Exploring how social justice is considered in climate adaptation planning and implementation within local governments in the United States

Jennifer J. Brousseau

Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Forest Resources and Environmental Conservation

Marc J. Stern
R. Bruce Hull
Robin H. Lemaire
Todd Schenk

August 18, 2023
Blacksburg, VA

Keywords: climate adaptation, social justice, planning, implementation

Exploring how social justice is considered in climate adaptation planning and implementation within local governments in the United States

Jennifer J. Brousseau

Abstract

This dissertation investigates how social justice is considered as local governments in the United States develop and implement climate adaptation plans and is composed of an introduction (Chapter 1), three stand-alone manuscripts (Chapters 2-4), and a conclusion (Chapter 5). The introduction gives a brief overview of climate adaptation planning, the intersection of social justice and climate adaptation, and existing research about how social justice is considered as communities prepare for climate change. To conceptualize social justice throughout this dissertation, we adopt the three-dimensional theory that includes recognitional, distributional, and procedural justice. Both Chapter 2 and Chapter 3 focus on adaptation planning through a review of 101 climate adaptation, climate action, and climate resilience plans published between 2010-2021 by US municipalities. In Chapter 2, we used data from this review to understand generally how recognitional, distributional, and procedural justice were considered within these documents. In Chapter 3, we used the same data and demographic data for each community to understand trends over time and other patterns in how each type of justice was considered through a series of regressions. Chapter 4 serves as a follow-up to the adaptation plan review to understand how local governments are considering justice as they move forward and implement adaptation initiatives. We interviewed the plan leads from 25 communities that published a recent climate plan that we reviewed and asked them how their local government has considered social justice as they've implemented adaptation projects, what factors have enabled these considerations, and what challenges they've encountered. The results of these studies show that social justice is increasingly addressed in more recent climate plans, but recognitional and distributional justice are often considered more than procedural justice. Most communities we spoke with are still in the early phases of implementing these plans, and largely centered on how these municipalities have engaged marginalized individuals, with most aspiring towards empowerment but informing or consulting with residents. Our findings revealed that many opportunities remain to advance justice further, especially in how municipalities can meaningfully engage and empower marginalized residents in adaptation initiatives. The conclusion summarizes how social justice is considered in adaptation planning and implementation, as well as what gaps remain. Within this section, I reflect on my experiences as a Ph.D. student at Virginia Tech and my future goals within academia.

Exploring how social justice is considered in climate adaptation planning and implementation within local governments in the United States

Jennifer J. Brousseau

General Audience Abstract

As local governments prepare for climate change, they are grappling with how to ensure everyone is equipped to adapt, including their most vulnerable residents. Even with increased attention on social justice in climate adaptation efforts, it is unclear how municipalities plan to achieve this. Climate adaptation plans are one resource US municipalities can employ to address justice as they tackle climate change. While research has increasingly focused on climate adaptation planning, there's been little follow-up to suggest communities are moving from planning to implementation. The research included in this dissertation investigates how social justice is considered in climate adaptation, climate action, and climate resilience plans published between 2010-2021 by US municipalities and how justice is addressed when these plans are being implemented. The study considers social justice through the three-dimensional theory of recognitional, distributional, and procedural justice. The results show that social justice is increasingly addressed in more recent climate plans, but recognitional and distributional justice are often considered more than procedural justice. Most municipalities were still in the early phases of implementing these plans, so our discussions with government employees largely centered on how they have engaged marginalized individuals in initiating programs, with most aspiring towards empowerment but informing or consulting with residents. Many opportunities remain to advance justice further, especially in how municipalities can meaningfully engage and empower marginalized residents in adaptation initiatives.

Acknowledgements

None of this work would have been possible without many amazing individuals that have participated in the research or supported me throughout this process. To my advisor, Marc Stern, thank you for offering me the opportunity to join this team when I had little experience in climate adaptation or social science. I am forever grateful for your incredible knowledge of social science theory, meticulous editing, and ability to always make me feel more enthusiastic about the research than when I entered your office. Your guidance has had a tremendous impact on the researcher I've become, and I hope to continue collaborating as I move forward.

To my committee, Bruce Hull, Robin Lemaire, and Todd Schenk, thank you for providing me guidance and support throughout this process. Your feedback helped to shape these chapters as my dissertation changed and improved my writing along the way.

To Caleb, my partner in all things PhD! How will I ever do research on my own?! I can't imagine going through this entire program and navigating the world of social science with anyone else. You have been a sounding board and advice guru far too many times, and I hope that we will continue to work together at any opportunity in the future. I will miss following you during introductions and adding, "same as what he said." Thank you also to the other members of the Stern Squad, Kelley Anderson, Malia Pownall, and Emily Thorpe, who I was lucky to have the opportunity to work with, laugh, learn from, and enjoy life alongside for much of this degree. Thank you to Dr. Eileen Merritt for being a wonderful mentor and friend throughout this process. I feel so fortunate to have met you through this work and appreciate all the listening sessions and advice you shared along the way. Thank you also to Dr. Lauren Mullenbach for not only reviewing this entire dissertation, but for all the advice and support you have offered in the past couple years. I feel grateful that we were able to connect around similar research interests and look forward to seeing where this research goes in the future.

I am deeply grateful for the opportunity to meet so many passionate individuals working to advance climate adaptation in their communities. This also extends to the team from EcoAdapt, who are helping communities like those discussed in this work prepare for climate change. Thank you for being incredible research partners and team for supporting and collaborating on this work. Thank you to the National Science Foundation (NSF) for funding this work. Thank you to the Department of Forest Resources and Environmental Conservation at Virginia Tech for providing assistance throughout my degree. Thank you also to the Global Change Center and Interfaces of Global Change Program, which has been a core community for me at Virginia Tech and introduced me to many scholars across disciplines and interdisciplinary opportunities I may not have known about otherwise.

Thank you to all of my friends that I've met in Blacksburg and those that have continued to support me from afar throughout this degree, with a special appreciation for Sarah Croft and Kat Mullin for your words of wisdom from your respective academic bubbles. Thank you to my parents and sister who have always supported me in whatever path I chose and never made me feel like I made the wrong choice in deciding to be a forever student. Thank goodness I've always had a cooler, more fashionable sister to dress me when I need to be somewhat "professional".

Lastly and most importantly, thank you to my partner, Brendan Holly. You are my stats guy, proofreader, in-house therapist, birding buddy, cheerleader, and advocate for my "tenacious" spirit that sometimes gets the best of me. I appreciate more than words can express how flexible you have been throughout these four years, especially when I petsat like crazy or said yes to more projects that I probably shouldn't have taken on. You have always challenged me to be better, especially intellectually, which I hope will always be the case as we both move through life together. I couldn't finish without acknowledging my two munchkins, Aster and Willow, who have been constant companions throughout my interviews (often uninvited) and writing sessions. I am so glad we made the decision to adopt you two crazy cats!

Table of Contents

List of Tables

List of Figures

Attribution

While the data collection, analysis, and write-up of this work was primarily conducted by me, this work was a collaborative effort. Chapter 2 and 3 are intended to be published as complementary articles within the same issue of the same journal. Malia Pownall was involved in the conceptualization of the adaptation plan review and initial coding process. She will be a co-author on Chapter 2. My advisor, Dr. Marc Stern, and research collaborator, Dr. Lara Hansen, provided feedback on drafts of each chapter and will be co-authors on each piece. My committee members, which includes Dr. Robin Lemaire, Dr. Bruce Hull, and Dr. Todd Schenk, also provided feedback on drafts of each chapter, as well as Dr. Lauren Mullenbach.

Chapter 1

Introduction

Differing values, norms, and goals among stakeholders fuel the debate around the causes of climate change, but the urgency to adapt to climate change has increased over the past decade (Brunner & Nordgren, 2012). Climate adaptation is defined by the Intergovernmental Panel on Climate Change (IPCC) as "the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities" (IPCC, 2014). Practitioners in the field of climate adaptation describe this process more broadly as reducing the vulnerability or increasing the resiliency of natural and human systems to climate change (Brunner & Nordgren, 2012). Vulnerability to climate change can be defined as the extent to which systems, institutions, people, and other entities are susceptible to harm caused by climate hazards (Paavola & Adger, 2006; Pörtner et al., 2022). Vulnerability is often considered as either biophysical, or the impacts an entity may experience when exposed to climate hazards, or social, which is what we'll focus on throughout this dissertation. Social vulnerability is defined as the susceptibility to climate impacts based on existing social, economic, and political factors, which might include characteristics like income, employment, access to public services/resources, and pre-existing medical conditions (Adger & Kelly, 1999).

Adapting to climate change is increasingly viewed as a social justice issue, as those individuals who will be disproportionately impacted are often less able to cope with the impacts (Hughes, 2020). We use the term *marginalized groups* throughout this dissertation to refer to members of the population that may be disproportionately impacted by climate change due to existing social vulnerabilities and current or historic inequalities (Anguelovski et al., 2016; Reckien et al., 2018). Adaptation initiatives, like enhancing access to cooling shelters or green infrastructure, will be needed to ensure marginalized residents have access to the resources, services, and other opportunities within the community to grapple with climate impacts (Bulkeley et al., 2014; Castán Broto et al., 2013; Meerow et al., 2019). However, it will also be important to engage marginalized groups while developing and implementing adaptation strategies to help ensure these efforts address existing injustices, enhance the legitimacy of decisions, and increase the likelihood of long-term success in implementing adaptation projects (Byskov et al., 2019; Paavola & Adger, 2006; Guyadeen et al., 2019).

As the realities of climate change become more apparent, more local governments are starting to plan for climate adaptation, which often involves creating climate adaptation plans (Bierbaum et al., 2013). These documents generally include details about how climate change will impact the community and what steps can be taken to address those impacts (Woodruff & Stults, 2016). While these plans are often non-binding documents (Hess & McKane, 2021; Long & Rice, 2019), they provide a reference point for understanding how communities are preparing for climate change. They could also be a tool through which local governments can consider justice as they plan for climate change.

Despite growing attention to the link between climate adaptation and social justice, it is unclear how local governments are operationalizing justice as they plan for adaptation and implement strategies. Existing research of adaptation planning suggests that most communities are focused on who is vulnerable to climate change and how they will benefit from proposed programs, with less attention to how they engaged marginalized groups in developing these strategies (Baker et al., 2012; Bulkeley et al., 2013; Finn & McCormick, 2011; Meerow et al., 2019). However, these considerations of justice vary considerably depending on the community, and little is known about what might be influencing how local governments address social justice through adaptation planning (Fiack et al., 2021; Mullenbach & Wilhelm Stanis, 2022). Little is also known about how these plans translate into action and how proposed initiatives impact marginalized residents (Westman & Castán Broto, 2021).

This dissertation focuses on the intersection between climate adaptation and social justice through the scope of municipal adaptation plans and implementation of those plans within the United States. Throughout this dissertation, we have conceptualized social justice through the three-dimensional theory popularized by

Schlosberg (2007), which includes recognitional, distributional, and procedural justice. *Recognitional justice* focuses on acknowledging how certain individuals or groups may be more vulnerable than others to climate change based on their race, socioeconomic status, age, physical ability, or other elements of their identity, as well as how historical or existing policies may exacerbate their vulnerability (Chu & Michael, 2019; Meerow et al., 2019). *Distributional justice* is centered around initiatives that enhance marginalized residents' access to resources, services, infrastructure, and other opportunities within the community. Addressing distributional justice also involves considering and planning for unintended consequences of climate adaptation strategies that may create new injustices or exacerbate existing conditions, like displacement or exclusion from services/programs (Anguelovski et al., 2016). *Procedural justice* aims to encourage participation in community processes through fair, transparent, and inclusive practices (Schlosberg, 2007), which in this context relates to the implementation of climate adaptation plans (Meerow et al., 2019).

Each chapter within this dissertation represents a stand-alone manuscript for publication. Both **Chapter 2** and **Chapter 3** focus on adaptation planning through a review of 101 climate adaptation, climate action, and climate resilience plans published between 2010-2021 by US municipalities. In this review, we identified examples of recognitional justice, distributional justice, procedural justice, and any frameworks or metrics to monitor plan implementation. We also assessed the extent to which each type of justice was considered within these documents. Using this data, **Chapter 2** addresses the following research questions:

- Who is considered vulnerable to climate change and how is vulnerability assessed in these documents?
- How and to what extent is justice (recognitional, distributional, and procedural) for marginalized audiences addressed in these same plans?

Overall, we found that local governments focused more on recognitional and distributional justice than procedural justice within these documents. Most plans acknowledged a similar understanding of vulnerability, but less recognized how historical injustices, like redlining or exclusion from community programs, contribute to this vulnerability. Plans proposed a range of adaptation strategies aimed to benefit marginalized groups, but these mainly focused on expanding existing programs rather than developing new ones. When procedural justice was addressed, it was mainly considered through one-off opportunities, rather than deeper, sustained engagement.

In **Chapter 3**, we sought to understand patterns in how each type of justice was considered through these research questions:

- Has attention to social justice in climate adaptation planning documents changed over time?
- What conditions (e.g., political orientation, community size, and demographics) are associated with how justice has been addressed in climate adaptation planning?

We conducted a series of regressions to assess how these variables were associated with justice considerations: year of publication, political orientation, community size, racial demographics, and levels of poverty. Overall, we found that newer plans more commonly addressed each type of justice, regardless of context. However, we also found that plans from more Republican-leaning areas considered recognitional and distributional justice to a lesser degree than those from Democratic areas. Plans from larger communities were more likely to address procedural justice and included plans for monitoring the impacts to marginalized people. Plans from poorer areas addressed distributional justice more and acknowledged more injustices marginalized groups may face.

Chapter 4 serves as a follow-up to the adaptation plan review to understand how local governments are considering justice as they move forward and implement adaptation initiatives. We interviewed local government representatives from 25 communities that published a climate plan between 2017-2020 within our review and sought to answer these questions:

- How are local governments addressing social justice as they implement their climate adaptation plans?
- What factors enable and constrain local government officials to address social justice as they implement these plans?

We found that most local governments have started to implement adaptation strategies aimed at benefitting marginalized groups, but it is still early to assess impacts. Most examples centered around how these governments have engaged marginalized individuals, with most focused on informing or consulting with residents and only a handful at the level of collaboration or empowerment. Several factors emerged that seem to enable considerations of justice: formal leadership support, community support, relationship and trust building, logistical considerations for accessibility, relevance to marginalized individuals' lives, and capacity building.

Chapter 5 concludes the dissertation by first summarizing how social justice is considered in adaptation planning and implementation, as well as what gaps remain. This section ends with a reflection on my experiences throughout my degree and goals for a future career in academia.

References

Adger, N. (2007). Climate Change 2007. Climate Change Impacts, Adaptation and Vulnerability. Summary for Policymakers. *Intergovernmental Panel On Climate Change Fourth Assessment Report.*

Adger, W. N., & Kelly, P. M. (1999). Social vulnerability to climate change and the architecture of entitlements. *Mitigation and adaptation strategies for global change*, *4*, 253-266.

Anguelovski, I., Shi, L., Chu, E., Gallagher, D., Goh, K., Lamb, Z., Reeve, K., & Teicher, H. (2016). Equity impacts of urban land use planning for climate adaptation: Critical perspectives from the global north and south. Journal of Planning Education and Research, 36(3), 333-348.

Baker, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. Landscape and urban planning, 107(2), 127-136.

Bierbaum, R., Smith, J. B., Lee, A., Blair, M., Carter, L., Chapin, F. S., ... & Verduzco, L. (2013). A comprehensive review of climate adaptation in the United States: more than before, but less than needed. *Mitigation and adaptation strategies for global change*, *18*, 361-406.

Brunner, R. D., & Nordgren, J. R. (2012). Climate adaptation as an evolutionary process: a white paper. *Living with climate change: How communities are surviving and thriving in a changing climate*, 134-144.

Bulkeley, H., Carmin, J., Broto, V. C., Edwards, G. A., & Fuller, S. (2013). Climate justice and global cities: Mapping the emerging discourses. *Global Environmental Change*, 23(5), 914-925.

Byskov, M. F., Hyams, K., Satyal, P., Anguelovski, I., Benjamin, L., Blackburn, S., ... & Venn, A. (2019). An agenda for ethics and justice in adaptation to climate change. *Climate and Development*, *13*(1), 1-9.

Castán Broto, V., Oballa, B., & Junior, P. (2013). Governing climate change for a just city: challenges and lessons from Maputo, Mozambique. *Local Environment*, *18*(6), 678-704.

Chu, E., & Michael, K. (2019). Recognition in urban climate justice: Marginality and exclusion of migrants in Indian cities. *Environment and Urbanization*, 31(1), 139-156.

Fiack, D., Cumberbatch, J., Sutherland, M., & Zerphey, N. (2021). Sustainable adaptation: Social equity and local climate adaptation planning in US cities. *Cities*, 115, 103235.

Finn, D., & McCormick, L. (2011). Urban climate change plans: how holistic?. *Local Environment*, *16*(4), 397-416.

Guyadeen, D., Thistlethwaite, J., & Henstra, D. (2019). Evaluating the quality of municipal climate change plans in Canada. *Climatic Change*, *152*, 121-143.

Hess, D. J., & McKane, R. G. (2021). Making sustainability plans more equitable: an analysis of 50 US Cities. *Local Environment*, 26(4), 461-476.

Hughes, S. (2020). Principles, drivers, and policy tools for just climate change adaptation in legacy cities. *Environmental Science & Policy*, *111*, 35-41.

IPCC. (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A.

Long, J., & Rice, J. L. (2019). From sustainable urbanism to climate urbanism. *Urban Studies*, 56(5), 992-10

Meerow, S., Pajouhesh, P., & Miller, T. R. (2019). Social equity in urban resilience planning. *Local Environment*, 24(9), 793-808.

Mullenbach, L. E., & Wilhelm Stanis, S. A. (2022). Climate change adaptation plans: Inclusion of health, equity, and green space. *Journal of Urban Affairs*, 1-16.

Paavola, J., & Adger, W. N. (2006). Fair adaptation to climate change. *Ecological economics*, *56*(4), 594-609

Pörtner, H. O., Roberts, D. C., Adams, H., Adler, C., Aldunce, P., Ali, E., ... & Birkmann, J. (2022). Climate change 2022: Impacts, adaptation and vulnerability. *IPCC Sixth Assessment Report*, 37-118.

Schlosberg, D. (2007). *Defining environmental justice: Theories, movements, and nature.* OUP Oxford.

Westman, L., & Castán Broto, V. (2021). Transcending existing paradigms: the quest for justice in urban climate change planning. *Local Environment*, *26*(5), 536-541.

Woodruff, S. C., & Stults, M. (2016). Numerous strategies but limited implementation guidance in US local adaptation plans. *Nature Climate Change,* 6(8), 796-802.

