are often not tailored to their specific audiences and often use complicated graphics and climate projections that confuse rather than educate or inspire others to act.

By having a solid understanding of effective climate communication strategies, and with greater access and knowledge of the tools available to help communicate climate impacts to their communities, planners can better utilize community engagement efforts to gain support for and adopt climate-friendly policies that increase cities' resilience to climate change and climate justice.



Source: Climate Action, The Essentials: Understanding and tackling climate change. (n.d.). Voices of Youth. Retrieved April 4, 2023, from <https://www.voicesofyouth.org/climateaction>

CLIMATE COMMUNICATION STRATEGIES

1. Know your audience + tailor your communications

Some communities are more amenable to discussing climate change than others, but most communities would probably agree that they want their cities to be protected from hazards and remain safe places to live. Targeting and tailoring your messaging can increase the likelihood of achieving climate communication goals.¹

1.1 TERMINOLOGY + FRAMING

If your community members don't respond well to the term "climate change", it's important to figure out how to frame the issue so they are more open to discussing solutions. Some communities might be more receptive to discussing the implementation of their hazard mitigation plan, for instance. In this case, you could emphasize how planning actions can enhance the community's resilience to different natural hazards, foster safer communities, or improve infrastructure. This way, you are still addressing potential climate impacts but from a lens of enhancing community resilience rather than climate mitigation or adaptation. As community members begin to see the benefits of these plans, they might be more trusting of planning processes and eventually be willing to address climate change directly.

2. Use plain language + avoid using technical jargon

When discussing climate change, use as plain language as possible and avoid technical jargon in order to be approachable to wide audiences. It's widely suggested that using shorter words and sentences and avoiding jargon in general make for more approachable and clear communications.²

2.1 TECHNICAL JARGON

The vocabulary used in a planner's day-to-day work is not always familiar to broad audiences. For instance, the term "resilience" might not be well known or hold the same meaning among community members or people in other fields of work. While you can provide a definition for resilience or related terms as they come up, you can also substitute words like "preparedness" or similar terms.³

3. Clearly define + contextualize terms used

Clearly define and contextualize any terms used to ensure your audience has a shared understanding of the subject at hand and to increase the effectiveness of your communications. To combat misinterpretations, provide specific examples of what the terms you are using look like in practice.

3.1 CLEARLY DEFINE TERMS

Not everyone knows what the term “carbon dioxide” means or understands what it means in different contexts, such as “carbon neutral”. Clarify that carbon dioxide, or CO₂ for short, is emitted during the combustion of fossil fuels, and though there is a natural carbon cycle, human activity is contributing to unprecedented amounts of carbon dioxide being added to the atmosphere. Clarify what different terms referring to carbon dioxide mean; for instance, “carbon neutral” refers to a no net increase in the amount of carbon dioxide in the atmosphere.⁴

3.2 CONTEXTUALIZE TERMS

There might be words that mean completely different things in climate science than in other contexts. For instance, usually, the word “enhanced” means to make something better, but in the case of climate change, “enhanced global warming” means global warming is getting worse.⁵ Additionally, a “positive feedback loop” doesn’t necessarily mean it will have a positive outcome.

3.3 CLARIFY SIMILAR TERMS

Global warming and climate change are often used interchangeably but have distinct meanings (Figure 1). Global warming refers to the long-term increase in Earth’s surface temperatures due to an increased concentration of greenhouse gas emissions in the atmosphere. Climate change refers to the broad, long-term changes in the average weather patterns on Earth due to anthropogenic greenhouse gas emissions.

Figure 1. Graphic Depicting Global Warming vs. Climate Change

GLOBAL WARMING VS. CLIMATE CHANGE

Global warming: the long-term increase in *Earth’s surface temperatures* due to increased concentration of greenhouse gasses in the atmosphere

Climate change: the broad, long-term changes in the *average weather patterns* on Earth due to anthropogenic greenhouse gas emissions



Note: Graphic made by Chen, R. Icons from: Social Issues Thesis: Climate Change | Google Slides & PPT. (n.d.). Retrieved May 23, 2023, from <https://slidesgo.com/theme/social-issues-thesis-climate-change>

4. Prioritize the use of narrative forms of communication

Utilize narrative forms of communication that emphasize the human impacts of climate change and appeal to the human experience.

4.1 COMMUNITY NARRATIVES

The use of narratives can help planners determine how communities understand and practice adaptation.⁶ For instance, “a community in a flood-prone coastal town...constructs individual and collective stories about their historical experiences, their coping strategies, and problems encountered, which are passed down as intergenerational local knowledge”.⁷ Provide an opportunity for communities to talk about their experiences and share how they coped with past climate impacts to determine how you, as a planner, can supplement these efforts and better assist communities in the future based on their capacity and needs.

4.2 PERSONAL NARRATIVES

Utilize personal stories to help others think about how climate change has impacted their lives, make a connection between the science and their personal experiences, and see why taking action to address climate change is urgent. My personal story follows:

Growing up in San Francisco, I never had a sunny and warm birthday celebration. My birthday is in July, which is often described as the coldest time in San Francisco because of the thick fog and grey skies that typically characterize our summers. As I got older and visited home in the summers during college, I began to notice that our weather was a lot more sunny than it used to be! I finally had a warm birthday celebration outdoors. Along with warmer summer temperatures, San Francisco also began to experience heat waves, which the city was vastly unprepared for. I’m sure you can think of similar examples of where you’ve also observed long-term weather changes.

Figure 2. Typical San Francisco Summer vs. New Normal



SFGATE, A. G. (2017, July 14). San Francisco's summer fog as you've never seen it before. SFGATE. <https://www.sfgate.com/bayarea/article/Video-Watch-Karl-the-Fog-push-his-way-into-San-11288915.php>



Chen, R. (2022).

5. Emphasize the benefits from acting now vs. the potential future losses from inaction

Emphasize the potential benefits of acting as soon as possible rather than the potentially devastating losses from inaction to help community members view climate action as a more worthwhile endeavor.⁸

5.1 COST-EFFECTIVE

The cost of implementing climate-friendly policies and investments now is significantly lower than the cost of paying for disaster recovery efforts following a natural disaster. It's important to emphasize how changes are low-cost, easy to implement, and will help make the city more efficient and resilient over time. If possible, present relevant numbers to your community to help demonstrate savings over time.

5.2 IMMEDIATE BENEFIT VS. LONG-TERM LOSS

Emphasize co-benefits of immediate climate action like increased green space and healthier communities rather than potential devastating effects of climate change from inaction like species extinction or damage to city infrastructure and services. Though mention of devastating impacts can be motivating as well, it might lead some people to feel hopeless. Discussing the many co-benefits of climate action, some of which are shown in Figure 3, can provide a positive vision of the future that incorporates community values.

6. Emphasize *what* will happen, not *when*

Many climate impacts are accompanied by a certain amount of uncertainty surrounding exactly when they will occur. While scientists agree climate impacts will happen in our lifetimes, and already are happening in many places, the exact timing of climate impacts such as floods or wildfires can be hard to predict.

6.1 FLOODING WILL OCCUR VS. 100-YEAR FLOODPLAIN

While planners and scientists alike may have a strong understanding on what phrases like a "100 year floodplain" mean, communities may misinterpret this information to mean they are relatively safe from flooding. However, as climate change is changing the timing and magnitude of such hazards, it's important to communicate how communities need to be prepared for such large flooding events to happen much more frequently. As such, it is important to clearly describe the consequences of such events rather than on the likelihood they will happen each year. Focus on painting a picture of what will happen the next time the community floods.

7. Frame climate action to address the everyday concerns of your community

Framing is a communication theory that argues how you craft a message, i.e., what information and how you present it, influences how others receive and interpret that message. Framing plays an important role in climate communication, as it can affect how messages around climate change are received.