<u>Chapter 2</u>

Understanding how justice is considered in climate adaptation approaches: a qualitative review of climate adaptation plans

Abstract

As communities plan for climate change, they will face challenges in ensuring everyone is prepared to adapt, including the most vulnerable residents. Even with increased attention on justice in climate adaptation efforts, it is unclear how communities plan to advance this. Climate adaptation plans are one resource communities can employ to address justice as they tackle climate change. This study aims to understand how justice is considered in adaptation processes through a qualitative review of climate adaptation plans and related documents from US communities. We reviewed 101 plans using a three-pronged coding framework of recognitional, distributional, and procedural justice. Overall, our findings revealed a stronger focus on recognitional and distributional justice than procedural justice. Recognitional justice mainly focused on who is most vulnerable to climate change and how, with most plans adopting a similar understanding of vulnerability. Plans less frequently acknowledged how historical injustices contribute to vulnerability. Distributional justice was addressed through adaptation strategies across six focus areas (e.g., health and safety, buildings, green infrastructure, professional development, food, and transit), but plans focused more attention on certain sectors and on expanding existing programs than new projects or policies. Procedural justice was mainly considered through one-off opportunities, rather than more extensive engagement or involvement in decision-making. Most plans lacked implementation considerations, but when included, these details mainly focused on who would be involved and not how strategies would be implemented. These findings provide an array of approaches to address justice in adaptation planning and support several considerations for developing future plans.

Keywords: social justice, climate change, marginalized communities, climate adaptation plans, implementation

Introduction

Social justice concerns are increasingly at the forefront of climate adaptation discussions (Bulkeley et al., 2013; Klinsky et al., 2017; Shi et al., 2016). Not only will climate change affect some geographies more than others, but many individuals, such as older adults, youth, people with pre-existing medical conditions, and low-income residents, may also be disproportionately affected and less able to cope with climate impacts (Reckien et al., 2018; White-Newsome et al., 2018). People of color, indigenous people, and immigrants have also been historically excluded from community planning processes and disenfranchised as a result (Anguelovski et al., 2016). Centering justice in climate adaptation processes and engaging marginalized groups can help ensure adaptation efforts address existing injustices, enhance the legitimacy of decisions, and increase the likelihood of long-term success in implementing adaptation projects (Byskov, 2019; Paavola & Adger, 2006; Guyadeen et al., 2019). If adaptation planning processes neglect to engage marginalized individuals, initiatives may reinforce existing social vulnerabilities, result in negative consequences, and fail to generate support, or draw active opposition, from those that stand to be most impacted (Adger, 2016; Anguelovski et al., 2016; Shi et al., 2016).

Despite the growing focus on climate justice, it is unclear how local governments are operationalizing justice within climate adaptation planning. Prior research suggests considerable variation in whether and how communities address justice in their approaches (Anguelovski et al., 2016; Chu & Cannon, 2021; Fiack et al., 2021; Meerow et al., 2019). When justice is considered, communities mainly focus on ensuring marginalized residents experience the benefits of adaptation projects (Anguelovski et al., 2016; Finn & McCormick, 2011; Meerow et al., 2019). While expanding access to services and resources can help marginalized residents adapt, existing literature recommends a more holistic approach that also focuses on recognizing the link between

existing injustices and vulnerability to climate change and engaging marginalized individuals in adaptation planning (Holland, 2017; Schlosberg & Collins, 2014). To date, most analyses of adaptation planning processes reveal ambiguity around who is considered most vulnerable to climate impacts and scant details about how communities engaged marginalized groups in developing adaptation strategies (Baker et al., 2012; Bulkeley et al., 2013; Finn & McCormick, 2011; Meerow et al., 2019). Some studies have shown that planning approaches often end with broad goals, lacking specific details on how local governments plan to implement these strategies or monitor implementation (Meerow et al., 2019; Mullenbach & Wilhelm Stanis, 2022).

Climate adaptation plans provide a tool through which communities can consider justice as they prepare for climate change. Climate adaptation plans can vary widely in their approaches, but these documents generally contain details about existing vulnerabilities to climate change, future climate impacts, and strategies proposed to address these impacts (Woodruff & Stults, 2016). While these plans are often non-binding documents (Hess & McKane, 2021; Long & Rice, 2019), they provide a reference point for understanding how communities consider justice in their adaptation approaches. We systematically reviewed climate adaptation plans and related climate plans from the United States to address the following research questions:

- Who is considered vulnerable to climate change and how is vulnerability assessed in these documents?
- How and to what extent is justice (recognitional, distributional, and procedural) for marginalized audiences addressed in these same plans?

Literature Review

Vulnerability to climate change

Vulnerability to climate change can be defined as the extent to which systems, institutions, people, and other entities are susceptible to harm caused by climate hazards (Paavola & Adger, 2006; Pörtner et al., 2022). Vulnerability to climate change is often broken into two categories: biophysical vulnerability, or the impacts an entity may experience when exposed to climate hazards, and social vulnerability, which is the focus of this study. Social vulnerability is defined as the susceptibility to climate impacts based on existing social, economic, and political factors, which might include characteristics like income, employment, access to public services/resources, and pre-existing medical conditions (Adger & Kelly, 1999). Social vulnerability is largely context dependent, which may challenge efforts to recognize and engage the "relevant" actors in climate adaptation planning (Chu & Michael, 2019; Shi et al., 2016; van den Berg & Keenan, 2019).

Defining social justice in climate adaptation planning

We conceptualize climate justice based on Schlosberg's (2007) three-dimensional theory, which delineates three forms: recognitional, distributional, and procedural justice. In this study, we focus on the extent to which each form of justice reflects the purposeful inclusion of marginalized groups.

Recognitional justice

To advance justice, scholars argue that it is essential to first recognize the social structures and policies that have created injustices, which may prevent marginalized residents from accessing benefits or participating in these opportunities (Bulkeley et al., 2013; Schlosberg, 2004). In the context of climate adaptation, how communities conceptualize vulnerability and recognize who is most at-risk informs their approach to address these vulnerabilities, as well as who to engage in decision-making processes. Adaptation planning processes may privilege certain groups' participation, exclude others, and risk prioritizing investments that fail to address existing injustices or exacerbate current conditions (Anguelovski et al., 2016; van den Berg & Keenan,

2019). Therefore, this recognition can be viewed as an entry point or pre-condition to address the other types of justice (Bulkeley et al., 2014).

Recognitional justice seeks to acknowledge elements of community members' identities that may increase their vulnerability to climate change, understand the existing injustices these individuals face, and recognize how historical or existing policies influence these injustices (Chu & Michael, 2019; Meerow et al., 2019). To address recognitional justice in climate adaptation planning, communities can acknowledge these elements of vulnerability and work to change institutional norms/culture that often perpetuate injustices (Schlosberg, 2007; Meerow et al., 2019). Meerow et al. (2019), for example, sought out examples of how urban resilience plans identified marginalized groups, injustices they face, and historical discriminatory practices/policies that contribute to vulnerability. We expand upon their definition by also looking for examples of how marginalized groups may be impacted by climate change to date and in the future.

Distributional justice

Distributional, or distributive, justice concerns the fair distribution of goods and benefits in a society (Rawls, 1971). When it comes to climate adaptation planning, distributional justice occurs through initiatives that enhance access to goods, services, infrastructure, and opportunities to those who lack these benefits or require more than allocated to overcome vulnerabilities (Meerow et al., 2019). Common adaptation projects designed to benefit marginalized communities include the development of infrastructure (e.g., green space, cooling centers, public transit), outreach programs to enhance social support networks, and outreach concerning the risks associated with climate change (Bulkeley et al., 2014; Castán Broto et al., 2013; Preston et al., 2011). These efforts are often grouped into three categories based on the extent to which strategies shift existing conditions and include: resilience, transitional, and transformative strategies (Pelling, 2010). Resilience efforts maintain the status quo, transitional actions involve adjusting existing initiatives or designing similar programs, and transformative projects aim to change underlying structures that contribute to injustices (Kates & Travis, 2012).

Distributional justice also considers how members of marginalized communities may be negatively impacted or burdened by climate adaptation (Anguelovski et al., 2016; Swanson, 2021), as some adaptation projects can exacerbate existing vulnerabilities or create new sources of vulnerability (Eriksen et al., 2021). Unanticipated impacts of climate adaptation planning may include segregation, gentrification, displacement, and inequitable access to infrastructure (Anguelovski et al., 2016; Long & Rice, 2019; Sovacool et al., 2015). Our conceptualization of distributional justice is similar to Meerow et al.'s (2019), which considers initiatives that enhance access to resources and services, but we also track the potential negative consequences of proposed strategies.

Procedural justice

Procedural justice is focused on ensuring public engagement processes are fair, transparent, and inclusive of a variety of perspectives (Schlosberg, 2007). Procedural justice seeks to move public engagement beyond informing or consulting community members by empowering them to participate in developing strategies and decision-making (Holland, 2017; Malloy & Ashcraft, 2020; Shi et al., 2016). In the field of climate adaptation and resilience planning, Meerow et al. (2019) consider procedural justice as any efforts to encourage participation in plan development and implementation. For our analysis, we focus on efforts to engage marginalized groups in adaptation processes. This narrower focus involves designing processes that consider the needs of marginalized groups; incorporating material that resonates with participants' identities; and expanding broader participation through engaging trusted people or organizations (Phadke et al., 2015; Stern et al., 2020).

Elements of adaptation plan quality

To inform our understanding of how justice is addressed in adaptation planning, we focus on two characteristics that have been used in recent research to characterize plan quality: 1. the inclusion of implementation details and 2. frameworks and metrics to monitor plan implementation (Baker et al., 2012; Guyadeen et al., 2019; Stults & Woodruff, 2017). Implementation considerations include identifying leads and partners for adaptation strategies (Berke & Lyle, 2013; Berke et al., 2012); outlining timelines and funding sources to implement proposed actions (Berke et al., 2012; Horney et al., 2012; Hughes, 2015); and operationalizing adaptation goals or objectives through measurable targets or additional details (Bassett & Shandas, 2010). Monitoring or evaluation steps include developing indicators, criteria, or questions for tracking implementation strategies (Baker et al., 2012; Li & Song, 2016).

Methods

Data collection

We selected plans for review based on five criteria: 1. the plan is focused solely on climate adaptation or includes adaptation strategies as part of a larger climate action plan, 2. the plan is focused on a specific US city or county, 3. the plan was written by or involved the support of a US city/county government and has been adopted by the community, 4. the plan covers adaptation strategies across multiple sectors within a city/county (e.g., we excluded plans focused only on the transportation or energy sector), and 5. the plan was published between 2010 and 2021. If a city or county released more than one climate plan during the study period, we evaluated all plans that met our criteria.

These criteria excluded plans that did not focus solely on climate change (e.g., hazard mitigation plans, sustainability plans), plans that were written without local government involvement or were not formally adopted, plans focused solely on municipal operations, and any multi-county, regional, or state climate plans. When plans focused on both climate mitigation and adaptation, we reviewed the entire plan but only evaluated the content related to climate adaptation, (i.e., information about climate impacts and adaptation strategies for the area). We excluded climate action plans that didn't explicitly differentiate between climate mitigation and adaptation strategies to ensure we weren't arbitrarily deciding what material was related to adaptation. We also excluded any plans that were labeled as "draft plans" for which we couldn't acquire the final version.

We searched for plans on three online adaptation databases: the Georgetown Climate Center (Georgetown Climate Center, 2022b), the closely associated Adaptation Clearinghouse (Georgetown Climate Center, 2022a), and the Climate Adaptation Knowledge Exchange (CAKE) (EcoAdapt, 2022). To differentiate plans from other adaptation resources (e.g., assessments, case studies) on Georgetown's Adaptation Clearinghouse, we only included documents categorized as *Planning* resources within that database. We also identified plans through Google searches by state, reviewing the first 10 pages of results for each keyword search. We searched each state's name followed by the terms *adaptation plan*, *climate action plan*, and *climate resilience plan*, as these were common terms found in our earlier searches of online adaptation databases. Through our searches, we found 156 plans, but only 112 of these met our criteria for evaluation.

Coding scheme and analysis

We developed a qualitative coding scheme based on the three-pronged framework of recognitional, distributional, and procedural justice introduced by Schlosberg (2007) and adapted from Meerow et al.'s (2019) operationalization. We coded the selected plans through a two-stage qualitative coding process. In phase one, we created a spreadsheet with deductive codes adapted from Meerow et al.'s (2019) coding scheme. Within our coding scheme, *marginalized groups* refers to members of the population that may be disproportionately impacted by climate change due to existing social vulnerabilities and current or historic inequalities (Anguelovski et al., 2016; Reckien et al., 2018). To understand how plans addressed *recognitional*

justice, we tracked how plans identified groups as vulnerable to climate change, discussed the historical and continuing injustices affecting these groups, and documented how these groups will experience the impacts of climate change. To code *distributional justice* approaches, we identified any adaptation strategies that emphasized benefits to marginalized groups and coded them by the strategies or projects they were framed around (e.g., enhancing access to resources, infrastructure, economic opportunities). *Procedural justice* codes addressed the extent to which plans describe marginalized groups' engagement in plan development and implementation. We define engagement as any efforts explicitly prioritizing marginalized groups that sought to gather their feedback on plan content, involve them in developing adaptation strategies, include them in implementing proposed programs/projects, or elicit additional input when implementing strategies. We also coded for any *monitoring/evaluation* metrics proposed to assess outcomes and initiatives related to any forms of justice. We sought out examples that explicitly discussed justice and marginalized groups but also coded any examples that implicitly considered groups that may be more vulnerable to climate change.

We assigned numerical weights to each code, as described in Table 2-1, to account for the degree to which each was elucidated or emphasized within the plans. For each code, plans scored a zero if that element of justice wasn't addressed, a one if the code was addressed but only at a general level (low degree), or a two if the code was addressed and included concrete details or implementation considerations (high degree). We calculated the overall score for each type of justice and monitoring/evaluation, based on the highest level observed in each plan (i.e., based on the subcodes that made up each justice theme). Four researchers tested the coding scheme by pilot coding four climate adaptation and action plans that met our criteria and storing examples of the different codes in a spreadsheet. After each researcher reviewed each plan, the team discussed and reconciled all disagreements to refine the coding scheme. After this initial review, the lead author reviewed the remaining plans, copying relevant examples into the spreadsheet.

After the first stage of coding, we evaluated the resulting examples and decided to recode the distributional justice strategies based on sector or focus area. This reclassification better aligns with how these plans were organized and relevant literature on climate plan evaluation (Diezmartínez & Short Gianotti, 2022; Hess & McKane, 2021). These focus areas included health and safety, buildings, professional development opportunities, green infrastructure, food, and transit. In this second stage of coding, we also reviewed recognitional justice examples and developed additional codes to track the specific injustices addressed in each plan (see Table 2-2). We also tracked if plans highlighted potential negative impacts of proposed strategies and which marginalized groups were considered in recognitional, distributional, and procedural justice examples within each plan. Co-authors provided quality checks and feedback throughout the process.

Table 2-1: Coding scheme for our plan review

Coding category	Description	Scoring system
Recognitional justice		
Identification of marginalized groups	Identifies groups that may be disproportionately impacted by climate change.	0- Does not specify marginalized groups 1- Low degree: Identifies specific groups vulnerable to climate change 2- High degree: Identifies specific groups vulnerable to climate change and describes how vulnerability was assessed
Consideration of climate change impacts to marginalized groups	Considers how groups are disproportionately affected by climate change, whether past, present, or future impacts.	0- Does not describe impacts to marginalized groups 1- Low degree: Mentions that climate impacts may affect marginalized groups generally 2- High degree: Describes how specific groups may be disproportionately impacted by climate change
Recognition of existing injustices experienced by marginalized groups	Recognizes the specific injustices experienced by marginalized groups that exacerbates their vulnerability to climate change.	0- Does not mention existing injustices 1- Low degree: Describes existing injustices experienced by marginalized groups generally without linking specific needs with certain groups 2- High degree: Describes existing injustices experienced by specific marginalized groups
Distributional justice		
Health and safety	Strategies that enhance access to public health resources and emergency support before, during, and after natural disasters.	0- Does not address distributional justice strategies within the focal area 1- Low degree: Describes general strategies aimed at enhancing marginalized groups' access to resources, services, and other community processes within the focus area 2- High degree: Describes details about strategy implementation, such as who will be involved, their roles, or how projects will be funded
Buildings	Strategies that increase access to housing and other community buildings equipped to deal with climate impacts.	
Professional development opportunities	Strategies that enhance access to green jobs (e.g., renewable energy, sustainable agriculture) and climate education.	
Green infrastructure	Strategies that improve access to green infrastructure, which mainly includes parks and canopy coverage.	
Food	Strategies that improve access to healthy and affordable food.	
Transit	Strategies that increase access to different modes of transit, such as public transportation and ride-share programs.	
Procedural justice		

Engagement in plan creation	Describes how marginalized groups were involved in the creation of the plan. Public engagement processes may include surveys, interviews, focus groups, workshops, or other strategies.	0- Does not address procedural justice 1- Low degree: Mentions general strategies aimed at engaging marginalized groups in developing the plan and/or implementing adaptation strategies, such as providing information about the plan or involving them in decision-making
Participation in implementation	Describes how groups will be involved in the implementation of adaptation strategies/solutions proposed in the plan. This code would also include marginalized groups' involvement in additional outreach to other members of their community.	2- High degree: Describes details about how marginalized groups were engaged in developing the plan and/or how they plan to engage them in implementation, such as what outreach strategy they used, who was involved, or details about outreach that considered marginalized groups' needs
Monitoring/evaluation		
Evaluation of how adaptation projects advance justice	Proposes metrics or specific plans to assess how strategies affect marginalized groups (e.g., the number of low-income households signing up for a program, greenspace within 10-minute walk).	0- Does not mention plans to track or monitor how strategies are implemented and will impact marginalized groups 1- Low degree: Describes general intentions to track how strategies advance justice but doesn't describe specific plans or metrics to assess the impacts 2- High degree: Describes specific plans about how they will assess impacts and/or metrics they will use to track the impacts of strategies and how they advance justice

Table 2-2: Summary of codes for marginalized groups and injustices they experience.

	Marginalized groups identified	Injustices experienced by marginalized groups
Description	Members of the population that may be disproportionately impacted by climate change due to existing social vulnerabilities and current or historic inequalities	Reasons that may contribute to marginalized groups' increased vulnerability to climate change
Categories	• Older adults • Youth • People of color • People with pre-existing medical conditions (e.g., those with disabilities, asthma, or other chronic conditions) • Low-income individuals • Non-English speakers (e.g., immigrants and refugees) • Outdoor workers (e.g., farmers, construction workers) • Indigenous people • Unhoused individuals • Renters • Pregnant women	Lack of access to… • Money • Healthcare • Affordable housing • Food • Transportation • Greenspace • Cooling • Information • Social connections

This research doesn't seek to explain any variation in how justice was addressed. In our companion piece, we aim to better understand this variation by examining trends in how justice was considered over time and associated with other community characteristics (Authors, in prep).