7.1 CO-BENEFITS

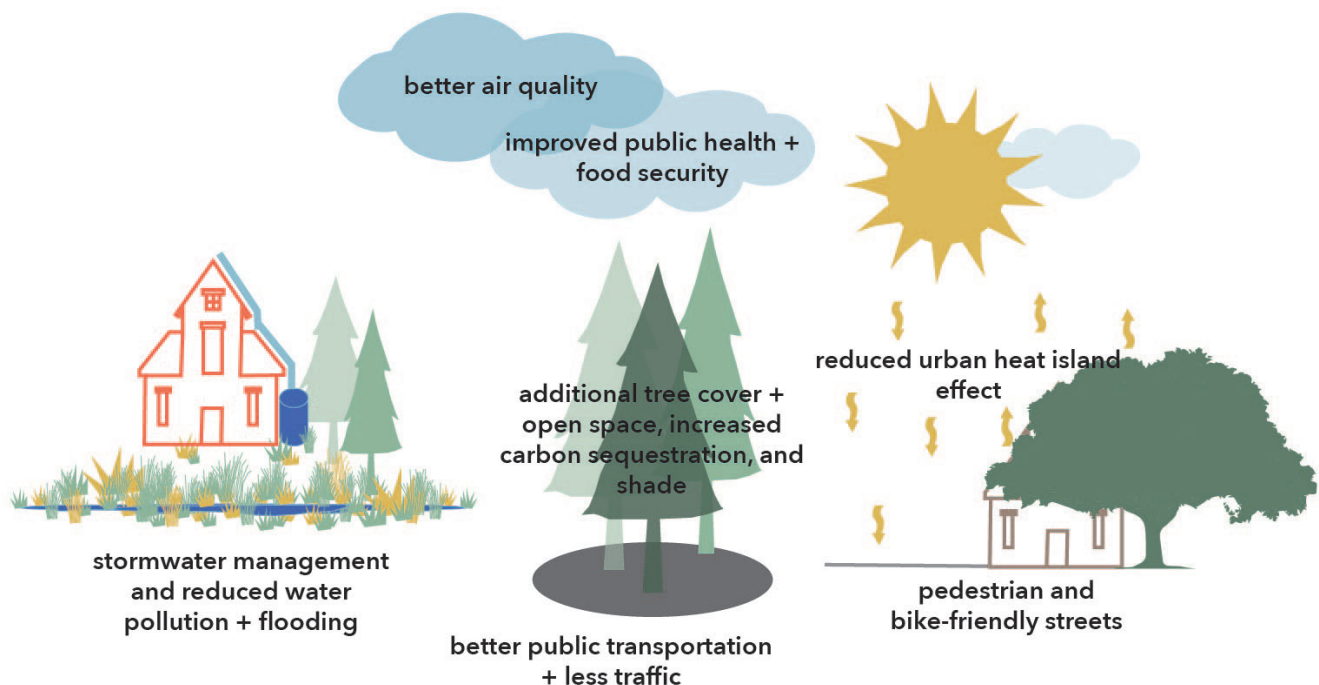
Frame climate change in terms of the co-benefits climate action has for the everyday concerns of your community members.⁹ People may not be able to see the real-life, tangible benefits of climate action without these connections being drawn, and tend to view such issues as more important than climate change action, despite believing climate change will greatly affect their future.¹⁰ At the same time, most people want to live in a more equitable city with ample green space, less air pollution, and well-maintained infrastructure, which are all potential co-benefits of climate action.

7.2 PUBLIC HEALTH

Using a public health frame is especially effective as climate change's impact on human health is "one of five key climate change beliefs that are strongly associated with [the] likelihood to support a societal response and to personally take actions that encourage a societal response".¹¹ Researchers also found that a public health frame was the "most likely to elicit emotional reactions consistent with support for climate change mitigation and adaptation".¹² It's important to be mindful of how climate action can foster equity to ensure health impacts aren't disproportionately experienced.

Figure 3. Some Potential Co-Benefits of Climate Change Action

POTENTIAL CO-BENEFITS OF CLIMATE CHANGE ACTION



8. Focus on solutions to climate change that are being implemented

Provide examples of climate mitigation and adaptation efforts to prevent people from feeling hopeless in the face of climate change. It's important to show that the solutions to climate change are available and are already being implemented; we just need to accelerate these efforts. Provide local examples where possible.

8.1 HIGHLIGHT EXISTING EFFORTS

Seattle's electricity provider, Seattle City Light, has been carbon neutral since 2005. Seattle City Light primarily relies on hydroelectric power, but is incorporating wind and other renewable energy sources to further diversify their renewable energy profile and meet future energy load demand.

8.2 CELEBRATE ACCOMPLISHMENTS

Greenhouse gas emissions in Seattle decreased by 6%, and per capita emissions declined by 17% from 2008 to 2018, despite a 13% growth in population.¹³ Highlight accomplishments such as these to help people see that the changes necessary for climate action are not impossible.

9. Provide specific, current, and local examples of mitigation + adaptation efforts

Provide specific and local examples of climate mitigation and adaptation efforts in your community to help community members visualize what adaptation looks like, and encourage them to join in existing efforts.

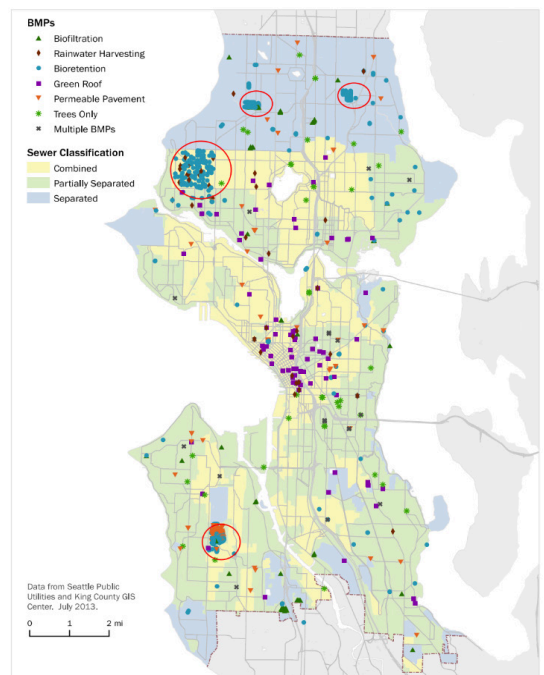
9.1 HIGHLIGHT EXISTING EFFORTS

Seattle has a goal of managing 700 million gallons of stormwater per year. As of now, Seattle manages 465 million gallons of stormwater, though many additional green stormwater infrastructure projects are underway (Figure 4).¹⁴ As part of this, King County provides support through a RainWise program that assists homeowners with installing rain gardens on their property. These efforts not only help prevent extreme flooding in neighborhoods, but they also can mitigate the urban heat island effect, reduce water pollution, and sequester carbon by adding trees and other greenery.

9.2 REVIEW EXISTING GOALS

Seattle also has goals to adopt insulation and window requirements to reduce energy use during extreme hot and cold temperatures, improve energy efficiency, and increase cooling capacity during heat waves.¹⁵

Figure 4. GSI in Seattle in 2017



Note: the GSI inventory only includes those planted for stormwater management purposes in Seattle, not the entire tree canopy.
United States Environmental Protection Agency. (2017). Expanding the Benefits of Seattle's Green Stormwater Infrastructure. https://www.epa.gov/sites/default/files/2017-03/documents/seattle_technical_assistance_010517_combined_508.pdf

10. Use simple visuals rather than complex data visualizations

When discussing complex scientific information like climate science, it's important not to overwhelm your audience. Imagery can greatly increase understanding of climate change and encourage people to act.¹⁶ Using appropriate images as outlined below can contribute to more memorable messages than using complex data to depict climate change.