Results

Study Sample Details

We identified 112 climate adaptation, action, and resilience plans published between 2010-2021 that met the study criteria (see complete list of plans in the Supplementary Material). The plans in our sample were mainly published between 2014-2016 and 2019-2021, with fewer plans published before 2014 and in 2017 and 2018 (see Figure 2-1).
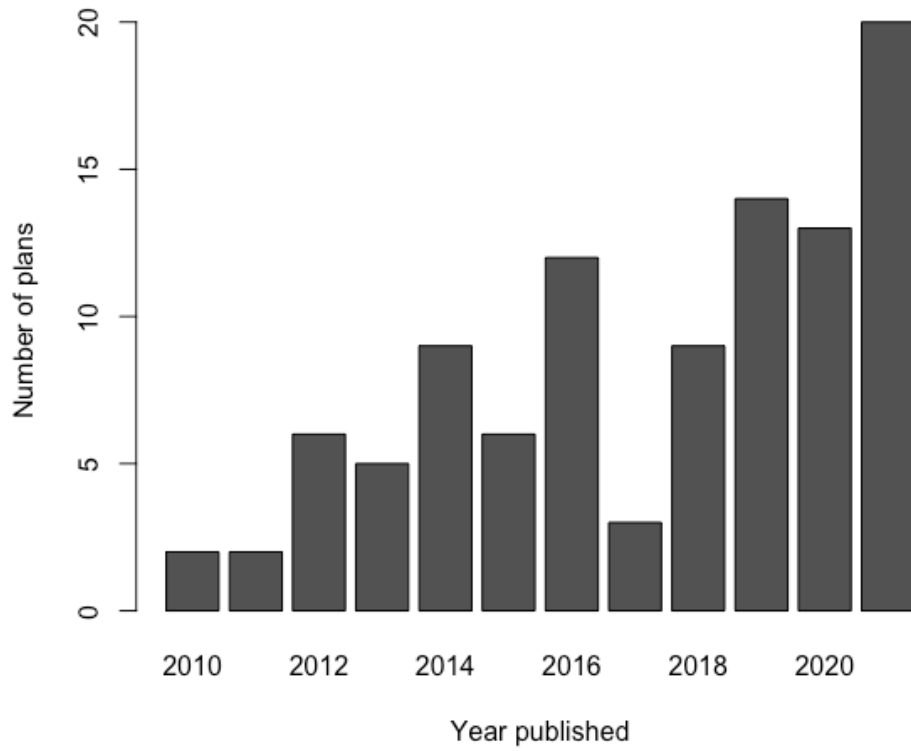
Figure 2-1: Distribution of plans within our sample from 2010-2021 (N=101).

The plans came from 30 states, with the majority from communities in the Northeast and along the Pacific Coast. There were only three communities in our sample that had published an earlier plan and an update to that plan that both met our criteria, so we reviewed both plans from these communities (Broward County, FL, Cleveland, OH and King County, WA). Based on the National Center for Education Statistics' (NCES) community classification system (National Center for Education Statistics, 2022), most plans came from cities (n=52) or suburban areas (n=43). Twelve of the plans were county-level documents, while the rest were from cities or other single communities (see Supplementary Material for complete list of plans and additional details).

Twelve plans in our sample were from the same region in upstate New York, created by the same regional planning organization, published between 2014-2016, and were largely identical to each other. These plans all addressed justice in the same way (low recognitional justice, low distributional justice, and didn't address procedural justice or monitoring). To avoid skewing our data, we selected the largest community (Cortland, NY) to include in the remaining analysis and excluded the other 11 plans. The resulting sample for subsequent analyses is thus 101 plans.

Overall trends in justice

Overall, plans in our sample addressed recognitional and distributional justice to a greater extent than procedural justice or monitoring/evaluating justice (Figure 2-2). Though most plans addressed recognitional justice to some degree, only 26 plans described how certain groups' may be more vulnerable to climate change and explained how they assessed social vulnerability (high degree). Fifty-seven plans included details

about how they planned to implement adaptation strategies related to distributional justice (high degree). Twenty-seven plans in our sample described detailed actions to engage marginalized groups in their adaptation processes (high degree of procedural justice), and 23 plans included details about monitoring the impacts of proposed adaptation initiatives (high degree of monitoring/evaluation). In the following sections, we summarize the key findings for each dimension of justice and provide examples. We discuss trends we observed over time and based on other contextual variables in our companion piece (Authors, in prep).
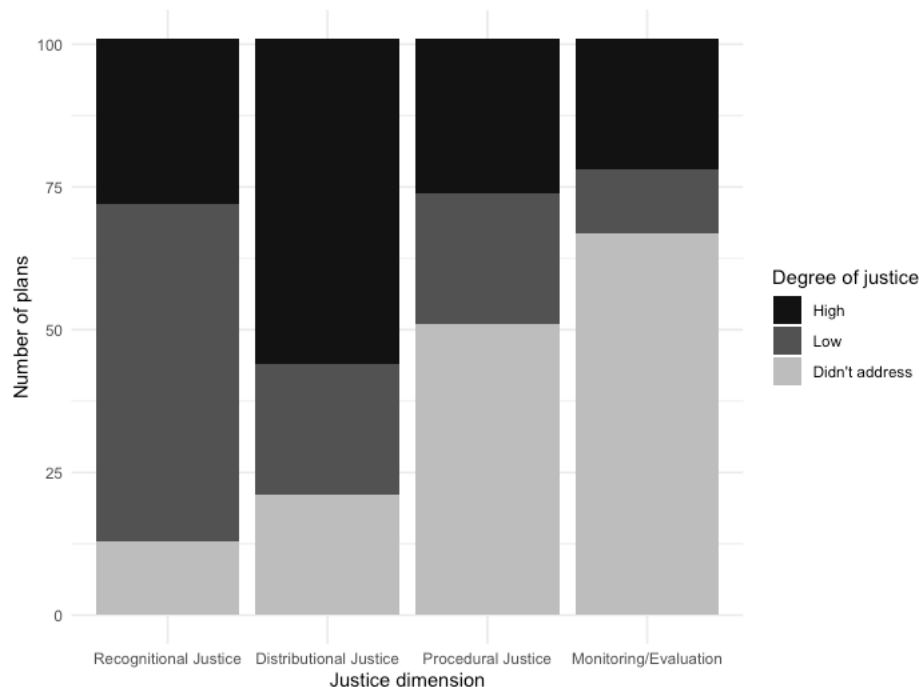
Figure 2-2: Summary scoring of the degree to which plans in our sample addressed each dimension of justice.

Elements of recognitional justice

Identification of marginalized groups

Most plans (n=88) identified specific groups that may be disproportionately impacted by climate change and described these groups as *vulnerable populations*. Some also used terms like *underserved populations*, *sensitive populations*, *disadvantaged groups*, *marginalized communities*, and *frontline communities*. Of these plans, most identified low-income (n=76), youth (n=72), older adults (n=72), people with existing medical conditions (n=64), non-English speakers (n=50), and people of color (n=46) as more vulnerable to climate impacts. Other marginalized groups included outdoor workers (n=41), unhoused people (n=33), indigenous people (n=20), renters (n=17), and pregnant women (n=13).

Marginalized groups' vulnerability to climate impacts

Of the 88 plans that identified marginalized groups, 67 documents described how specific groups may be disproportionately affected by climate impacts. The other 21 identified groups as more vulnerable to climate change but didn't describe how they may be impacted. Nearly all these plans (n=59) framed marginalized groups' vulnerability to climate change around the health impacts they may experience due to climate hazards (e.g., extreme heat, wildfire smoke). Plans mainly described older adults, youth, and those with pre-existing health conditions as more vulnerable to poor air quality caused by wildfire smoke and extreme heat events. Several plans also acknowledged that outdoor workers may be disproportionately affected by these events due to their working conditions and inability to seek shelter. Forty-three plans also described marginalized groups'

reduced capacity/resources to deal with climate-related events. Reduced capacity was most often discussed for low-income households and how they could struggle to pay higher utility bills associated with extreme heat or cold. Fewer plans (n=16) acknowledged that marginalized groups would face challenges in recovering from extreme weather events, such as rebuilding homes or recovering lost wages. Twenty-six plans described how vulnerable groups were identified, mainly through social vulnerability assessments. Most of these assessments involved mapping where marginalized groups live and work relative to climate hazards.

Existing injustices experienced by marginalized groups

Most plans (n= 78) also described existing injustices that may contribute to marginalized groups' vulnerability to climate impacts. Of these plans, 70 identified a lack of access to money, 65 highlighted a lack of access to adequate health care/services, and 50 noted a lack of access to affordable housing. Plans also noted marginalized groups' lack of access to information, healthy food, transportation, cooling, green space, and social connections. Thirty plans attributed existing injustices to discriminatory government practices, such as housing policies that pushed individuals to live near floodplains, near hazardous waste/other polluted areas, or in housing that is poorly equipped for climate hazards. This historic marginalization was most often associated with communities of color, low-income individuals, and non-English speakers. Several plans also acknowledged that marginalized groups have been historically excluded from civic engagement processes.

Elements of distributional justice

Of the plans that addressed distributional justice (n=80), most described strategies aimed at improving the health and safety of marginalized groups (n=55); making buildings used by marginalized groups more resilient (n=48); and enhancing access to jobs and educational opportunities for marginalized groups (n=42). Fewer plans described strategies that enhanced access to green infrastructure (n=33), food (n=29), or transit (n=26) for members of marginalized groups. We identified 20 types of adaptation strategies aimed at enhancing marginalized groups' access to resources, services, or other opportunities (Table 2-3). For a list of examples for each type of strategy, see additional tables in the Supplementary Material.
.

Table 2-3: Adaptation strategies related to each focus area and organized by the most and least reported strategies within each area. The number of plans that described each strategy is noted in bold.

Focus area	Most reported strategies	Least reported strategies
Health and safety	• Enhance access to emergency shelters and resources, like cooling centers or emergency toolkits **(34)** • Develop or expand services to support marginalized individuals during emergencies, like emergency alert systems or volunteer networks to check on individuals **(30)** • Consider marginalized groups' needs when developing emergency protocols, like heat response plans **(30)** • Provide access to information about health risks **(23)**	• Expand access to healthcare and health facilities **(8)**
Buildings	• Expand energy efficiency programs through targeted outreach or reduced or no-cost services for income-qualified households **(35)**	• Enact housing policies/standards that require or incentivize the development of affordable, sustainable housing **(14)** • Develop community infrastructure, like resilience hubs or using "Cool", solar reflective building materials **(12)** • Expand floodproofing programs (efforts to reduce or eliminate flood damage to buildings) through targeted outreach or reduced or no-cost services for income-qualified households **(8)**
Professional development opportunities	• Enhance access to climate education within schools or through adult education programs **(33)** • Create or expand green job programs **(24)**	• Develop community grant programs to support adaptation projects led by marginalized individuals or groups working with them **(3)**
Green infrastructure	• Expand greenspace development, like increased access to parks and urban forests **(27)** • Increase tree canopy coverage in underserved areas **(21)**	• Invest in green-blue infrastructure (natural or semi-natural features to protect against flood risks), like raingardens or wetland development **(6)**
Food	• Encourage local food production through community gardens **(21)** • Increase participation in food assistance programs **(19)**	• Develop food security policies or assessments **(7)**
Transit	• Expand access to public transportation by adding routes, installing more bus shelters, and eliminating or reducing fares **(20)**	• Enhance other transit options, like biking, walking, or neighborhood car-share programs **(10)**

Of the plans that addressed distributional justice, 57 documents included some details about the implementation of proposed adaptation strategies. These details mainly involved identifying leads and partners who would be responsible for implementing these strategies (n=45). Most included the names of relevant entities but didn't describe their roles or responsibilities. Some plans (n=19) described intentions to model new programs off existing ones or leverage existing tools during implementation. For example, several proposed expanding existing food donation or income-based weatherization programs. Fewer plans (n=12) identified specific locations for their proposed strategies, such as where to situate community gardens or cooling centers. Even fewer plans (n=4) described funding sources they intended to use to implement proposed strategies.

Twenty-four plans acknowledged that proposed strategies could create unintended negative consequences for the groups they intended to benefit. These included the potential for gentrification, associated risk of displacement, and heightened fees for public services, like utilities. However, only two plans described efforts to reduce the risks of these unintended consequences, involved offering legal and financial assistance for those facing eviction.

Elements of procedural justice

Engaging marginalized groups in plan development

While almost half of plans in our sample described their community engagement processes (n=44), only 22 plans described specific efforts to engage marginalized groups. Sixteen of those plans included details about how they engaged these groups, which included a range of strategies like online and in-person surveys, interviews, focus groups, and workshops. Several plans highlighted elements of focus groups or workshops to make these events more accessible for marginalized groups, including holding events in neighborhoods where many marginalized groups live and providing meals, stipends, and headsets for those hard of hearing. Most of these efforts focused on one-off opportunities that either informed residents about the content of these plans or solicited feedback. Only three plans described how that feedback was incorporated.

Stakeholder advisory committees were described in 13 plans. These groups were tasked with considering how adaptation strategies might harm or benefit marginalized groups. Two plans described involving community organizations that work with marginalized individuals, and three plans indicated that members of these marginalized groups were included on the committees. These plans also included few details about how these committees' feedback was integrated into the plans or how decisions were made. One exception, King County's second Climate Action Plan (WA), had a "Climate Equity Community Task Force (CECTF)" that was responsible for creating the "Sustainable Frontline and Resilient Communities" (SFRC) Chapter of the Plan and "developing the community-driven and equity-oriented climate actions represented in the SRFC section" (p. 183). This task force was composed of leaders from frontline communities, which included people of color, immigrants, refugees, indigenous groups, limited-English speakers, youth, low-income individuals, and communities with existing social and health disparities.

Engaging marginalized groups in implementing the plan

Forty-four plans in our sample described aims to engage marginalized groups in implementing the plan. Efforts for engaging marginalized groups included: 1. building partnerships, 2. engaging them in decision making, or 3. involving them in additional outreach. Only 12 of those plans included details about how marginalized groups would be engaged in implementation, rather than describing general intentions to engage these communities moving forward. A few plans also proposed a stakeholder advisory committee in the implementation phase. These plans more explicitly acknowledged bringing marginalized voices to the decision-making table to advance justice through climate adaptation actions. Apart from the advisory committee, the strategies proposed focused mainly on informing or consulting with marginalized groups during implementation.

Strategies for specific marginalized groups

While many plans identified several groups as vulnerable to climate impacts (recognitional justice), fewer described adaptation efforts targeted towards specific groups (distributional justice, n=76) or engaging them in adaptation planning or implementation (procedural justice, n=39). Distributional justice strategies focused more on enhancing access for low-income individuals (n=50), youth (n=36), non-English speakers (n-30), and older adults (n=25) than the other marginalized groups. Procedural justice approaches mainly focused on engaging youth (n=24), people of color (n=19), and non-English speakers (n=14). Engaging non-English speakers most often involved disseminating outreach materials in multiple languages or having interpreters on-hand for in-person or virtual events. Plans described a range of strategies to engage youth in plan development and implementation, which included appointing youth representatives to the local Climate Action Committee; using creative projects to solicit feedback through song, spoken word or other creative outlet; and engaging youth as "climate ambassadors" to learn more about climate adaptation strategies and then share this information with other people they know. For more information about how marginalized groups were considered in distributional and procedural justice strategies, see an additional table in the Supplementary Material.

Monitoring/evaluation

Of the 34 plans in our sample that described intentions to monitor how adaptation strategies advance justice, 23 included specific details about how they planned to track impacts, such as indicators or checklists they would use. These indicators consisted of measurable targets local governments could use to assess the benefits and costs that climate policies create for marginalized groups. Several plans also created decision-making framework tools consisting of a set of questions or checklists to consider before, during, and after implementing programs to incorporate justice concerns throughout the process. For example, Cleveland's Racial Equity Tool from their second Climate Action Plan listed five criteria to evaluate their projects, which included how strategies consider language, increase accountability, address disproportionate impacts, advance economic opportunities, and enhance neighborhood engagement for people of color (Cleveland's Climate Action Plan, 2018).

Discussion

Overall, we found that most plans in our sample addressed justice to some extent in climate adaptation planning, most commonly recognitional and distributional justice. Fewer plans addressed procedural justice or described plans to monitor how adaptation actions in the plan influence justice. We discuss the implications of these findings for future adaptation planning.

Recognitional justice

Most plans adopted a similar, broad understanding of vulnerability and who is most marginalized (low-income individuals, older adults, youth, those with pre-existing medical conditions, non-English speakers, and people of color). These findings align closely with existing literature about social vulnerability (Reckien et al., 2018; White-Newsome et al., 2018). The plans less frequently acknowledged how government policies/programs have historically discriminated against certain groups and contributed to existing injustices.

Without acknowledging past discrimination and governments' role in perpetuating these injustices, these plans may negatively influence community members' perceptions of their local government, affect future engagement in adaptation projects, and risk repeating past mistakes. Individuals who have been wronged by or excluded from historical policies may be reluctant to trust, or actively distrust, government agencies based on their past actions (Stern & Coleman, 2015). Recognizing past wrongdoings and how these policies have contributed to existing conditions can begin to help to repair feelings of distrust among impacted communities (Gillespie & Dietz, 2009; Stern & Baird, 2015). Acknowledgement of past injustices in other

sectors within these plans can also provide a way for community members to hold governments accountable for rectifying these harms (Kania et al., 2022; Zoll, 2022). Enhancing accountability and trust may be a first step towards centering justice in community processes and encouraging marginalized individuals' engagement in future projects (Kania et al., 2022). Moving forward, more local governments could couple historical analyses with their social vulnerability assessments and summarize the findings in these documents. This might involve pinpointing specific policies that have created and perpetuated injustices (Petersen, 2022). For example, Hoffman et al. (2020) assessed how current urban heat exposure may result from historical policies (i.e., redlining) and how present-day planning practices may exacerbate these conditions. Redlining is one example of a government policy from the 1930's that categorized neighborhoods where predominantly low-income, communities of color lived as "hazardous" for real estate investments, resulting in reduced access to loans, subsequent disinvestment, and segregation (Aaronson et al., 2021). Pinpointing the impacts of historical policies could inform the design of adaptation strategies, such as prioritizing adaptation projects in vulnerable, historically underserved areas.