10.1 SIMPLIFY, SIMPLIFY

Oftentimes information from climate change organizations like the Intergovernmental Panel on Climate Change (IPCC) is not appropriately communicated to local communities and is too technical and overwhelming to understand.¹⁷ Graphs are generally accessible to most people, especially if supplemented with a patient explanation, but large amounts of text and tables are more difficult for people to understand and interpret.¹⁸ Support your communication efforts with simple graphics to foster greater understanding.

10.2 INSPIRING IMAGES

Imagery featuring “fear-inducing images”, though they capture people’s attention, also “[tend] to distance or disengage individuals, rendering them feeling helpless, overwhelmed, and not empowered to act”.¹⁹ Alternatively, images showing solutions to climate change have been found to be more encouraging and inspiring, especially if they are local.²⁰

10.3 HUMAN-SCALE + CENTERED IMAGES

Many previous climate communications have shown animals or landscapes at risk as a way to demonstrate climate impacts. However, while images showing impacts on humans were not as common until recently, they are more effective in encouraging action.²¹ Wang et al. offer additional suggestions for using visuals in climate communications, as shown below in Figure 5.

Figure 5. Seven Principles for Visual Climate Change Communication

BOX 2

SEVEN PRINCIPLES FOR VISUAL CLIMATE CHANGE COMMUNICATION

1. **Show “real people,” not staged photo-ops.** Discussion groups favored “authentic” images over staged photographs, which were seen as gimmicky or even manipulative.
2. **Tell new stories.** Familiar images are quickly and easily understood, but they also prompted cynicism and fatigue. Less familiar, thought-provoking images can help tell new stories about climate change, and remake the visual representation of climate change in the public mind.
3. **Show climate causes at scale.** When communicating the links between problematic individual behaviors and climate change, it is best to show these behaviors at scale, for instance, a congested highway, rather than a single driver.
4. **Climate impacts are emotionally powerful.** Images of climate impacts can prompt a desire to respond, but because they are emotionally powerful, they can also be overwhelming. Coupling images of climate impacts with concrete behavioral actions may help overcome this.
5. **Show local (but serious) climate impacts.** When images of localized climate impacts show an individual person or group of people, with identifiable emotions, they are likely to be most powerful. It is also important to strike a balance, to show local, relatable impacts, and simultaneously avoid trivializing the issue.
6. **Be careful with protest imagery.** Images of “typical environmentalists” only resonated with people who already considered themselves activists and campaigners. Images showing people directly affected by climate change impacts were seen as more authentic and compelling.
7. **Understand your audience.** Reactions to climate imagery differ according to level of concern, scepticism, as well as political affiliations. For instance, images of distant climate impacts produced flatter emotional responses among those on the political right than the left, whereas solutions images produced positive emotions for both sides.

Source: Wang, S., Corner, A., Chapman, D., & Markowitz, E. (2018). Public engagement with climate imagery in a changing digital landscape. *WIREs Climate Change*, 9(2), e509. <https://doi.org/10.1002/wcc.509>

11. Present climate change as a local + current phenomenon

Discuss the changes in climate that your community has already experienced and how these will increase with additional greenhouse gas emissions. Presenting climate change as a local phenomenon happening in real time helps people to make personal connections between things they might've observed in daily life, such as shifting weather patterns, to climate change.²²

11.1 PHOTOS OF LOCAL IMPACTS

Show imagery of local climate impacts, such as an intersection or neighborhood that got flooded recently due to above-average rainfall (Figure 6).

Figure 6. Recent Flooding in South Park, Seattle

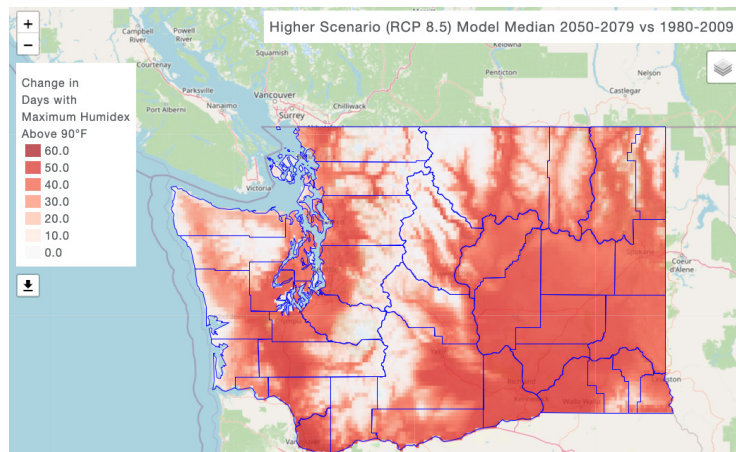


Source: Kim, G. (2022, December 27). 'We lost everything': Duwamish River gushes into Seattle homes. The Seattle Times. <https://www.seattletimes.com/seattle-news/duwamish-river-floods-seattles-south-park-neighborhood/>

11.2 LOCAL CLIMATE PROJECTIONS

Present facts related to local climate changes, such as the increase in days above average temperatures. For instance, Seattle in 2022 experienced a record-breaking 13 days above 90°F, which communities were vastly unprepared for due to the lack of air conditioning and infrastructure to mitigate extreme heat.²³ Show simplified, local climate projections that model how local climate will continue to change in the future. One useful tool for this is the Climate Impact Group's Climate Mapping for a Resilient Washington tool (Figure 7), which can be found in the "Climate Resources" section.

Figure 7. Climate Mapping for a Resilient Washington Tool Example



Source: Raymond, C., & Rogers, M. (2022). Climate Mapping for a Resilient Washington. Prepared by the Climate Impacts Group, University of Washington, Seattle and Research Data & Computing Services, University of Idaho, Moscow. Retrieved April 8, 2023, from <https://cig.uw.edu/resources/analysis-tools/climate-mapping-for-a-resilient-washington/>

12. Incorporate opportunities + activities to co-produce knowledge + explore various climate solutions with your community

Planners can use several hands-on strategies during community engagement to further increase learning and collaboration. Design participation in ways that allow for meaningful outcomes for participants; in some cases this requires working with communities to determine the outreach efforts themselves.²⁴

12.1 PARTICIPATORY MAPPING

Participatory mapping “can be defined as ‘the creation of maps by local communities - often with the involvement of supporting organizations including governments...and other actors engaged in development and land-related planning’”.²⁵ It can be effective not only in helping community members understand complex problems and visualize risks and potential changes to their community, but it can also identify more effective adaptation responses by incorporating local and traditional ecological knowledge.²⁶

One specific example of this is to have participants “plot a transport route through a local interactive map with flood risk areas highlighted, or [explore] how they might retrofit a local existing building to cope with changing climate conditions”.²⁷ In all, participatory mapping should be part of a broader engagement strategy in order to incorporate local knowledge and shouldn’t function as the sole form of engagement.²⁸

12.2 ASERT MODEL

The ASERT Model²⁹ is another participatory engagement strategy that involves several stations at which community members can complete various learning activities related to climate risks and vulnerabilities and receive a reward for completing them all. It allows for the co-production of policy-relevant knowledge grounded in local contexts, as it offers space for community members to share their experiences and voice their preferences for different solutions.³⁰ It provides an opportunity to support marginalized voices as long as the opportunity to participate reaches those communities effectively in the first place. Care should be taken to ensure the activities don’t diminish the importance of the issue at hand or come off as belittling, especially if the community you are working with has recently experienced loss or trauma.

Closing Thoughts

These strategies are meant to be a starting place to help planners better tailor their climate communications to the communities they work with in order to increase understanding of the issues at hand, bolster approval and implementation of climate resilient policies, and build social capital in cities. While they are all listed as individual strategies, many are closely related, and they will all be more effective if used together.

As with all community engagement, engagement for climate planning is not a one-time occurrence. Engagement should be thoughtfully done throughout the planning process to ensure climate action is equitably distributed and implemented and to ensure planning policies and projects are able to achieve climate goals.

ENDNOTES

- 1 Bostrom, A., Böhm, G., & O'Connor, R. E. (2013). Targeting and tailoring climate change communications. *WIREs Climate Change*, 4(5), 447–455. <https://doi.org/10.1002/wcc.234>
- 2 Bruine de Bruin, Wändi, Lila Rabinovich, Kate Weber, Marianna Babboni, Monica Dean, and Lance Ignon. "Public Understanding of Climate Change Terminology." *Climatic Change* 167, no. 3 (August 12, 2021): 37. <https://doi.org/10.1007/s10584-021-03183-0>.
- 3 Moser, S. C. (2017, September 26). *Communicating Climate Change Adaptation and Resilience*. Oxford Research Encyclopedia of Climate Science. <https://doi.org/10.1093/acrefore/9780190228620.013.436>
- 4 Bruine de Bruin, Wändi, Lila Rabinovich, Kate Weber, Marianna Babboni, Monica Dean, and Lance Ignon. "Public Understanding of Climate Change Terminology." *Climatic Change* 167, no. 3 (August 12, 2021): 37. <https://doi.org/10.1007/s10584-021-03183-0>.
- 5 Nerlich, B., Koteyko, N., & Brown, B. (2010). Theory and language of climate change communication. *Wiley Interdisciplinary Reviews. Climate Change*, 1(1), 97–110. <https://doi.org/10.1002/wcc.2>
- 6 Paschen, J.-A., & Ison, R. (2014). Narrative research in climate change adaptation—Exploring a complementary paradigm for research and governance. *Research Policy*, 43(6), 1083–1092. <https://doi.org/10.1016/j.respol.2013.12.006>
- 7 Ibid.
- 8 van der Linden, S., Maibach, E., & Leiserowitz, A. (2015). Improving Public Engagement With Climate Change: Five "Best Practice" Insights From Psychological Science. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 10(6), 758–763. <https://doi.org/10.1177/1745691615598516>
- 9 Lieberknecht, K. (2022). Community-Centered Climate Planning: Using Local Knowledge and Communication Frames to Catalyze Climate Planning in Texas. *Journal of the American Planning Association*, 88(1), 97–112. <https://doi.org/10.1080/01944363.2021.1896974>
- 10 Ibid.
- 11 Sarfaty & Maibach, 2015, as cited in Weathers, M. R., Maibach, E., & Nisbet, M. (2017). *Communicating the Public Health Risks of Climate Change*. Oxford Research Encyclopedia of Climate Science. <https://doi.org/10.1093/acrefore/9780190228620.013.428>
- 12 Myers, T. A., Nisbet, M. C., Maibach, E. W., & Leiserowitz, A. A. (2012). A public health frame arouses hopeful emotions about climate change. *Climatic Change*, 113(3), 1105–1112. <https://doi.org/10.1007/s10584-012-0513-6>
- 13 City of Seattle. (2018). *Seattle Climate Action Strategy*. City of Seattle. http://greenspace.seattle.gov/wp-content/uploads/2018/04/SeaClimateAction_April2018.pdf
- 14 Seattle Public Utilities. (2020). *2020 Green Stormwater Infrastructure Progress Report: A Natural Approach to Stormwater Management*. https://kingcounty.gov/~media/services/environment/wastewater/cso/rainwise/2103_GSI_2020-Annual-Report.ashx?la=en
- 15 Office of Sustainability & Environment, City of Seattle. (2017). *Preparing for Climate Change*. City of Seattle. https://www.seattle.gov/Documents/Departments/OSE/ClimateDocs/SEAClimatePreparedness_August2017.pdf
- 16 O'Neill, S. J., Boykoff, M., Niemeyer, S., & Day, S. A. (2013). On the use of imagery for climate change engagement. *Global Environmental Change*, 23(2), 413–421. <https://doi.org/10.1016/j.gloenvcha.2012.11.006>
- 17 Reis, J., & Ballinger, R. C. (2020). Creating a climate for learning-experiences of educating existing and future decision-makers about climate change. *Marine Policy*, 111. <https://doi.org/10.1016/j.marpol.2018.07.007>
- 18 Ibid.
- 19 O'Neill, S. J., Boykoff, M., Niemeyer, S., & Day, S. A. (2013). On the use of imagery for climate change engagement. *Global Environmental Change*, 23(2), 413–421. <https://doi.org/10.1016/j.gloenvcha.2012.11.006>
- 20 Wang, S., Corner, A., Chapman, D., & Markowitz, E. (2018). Public engagement with climate imagery in a changing digital landscape. *WIREs Climate Change*, 9(2), e509. <https://doi.org/10.1002/wcc.509>
- 21 Ibid.
- 22 van der Linden, S., Maibach, E., & Leiserowitz, A. (2015). Improving Public Engagement With Climate Change: Five "Best Practice" Insights From Psychological Science. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 10(6), 758–763. <https://doi.org/10.1177/1745691615598516>
- 23 King 5 Staff. (2022, September 11). Seattle breaks record for most 90-degree days in a year. *King5.Com*. <https://www.king5.com/article/news/local/seattle/seattle-90-degree-day-record-most-in-a-year/281-f472a02d-003c-46a0-8b05-093f4dc09398>
- 24 Fung, A. (2015). Putting the Public Back into Governance: The Challenges of Citizen Participation and Its Future. *Public Administration Review*, 75(4), 513–522. <https://doi.org/10.1111/puar.12361>
- 25 IFAD 2013, as cited in Yusuf, J.-E. (Wie), & St. John III, B. (Eds.). (2022). *Communicating Climate Change: Making Environmental Messaging Accessible* (1st ed.). Routledge. <https://doi.org/10.4324/9781003037378>
- 26 Kamaci, 2014, as cited in Yusuf, J.-E. (Wie), & St. John III, B. (Eds.). (2022). *Communicating Climate Change: Making Environmental Messaging Accessible* (1st ed.). Routledge. <https://doi.org/10.4324/9781003037378>
- 27 Reis, J., & Ballinger, R. C. (2020). Creating a climate for learning-experiences of educating existing and future decision-makers about climate change. *Marine Policy*, 111. <https://doi.org/10.1016/j.marpol.2018.07.007>
- 28 Yusuf, J.-E. (Wie), & St. John III, B. (Eds.). (2022). *Communicating Climate Change: Making Environmental Messaging Accessible* (1st ed.). Routledge. <https://doi.org/10.4324/9781003037378>
- 29 ASERT Approach – ASERT. (n.d.). Retrieved May 28, 2023, from <https://sites.wp.odu.edu/asert/approach/>
- 30 Ibid.