Distributional justice

We found that attention to justice was not evenly distributed across focus areas, and we observed little consensus in the strategies proposed to advance justice (see Table 2-3), supporting the idea that no one-size-fits-all approach exists to address justice in adaptation approaches (Cannon et al. 2023). Several similar reviews of climate plans noted this uneven focus across different areas (Diezmartínez & Short Gianotti, 2022; Hess & McKane, 2021; Meerow et al., 2019), with distributional justice most commonly addressed through public health strategies (Fiack et al., 2021; Chu & Cannon, 2021). Our findings also revealed a strong focus on reducing marginalized residents' vulnerability to the health impacts of climate change, which may reflect local governments' tendency to view adaptation through a risk management/emergency response lens (Schlosberg et al., 2017). On the other hand, community members' ideas of vulnerability tend to center around improving their day-to-day needs, such as access to food and transit (Schlosberg et al., 2017). Government actors' perspectives on vulnerability may be driven by state or federal mandates or their accountabilities to other agencies, which may conflict with their accountabilities to community members and their concerns (Christensen & Ebrahim, 2006; Stern et al., 2010). Community engagement processes to develop these plans provide an opportunity to discuss relevant entities' accountabilities, identify areas of shared concern, and brainstorm a wider range of strategies that can satisfy government mandates and address the needs of marginalized individuals (Chu et al., 2016; Stern, 2018). Future research could investigate disparate attention to justice across sectors and the implications of this variation.

Reviewed plans focused more on the benefits of adaptation strategies and rarely flagged potential negative impacts, such as gentrification or exclusion from government programs/services. These negative impacts of adaptation strategies have been well documented in existing literature (Eriksen et al., 2021; Long & Rice, 2020), especially regarding green space expansion, which is often associated with gentrification, as new parks drive residents away by raising property values (Chu & Cannon, 2021; Gould & Lewis, 2018). Yet these unintended consequences are often infrequently considered in climate adaptation planning, which may result in adaptation strategies that exclude or negatively impact individuals intended to benefit from these efforts (Anguelovski et al., 2018).

Our results show that local governments also focused more on expanding existing programs or enhancing access to existing infrastructure within these plans, rather than developing new services or broader policy changes. These types of distributional justice initiatives, like expanding energy efficiency programs, could be considered *transitional* or *incremental* actions that aim to improve existing governance practices (Pelling, 2010). Existing adaptation literature increasingly calls for a shift from these incremental actions to transformative changes that address the root causes of injustices, such as policies that address food insecurity or promote sustainable, affordable housing (Pelling et al., 2015; Shi & Moser, 2021; Westman & Castán Broto, 2021). We argue that most initiatives proposed in these plans, while not addressing the root causes of injustice, can improve marginalized groups' capacity to deal with climate change and may trigger substantive changes over

time (Ajibade & Adams, 2019; Schlosberg et al., 2017). Chu et al. (2019) shared several adaptation strategies that might lead to more substantial changes over time, including increasing tree canopy coverage and retrofitting existing infrastructure, which many plans in our review highlighted. To help ensure strategies lead to transformative changes and avoid negatively impacting marginalized residents, more planning efforts can consider how proposed efforts might change existing neighborhoods (Anguelovski et al., 2018), as well as how to prevent this from happening and track impacts over time to adjust decision-making accordingly (Pelling et al., 2015).

Procedural justice

The plans we reviewed rarely explicitly acknowledged marginalized groups' involvement in plan development or implementation. When plans described engagement, it was often unclear how they involved individuals in decision-making or intended to include their input moving forward. Local governments may have engaged in more robust planning processes that weren't described in these documents, but our results align with findings from similar studies that demonstrate an increased focus on advancing justice through outcomes, rather than within the processes themselves (Chu & Cannon, 2019; Fitzgibbons & Mitchell, 2019; Meerow et al., 2019). Less attention in these documents may be devoted to procedural justice because of a tension between the urgent need to adapt and the resource-intensive and time-demanding processes that are often needed to facilitate inclusive planning (Byskov et al., 2019; Healey, 2020; Innes & Booher, 2004). These processes require patience, empathy, and time to overcome power dynamics, build trust, and develop shared understandings between community members and local government (Ansell & Gash, 2008; Schuckman, 2001). These elements can often feel at odds with the bureaucratic processes of governments (Hoover & Stern, 2014). Public officials may also discourage more robust engagement to avoid disagreements over planned initiatives and feedback that is not "scientific" or "technical" (Predmore et al., 2011). However, avoiding these discussions risks marginalizing certain voices, fostering distrust, and creating opposition to proposed strategies. To advance justice in climate adaptation planning, local governments may need to institutionalize norms that address these concerns and encourage relationship building and culturally responsive practices, create spaces for hearing community members' perspectives, and empower marginalized communities to act (Cannon et al., 2023; Schrock et al., 2022).

Stakeholder advisory boards/committees are one strategy to involve community members in more long-term, robust engagement to address environmental challenges. Several challenges exist with this approach, as it may be difficult to initiate the process due to existing distrust or conflict, select individuals that represent the interests of these marginalized groups, and ensure the wider community is aware of the planning process (Lynn & Busenberg, 1995). Schrock et al., (2022) spoke with government officials and community members (some members of marginalized groups) involved in Portland's Equity Working Group (OR) to understand how the group advanced justice in the city's Climate Action Plan Update. Participants emphasized that the committee ensured equity was considered in proposed actions. More importantly, they felt that the process enhanced feelings of efficacy, empowering them to act (Schrock et al., 2022). However, participants also noted that the plan stalled during implementation and relationships between government officials and community members dissolved, because officials prioritized other work. The findings from this study highlight the value in these types of initiatives but demonstrate that engagement may need to be viewed as long-term partnerships (Schrock et al., 2022). Future research could seek to understand how inclusive planning processes influence how justice is addressed during implementation.

Operationalizing climate justice strategies

While plans discussed some details about how they intended to implement adaptation strategies, they mainly described which organizations would be involved and less commonly outlined other concrete details (e.g., funding for projects, potential locations, existing tools/programs that could be used). Fewer plans described details about how they intended to evaluate how strategies impact marginalized groups. This aligns with findings from similar evaluations of climate adaptation plans, climate action plans, and sustainability plans

that found these documents describe broad goals with little specifics about implementation (Angelo et al., 2022; Hess & McKane, 2021; Mullenbach & Wilhelm Stanis, 2022). When it comes to implementation, we also noted less specificity in the marginalized groups that will benefit from adaptation strategies and be engaged moving forward. When they were identified, they tended to be youth, low-income individuals, and non-English speakers (see Supplementary Material). Some of these groups may be easier to engage with than others, but it is also possible that some groups acted as proxies for others that weren't explicitly noted (Brinkley & Wagner, 2022), reflecting the intersectional and overlapping nature of marginalized groups' identities (Kaijser & Kromwell, 2014).

Climate plans are often viewed as strategic documents for how local governments plan to address climate impacts (Measham et al., 2011; Long & Rice, 2019). Some argue that strategic plans should include few details to encourage creativity as conditions change (Miller & Cardinal, 1994; Mintzberg, 1990), while others advocate for more details to hold governments accountable and increase the likelihood actions will be implemented (Meerow et al., 2019; Stults & Meerow, 2017). Threading the needle between these competing challenges might require thinking about which procedures should be established ahead of time, and which should be left open and flexible. Existing literature suggests that certain implementation details (e.g., identifying lead organizations, partners, available resources, and timelines) can help ensure these plans don't sit on shelves, while avoiding pre-determined actions that might not adequately fit the context as conditions change (Bryson, 2018; Lee et al., 2018). Theory also suggests that establishing clear, shared criteria among relevant entities at the start of collaborative processes can inform how projects are adjusted and enhance trust moving forward (Fisher et al., 2011; Stern & Coleman, 2015). To demonstrate their commitment to action, municipalities could include implementation steps for each proposed strategy, as the city of Bethlehem (PA) did in their Climate Action Plan (Bethlehem's Climate Action Plan, 2021). Several other local governments also mentioned an "Implementation Plan," which they either created either in tandem with their plan or since publishing the initial document. While it was beyond the scope of this study to understand whether plans with implementation considerations and monitoring were associated with advancing justice, future research could explore the link between more detailed plans and outcomes.

Study limitations

This study has several limitations that illuminate additional opportunities for future research. Our sample only represents a segment of planning documents with content relevant to climate adaptation. Our sample is also limited to those posted by communities that have made their plans publicly available online. Instead of creating standalone climate plans, some local governments mainstream climate adaptation efforts into other community plans, like general plans, comprehensive plans, or hazard mitigation plans (Matos et al., 2022; Reckien et al., 2019). Future research could conduct a more exhaustive review of how justice considerations compare across standalone climate plans and more general planning approaches. Our research provides a snapshot of how communities are planning for climate adaptation by reviewing one piece of larger adaptation processes. Future research could better explore other facets of adaptation planning in US communities to understand how these plans translate into action and who benefits from these initiatives.

Conclusion

Climate adaptation plans provide one avenue through which local governments can consider justice as they adapt to climate impacts. Our findings summarize a range of ways local municipalities addressed justice through recognitional, distributional, and procedural approaches. While justice considerations are highly context-specific, we hope that the examples shared can provide helpful reference points for other communities looking to address justice within adaptation planning. These findings also support several considerations for developing future plans. To enhance feelings of trust, accountability, and support for adaptation planning, local governments can recognize past discriminatory policies and how these have influenced marginalized groups' vulnerability within these plans. Proposing adaptation strategies that expand existing programs/services provide municipalities with an opportunity to enhance marginalized residents'

capacity to adapt, but evidence suggests that consideration also be given during planning to how to prevent unintended negative impacts. Community engagement processes that empower marginalized voices are key to developing plans that highlight marginalized individuals' concerns, illustrate shared understandings, identify strategies that address their needs, and enhance feelings of efficacy moving forward. Local governments may need to foster internal norms that encourage inclusive planning and long-term engagement. To help ensure these plans translate into action and aren't overly prescriptive, decisionmakers could consider implementation details for each strategy, such as identifying the implementors and who they intend to benefit from these efforts.

References

Aaronson, D., Hartley, D., & Mazumder, B. (2021). The effects of the 1930s HOLC" redlining" maps. *American Economic Journal: Economic Policy*, *13*(4), 355-92.

Adger, W. N. (2016). Place, well-being, and fairness shape priorities for adaptation to climate change. *Global Environmental Change*, 38, A1-A3.

Adger, W. N., & Kelly, P. M. (1999). Social vulnerability to climate change and the architecture of entitlements. *Mitigation and adaptation strategies for global change*, *4*, 253-266.

Ajibade, I., & Adams, E. A. (2019). Planning principles and assessment of transformational adaptation: Towards a refined ethical approach. *Climate and Development*, *11*(10), 850-862.

Angelo, H., MacFarlane, K., Sirigotis, J., & Millard-Ball, A. (2022). Missing the housing for the trees: Equity in urban climate planning. *Journal of Planning Education and Research*, 0739456X211072527.

Anguelovski, I., Connolly, J., & Brand, A. L. (2018). From landscapes of utopia to the margins of the green urban life: For whom is the new green city?. *City*, *22*(3), 417-436.

Anguelovski, I., Shi, L., Chu, E., Gallagher, D., Goh, K., Lamb, Z., Reeve, K., & Teicher, H. (2016). Equity impacts of urban land use planning for climate adaptation: Critical perspectives from the global north and south. Journal of Planning Education and Research, 36(3), 333-348.

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of public administration research and theory*, *18*(4), 543-571.

Baker, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. Landscape and urban planning, 107(2), 127-136.

Bassett, E., & Shandas, V. (2010). Innovation and climate action planning: Perspectives from municipal plans. *Journal of the American planning association*, *76*(4), 435-450.

Berke, P., & Lyles, W. (2013). Public risks and the challenges to climate-change adaptation: A proposed framework for planning in the age of uncertainty. *Cityscape*, 181-208.

Berke, P., Smith, G., & Lyles, W. (2012). Planning for resiliency: Evaluation of state hazard mitigation plans under the disaster mitigation act. *Natural Hazards Review*, *13*(2), 139.

Brinkley, C., & Wagner, J. (2022). Who Is Planning for Environmental Justice—and How?. *Journal of the American Planning Association*, 1-14.

Bryson, J. M. (2018). *Strategic planning for public and nonprofit organizations: A guide to strengthening and sustaining organizational achievement*. John Wiley & Sons.

Bulkeley, H., Carmin, J., Broto, V. C., Edwards, G. A., & Fuller, S. (2013). Climate justice and global cities: Mapping the emerging discourses. *Global Environmental Change*, 23(5), 914-925.

Bulkeley, H., Edwards, G. A., & Fuller, S. (2014). Contesting climate justice in the city: Examining politics and practice in urban climate change experiments. *Global Environmental Change*, *25*, 31-40.

Byskov, M. F., Hyams, K., Satyal, P., Anguelovski, I., Benjamin, L., Blackburn, S., ... & Venn, A. (2019). An agenda for ethics and justice in adaptation to climate change. *Climate and Development*, *13*(1), 1-9.

Cannon, C., Chu, E., Natekal, A., & Waaland, G. (2023). Translating and embedding equity-thinking into climate adaptation: an analysis of US cities. *Regional Environmental Change*, *23*(1), 30.

Castán Broto, V., Oballa, B., & Junior, P. (2013). Governing climate change for a just city: challenges and lessons from Maputo, Mozambique. *Local Environment*, *18*(6), 678-704.

Chu, E., Anguelovski, I., & Carmin, J. (2016). Inclusive approaches to urban climate adaptation planning and implementation in the Global South. *Climate Policy*, *16*(3), 372-392.

Chu, E., Brown, A., Michael, K., Du, J., Lwasa, S., & Mahendra, A. (2019). Unlocking the potential for transformative climate adaptation in cities. *Background Paper prepared for the Global Commission on Adaptation, Washington DC and Rotterdam.*

Chu, E. K., & Cannon, C. E. (2021). Equity, inclusion, and justice as criteria for decision-making on climate adaptation in cities. *Current Opinion in Environmental Sustainability*, 51, 85-94.

Chu, E., & Michael, K. (2019). Recognition in urban climate justice: Marginality and exclusion of migrants in Indian cities. *Environment and Urbanization*, 31(1), 139-156.

Christensen, R. A., & Ebrahim, A. (2006). How does accountability affect mission? The case of a nonprofit serving immigrants and refugees. *Nonprofit Management and Leadership*, *17*(2), 195-209.

Diezmartínez, C. V., & Short Gianotti, A. G. (2022). US cities increasingly integrate justice into climate planning and create policy tools for climate justice. *Nature communications*, 13(1), 1-10.

EcoAdapt. (2022). Climate Adaptation Knowledge Exchange (CAKE). https://www.cakex.org/

Eriksen, S., Schipper, E. L. F., Scoville-Simonds, M., Vincent, K., Adam, H. N., Brooks, N., ... & West, J. J. (2021). Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance?. *World Development*, 141, 105383.

Fiack, D., Cumberbatch, J., Sutherland, M., & Zerphey, N. (2021). Sustainable adaptation: Social equity and local climate adaptation planning in US cities. *Cities*, 115, 103235.

Finn, D., & McCormick, L. (2011). Urban climate change plans: how holistic?. *Local Environment*, *16*(4), 397-416.

Fisher, R., Ury, W. L., & Patton, B. (2011). *Getting to yes: Negotiating agreement without giving in*. Penguin.

Fitzgibbons, J., & Mitchell, C. L. (2019). Just urban futures? Exploring equity in "100 Resilient Cities". *World development*, *122*, 648-659.

Georgetown Climate Center. (2022a). *Adaptation Clearinghouse*. https://www.adaptationclearinghouse.org/

Georgetown Climate Center. (2022b). *State Adaptation Progress Tracker.* https://www.georgetownclimate.org/adaptation/plans.html

Gillespie, N., & Dietz, G. (2009). Trust repair after an organization-level failure. *Academy of management review*, *34*(1), 127-145.

Gould, K. A., & Lewis, T. L. (2018). From green gentrification to resilience gentrification: An example from Brooklyn.

Guyadeen, D., Thistlethwaite, J., & Henstra, D. (2019). Evaluating the quality of municipal climate change plans in Canada. *Climatic Change*, *152*, 121-143.

Healey, P. (2020). *Collaborative planning: Shaping places in fragmented societies*. Bloomsbury Publishing.

Hess, D. J., & McKane, R. G. (2021). Making sustainability plans more equitable: an analysis of 50 US Cities. *Local Environment*, 26(4), 461-476.

Hoffman, J. S., Shandas, V., & Pendleton, N. (2020). The effects of historical housing policies on resident exposure to intra-urban heat: a study of 108 US urban areas. *Climate*, *8*(1), 12.

Holland, B. (2017). Procedural justice in local climate adaptation: political capabilities and transformational change. *Environmental Politics*, *26*(3), 391-412.

Hoover, K., & Stern, M. J. (2014). Team leaders' perceptions of public influence in the US Forest Service: Exploring the difference between doing and using public involvement. *Journal of Environmental Planning and Management*, *57*(2), 157-172.

Horney, J., Nguyen, M., Salvesen, D., Dwyer, C., Cooper, J., & Berke, P. (2017). Assessing the quality of rural hazard mitigation plans in the southeastern United States. *Journal of Planning Education and Research*, *37*(1), 56-65.

Hughes, S. (2015). A meta-analysis of urban climate change adaptation planning in the US. *Urban Climate*, *14*, 17-29.

Innes, J. E., & Booher, D. E. (2004). Reframing public participation: strategies for the 21st century. *Planning theory & practice*, *5*(4), 419-436.

Kaijser, A., & Kronsell, A. (2014). Climate change through the lens of intersectionality. *Environmental politics*, *23*(3), 417-433.

Kania, J., Williams, J., Schmitz, P., Brady, S., Kramer, M., & Juster, J. S. (2022). Centering equity in collective impact. *Stanford social innovation review*, *20*(1), 38-45.

Kates, R. W., Travis, W. R., & Wilbanks, T. J. (2012). Transformational adaptation when incremental adaptations to climate change are insufficient. *Proceedings of the National Academy of Sciences*, *109*(19), 7156-7161.

Klinsky, S., Roberts, T., Huq, S., Okereke, C., Newell, P., Dauvergne, P., ... & Bauer, S. (2017). Why equity is fundamental in climate change policy research. *Global Environmental Change*, 44, 170-173.

Lee, D., McGuire, M., & Kim, J. H. (2018). Collaboration, strategic plans, and government performance: The case of efforts to reduce homelessness. *Public Management Review*, *20*(3), 360-376.

Li, C., & Song, Y. (2016). Government response to climate change in China: A study of provincial and municipal plans. *Journal of Environmental Planning and Management*, *59*(9), 1679-1710.

Long, J., & Rice, J. L. (2019). From sustainable urbanism to climate urbanism. *Urban Studies*, 56(5), 992-1008.

Lynn, F. M., & Busenberg, G. J. (1995). Citizen advisory committees and environmental policy: What we know, what's left to discover. *Risk Analysis*, *15*(2), 147-162.

Malloy, J. T., & Ashcraft, C. M. (2020). A framework for implementing socially just climate adaptation. *Climatic Change*, *160*(1), 1-14.

Matos, M., Gilbertson, P., Woodruff, S., Meerow, S., Roy, M., & Hannibal, B. (2022). Comparing hazard mitigation and climate change adaptation planning approaches. *Journal of Environmental Planning and Management*, 1-21.