CLIMATE RESOURCES

Climate Science

CLIMATE CHANGE 101

- EPA Climate Change Science Overview
- EPA Greenhouse Gases Overview
- Global Carbon Budget Graphs + Climate Information
- IPCC Reports
- IPCC Adaptation and Vulnerability Summary for Policymakers
- IPCC Mitigation of Climate Change Summary for Policymakers
- New York Times The Science of Climate Change Explained
- NOAA U.S. Climate Normals

Climate Communication

- Columbia Guide to Effective Climate Change Communication
- EcoAmerica Connecting on Climate
- Metcalf Institute Inclusive Science Communication Starter Kit
- NACRP Community Driven Climate Resilience Planning
- Oxford Encyclopedia of Climate Communication
- UNFCC Communicating Climate Change: A Practitioner's Guide
- Vancouver Public Engagement Toolkit for Sea Level Rise

Climate Mapping

CLIMATE IMPACTS

- Climate Central Tools + Resources
- Climate Impacts Group Analysis Tools
- Climate Impacts Group Climate Mapping for a Resilient Washington
- EPA Climate Impacts Overview
- FEMA National Risk Index Map
- Puget Sound Regional Council Displacement Risk Map
- Puget Sound Regional Council Regional Hazards Map
- Risk Factor Mapping Tool
- The Climate Toolbox Climate Mapper Tool
- U.S. Climate Resilience Toolkit Climate Mapper for Resilience and Adaptation
- U.S. Climate Resilience Toolkit Climate Impacts Tools
- U.S. Climate Resilience Toolkit Climate Tool Library
- USGS National Climate Change Viewer

HEALTH + EQUITY IMPACTS

- Climate Impacts Group Tribal Climate Tool
- EPA Environmental Justice Screening Tool
- Seattle Race and Social Equity Index
- Washington State Department of Health Environmental Health Disparities Map

Climate Planning

GUIDELINES

C40 Cities Guide to Integrating Climate Action
Georgetown Climate Adapting to Urban Heat: A Toolkit for Local Governments
National Wildlife Federation Green Works for Climate Resilience

CLIMATE IMPACTS

APA Urban Heat Management and the Legacy of Redlining
C2ES Heat Waves and Climate Change
Carbon Brief What Climate Models Tell us About Future Rainfall
CDC Climate Impacts on Human Health
Climate Impacts Group State of Knowledge: Climate Change in Puget Sound
EPA Climate Indicators: Heat Waves
EPA Climate Indicators: Heavy Precipitation
NRDC Flooding and Climate Change
Union of Concerned Scientists Heat Waves
Union of Concerned Scientists Heat Waves and Human Health
World Health Organization Heat Waves

Heat Waves

GUIDANCE

APA Planning for Urban Heat Resilience
Georgetown Climate Center Adaptation Toolkit: Sea Level Rise and Coastal Land Use
Low Carbon Living Guide to Urban Cooling Strategies
Northern Institute of Applied Climate Science Tree Species Guide

URBAN HEAT ISLANDS

EPA Urban Heat Islands
Google Tree Canopy Viewer
NOAA Urban Heat Tools
Tree Equity Score Mapper

HEALTH IMPACTS

Future Heat Events and Social Vulnerability Map
CDC Heat and Health Tracker

Urban Flooding

GUIDANCE

APA Getting Ready for the Rain: Urban Flooding and Planning for Community Resilience
C40 Cities Flooding Implementation Guides
C40 Cities How to Increase Your City's Permeability
EPA Flooding Guidance
Urban Floods Community of Practice Land Use Planning for Urban Flood Risk Management
Washington Department of Ecology Planning for Flood Hazards
Washington Department of Ecology Comprehensive Planning for Floodplain Management

VISUALIZATION TOOLS

Climate Impacts Group Projected Changes in Extreme Precipitation Tool
Climate Impacts Group Sea Level Rise Viewer
FEMA National Flood Hazard Layer
NOAA Tides and Currents Map
NOAA Inundation Dashboard
NOAA Sea Level Rise Viewer
Seattle Public Utilities Sea Level Rise Mapper
US Fish and Wildlife Service National Wetlands Inventory
Washington Coastal Resiliency Network Washington Coastal Hazards Risk Reduction Project Mapper

GREEN STORMWATER INFRASTRUCTURE

EPA Green Infrastructure Modeling Toolkit
EPA Stormwater Trees Technical Memorandum

Wildfire


GUIDANCE

NOAA Wildfire Climate Connection
USDA + USFS Wildfire Crisis Strategy Implementation Plan and Confronting the Wildfire Crisis

WILDFIRE + SMOKE MAPPING

Air Now Fire and Smoke Map
DNR Community Wildfire Resilience Resource Library
U.S. Climate Resilient Toolkit Landfire Mapping Tool
USGS Current Wildfires Map
USGS Wildland Fire Trends Tool
Washington State Department of Ecology Smoke Forecast

APPENDIX C: FOCUS GROUP PRESENTATION



Climate
Communication
Methods for
Planners in Puget
Sound, WA

Rachel Chen
UW MUP
April 14, 2023

Why is effective climate communication important?

- Community centered climate change is crucial to ensure adaptation is **supported and informed** by the community
- Planners play a large role in preparing cities for climate change
- Planners should be able to clearly communicate impacts and discuss climate change with communities to **establish shared knowledge base**
- Increases collaborative planning processes that **incorporate local knowledge**

2

Climate Communication Strategies

1. Use plain language and avoid technical jargon
2. Clearly define and contextualize terms used
3. Prioritize narrative forms of communication over complex scientific data
4. Know your audience and tailor your communications
5. Frame climate action to address the everyday concerns of your community
6. Emphasize benefits from acting now vs. the potential future losses from inaction
7. Focus on solutions to climate change that are being implemented
8. Provide specific, current, local examples of adaptation
9. Use simple visuals rather than complex data visualizations, but choose wisely
10. Present climate change as a local phenomenon that is currently happening
11. Incorporate opportunities to co-produce knowledge with your community

3

Use plain language and avoid technical jargon

- Shorter, simpler words
- Avoid technical jargon
- Explain what you are talking about in simple terms



Helps your communications be approachable for all knowledge levels

4

Clearly define and contextualize terms used

- i.e. carbon dioxide, carbon neutral - what kind of carbon are you referring to? What does carbon neutral mean?
- i.e. enhanced usually means to make something better, but enhanced global warming means it is getting worse
- i.e. climate change + global warming are often used interchangeably, but they have distinct meanings



Ensures your audience has a shared understanding of the subject at hand and combats misinterpretation

5

Prioritize narrative forms of communication over complex data

- Personal stories about climate change can help others think about how it has impacted them, too
- Hearing community stories can help planners learn how communities practice and understand adaptation



Emphasizes the human impact of climate change and appeals to the human experience

6

Know your audience and tailor your communications

- Avoid using words that are contentious in your community
- Emphasize how planning actions can foster safer communities, improve infrastructure, improve human health, or what your community cares most about



Increases the likelihood of achieving the goals of climate communication; communities could become more trusting of planning processes

7

Frame climate action to address everyday concerns of community

- Frame in terms of co-benefits i.e. improved or added greenspace, decreased air pollution, repair or replace aging infrastructure
- Explain how climate action will improve public health of community or mitigate disproportionate impacts



Allows communities to see how climate action will benefit them and draw connections between planning actions and their priorities

8

Emphasize benefits of acting now vs. potential losses of inaction

- Implementing climate friendly policies now saves a lot of money from paying for disaster recovery later
- Explain how changes are low-cost + easy to implement
- Co-benefits of immediate action i.e. increased greenspace + healthier communities vs. potential species extinction, etc.



Allows communities to view climate change action as a worthwhile endeavor

9

Focus on solutions that are being implemented

- Highlight existing mitigation efforts in your community i.e. Seattle City Light has been carbon neutral since 2005
- Celebrate accomplishments, i.e. achieving emissions reduction goals or increasing tree canopy



Shows that solutions to climate change are available and are already being implemented, we just need to accelerate and add to these efforts

10

Provide specific, current, local examples of adaptation

- Highlight existing adaptation efforts in your community, i.e. Seattle has implemented green stormwater infrastructure to help prevent stormwater runoff
- Review existing community goals or plans i.e. cooling centers or air conditioning assistance programs



Helps community members visualize what adaptation looks like and encourages them to join in existing efforts or help create new strategies

11

Use simple visuals rather than complex data, but choose wisely

- Images that show local solutions to climate change, local impacts, and are human-centered
- Tell new stories about climate change, show climate impacts or causes at scale



Aids in understanding of climate change without overwhelming audience, compels them to act rather than fear

12

Present climate change as a local phenomenon that is happening now

- Show imagery of local impacts i.e. South Park flooding in Seattle
- Present facts related to local climate changes rather than global impacts



Draws personal connection to climate change and helps people understand how they might be affected, or already have been

13

Incorporate opportunities to co-produce knowledge

- Participatory mapping i.e. explore with community how a road could be re-routed to avoid coastal flooding
- ASERT Model: incorporate learning activities at different stations that provide opportunities for community members to share their personal experiences and explore different local solutions



Creates hands-on learning environment for both you and your community, allows for greater collaboration

14

Final Thoughts

Community engagement surrounding climate change is not a one time occurrence, but rather should be done often as climate issues evolve in your community to ensure planning projects and policies are equitably distributed.



Heat Waves

What's causing them, how they relate to planning decisions, and how planners can discuss them more effectively with communities



16

What is a heat wave?



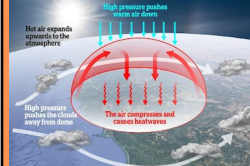
a period of hot weather above historical averages for the area that lasts for two or more days (CDC)



17

What causes heat waves?

HOW HEAT DOMES WORK



High pressure systems strengthen and remain in the atmosphere for multiple days

- These systems push hot air down and:
- Prevent heat from rising back to the atmosphere
 - Trap hot air rising from the ground
 - Minimize wind and cloud cover
 - Prevent other weather systems from coming in

18

The Late June Heat Wave

Climate Change + Heat Waves

- Increasing frequency, duration, and intensity of heat waves
- Changing seasonality
- Affecting more people annually as the Earth warms, 100 heat related deaths in Seattle 2021 (WA DCH)

19

Climate Change + Heat Waves

CITY	NUMBER OF DEATHS PER EXTREME HEAT EVENT (PER 100,000 PEOPLE)		
	With a 5.4° F increase	3.6° F increase	2.7° F increase
Miami	520	323	248
Detroit	204	135	109
St. Louis	113	87	75
Seattle	103	63	49
Philadelphia	95	63	51
Atlanta	94	73	66
Washington, D.C.	71	45	37
Dallas	68	45	33
New York	68	45	36
Chicago	66	42	34
Los Angeles	64	45	37
Boston	49	32	25
San Francisco	40	31	27
Houston	34	23	19
Phoenix	33	20	14

- Increasing frequency, duration, and intensity of heat waves
- Changing seasonality
- Affecting more people annually as the Earth warms, 100 heat related deaths in Seattle 2021 (WA DCH)

20

Humidity

Increased global warming also increases the humidity of the air

- As the air warms, it can hold more water vapor
- For every degree of warming, water vapor increases 7%

Exacerbates how high temperatures actually feel → wet bulb temperature: reports how hot it actually feels outside in terms of heat stress on the human body

21

Urban Heat Island Effect

22

Urban Heat Island Effect

Temperatures in the city are several degrees warmer than rural counterparts due to abundance of impervious surfaces that absorb, rather than reflect heat

23

UHI + Heat Waves

Night time temperatures remain high as urban surfaces slowly release the heat they absorbed during the day

Previously redlined neighborhoods experience disproportionate impacts of human heat due to decades of disinvestment

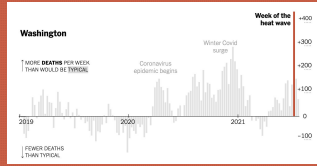
Up to 12.6° F warmer than non-redlined neighborhoods

24

Impacts of heat waves in cities

Human Health

- Can cause heat related illnesses: heat stroke and heat stress, worsen existing health conditions, and in extreme cases: death



Built Environment

Can damage infrastructure i.e. roads, bridges, disrupt industry i.e. airlines, worsen air quality

Impacts of heat waves in cities



Impacts of heat waves in cities

Energy Infrastructure

Can overload energy grid through increased air conditioning use, decrease efficiency of grid due to slower transmission, can cause brownouts/blackouts to prevent widespread grid failure



Urban Planning + Heat Wave Adaptation



Increase greenspace, tree cover, shade structures, green roofs, etc



Green buildings, improve wind circulation through street grid and building arrangement



Implement equitable heat management strategies and increase access to air conditioned spaces

Communication of heat impacts

LOCAL IMPACTS

What areas will be most affected? Which populations are most at risk?

LOCAL ACTION

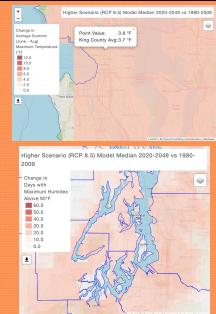
What is your city doing to mitigate and adapt to heat waves? What resources are available to residents?

LOCAL KNOWLEDGE

How are communities adapting and how can planners assist in these efforts?

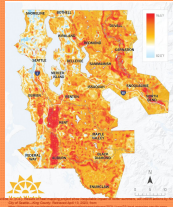
Local impacts

- Using CIG's Climate Mapping for a Resilient Washington Tool
- Seattle is expected to experience
 - A 3.6° F increase in average summer maximum temperature by mid-century
 - An average of 14.7 days above 90° F by mid-century



Local action

- Trees for Neighborhoods Program to help residents plant trees on their property
 - Since 2009, over 13,400 trees have been planted
- Seattle to develop first Extreme Heat Mitigation Strategy



31

Local knowledge

- Ask where people go when it is hot outside, what do they need in their community to supplement adaptation?
 - Air conditioning assistance programs, trees/greenspace, water features, something else?
 - Participatory mapping or other hands-on engagement



32

Visualization Tools

- FEMA National Risk Index
 - CDC Heat and Health Tracker
 - CDC Future Heat Events and Social Vulnerability Map
 - Washington Health Disparities Map
-
- Google Tree Canopy Viewer
 - Tree Equity Score Mapper
 - Climate Impacts Group Climate Mapping for a Resilient Washington

33

Heat waves are one important impact for Puget Sound planners to effectively communicate with community members.

Urban flooding is another impact that is increasing in frequency, duration, and intensity that planners should be able to effectively communicate.



34

Urban Flooding

What's causing it, how it relates to planning decisions, and how planners can better communicate the risks of flooding



35

What contributes to urban flooding



- Increased annual precipitation
- Larger precipitation events
- Sea level rise
- Changes in streamflow
- Increase in impervious surfaces in cities
- Insufficient stormwater infrastructure
- Many more!

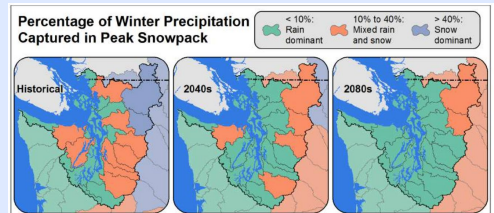
36

Climate change is shifting precipitation patterns

- Overall **increase** in annual precipitation
- More precipitation is **falling as rain rather than snow**
- With **less snowpack**, timing of runoff changes
 - More melting earlier in the year and less stream flow in the summer
 - PNW snow melting 10 days earlier on average

37

Puget Sound changes in precipitation patterns



38



Wet gets wetter dry gets drier

- With increased temperature, areas that already experience relatively high levels of precipitation are expected to experience even more precipitation, **while drier areas will receive less precipitation.**
- In Puget Sound, climate change will lead to an increase in overall precipitation and more intense precipitation events
 - Seattle fall-winter of 2021 saw 19in of rain, breaking record since 1945

39

- With **every degree** of warming, water vapor increases by **7%**
- Atmosphere can hold more water, which means more water is now available for precipitation
- Additional water vapor in the atmosphere also leads to more warming because it is a greenhouse gas that traps heat in the atmosphere just like carbon dioxide or methane (**positive feedback loop**)

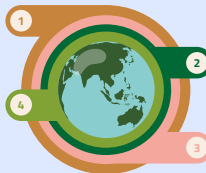
Global warming increases the amount of water vapor the atmosphere can hold

40

Positive Feedback Loop

Increased global temperature due to greenhouse gas emissions will lead to more water vapor being held in the atmosphere.