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, 889-909.

Meerow, S., Pajouhesh, P., & Miller, T. R. (2019). Social equity in urban resilience planning. *Local Environment*, 24(9), 793-808.

Miller, C. C., & Cardinal, L. B. (1994). Strategic planning and firm performance: A synthesis of more than two decades of research. *Academy of management journal*, *37*(6), 1649-1665.

Mintzberg, H. (1990). The design school: reconsidering the basic premises of strategic management. *Strategic management journal*, *11*(3), 171-195.

Mullenbach, L. E., & Wilhelm Stanis, S. A. (2022). Climate change adaptation plans: Inclusion of health, equity, and green space. *Journal of Urban Affairs*, 1-16.

Paavola, J., & Adger, W. N. (2006). Fair adaptation to climate change. *Ecological economics*, *56*(4), 594-609.

Pelling, M. (2010). *Adaptation to climate change: from resilience to transformation*. Routledge.

Pelling, M., O'Brien, K., & Matyas, D. (2015). Adaptation and transformation. *Climatic Change*, *133*, 113-127.

Petersen, B. (2022). Sustainable City? The Search for Social Justice in Flagstaff, Arizona's Climate Action Plan. *Justice in Climate Action Planning*, 43-57.

Phadke, R., Manning, C., & Burlager, S. (2015). Making it personal: Diversity and deliberation in climate adaptation planning. *Climate Risk Management*, *9*, 62-76.

Pörtner, H. O., Roberts, D. C., Adams, H., Adler, C., Aldunce, P., Ali, E., ... & Birkmann, J. (2022). Climate change 2022: Impacts, adaptation and vulnerability. *IPCC Sixth Assessment Report*, 37-118.

Predmore, S. A., Stern, M. J., & Mortimer, M. J. (2011). Constructing the public: the 'substantive sieve'and personal norms in US Forest Service Planning. *Journal of environmental planning and management*, *54*(3), 403-419.

Preston, B. L., Westaway, R. M., & Yuen, E. J. (2011). Climate adaptation planning in practice: an evaluation of adaptation plans from three developed nations. *Mitigation and adaptation strategies for global change*, *16*(4), 407-438.

Rawls, J. (1971). *A Theory of Justice*. Cambridge, MA: Harvard University Press.

Reckien D, Lwasa S, Satterthwaite D, McEvoy D, Creutzig F. (2018). Equity, environmental justice, and urban climate change. In: *Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network*. New York: Cambridge University Press, pp. 173–224.

Reckien, D., Salvia, M., Pietrapertosa, F., Simoes, S. G., Olazabal, M., Hurtado, S. D. G., ... & Heidrich, O. (2019). Dedicated versus mainstreaming approaches in local climate plans in Europe. *Renewable and Sustainable Energy Reviews*, 112, 948-959.

Schlosberg, D. (2004). Reconceiving environmental justice: global movements and political theories. *Environmental politics*, *13*(3), 517-540.

Schlosberg, D. (2007). *Defining environmental justice: Theories, movements, and nature*. OUP Oxford.

Schlosberg, D., & Collins, L. B. (2014). From environmental to climate justice: climate change and the discourse of environmental justice. *Wiley Interdisciplinary Reviews: Climate Change*, 5(3), 359-374.

Schlosberg, D., Collins, L. B., & Niemeyer, S. (2017). Adaptation policy and community discourse: risk, vulnerability, and just transformation. *Environmental Politics*, 26(3), 413-437.

Schrock, G., Horst, M., & Ock, Y. (2022). Incorporating an Equity Lens into Local Climate Action Planning in Portland, Oregon. In *Justice in Climate Action Planning* (pp. 79-96). Cham: Springer International Publishing.

Schuckman, M. (2001). Making the hard choices: a collaborative governance model for the biodiversity context. *Wash. ULQ*, *79*, 343.

Shi, L., Chu, E., Anguelovski, I., Aylett, A., Debats, J., Goh, K., ... & VanDeveer, S. D. (2016). Roadmap towards justice in urban climate adaptation research. *Nature Climate Change*, 6(2), 131-137.

Shi, L., & Moser, S. (2021). Transformative climate adaptation in the United States: Trends and prospects. *Science*, *372*(6549), eabc8054.

Sovacool, B. K., Linnér, B. O., & Goodsite, M. E. (2015). The political economy of climate adaptation. *Nature Climate Change*, *5*(7), 616-618.

Stern, M. J. (2018). *Social science theory for environmental sustainability: A practical guide*. Oxford University Press.

Stern, M. J., & Baird, T. D. (2015). Trust ecology and the resilience of natural resource management institutions. *Ecology and Society*, *20*(2).

Stern, M. J., Brousseau, J., O'Brien, C., Hurst, K., & Hansen, L. (2020). Climate adaptation workshop delphi study report: Facilitators' viewpoints on effective practices. *Virginia Tech: Blacksburg, VA, USA*.

Stern, M. J., & Coleman, K. J. (2015). The multidimensionality of trust: Applications in collaborative natural resource management. *Society & Natural Resources*, *28*(2), 117-132.

Stern, M. J., Predmore, S. A., Mortimer, M. J., & Seesholtz, D. N. (2010). From the office to the field: Areas of tension and consensus in the implementation of the National Environmental Policy Act within the US Forest Service. *Journal of environmental management*, *91*(6), 1350-1356.

Stults, M., & Woodruff, S. C. (2017). Looking under the hood of local adaptation plans: shedding light on the actions prioritized to build local resilience to climate change. Mitigation and Adaptation Strategies for Global Change, 22(8), 1249-1279.

Swanson, K. (2021). Equity in urban climate change adaptation planning: A review of research. *Urban planning*, 6(4), 287-297.

van den Berg, H. J., & Keenan, J. M. (2019). Dynamic vulnerability in the pursuit of just adaptation processes: a Boston case study. *Environmental Science & Policy*, *94*, 90-100.

Westman, L., & Castán Broto, V. (2021). Transcending existing paradigms: the quest for justice in urban climate change planning. *Local Environment*, *26*(5), 536-541.

White-Newsome, J., Meadows, P. & Kabel, C. (2018). Bridging Climate, Health, and Equity: A Growing Imperative. *American Journal of Public Health Perspectives*, Supplement 2; 108: S72–S73.

Woodruff, S. C., & Stults, M. (2016). Numerous strategies but limited implementation guidance in US local adaptation plans. *Nature Climate Change,* 6(8), 796-802.

Zoll, D. (2022). We Can't Address What We Don't Acknowledge: Confronting Racism in Adaptation Plans. In *Justice in Climate Action Planning* (pp. 3-23). Springer, Cham.

Supplementary material

Supplementary Table 2-1: List of analyzed climate action plans, climate adaptation plans, and climate resilience plans. Seventy-two of the documents were climate action plans with adaptation sections, 19 were climate adaptation plans, 14 were labeled as dual climate action and adaptation plans, and seven were climate resilience plans.

Community	State	Plan type*	Year	Plan
Phoenix	AZ	CAP	2021	Phoenix Climate Action Plan
Sedona	AZ	CAP	2021	Sedona Climate Action Plan
Tempe	AZ	CAP	2019	Tempe Climate Action Plan
Alameda	CA	CAP + AP	2019	Alameda Climate Action and Resiliency Plan
Albany	CA	CAP + AP	2019	Albany Climate Action and Adaptation Plan
Butte County	CA	CAP	2014	Butte County Climate Action Plan
Benicia	CA	AP	2016	City of Benicia Climate Adaptation Plan
Calimesa	CA	CAP	2014	City of Calimesa Climate Action Plan
Chula Vista	CA	AP	2011	City of Chula Vista, California Climate Adaptation Plan
Concord	CA	CAP	2013	City of Concord Climate Action Plan
Hesperia	CA	CAP	2010	City of Hesperia Climate Action Plan
Laguna Woods	CA	AP	2014	City of Laguna Woods Climate Adaptation Plan
Paso Robles	CA	CAP	2013	City of Paso Robles Climate Action Plan
San Luis Obispo	CA	CAP	2012	City of San Luis Obispo Climate Action Plan
Truckee	CA	AP	2020	Climate Ready Truckee
San Diego	CA	CRP	2021	Climate Resilient SD
Corte Madera	CA	AP	2021	Corte Madera Climate Adaptation Assessment
Del Mar	CA	CAP	2016	Del Mar Climate Action Plan
Emeryville	CA	CAP	2016	Emeryville Climate Action Plan
Encinitas	CA	CAP	2018	Encinitas Climate Action Plan
Escondido	CA	CAP	2021	Escondido Climate Action Plan
Marin County	CA	CAP	2020	Marin County Climate Action Plan 2030

Oakland	CA	CAP	2020	Oakland Equitable Climate Action Plan
Pasadena	CA	CAP	2018	Pasadena Climate Action Plan
Pismo Beach	CA	CAP	2014	Pismo Beach Climate Action Plan
Rialto	CA	AP	2021	Rialto Climate Adaptation Plan
Richmond	CA	CAP	2016	Richmond Climate Action Plan
San Anselmo	CA	CAP	2019	San Anselmo Climate Action Plan
Santa Monica	CA	CAP + AP	2019	Santa Monica Climate Action and Adaptation Plan
Santa Rosa	CA	CAP	2012	Santa Rosa Climate Action Plan
South Lake Tahoe	CA	CAP	2020	South Lake Tahoe Climate Action Plan
Union City	CA	CAP	2010	Union City Climate Action Plan
Vista	CA	CAP	2012	Vista Climate Action Plan
Watsonville	CA	CAP + AP	2021	Watsonville Climate Action and Adaptation Plan
Boulder County	CO	AP	2012	Boulder County Climate Preparedness Plan
Denver	CO	AP	2014	Denver Climate Adaptation Plan
Branford	CT	CRP	2016	Town of Branford Coastal Resilience Plan
Guilford	CT	CRP	2016	Town of Guilford Community Coastal Resilience Plan
Madison	CT	CRP	2016	Town of Madison Coastal Resilience Plan
Stratford	CT	CRP	2016	Town of Stratford Community Coastal Resilience Plan
Delaware City	DE	AP	2014	Delaware City Hazard Mitigation and Climate Adaptation Plan
District of Columbia	DC	AP	2016	Climate Ready DC
Broward County	FL	CAP	2015	Broward County Climate Action Plan
Broward County	FL	CAP	2021	Broward County Climate Action Plan
Pinecrest	FL	CAP	2016	Pinecrest Climate Action Plan
Punta Gorda	FL	AP	2019	Punta Gorda Climate Adaptation Plan
Sarasota	FL	AP	2017	Sarasota Climate Adaptation Plan

Boise	ID	CAP	2021	Boise's Climate Action Roadmap
Evanston	IL	CAP + AP	2018	Evanston Climate Action and Resiliency Plan
Northbrook	IL	CAP	2021	Northbrook Climate Action Plan
Park Forest	IL	CAP + AP	2019	Park Forest Climate Action and Resilience Plan
Bloomington	IN	CAP	2021	Bloomington Climate Action Plan
Cedar Rapids	IA	CAP	2021	Cedar Rapids Climate Action Plan
Dubuque	IA	CAP	2020	Dubuque Climate Action Plan
Iowa City	IA	CAP + AP	2018	Iowa City Climate Action and Adaptation Plan
Portland	ME	CAP + AP	2020	One Climate Future-Portland Climate Action and Adaptation Plan
Montgomery County	MD	CAP	2021	Montgomery County Climate Action Plan
Brookline	MA	CAP	2018	Brookline Climate Action Plan
Newton	MA	CAP + AP	2018	City of Newton Climate Change Vulnerability Assessment and Action Plan
Boston	MA	AP	2016	Climate Ready Boston
Salem	MA	AP	2014	Salem Climate Change Vulnerability Assessment and Adaptation Plan
Somerville	MA	CAP+AP	2018	Somerville Climate Forward Plan
Winchester	MA	CAP	2020	Winchester Climate Action Plan
Edina	MN	CAP	2021	Edina Climate Action Plan
Faribault	MN	AP	2020	Faribault Climate Adaptation Plan
Hennepin County	MN	CAP	2021	Hennepin County Climate Action Plan
Northfield	MN	CAP	2019	Northfield Climate Action Plan
Saint Paul	MN	CAP + AP	2019	Saint Paul Climate Action and Resilience Plan
Columbia	MO	CAP + AP	2019	Columbia Climate Action and Adaptation Plan
St. Louis	MO	CAP + AP	2019	St. Louis Climate Action and Adaptation Plan
Missoula	MT	AP	2020	Climate Ready Missoula

Portsmouth	NH	CRP	2013	Portsmouth, New Hampshire Coastal Resilience Initiative
Albany	NY	AP	2013	Albany Climate Change Vulnerability Assessment and Adaptation Plan
Cazenovia	NY	CAP	2015	Cazenovia Climate Action Plan
Cortland	NY	CAP	2014	Cortland Climate Action Plan
East Hampton	NY	CAP	2015	East Hampton Climate Action Plan
Fayetteville	NY	CAP	2014	Fayetteville Climate Action Plan
Huntington	NY	CAP	2015	Huntington Climate Action Plan
Jordan	NY	CAP	2014	Jordan Climate Action Plan
Minetto	NY	CAP	2015	Minetto Climate Action Plan
Minoa	NY	CAP	2015	Minoa Climate Action Plan
Montezuma	NY	CAP	2015	Montezuma Climate Action Plan
Niles	NY	CAP	2015	Niles Climate Action Plan
Oneida	NY	CAP	2014	Oneida Climate Action Plan
Owasco	NY	CAP	2015	Owasco Climate Action Plan
Red Hook	NY	CAP	2012	Red Hook Energy and Climate Action Plan
Richland	NY	CAP	2016	Richland Climate Action Plan
Rochester	NY	CRP	2019	Rochester Climate Change Resilience Plan
Skaneateles	NY	CAP	2015	Skaneateles Climate Action Plan
Suffolk County	NY	CAP	2015	Suffolk County Climate Action Plan
Chapel Hill	NC	CAP	2021	Chapel Hill Climate Action and Response Plan
Raleigh	NC	CAP	2021	Raleigh Climate Action Plan
Cleveland	OH	CAP	2013	Cleveland Climate Action Plan
Cleveland	OH	CAP	2018	Cleveland Climate Action Plan Update
Ashland	OR	CAP	2017	Ashland Climate and Energy Action Plan
Beaverton	OR	CAP	2019	Beaverton Climate Action Plan
Corvallis	OR	CAP	2016	Corvallis Climate Action Plan
Eugene	OR	CAP	2020	Eugene Climate Action Plan
Lake Oswego	OR	CAP	2020	Lake Oswego Climate Action Plan
Milwaulkie	OR	CAP	2018	Milwaukie Climate Action Plan
Portland	OR	CAP	2015	Portland Climate Action Plan
Bethlehem	PA	CAP	2021	Bethlehem Climate Action Plan

San Antonio	TX	CAP + AP	2019	Climate Ready San Antonio
Dallas	TX	CAP	2020	Dallas Environmental and Climate Action Plan
Chittenden County	VT	CAP	2014	Chittenden County Regional Climate Action Guide
Alexandria	VA	CAP	2011	Alexandria Energy and Climate Change Action Plan
Burien	WA	CAP	2021	Burien Climate Action Plan
King County	WA	CAP	2012	King County Climate Action Plan
King County	WA	CAP	2015	King County Climate Action Plan
King County	WA	CAP	2020	King County Climate Action Plan
Seattle	WA	AP	2017	Seattle Climate Preparedness Strategy
Tacoma	WA	AP	2021	Tacoma Climate Adaptation Strategy

*CAP: Climate Action Plan; AP: Climate Adaptation Plan; CAP + AP: Climate Action and Adaptation Plan; Climate Resilience Plan: CRP.

Supplementary Table 2-2: Adaptation strategies related to health and safety, as well as buildings, focused on enhancing access for marginalized groups.

Adaptation strategy	% of plans	Examples
Health and safety		
Enhance access to emergency shelters and resources	32%	• Provide access to emergency shelters or cooling centers during extreme weather events, such as within a 10-minute walk of all residents o Consider areas for pets, security, sign-language interpreters, child friendly amenities, ADA accessibility, medical assistance, back-up power, sleeping areas, drinking water, and proximity to transit • Send mobile cooling facilities into at-risk neighborhoods • Distribute disaster response toolkits, which might include masks, air filters, and sandbags
Develop emergency support systems	30%	• Create a voluntary registry of individuals who may be vulnerable during emergencies and where they live • Train community emergency response teams or volunteer networks to check on at-risk individuals during emergencies • Improve and expand emergency alert systems by providing information in multiple languages and through a variety of media channels
Create emergency response policies	30%	• Develop extreme heat response plans in coordination with marginalized groups • Amend emergency protocols to consider how you would support and evacuate members of marginalized groups
Provide access to information about health risks	23%	• Share information about the health risks of climate hazards, like wildfire smoke and extreme heat • Educate employers about ways to protect their outdoor employees from extreme heat
Improve access to healthcare	8%	• Enhance access to mental health services • Create mobile health clinics that can visit areas where marginalized groups live • Promote wellness programs that address the illnesses and conditions forecast to be exacerbated by climate changes
Buildings		
Expand energy efficiency programs	46%	• Offer free home energy audits • Leverage existing funding to provide incentives or reduce the cost of programs to weatherize buildings, such as improving insulation or installing energy efficient appliances • Conduct targeted outreach to landlords, renters, and low-income households about energy efficiency programs
Enact housing policies/standards for marginalized households	16%	• Incentivize developers to create additional affordable housing o Encourage housing near public transit • Require landlords or developers to weatherize and floodproof new affordable housing • Consider creating anti-displacement policies that provide financial assistance to marginalized individuals in danger of eviction or losing their homes
Develop resilient community infrastructure	15%	• Create resilience hubs at government facilities and trusted community centers, such as libraries and senior centers, that provide community services to meet patrons' day-to-day needs and serve them during emergencies

		• Pilot "Cool Roof", "Cool Building", and "Cool Pavement" projects in urban heat island neighborhoods
Expand floodproofing programs	10%	• Conduct targeted outreach to landlords, renters, and low-income households about floodproofing programs • Provide floodproofing audits and services at a discounted rate or no cost for low-income households and renters (e.g., sump-pumps and flood control landscaping)

Supplementary Table 2-3: Adaptation strategies related to green infrastructure and food, specifically focused on enhancing access for marginalized groups.