More warming leads to even more water vapor in the atmosphere, and the cycle continues



More water vapor in the atmosphere traps even more heat because it is a greenhouse gas.

More heat trapped in the atmosphere means more warming.

41

How urban planning influences flooding

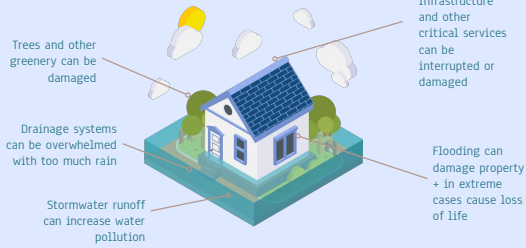
- Development of cities has led to more impermeable surfaces like concrete, that don't allow for water to infiltrate into the soil as well
- During heavy rains, this leads to **surface runoff** and potential flooding
- More runoff **overwhelms** drainage pipes which can overflow during **large precipitation events**, causing flooding



Ward, J. 2012. December 21. Seattle neighborhood flooded during heavy rain. King.com. <http://www.king.com/news/Seattle-neighborhood-flooded-during-heavy-rain-2012-12-21>

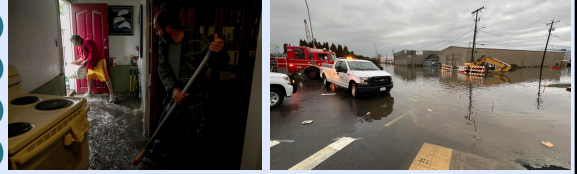
42

Impacts of flooding in cities



43

South Park, Seattle Flooding Winter 2022-3



South Park, Seattle, December 2022. The flooding caused that person to leave home. The photo from the Seattle Times. <https://www.seattletimes.com/archive/local/south-park-flooding-winter-2022-3/>

King 5 Staff 2022, December 10. South Park's Floods, Residents' Homes, Businesses Hit as Rain Soaks Region. King 5. <https://www.king5.com/news/south-park-floods-residents-businesses-hit-as-rain-soaks-region/>

44

Erosion + Landslides

- Large precipitation events can lead to erosion and the destabilization of slopes that can lead to landslides and other geologic hazards.
- Large property loss, potential loss of life, can worsen water quality as stormwater picks up sediment and pollutants



Propp, B. 2022. January 18. Landslide Destroys Seattle Home, Causes 2 Deaths. NPR. <https://www.npr.org/2022/01/18/1071111111-landsides-destroys-seattle-home-causes-2-deaths/>

45

Recurrent flooding

- Occurs in coastal areas during high tide
- Sea level rise, storm surges, or heavy precipitation can all increase flooding risks
- Some infrastructure and communities will be more affected than others i.e. stormwater infrastructure, roads near the coast, etc.

46

Urban Planning + Flooding Adaptation



Early Warning Systems

County-wide alerts, prioritize assistance for low income and high risk neighborhoods.

Ensure people know what resources are available to them i.e. evacuation centers, guidance on what to do before, during, and after floods



Green Stormwater Infrastructure

Permeable pavement, bioswales, bioretention ponds, green roofs, tree cover, etc.

I.e. High Point neighborhood in Seattle

2020 Updates to Seattle's Floodplain Development Regulations

- The elevation that the first floor of a new structure must be built at to keep the first story above anticipated flood levels
- Structure must be engineered to withstand wind from anticipated storms
- Structure must be engineered to withstand flood waters should anticipated flood levels be exceeded

Zoning and Natural Buffers

Prohibits new development in known flood plains (FEMA), but increase flood zones to include sea level rise estimates if appropriate.

Increase natural buffers and improve vegetation along riverbanks

47

COMMUNICATE:

local impacts

what areas and who will be affected?

local action

what is being done? What resources are available?

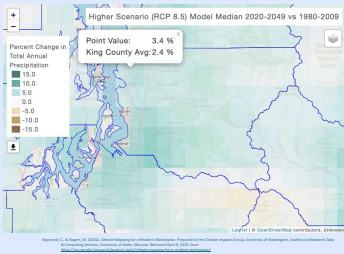
local knowledge

how are communities adapting?

48

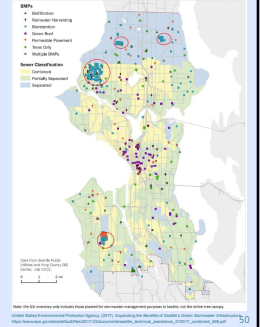
Local impacts

- King County is expected to experience an average of 2.4% increase in precipitation by the mid-century
- Show clear images and maps vs. data projections



Local action

- Seattle currently manages 465 million gallons of stormwater annually, goal of managing **700 million gallons per year**
- **RainWise Program** in King County assists people with building rain gardens on their property



Local knowledge

- **Participatory mapping** in the Duwamish to understand community's vision for the Duwamish Valley
- Resulted in Duwamish Valley Action Plan incorporating goals such as improving natural filtration and reducing flooding risks



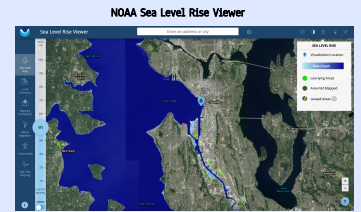
Visualization Tools

Tides and Currents

- [NOAA Tides and Currents Map](#)
- [NOAA Inundation Dashboard](#)

Floodplain

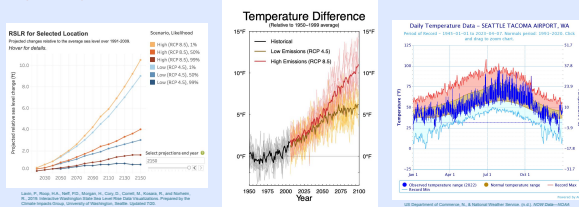
- [FEMA National Flood Hazard Layer](#)
- [Climate Central Coastal Risk Screening Tool](#)



Sea Level Rise

- [Climate Impacts Group SLR Visualization Tool](#)
- [NOAA SLR Viewer \(shown above\)](#)
- [Seattle Public Utilities SLR Mapper](#)
- [Climate Central Coastal Risk Screening Tool](#)

Images commonly look like this but these can be hard for people to understand! Try using the visualization tools listed in the Toolkit to more clearly show local impacts + projections.



Thank you!

Rachel Chen
rachel.chen217@gmail.com

Link to Survey:
<https://forms.gle/kDiE6vGtO2RMDnRx6>

APPENDIX D:
FOCUS GROUP SURVEY

FOCUS GROUP SURVEY

This survey will be used to further inform the development of the toolkit, gauge whether the strategies presented today will be applicable to your work in the future, and determine what further guidance would be useful to assist your climate communication efforts.

1. What is the main takeaway for you from today's discussion?

2. What, if anything, did you learn that was new or useful for your job from the discussion today?

3. Will the strategies discussed today help strengthen your climate communication efforts? Why or why not?

4. Which strategies do you think will be most useful or would you incorporate in your work?

5. What, if anything, might limit your ability to use what you learned today to communicate with others in your job?

6. What types of communication materials might help you communicate more effectively?

(i.e. a flyer template, handout on basic climate science, powerpoint template for basic climate science, glossary of terms related to climate change, an index of climate planning or visualization tools, or something else? A compilation of all of these?)