Adaptation strategy	% of plans	Examples
Green infrastructure		
Expand greenspace development	35%	• Increase access to parks or other greenspaces, ensuring all residents are within a 5- or 10-minute walk from these spaces • Expand path or trail development to increase access to greenspaces, prioritizing areas where marginalized groups live • Conduct an education program about how to care for green spaces
Increase tree canopy	28%	• Conduct a tree canopy assessment and prioritize tree planting in areas that score low or experience urban heat island effects • Improve forest health in areas where marginalized groups live by increasing tree maintenance efforts to sustain mature tree canopy • Expand tree maintenance and preservation through incentive-based programs
Invest in green-blue infrastructure	8%	• Incentivize green-stormwater infrastructure, like rain gardens, in underserved, flood-prone areas • Explore funding opportunities to help low- and middle-income residents benefit from drought and flood tolerant landscaping
Food		
Encourage local food production	28%	• Conduct outreach with marginalized groups to help them learn how to grow, preserve, and cook affordable, healthy meals, with a specific focus on culturally relevant food • Convert vacant lots, rooftops, or other available space to public community gardens where members of marginalized groups can grow their own food • Enhance access to commercial kitchen spaces so marginalized groups can produce food products to sell to the public
Expand participation in food assistance programs	25%	• Increase low-income patronage at farmer's markets and encourage participation in food assistance programs, such as the Supplemental Nutrition Assistance Program (SNAP) • Expand access to safety net programs, like food banks and meal programs at schools • Partner with grocery stores to create mobile shops in food deserts
Develop food security policies or assessments	9%	• Conduct food security assessments that determine where food insecure areas exist and use this information to guide strategies to improve food security • Develop food access policies to establish goals to increase food security, such as access to healthy food within a 15-min walk

Supplementary Table 2-4: Adaptation strategies related to transit and professional development opportunities specifically focused on enhancing access for marginalized groups.

Adaptation strategy	% of plans	Examples
Professional development opportunities		
Expand access to climate education	41%	• Encourage local schools to adopt a climate change education program ○ Curricula include information about local climate impacts and actions students can take to adapt • Share information about climate impacts and steps people can take to address these in culturally appropriate ways
Provide green job opportunities	30%	• Partner with local nonprofits and community organizations to develop workforce training programs aimed at developing green job skills in local sustainable agriculture, energy efficiency audits and upgrades, renewable energy, and other skills that support the goals of these plans • Expand contracting opportunities for city/county requests for proposals, with targeted outreach for minorities, women and emerging small businesses
Develop grant programs to support adaptation projects	4%	• Launch a community grant program specifically for marginalized groups or organizations supporting marginalized individuals that funds climate adaptation projects and other efforts to make the community more resilient
Transit		
Expand public transit	26%	• Identify barriers to using public transit and areas lacking transit options • Create additional public transit routes that prioritize routes serving employment centers and areas where marginalized groups live • Subsidize fares or provide no-cost public transit • Add more bus shelters along public transit routes, making them more resilient to climate hazards like extreme heat
Enhance other transit options	14%	• Implement "Safe Routes to School Programs" that aim to improve infrastructure and get more students biking and walking to schools • Consider supplementing the central transit network with neighborhood-level transportation services such as shuttles ○ Prioritize areas with a high percentage of individuals lacking other transit options • Expand neighborhood car sharing programs

Supplementary Table 2-5: Summary of how specific marginalized groups were considered in distributional and procedural justice strategies.

Marginalized group	# of plans considered each group by type of justice			Distributional justice strategies targeting each group	Procedural justice strategies targeting each group
	Recognitional	**Distributional**	**Procedural**		
Low-income	76	50	10	• Expand energy efficiency programs through targeted outreach or reduced or no-cost services for income-qualified households • Expand floodproofing programs through targeted outreach or reduced or no-cost services for income-qualified households • Enact housing policies/standards that require or incentivize the development of affordable, sustainable housing • Create or expand green job programs • Increase participation in food assistance programs • Expand access to public transportation by adding routes, installing more bus shelters, and eliminating or reducing fares	• No specific strategies mentioned beyond intent to engage this group
Youth	72	36	24	• Encourage local food production through community gardens • Enhance access to climate education within schools • Enhance other transit options, like biking, or walking	• Engage youth as members of Climate Action Committees • Share information at schools about climate plans • Use creative projects to solicit feedback through song, spoken word or other creative outlet • Engage youth as "climate ambassadors" to learn more about climate adaptation strategies and then share this information with other people they know
Older adults	72	25	4	• Develop or expand services to support marginalized individuals during emergencies, like emergency alert systems or volunteer networks to check on individuals	• No specific strategies mentioned beyond intent to engage this group

				• Expand access to public transportation by adding routes, installing more bus shelters, and eliminating or reducing fares	
People with pre-existing medical conditions	58	18	3	• Develop or expand services to support marginalized individuals during emergencies, like emergency alert systems or volunteer networks to check on individuals • Consider marginalized groups' needs when developing emergency protocols, like heat response plans • Expand access to public transportation by adding routes, installing more bus shelters, and eliminating or reducing fares	• No specific strategies mentioned beyond intent to engage this group
Non-English speakers	50	30	14	• Develop or expand services to support marginalized individuals during emergencies, like emergency alert systems or volunteer networks to check on individuals • Encourage local food production through community gardens • Enhance access to emergency shelters and resources, like cooling centers or emergency toolkits	• Sharing information via workshops by translating content into multiple languages • Eliciting feedback via surveys by translating content into multiple languages
People of color	46	14	19	• Create or expand green job programs	• No specific strategies mentioned beyond intent to engage this group

Trends in how climate adaptation plans address justice in US municipalities, 2010-2021

Abstract

Climate adaptation planning is increasingly approached locally through a social justice lens to ensure the needs of the most vulnerable are addressed. This study aims to identify trends in how recognitional, distributional, and procedural justice are considered within these plans over time and across socio-demographic contexts. We coded these forms of justice in 101 climate adaptation plans and related documents published in the United States between 2010 and 2021 and conducted a series of regressions to understand patterns over time and across contexts. Newer plans more commonly addressed each type of justice, with a marked shift in plans published after 2017. More recent plans addressed new elements of recognitional justice (e.g., historical marginalization, racial justice), a broader scope of distributional justice approaches (e.g., more strategies related to greenspaces, food, and green jobs), and more procedural justice-related initiatives to engage marginalized residents in adaptation. We also found that plans from more Republican-leaning communities considered recognitional and distributional justice to a lesser degree than those from more Democratic-leaning areas. Plans by larger communities were more likely to address procedural justice and included plans for monitoring the impacts to marginalized people. Plans from poorer communities addressed distributional justice more often and acknowledged more injustices marginalized groups may face. We observed no trends in the treatment of procedural justice related to racial demographics or poverty. We discuss potential reasons for these trends and their implications.

Keywords: climate change, social justice, climate adaptation plans, recent trends, contextual variables

Introduction

Climate adaptation discussions may happen at global, national, and regional scales, but planning for the impacts of climate change has increasingly shifted to the local level (Measham et al., 2011; Turner et al., 2003). This shift is mainly because climate effects are felt locally, and municipalities and other local actors are often responsible for responding to these impacts (Naess et al., 2005; Measham et al., 2011). As local governments in the United States prepare for climate change, some elect to create climate adaptation plans, which provide roadmaps that outline strategies to address predicted climate impacts. These plans are expected to help communities prepare for climate change and lower the cost of climate-related impacts (Preston et al., 2011). The content of these plans and strategies proposed can vary considerably, as they are shaped by the local context (Owen et al., 2020). In general, studies have shown that larger, denser, and growing cities in the US have been more likely to adopt climate adaptation policies, particularly in places with a higher number of college graduates and Democratic voters (Hultquist et al., 2017; Wood et al., 2014; Yeganeh et al., 2020). Yet other factors, such as funding, policy mandates, and the makeup of the surrounding community, also influence how communities prepare for climate change (Dilling et al., 2017; Owen et al., 2020).

Climate change is increasingly viewed through a social justice lens, as some of the most socially vulnerable and marginalized people in a community may also be most impacted by climate change (Hughes & Hoffman, 2020; Klinsky et al., 2017). Marginalized groups or residents are members of the population that may be disproportionately impacted by climate change due to current or historic inequalities, as well as existing and projected social vulnerabilities (Anguelovski et al., 2016; Reckien et al., 2018). While many definitions of social justice exist, we conceptualize social justice through the three-pronged framework popularized by Schlosberg (2007), which includes recognitional, distributional, and procedural justice, and the extent to which each type of justice has been applied to marginalized groups. *Recognitional justice* focuses on acknowledging how certain individuals or groups may be more vulnerable than others to climate change based on their race, socioeconomic status, or other factors of inequality or historical marginalization (Chu & Michael, 2019; Meerow et al., 2019). *Distributional justice* is concerned with ensuring marginalized people have

access to resources, services, infrastructure, and other opportunities within the community. Addressing distributional justice also involves considering and planning for negative impacts of climate adaptation strategies that may create new injustices or exacerbate existing conditions, like displacement or exclusion from services/programs (Anguelovski et al., 2016). *Procedural justice* aims to enable marginalized communities' participation in community processes through fair, transparent, and inclusive practices (Schlosberg, 2007), which in this context relates to the development and implementation of climate adaptation plans (Meerow et al., 2019).

Past research shows that social justice initiatives, whether or not they are climate focused, are largely context-dependent and likely shaped by existing conditions and needs of community members (van den Berg & Keenan, 2019). While federal guidance on adaptation planning is increasing (e.g., *Justice 40*), the lack of consistent guidance in the past may also have contributed to significant variation in approaches (Stults & Woodruff, 2017). Understanding trends in how social justice is addressed in climate adaptation planning can inform how discussions around government planning and policymaking are framed and how efforts to support municipal climate adaptation planning can be improved (e.g., where more resources are needed) (Shi et al., 2016). Prior evaluations of municipal adaptation planning document how justice has been considered, with less attention devoted to explaining how and why social justice considerations vary from place to place and over time (Fiack et al., 2021; Meerow et al., 2019; Mullenbach & Wilhelm Stanis, 2022). While some reviews of other forms of planning, including sustainability plans (Liao et al., 2019; Opp & Saunders, 2013), comprehensive plans (Loh & Kim, 2021), and climate mitigation plans (Diezmartínez & Short Gianotti, 2022; Hess & McKane, 2021), have sought to explain variation in considerations of social justice, we have been unable to uncover any such studies of climate adaptation plans beyond qualitative reviews that observed an increased focus on social justice over time (Fiack et al., 2021; Mullenbach & Wilhelm Stanis, 2022). To improve our understanding of what factors are associated with justice considerations in adaptation planning, we posed the following questions:

- Has attention to social justice in climate adaptation planning documents changed over time?
- What conditions (e.g., political orientation, community size, and diversity) are associated with how justice has been addressed in climate adaptation planning?

This work expands upon findings from a companion piece, where we summarize how justice was considered in climate adaptation plans, climate action plans, and climate resilience plans published within the US over the past decade (Authors, in prep). In this study, we draw upon plan details (i.e., year published) and sociodemographic data for each community and use a series of regression analyses to assess trends over time and identify other patterns in the incorporation of social justice in different contexts.

Literature Review

The existing planning literature suggests several factors that may influence how justice is considered in climate adaptation plans, including social change over time, political orientation, community size, and presence of marginalized residents. We review each below.

Potential factors influencing justice considerations

Recent support for social justice

Civic activism and grassroots support can influence the issues local governments prioritize (Fainstein, 2010). In recent years, communities in the US, especially urban centers, have experienced a rise in progressive politics and grassroots advocacy directing attention to efforts that advance justice (Krieger, 2020; Pastor et al., 2015). As these wider issues related to social justice are increasingly linked with climate change (Bulkeley, 2021), we might expect an increased focus on social justice within climate adaptation planning. There is some evidence that local actors and social movements are influencing local governments' decisions to prioritize

social justice in climate planning (Cannon et al., 2023; Fitzgerald, 2022). Recent evaluations of climate action and adaptation plans also found greater consideration of justice in newer plans, especially those published after 2017 (Diezmartínez & Short Gianotti, 2022; Fiack et al., 2021; Mullenbach & Wilhelm Stanis, 2022). Therefore, we expected that more recently published climate adaptation plans, specifically those published after 2017 as similar reviews found, would consider justice more than older plans.

Political orientation

Tackling climate change and addressing social justice are both issues more commonly prioritized by Democrats than Republicans (Dunn, 2020; Smeltz, 2020). National polls find that Republicans are less likely than Democrats to view social justice issues, like unemployment, lack of access to affordable health care, and inequitable treatment within the criminal justice system, as significant problems (Dunn, 2020). In one poll, Republican voters rated racial inequality, climate change, and income inequality as the least critical issues the country is facing, compared with Democrats who ranked these among their top issues (Smeltz, 2020). As local governments are generally influenced by the views and interests of their constituents, we expected that plans from communities with more Republican voters would address justice to a lesser degree than those from more Democratic areas.

Community size

Large, urban municipalities generally have greater capacity to support planning processes, commonly resulting in higher quality comprehensive plans (Berke & Godschalk, 2009) and stronger considerations of justice in climate action plans (Diezmartínez & Short Gianotti, 2022) and climate adaptation plans (Chu & Cannon, 2021). This capacity might include financial resources, technical expertise, dedicated staff, and access to larger support networks, which may support stronger demographic analyses or more robust community engagement efforts to advance justice in planning processes (Loh et al., 2022). Vulnerable populations may also be larger in more dense urban areas than in suburbs or towns, which may warrant greater consideration of justice (Flanagan et al., 2011). Therefore, we expected that plans from larger, urban areas with higher population density would address justice to a greater degree than those from smaller municipalities.

Presence of marginalized residents

Local governments may be more likely to address justice when more members of marginalized groups live in these communities, such as a higher percentage of people of color or low-income residents (Schrock et al., 2015). The presence of more residents of color and individuals living in poverty is commonly linked with the presence of greater disparities among residents, particularly regarding income, housing, healthcare, and other community resources/services. Communities where more members of these groups reside may be more likely to prioritize efforts that advance social justice, as community activists and nonprofits have tangible concerns to approach government officials with (Schrock et al., 2015). While reviews of climate action plans observed mixed results related to socio-economic demographics and justice (Diezmartínez & Short Gianotti, 2022; Hess & McKane, 2021), we expected that adaptation plans from communities with higher percentages of communities of color and residents living in poverty would address justice more than those from communities with fewer residents from these marginalized groups.

Methods

Data collection

We systematically reviewed climate adaptation plans, climate action plans, and climate resilience plans from communities in the United States. Specifically, we collected and reviewed planning documents that 1. focused solely on climate adaptation or included an adaptation section, 2. covered adaptation strategies across sectors, 3. focused on a specific city or county, 4. were adopted by the local government, and 5. were published between

2010-2021. We found 112 plans that met our criteria through searches on adaptation clearinghouses (Georgetown Climate Center, 2022a; Georgetown Climate Center, 2022b; EcoAdapt, 2022) and Google. Twelve plans in our sample were from the same region in New York, created by the same planning organization, published during the same time period, and addressed justice similarly. To avoid skewing our data due to this cluster of plans, we selected the largest community (Cortland, NY) to include in the remaining analysis and excluded the other 11 plans. The resulting sample for subsequent analyses is thus 101 plans.

Coding scheme

Drawing on relevant literature (Meerow et al., 2019; Schlosberg, 2007), we developed a qualitative coding scheme to identify examples of recognitional, distributional, and procedural justice. Following other studies that used frameworks to characterize plan quality (Baker et al., 2012; Guyadeen et al., 2019; Stults & Woodruff, 2017), we also coded a fourth justice theme that we called monitoring/evaluation to capture any efforts proposed to track implementation and assess how adaptation strategies influence justice. To understand how plans addressed *recognitional justice*, we tracked how plans identified groups as vulnerable to climate change, discussed the historical and continuing injustices affecting these groups, and documented how these groups will experience the impacts of climate change. To code *distributional justice* approaches, we identified any adaptation strategies that emphasized benefits to marginalized groups and coded them by the strategies or projects they were framed around (e.g., enhancing access to resources, infrastructure, economic opportunities). *Procedural justice* codes addressed the extent to which plans describe marginalized groups' engagement in plan development and implementation. We sought out examples that explicitly talked about justice and marginalized groups but also coded any examples that implicitly considered groups that may be more vulnerable to climate change.

In our companion piece to this research, we summarize the main examples of each type of justice (Authors, in prep). In this study, we examine trends over time and across contexts in how each type of justice was addressed. We assessed the extent to which each plan addressed each dimension of justice using a scoring system. Each plan received a score from zero to two for each of the four dimensions of justice. For each type of justice, plans scored a zero if that element of justice wasn't addressed, a one if the element was addressed at a broad or general level (low degree), or a two if the element included concrete details or specific implementation considerations (high degree) (see Table 1 for specific scoring descriptions). More details about the coding scheme and process can be found in our complementary article (Authors, in prep).

Data analysis

To assess trends over time and understand other conditions associated with justice considerations, we conducted a series of ordinal and binary logistic regression analyses.

Dependent variables

Each plan received a score for recognitional justice, distributional justice, procedural justice, and monitoring/evaluation ranging from 0 to 2, which served as the dependent variables of our ordinal logistic regression analyses (see Table 3-1 for more details). We also ran binary logistic regression analyses to examine the relationship between contextual variables and whether specific marginalized groups, specific injustices, and specific focal areas of distributional justice strategies were identified. This amounted to nine marginalized groups, nine identified injustices, and six focus areas, serving as dependent variables within the series of binary logistic regressions (see Supplementary Table 3-1 for complete list). We excluded renters and pregnant women from our analyses, because few plans identified these groups as more vulnerable to climate change (<20 plans). Finally, we conducted linear regression analyses to examine the relationship between contextual

variables and the number of categories of marginalized groups, injustices, and focal areas for distributional justice strategies identified in the plans.

Contextual factors/predictor variables

Table 3 describes how we operationalized the variables we expected might be associated with considerations of justice (year of publication, political orientation, population size, racial demographics, and poverty level), drawing on US Census Data, election data, and information from the plans, similar to prior studies (Hess & McKane, 2021; Loh et al., 2022; Schrock et al., 2015). To understand if existing racial demographics and level of poverty within the community were associated with justice considerations in the plans, we used the percentage of each community's population identified as groups that are often considered vulnerable to climate impacts as proxy measures (e.g., low-income, people of color). We excluded the percentage of youth, older adults, and indigenous people from this list because the percentage in each community didn't vary considerably based on the Census Data.

Table 3-1: Dependent variables in our analyses and scoring descriptions.

Dependent Variable	Scoring description
Recognitional justice	0: Does not address recognitional justice 1: Low degree: Identifies specific marginalized groups and/or describes injustices these groups are experiencing and/or describes how specific marginalized groups may be impacted by climate change 2: High degree: Describes **how** marginalized groups' vulnerability to climate change was assessed (e.g., social vulnerability assessment)
Distributional justice	0: Does not address distributional justice 1: Low degree: Describes general strategies aimed at enhancing marginalized groups' access to resources, services, and other community processes within each focus area 2: High degree: Describes details about how these strategies will be implemented, such as who will be involved, what their roles are, or how they will fund projects
Procedural justice	0: Does not address procedural justice 1: Low degree: Describes general strategies for engaging marginalized groups in developing the plan and/or implementing adaptation strategies, such as providing information about the plan or involving them in decision-making 2: High degree: Describes details about how marginalized groups were engaged in developing the plan and/or how marginalized groups will be engaged in implementation, including specific outreach and engagement strategies with specific marginalized groups.
Monitoring/evaluation	0: Does not mention plans to track or monitor how strategies are implemented and advance justice 1: Low degree: Describes general intentions to track how strategies advance justice but doesn't describe metrics to assess the impacts 2: High degree: Describes specific criteria or metrics to track the impacts of strategies and assess how they advance justice

Table 3-2: Contextual variables in our analyses.

Variable	Description/source	Range	Mean	SD
Year	Year plan was adopted	2010-2021	2017	3.18
Population size	Population estimates (US Census Bureau, 2021)	5,544.00-2,269,675.00	319,549.80	55,0147.70
Political orientation	2020 presidential election returns by county: % Republican (MIT Election Data and Science Lab, 2020)	5.40-63.70	33.88	12.04
% People living in poverty	Percentage of population living in poverty (US Census Bureau, 2021)	2.60-33.60	12.46	6.76
% People of color	Percentage of people that identified as races other than white alone (US Census Bureau, 2021)	8.80-90.80	39.79	20.74

Regression analyses

We first tested independent and dependent variables for collinearity by conducting Spearman Rank bivariate correlation tests (see the Supplementary Material for the correlation matrix). We then examined temporal trends among the dependent variables through four ordinal logistic regressions (i.e., one for each justice dimension) and three linear regressions examining the predictive abilities of plan year on the number of marginalized groups, specific injustices, and focus areas of adaptation strategies identified in each plan. We conducted binary logistic regressions with each of the variables in Table 3-2 to examine trends in their presence in plans over time. We ran ordinal logistic regression analyses using the polR function through the MASS package in R and used the logit link function for the linear and binary logistic regression analyses. We also ran chi-square tests to assess if each type of distributional justice strategy (n=20) was identified more in recent plans (i.e., those published between 2018-2021) than in earlier ones (i.e., those published between 2010-2017). To minimize the likelihood of false positives, we report a Bonferroni correction for these analyses ($p < 0.0025$).

We then ran additional regression analyses controlling for year to test whether any other contextual variables were independently predictive of justice considerations. This entailed two series of regression analyses. The first examined the relative predictive ability of each form of justice included in relation to year. The second examined the relative predictive ability of each of the contextual variables in Table 3-2 in relation to year. The set of analyses involved 24 distinct binary logistic regressions. To minimize the likelihood of false positives, we report a Bonferroni correction for these analyses ($p < 0.002$).

Results

Trends over time

More recent plans in our sample addressed each dimension of justice more often and to a higher degree: recognitional justice ($\beta = 0.441$, $p < .001$), distributional justice ($\beta = 0.684$, $p < .001$), procedural justice ($\beta = 0.673$, $p < .001$), and monitoring/evaluation ($\beta = 0.588$, $p < .001$) (see Figure 3-1 to visualize trends over time). Of the 50 plans that addressed procedural justice, most (n=39) were published after 2017. Similarly, 28 of the 34 plans that included justice-related monitoring/evaluation were published after 2017. In the following sections, we expand on trends over time related to each of the four justice themes.
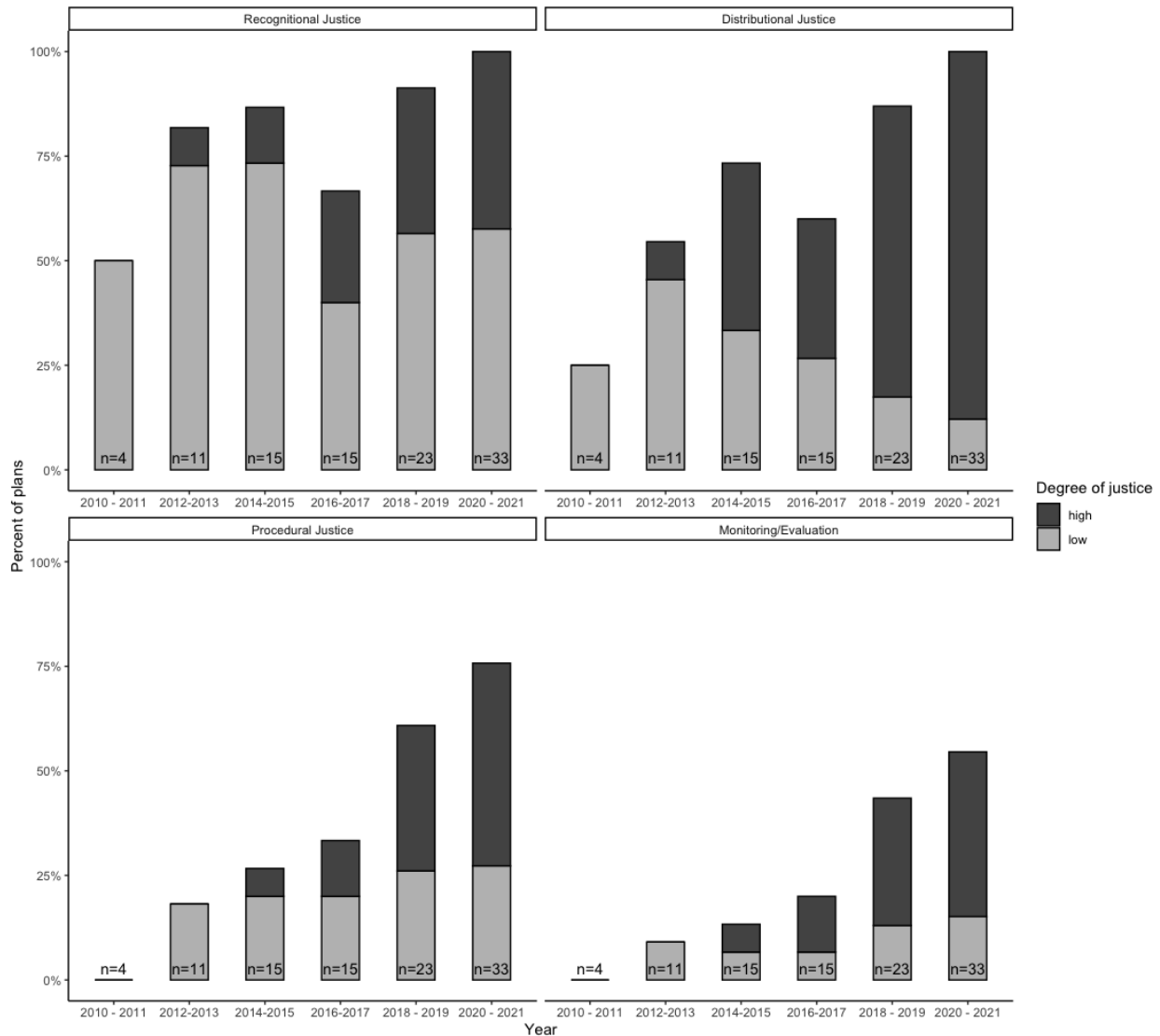
Figure 3-1: Summary scoring of the degree to which plans addressed recognitional justice, distributional justice, procedural justice, and monitoring/evaluation.

Recognitional justice

We observed that local governments recognized significantly more groups as marginalized over time (β = 1.297, p <.001). Plans published between 2010-2017 (n=45) identified an average of four marginalized groups, whereas plans from 2018-2021 (n=56) recognized an average of eight groups. We also found that plans published more recently were significantly more likely to identify low-income individuals, people of color, non-English speakers, outdoor workers, and unhoused individuals as more vulnerable to climate change (Table 3-3). Youth was identified by more plans over time, but this finding was only marginally significant. The increased recognition of people of color as more vulnerable to climate impacts is particularly acute. Before 2015, none of the plans in our sample described people of color as more vulnerable to climate impacts. However, from 2015 onwards, plans began to note the disproportionate impacts facing people of color, with more than 70% of the plans from 2019-2021 identifying them as vulnerable.

We also found that more recent plans acknowledged significantly more injustices that marginalized groups face that may exacerbate their vulnerability to climate change (β = 0.751, p <.001). Plans published between 2010-2017 recognized an average of two such injustices, compared with an average of five addressed in plans

43

from 2018-2021. More recently published plans were significantly more likely to acknowledge some injustices we identified in the review, including marginalized groups' lack of access to money, housing, transit, and green infrastructure. More plans over time recognized marginalized groups' lack of access to food, information, and social connections, but these relationships were only marginally significant. Only plans published since 2017 discussed how historical policies created these injustices.

Table 3-3: Binary logistic regression results of year regressed on the acknowledgement of marginalized groups, injustices, and distributional justice focus areas. Variables with an asterisk (*) indicate statistical significance beyond the Bonferroni correction threshold (p < 0.002). We share the standardized beta coefficients (β), standard errors, and p values for each model.

Elements of justice	Number of plans that acknowledged each element (n=101)	Predictor	β	SE	p
Marginalized groups					
Low-income individuals*	76	Year	0.724	0.299	<.001
Older adults	72	Year	0.220	0.221	0.071
Youth	72	Year	0.315	0.227	0.012
People with pre-existing medical conditions	64	Year	0.230	0.211	0.049
Non-English speakers*	51	Year	0.632	0.263	<.001
People of color*	46	Year	1.058	0.372	<.001
Outdoor workers*	41	Year	0.595	0.271	<.001
Unhoused individuals*	33	Year	0.600	0.297	<.001
Indigenous people*	20	Year	1.159	0.600	<.001
Injustices					
Lack of access to money*	70	Year	0.549	0.251	<.001
Lack of access to healthcare	65	Year	0.160	0.209	.164
Lack of access to housing*	50	Year	0.585	0.255	<.001
Lack of access to transit*	39	Year	0.54	0.26	<.001
Lack of access to information	30	Year	0.308	0.249	.025
Lack of access to social connections	22	Year	0.396	0.301	.017
Lack of access to food	22	Year	0.498	0.326	.006
Lack of access to cooling	21	Year	0.283	0.283	.069
Lack of access to green infrastructure*	20	Year	0.830	0.456	<.001
Focus areas of distributional justice strategies					
Health and safety*	55	Year	0.424	0.227	<.001
Buildings*	48	Year	0.472	0.238	<.001
Professional development opportunities*	42	Year	0.660	0.283	<.001
Green infrastructure*	33	Year	1.086	0.440	<.001
Food*	29	Year	0.833	0.381	<.001
Transit*	26	Year	0.932	0.437	<.001

Distributional justice

More recent plans were significantly more likely to identify approaches that enhance access for marginalized individuals across all six focus areas we identified: health and safety, green infrastructure, food, buildings, transit, and professional development opportunities (Table 3-4). Within each of these focus areas, we identified 20 distinct adaptation strategies and tracked their appearance in plans over the years. Linear regression reveals a significant trend in addressing a larger number of strategies per plan over time ($\beta = 0.694$, $p < .001$). Plans from 2010-2017 identified an average of two strategies, whereas plans published between 2018-2021 described an average of six. Only 36 of the 101 plans included five or more types of adaptation strategies, with most of these plans (n=32) published in 2018 and onwards. When plans published in 2017 and beforehand described adaptation strategies related to justice, they were mainly related to providing access to emergency services, health information, climate education programs, and energy efficiency and flood retrofitting programs. During this period, few plans addressed strategies aimed at enhancing marginalized individuals' access to food, green infrastructure, and transit. While each type of strategy was addressed by a larger share of plans after 2017, five strategies were identified by significantly more plans published from 2018-2021, which includes projects aimed at enhancing access to green jobs, enhancing access to public transit, developing community gardens, developing housing policies, and expanding greenspace development.

Table 3-4: Summary of the number of plans that addressed each type of distributional justice strategy and the percentage of those plans that were published after 2017. Each adaptation strategy listed below was only coded as a distributional justice approach if the strategy focused on enhancing marginalized group's or residents' access to resources, services, or other opportunities. The number of plans published after 2017 that addressed each strategy is in parentheses. Within our sample, 45 plans were published between 2010-2017 and 56 plans were published between 2018-2021. Variables with an asterisk (*) indicate statistical significance beyond the Bonferroni correction threshold (p < 0.0025).

Type of distributional justice strategy	# plans identifying each strategy	% of plans published from 2010-2017 that addressed each strategy	% of plans published from 2018-2021 that addressed each strategy	χ^2	p
Health and safety					
Enhance access to emergency shelters and resources	34	22% (10)	43% (24)	5.765	0.016
Develop or expand services to support marginalized individuals during emergencies	30	16% (7)	41% (23)	8.533	0.003
Consider marginalized groups' needs when developing emergency protocols	30	22% (10)	36% (20)	3.333	0.068
Provide access to information about health risks	23	11% (5)	32% (18)	7.348	0.007
Expand access to healthcare and health facilities	8	2% (1)	13% (7)	4.500	0.034
Buildings					
Expand energy efficiency programs	35	20% (9)	46% (26)	8.257	0.004
Enact housing policies/standards that require or incentivize the development of affordable, sustainable housing*	14	2% (1)	23% (13)	10.286	0.001
Develop community infrastructure, like resilience hubs or using "Cool", solar reflective building materials	12	4% (2)	18% (10)	5.333	0.021
Expand floodproofing programs (efforts to reduce or eliminate flood damage to buildings)	8	4% (2)	11% (6)	2.000	0.157

Professional development opportunities					
Enhance climate education within schools or adult education programs	33	16% (7)	46% (26)	8.758	0.003
Create or expand green jobs*	24	7% (3)	38% (21)	13.500	<.001
Develop community grant programs to support adaptation projects led by marginalized individuals or groups working with them	3	0% (0)	5% (3)	3.000	0.083
Green infrastructure					
Expand greenspace development*	27	7% (3)	43% (24)	16.333	<.001
Increase tree canopy coverage	21	9% (4)	30% (17)	8.048	0.005
Invest in green-blue infrastructure (natural or semi-natural features to protect against flood risks)	6	0% (0)	11% (6)	6.000	0.014
Food					
Encourage local food production through community gardens*	21	0% (0)	38% (21)	21.000	<.001
Increase participation in food assistance programs	19	7% (3)	29% (16)	8.895	0.003
Develop food security policies or assessments	7	0% (0)	13% (7)	7.000	0.008
Transportation					
Expand access to public transportation*	20	2% (1)	34% (19)	16.200	<.001
Enhance other transit options, like biking or walking	10	4% (2)	14% (8)	3.600	0.058

Procedural justice

Plans published from 2018 and onwards were significantly more likely to engage marginalized groups in plan development (χ^2= 14.727, p <.001). Similarly, plans published after 2017 were also significantly more likely to describe aims to engage marginalized groups in implementing the plan (χ^2= 14.696, p <.001).

Monitoring/evaluation

We observed a similar trend over time in plans that described efforts to monitor/evaluate plan implementation and justice impacts; significantly more plans describing these efforts were published from 2018-2021 (χ^2= 14.235, p <.001).

Influence of context and engagement factors

Table 3-5 shows the results of regression models for each justice dimension regressed on contextual variables. We found that year remained the most significant predictor of how plans addressed each dimension of justice, even after accounting for communities' political characteristics, size, and racial and socio-economic diversity. However, population size exerted an independent effect on procedural justice elements, with procedural justice and monitoring/evaluation addressed to a greater extent in larger communities. Also, plans from areas with larger proportions of Republican voters were less likely to address recognitional and distributional justice, regardless of the year of the plans.

We also explored the relationship between contextual variables and the identification of marginalized audiences and the social justice issues they face, as well as the focus areas of distributional justice strategies. We found that all models passed the Bonferroni correction (model p value < .002), apart from those that assessed the relationship between contextual variables and plans' identification of youth as a marginalized group and injustices related to marginalized individuals' access to transit, information, social connections, food, and cooling. We summarize the statistically significant findings in Table 3-6 (see Supplementary Material for complete statistical results).

Year, again, was the most consistent predictor of each element, typically accounting for most of the explained variance in each plan element. However, additional variance was predicted by political orientation and the percentage of people living in poverty for some elements. Controlling for year, plans from more Republican areas identified fewer marginalized groups, described fewer injustices these groups may face, and identified a narrower range of distributional justice strategies. Specifically, plans from these communities were less likely to identify low-income individuals, older adults, people with pre-existing medical conditions, non-English speakers, and people of color as marginalized groups. They were also less likely to acknowledge the following social injustices: lack of access to money; lack of access to healthcare; and lack of access to housing. Plans from more Republican areas were also less likely to include strategies that enhance marginalized groups' access to health services/resources and professional development opportunities, but these relationships were only marginally significant (.01 < p < .05).

Overall, plans from communities with higher poverty levels identified more injustices marginalized individuals may face and addressed more focus areas through the distributional justice strategies they proposed related to climate adaptation. Plans from areas with a higher percentage of low-income residents were more likely to note lack of access to money, food, and green infrastructure as specific injustice issues, as well as describe adaptation strategies that enhance access to food, green infrastructure, and health and safety programs. These plans were also more likely to identify low-income individuals as marginalized. Population size and the proportion of people of color living in these communities had little influence on how these additional elements of justice were considered. Plans from communities with larger populations and higher proportions of people of color were more likely to contain strategies related to food access once the effects of the year of the plan were accounted for, but this effect was marginal (.01 < p < .05).

Table 3-5: Ordinal logistic regression results testing for relationships between contextual variables and how justice themes were addressed. Each ordinal dependent variable is each type of justice that was coded into three categories. Plans received either a zero if that element of justice wasn't addressed, a one if the code was addressed at a broad or general level (low degree), or a two if the code was addressed and included concrete details or implementation considerations (high degree). We share the standardized beta coefficients (β), standard errors, and p values for each variable in each model, as well Nagelkerke's Pseudo-R² and p value for each model.

Independent variables	Models											
	Recognitional justice			Distributional justice			Procedural justice			Monitoring/evaluation		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p
Year	0.540	0.247	<.001	0.740	0.247	<.001	0.712	0.268	<.001	0.611	0.290	<.001
Population size	-0.042	0.221	0.729	0.002	0.222	0.988	0.278	0.228	0.027	0.264	0.225	0.034
% Republican	-0.496	0.251	<.001	-0.334	0.252	0.017	-0.173	0.216	0.146	-0.097	0.240	0.464
% People of color	0.112	0.239	0.396	-0.047	0.267	0.750	-0.045	0.273	0.767	-0.045	0.281	0.770
% People living in poverty	0.222	0.225	0.073	0.329	0.254	0.019	-0.001	0.238	0.988	0.132	0.251	0.341
Nagelkerke Pseudo-R²	0.355			0.427			0.367			0.270		
Model p value	<.001			<.001			<.001			<.001		

Table 3-6: Summary of statistically significant relationships within regression analysis between contextual variables and justice themes in reviewed plans. See Supplementary Material for complete regression results. A single + signifies p < 0.05, double ++ signifies p < 0.01, and triple +++ signifies p < 0.001. Variables with an asterisk (*) indicate statistical significance beyond the Bonferroni correction threshold for the p value of each model (p < 0.002).