7. How well did I present the toolkit today? Identify any strengths or weaknesses.

8. Any additional feedback that would help improve the toolkit and tools for planners to communicate about climate change?

9. ***The following questions are to test how clear my presentation of the science of climate impacts was.***

Climate change is causing more precipitation to fall as rain rather than snow

Mark only one oval.

True

False

Don't know

10. Which of the following statements is **false**?

Mark only one oval.

- Climate change is increasing snowpack globally
- The timing of snowmelt in the PNW is shifting earlier in the year
- With climate change, relatively wet areas will get wetter, dry areas drier
- Precipitation events are becoming stronger with climate change

11. How is global warming changing the amount of water vapor in the atmosphere?

12. How does humidity impact how humans experience temperature?

13. How do heat waves form?

14. The Urban Heat Island effect is exacerbated by...

(Select all that apply)

Check all that apply.

- Impervious surfaces like concrete
- Tree cover
- Increased greenhouse gas emissions
- Heat waves

15. Any final comments or questions are welcome. Thank you for participating!

FOCUS GROUP SURVEY

3 responses

[Publish analytics](#)

What is the main takeaway for you from today's discussion?

3 responses

Rely on storytelling more

communicate in plain language and make it relevant to your audience

Benefits of having commonly accessible language regarding public facing climate change information.

What, if anything, did you learn that was new or useful for your job from the discussion today?

3 responses

the encouragement to only share graphics that are human-centered

examples from other communities that are engaging with partner organizations, particularly those working with vulnerable communities

Unsure

Will the strategies discussed today help strengthen your climate communication efforts? Why or why not?

3 responses

Yes, its helpful to have a list of strategies to quickly reference

yes, they remind me and inspire me to learn and share local climate impacts and actions.

I would make great use of the first 10 or so slides.



Which strategies do you think will be most useful or would you incorporate in your work?

3 responses

I will incorporate all of them

4) know audience and tailor communications, 5) frame climate action to address everyday concerns of community, and 7) focus on solutions that are being implemented

Personalization of climate issues would undoubtedly be highly effective for public education on climate issues.

What, if anything, might limit your ability to use what you learned today to communicate with others in your job?

3 responses

nothing

limited staff capacity to do public engagement

n/a

What types of communication materials might help you communicate more effectively?

(i.e. a flyer template, handout on basic climate science, powerpoint template for basic climate science, glossary of terms related to climate change, an index of climate planning or visualization tools, or something else? A compilation of all of these?)

3 responses

any and all

index of climate planning or visualization tools, glossary of terms

Access to the first 10 slides in the presentation.



How well did I present the toolkit today? Identify any strengths or weaknesses.

3 responses

You did well. The images and the stories stayed with me.

Very well overall, clear and simple explanations with good visuals. There were some slightly jargony words, however (impervious, albedo, etc)

Great job, slide show might be pared down a bit?

Any additional feedback that would help improve the toolkit and tools for planners to communicate about climate change?

2 responses

no

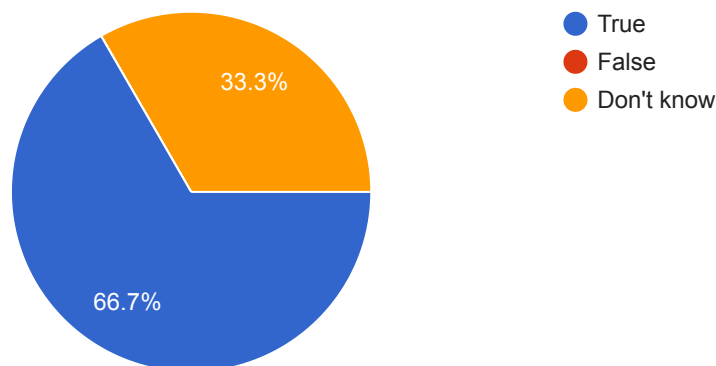
Thanks for giving me the opportunity to participate!

The following questions are to test how clear my presentation of the science of climate impacts was.

 Copy

Climate change is causing more precipitation to fall as rain rather than snow

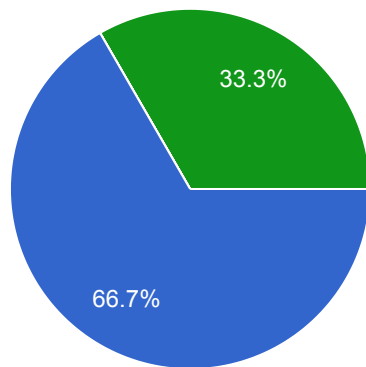
3 responses



Which of the following statements is **false**?

 Copy

3 responses



- Climate change is increasing snowpack globally
- The timing of snowmelt in the PNW is shifting earlier in the year
- With climate change, relatively wet areas will get wetter, dry areas drier
- Precipitation events are becoming stronger with climat...

How is global warming changing the amount of water vapor in the atmosphere?

3 responses

it increases the amount of water vapor in the air

increasing temperatures increase evaporation leading to more water vapor in the air, which further increases temperatures in a positive feedback loop.

Increasing it.

How does humidity impact how humans experience temperature?

3 responses

higher humidity lessens human's ability to regulate body temperature.

humidity slows down the sweat evaporation process so you don't cool off

Creates more warmth.

How do heat waves form?

3 responses

high pressure

high pressure system pushes hot air down, gets trapped in a dome

Unk from presentation: note: I left prior to presentation completion.

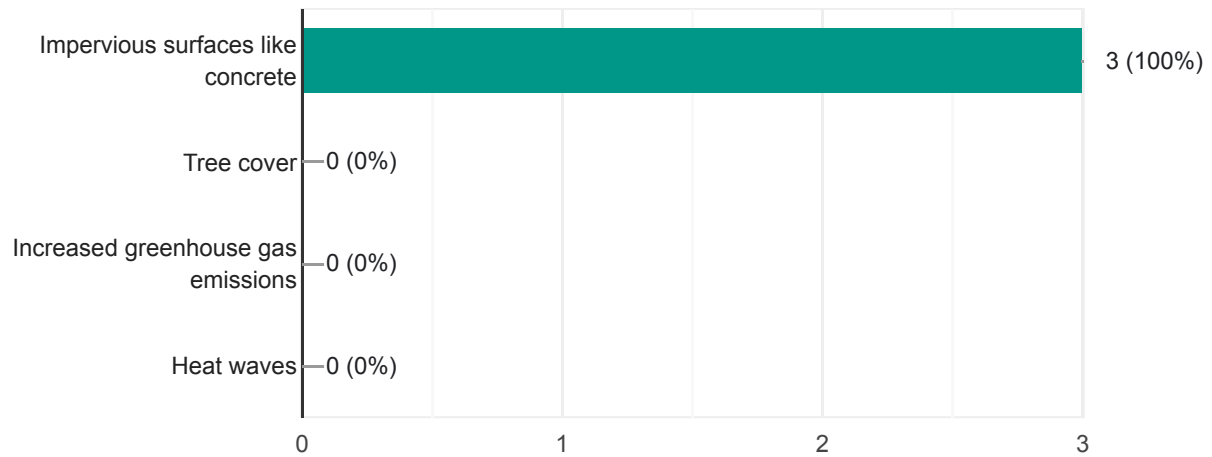


The Urban Heat Island effect is exacerbated by...

 Copy

(Select all that apply)

3 responses



Any final comments or questions are welcome. Thank you for participating!

3 responses

The question above is a little confusing because a lack of vegetative cover is part of UHI but the way its worded makes it confusing because what about tree cover

good job

Thanks for allowing me to participate.

This content is neither created nor endorsed by Google. [Report Abuse](#) - [Terms of Service](#) - [Privacy Policy](#).

Google Forms