Justice element	Year	Population size	% Republican	% People of color	% People living in poverty
Marginalized groups identified					
Total number of marginalized groups identified	+++		++		
Identification of specific groups					
Low-income individuals*	+++		++		+
Older adults*			+++		
Youth	+				
People with pre-existing medical conditions*	+		+++		
Non-English speakers*	+++		+		
People of color*	+++		+		
Outdoor workers*	+++				
Unhoused individuals*	+++				
Indigenous people*	+++	+			
Injustices addressed					
Total number of injustices addressed	+++		+++		+
Addressed marginalized individuals' lack of access to…					
Money*	+++		++		+
Healthcare*			+++		
Housing*	+++		++		
Transit	+++				
Information	+				
Social connections	+				
Food	++				+
Cooling					
Green infrastructure*	+++				++
Focus areas of distributional justice strategies					
Total number of focus areas addressed	+++		+		++
Described distributional justice strategies in specific focus areas					
Health and safety*	+++		+		+
Buildings*	+++				
Professional development opportunities*	+++		+		
Green infrastructure*	+++				+
Food*	+++	+		+	++
Transit*	+++				

Discussion

We examined trends in how justice has been addressed in official climate adaptation-focused planning documents published between 2010 and 2021. Overall, we found that the year plans were published was the most consistent predictor of an increase in attention to justice elements within these documents. We also observed that plans from communities with a higher proportion of Republican voters addressed recognitional and distributional justice to a lesser extent. Plans from communities with larger populations were more likely to address procedural justice and include monitoring and evaluation relevant to justice outcomes. Plans from areas with a higher proportion of low-income residents addressed distributional justice to a greater extent. We discuss possible reasons why we observed these trends and the implications for future adaptation planning by drawing on the literature.

Trends over time

Similar to other recent evaluations of climate adaptation plans and climate action plans (Diezmartínez & Short Gianotti, 2022; Fiack et al., 2021; Mullenbach & Wilhelm Stanis, 2022), we observed that more recent plans addressed all types of justice to a greater degree, even after accounting for other conditions within each community. Specifically, we observed that plans published after 2017 were more likely to consider recognitional justice (historical marginalization, focus on racial justice), engage marginalized individuals in adaptation work, and describe plans to monitor the justice-related impacts of adaptation strategies. Our findings also show that more recent plans have broadened their idea of who is most vulnerable to climate change, originally centering around older adults, youth, and people with pre-existing medical conditions and more recently expanding to include additional groups, like low-income individuals, people of color, and outdoor workers. More recent plans also propose a wider array of adaptation strategies to enhance marginalized individuals' capacity to prepare for climate change, such as improving access to green jobs or community gardens.

This broadened definition of marginalized groups and scope of distributional justice strategies may be a result of engaging more voices in plan development (i.e., increase in procedural justice over time). Existing theory suggests that inclusive planning processes can elicit knowledge from a wide range of residents, generate a broader set of outcomes, encourage buy-in for these initiatives, and help ensure that programs do not perpetuate injustices (Ajibade & Adams, 2019; Byskov, 2019; Healey, 2020; Innes & Booher, 2004). These trends are consistent with growing attention to the disproportionate impacts of climate change on marginalized populations and shifting norms within municipal climate planning over time to engage those who will be most impacted (Cannon et al., 2023; Fiack et al., 2021). The COVID-19 pandemic and growth of the Black Lives Matter movement in 2020, which have ignited national calls for justice and transformative action, may further strengthen these trends (Henrique & Tschakert, 2020).

Our findings may also suggest that local governments are learning from broader networks providing knowledge about social justice-focused climate planning (Lioubimtseva, 2022). Membership within global and regional climate networks, such as 100 Resilient Cities, C40 Cities Climate Leadership Group, or the Global Covenant of Mayors, may shape how local leaders or planners consider justice in adaptation planning (Cannon et al., 2023). These networks provide a forum where municipalities can share ideas and learn from what other communities are doing. Cannon et al. (2023) found that membership within national and regional municipal climate networks has played a role in building norms around justice in climate adaptation planning, although grassroots movements seemed to exert an even larger influence. Our research did not assess the influence of membership in these networks. This presents an area for potential future research. We might expect to see stronger considerations of social justice, as more communities learn from each other and take advantage of the growing body of climate justice literature (Diezmartínez & Short Gianotti, 2022).

Political context

Beyond this more recent focus on social justice, we also found that politics may play a role in adaptation planning and the extent to which the most marginalized residents are considered in these efforts. Specifically, we found that plans from communities with more Republican voters described a narrower range of marginalized people, injustices they may encounter, and distributional justice initiatives. This narrower focus may be driven by residents' interests, as Republican voters tend to oppose social justice efforts and commonly prioritize approaches that may conflict with these initiatives, such as cuts to social services or anti-immigration policies (Dunn, 2020; Thomas, 2018). It is also possible that to avoid potential opposition, planners from these Republican-leaning communities may have addressed social justice but reframed these strategies within their planning documents to avoid explicit language around justice themes. For example, other studies have shown that planners in politically conservative communities have reframed climate strategies to align with residents' values, emphasizing cost-saving measures and public health benefits (Foss &

Howard, 2015; Frick, 2014; Foss, 2018a), which could be considered distributional justice approaches depending on who these initiatives benefit.

As climate-related planning and social justice concerns become increasingly polarized, planners are often forced to contend with the partisan perspectives of elected officials and concerns of the public (Foss, 2018a; Klein et al., 2022; Liao et al., 2020). Prior research suggests that planners may be insufficiently prepared to address controversial issues and engage community members in productive dialogues that legitimize their interests, identify areas of shared concern, and frame initiatives around issues they care about, especially in politically conservative areas (Foss, 2018a; Foss, 2018b; Meerow & Mitchell, 2017; Trapenberg Frick et al., 2015).

Population size

We also found that plans from larger communities (in terms of population size) addressed procedural justice and monitoring/evaluation to a somewhat greater degree than plans from smaller municipalities. Previous studies have not reported a strong association between the size of communities and extent to which they have addressed justice within their climate action plans and sustainability plans, perhaps because these evaluations involved a smaller sample of plans from the largest cities in the US (Diezmartínez & Short Gianotti, 2022; Hess & McKane, 2021). Smaller municipalities may lack the funding and staff to facilitate robust community engagement processes and to implement monitoring programs (Innes & Booher, 2004; Lioubimtseva & da Cunha, 2020). In smaller communities, there may also be a smaller network of community-based organizations, which local governments often rely on to connect with marginalized groups (Lioubimtseva & da Cunha, 2022), making it more challenging to engage them in plan development and implementation. Larger cities may have access to more opportunities to learn about what other municipalities are doing to engage marginalized individuals, as they are often members of national adaptation networks (Lioubimtseva, 2022; Woodruff, 2018). Our findings provide support for more attention to developing and targeting capacity-building resources to smaller cities, suburban areas, and rural communities to help them advance justice within planning processes, as well as more broadly support their climate adaptation planning.

Presence of marginalized residents

Our results suggest that the presence of higher levels of poverty influences the type of adaptation strategies proposed and injustices considered. Similar to other evaluations of climate and sustainability plans (Diezmartínez & Short Gianotti, 2022; Liao et al., 2019; Schrock et al., 2015), we found no clear relationship between racial demographics and justice considerations. While many city governments are starting to acknowledge their histories of racism and oppression (Diezmartínez & Short Gianotti, 2022), the link between low-income residents' capacity and their vulnerability to climate change may be more tangible to address through adaptation strategies than systemic racism. Although a greater presence of communities of color and low-income households likely influence governments' adaptation and justice initiatives, it seems as if neither element is sufficient alone to influence how adaptation planning processes are conducted (i.e., procedural justice). Existing disparities provide community activists or nonprofits with concerns to advocate for, but authors of similar reviews argue that other factors need to be in place to spur local governments to adopt more just processes (Liao et al., 2019; Schrock et al., 2015). In their review of sustainability plans, Liao et al. (2019) found that collaboration across government departments, an existing vision around justice and equity, and greater fiscal capacity were more influential on a city's adoption of justice-related goals than racial or income diversity. Our research did not evaluate the influence of these elements of government capacity. This presents another area to explore in future research.

Study limitations

Our selection criteria led primarily to the inclusion of documents from large, urban areas and suburban communities, with few plans from smaller towns or rural communities, as classified by the National Center for Education Statistics' (NCES). Previous research suggests that smaller communities typically incorporate climate adaptation planning into other community plans, like general plans, comprehensive plans, or hazard mitigation plans, which may explain the imbalance in our sample (Matos et al., 2022; Reckien et al., 2019). Our sample is also limited to plans that are publicly available online. Our analyses were driven by theory and relevant literature. Other potential contextual variables of interest might include other geographic factors, whether external consultants were engaged, the existence of policy mandates, prior climate-related events, and budgetary information of communities as a potential measure of capacity. Perhaps most importantly, the study focused only on written plans. We did not account for other elements of climate adaptation planning not captured within these written documents. Case-study research involving interviews with planners and those involved in preparing these documents could inform our understanding of how justice is advanced (or not) through local climate adaptation efforts.

Conclusion

Our results suggest that several factors are related to justice considerations, yet we cannot fully explain why some local governments addressed social justice more than others as they prepare for climate change. Our findings demonstrate that local climate adaptation plans have been including social justice considerations more in recent years. Our findings also reveal that conditions within these communities may influence how local governments consider justice in their adaptation approaches. Areas with a greater proportion of Republican voters have included justice considerations to a lesser extent than others, and areas with greater population size have tended to address procedural justice to a greater extent in their plans. The results suggest that politics play a meaningful role in whether and how much social justice issues are considered in climate adaptation planning. They also suggest that greater attention towards providing resources and capacity building for smaller communities may help to develop more robust community engagement processes that advance justice considerations and empower residents to act. The presence of existing income disparities among residents may bring justice concerns to the forefront, but these conditions alone are insufficient to encourage procedural justice.

References

Ajibade, I., & Adams, E. A. (2019). Planning principles and assessment of transformational adaptation: Towards a refined ethical approach. *Climate and Development*, *11*(10), 850-862.

Anguelovski, I., Shi, L., Chu, E., Gallagher, D., Goh, K., Lamb, Z., Reeve, K., & Teicher, H. (2016). Equity impacts of urban land use planning for climate adaptation: Critical perspectives from the global north and south. Journal of Planning Education and Research, 36(3), 333-348.

Baker, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. Landscape and urban planning, 107(2), 127-136.

Berke, P., & Godschalk, D. (2009). Searching for the good plan: A meta-analysis of plan quality studies. *Journal of planning literature*, *23*(3), 227-240.

Byskov, M. F., Hyams, K., Satyal, P., Anguelovski, I., Benjamin, L., Blackburn, S., ... & Venn, A. (2019). An agenda for ethics and justice in adaptation to climate change. *Climate and Development*, *13*(1), 1-9.

Bulkeley, H. (2021). Climate changed urban futures: environmental politics in the anthropocene city. *Environmental Politics*, *30*(1-2), 266-284.

Cannon, C., Chu, E., Natekal, A., & Waaland, G. (2023). Translating and embedding equity-thinking into climate adaptation: an analysis of US cities. *Regional Environmental Change*, *23*(1), 30.

Chu, E. K., & Cannon, C. E. (2021). Equity, inclusion, and justice as criteria for decision-making on climate adaptation in cities. *Current Opinion in Environmental Sustainability*, 51, 85-94.

Chu, E., & Michael, K. (2019). Recognition in urban climate justice: Marginality and exclusion of migrants in Indian cities. *Environment and Urbanization*, 31(1), 139-156.

Diezmartínez, C. V., & Short Gianotti, A. G. (2022). US cities increasingly integrate justice into climate planning and create policy tools for climate justice. *Nature communications*, 13(1), 1-10.

Dilling, L., Pizzi, E., Berggren, J., Ravikumar, A., & Andersson, K. (2017). Drivers of adaptation: Responses to weather-and climate-related hazards in 60 local governments in the Intermountain Western US. *Environment and Planning A: Economy and Space*, *49*(11), 2628-2648.

Dunn, A. (2020). As the U.S. copes with multiple crises, partisans disagree sharply on severity of problems facing the nation. *Pew Research*. https://www.pewresearch.org/fact-tank/2020/07/14/as-the-u-s-copes-with-multiple-crises-partisans-disagree-sharply-on-severity-of-problems-facing-the-nation/

EcoAdapt. (2022). Climate Adaptation Knowledge Exchange (CAKE). https://www.cakex.org/

Fainstein, S. S. (2010). *The just city*. Cornell University Publishing.

Fiack, D., Cumberbatch, J., Sutherland, M., & Zerphey, N. (2021). Sustainable adaptation: Social equity and local climate adaptation planning in US cities. *Cities*, 115, 103235.

Flanagan, B. E., Gregory, E. W., Hallisey, E. J., Heitgerd, J. L., & Lewis, B. (2011). A social vulnerability index for disaster management. *Journal of homeland security and emergency management*, *8*(1).

Foss, A. (2018a). Divergent responses to sustainability and climate change planning: The role of politics, cultural frames and public participation. *Urban Studies*, 55(2), 332-348.

Foss, A. W. (2018b). Planning and climate change: Opportunities and challenges in a politically contested environment. *Planning Theory & Practice*, *19*(4), 604-608.

Foss, A. W., & Howard, J. (2015). The other end of the spectrum: Municipal climate change mitigation planning in the politically conservative Dallas–Fort Worth region. *Environment and planning C: government and policy*, 33(6), 1412-1431.

Frick, C. M. (2014). Climate planning in politically conservative cities: a case study of seven climate action plans.

Georgetown Climate Center. (2022a). *Adaptation Clearinghouse*. https://www.adaptationclearinghouse.org/

Georgetown Climate Center. (2022b). *State Adaptation Progress Tracker*. https://www.georgetownclimate.org/adaptation/plans.html

Guyadeen, D., Thistlethwaite, J., & Henstra, D. (2019). Evaluating the quality of municipal climate change plans in Canada. *Climatic Change*, *152*, 121-143.

Healey, P. (2020). *Collaborative planning: Shaping places in fragmented societies*. Bloomsbury Publishing.

Henrique, K. P., & Tschakert, P. (2021). Pathways to urban transformation: From dispossession to climate justice. *Progress in Human Geography*, *45*(5), 1169-1191.

Hess, D. J., & McKane, R. G. (2021). Making sustainability plans more equitable: an analysis of 50 US Cities. *Local Environment*, 26(4), 461-476.

Hughes, S., & Hoffmann, M. (2020). Just urban transitions: Toward a research agenda. *Wiley Interdisciplinary Reviews: Climate Change*, 11(3), e640.

Hultquist, A., Wood, R. S., & Romsdahl, R. J. (2017). The relationship between climate change policy and socioeconomic changes in the US Great Plains. *Urban Affairs Review*, *53*(1), 138-174.

Innes, J. E., & Booher, D. E. (2004). Reframing public participation: strategies for the 21st century. *Planning theory & practice*, *5*(4), 419-436.

Klein, N. J., Ralph, K., Thigpen, C., & Brown, A. (2022). Political partisanship and transportation reform. *Journal of the American Planning Association*, *88*(2), 163-178.

Klinsky, S., Roberts, T., Huq, S., Okereke, C., Newell, P., Dauvergne, P., ... & Bauer, S. (2017). Why equity is fundamental in climate change policy research. *Global Environmental Change*, 44, 170-173.

Krieger, N. (2020). ENOUGH: COVID-19, structural racism, police brutality, plutocracy, climate change—and time for health justice, democratic governance, and an equitable, sustainable future. *American Journal of Public Health*, *110*(11), 1620-1623.

Liao, L., Warner, M. E., & Homsy, G. C. (2019). Sustainability's forgotten third E: what influences local government actions on social equity?. *Local Environment*, *24*(12), 1197-1208.

Liao, L., Warner, M. E., & Homsy, G. C. (2020). When do plans matter? Tracking changes in local government sustainability actions from 2010 to 2015. *Journal of the American Planning Association*, *86*(1), 60-74.

Lioubimtseva, E. (2022). The role of inclusion in climate vulnerability assessment and equitable adaptation goals in small American municipalities. *Discover Sustainability*, 3(1), 3.

Lioubimtseva, E., & Da Cunha, C. (2020). Local climate change adaptation plans in the US and France: Comparison and lessons learned in 2007-2017. *Urban Climate*, 31, 100577.

Lioubimtseva, E., & da Cunha, C. (2022). Community engagement and equity in climate adaptation planning: experience of small-and mid-sized cities in the United States and in France. *Justice in climate action planning*, 257-276.

Loh, C. G., Ashley, A. J., Durham, L., & Bubb, K. (2022). Our Diversity is Our Strength: Explaining Variation in Diversity, Equity, and Inclusion Emphasis in Municipal Arts and Cultural Plans. *Journal of the American Planning Association*, *88*(2), 192-205.

Loh, C. G., & Kim, R. (2021). Are we planning for equity? Equity goals and recommendations in local comprehensive plans. *Journal of the American Planning Association*, *87*(2), 181-196.

Matos, M., Gilbertson, P., Woodruff, S., Meerow, S., Roy, M., & Hannibal, B. (2022). Comparing hazard mitigation and climate change adaptation planning approaches. *Journal of Environmental Planning and Management*, 1-21.

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*, 889-909.

Meerow, S., & Mitchell, C. L. (2017). Weathering the storm: The politics of urban climate change adaptation planning. *Environment and Planning A: Economy and Space*, *49*(11), 2619-2627.

Meerow, S., Pajouhesh, P., & Miller, T. R. (2019). Social equity in urban resilience planning. *Local Environment*, 24(9), 793-808.

MIT Election Data and Science Lab. (2020). *County Presidential Election Returns.* https://electionlab.mit.edu/data

Mullenbach, L. E., & Wilhelm Stanis, S. A. (2022). Climate change adaptation plans: Inclusion of health, equity, and green space. *Journal of Urban Affairs*, 1-16.

Naess, L. O., Bang, G., Eriksen, S., & Vevatne, J. (2005). Institutional adaptation to climate change: flood responses at the municipal level in Norway. *Global Environmental Change*, *15*(2), 125-138.

Opp, S. M., & Saunders, K. L. (2013). Pillar talk: local sustainability initiatives and policies in the United States—finding evidence of the "three E's": economic development, environmental protection, and social equity. *Urban Affairs Review*, *49*(5), 678-717.

Owen, G. (2020). What makes climate change adaptation effective? A systematic review of the literature. *Global Environmental Change*, *62*, 102071.

Pastor Jr, M., Benner, C., & Matsuoka, M. (2015). *This could be the start of something big: How social movements for regional equity are reshaping metropolitan America.* Cornell University Press.

Preston, B. L., Westaway, R. M., & Yuen, E. J. (2011). Climate adaptation planning in practice: an evaluation of adaptation plans from three developed nations. *Mitigation and adaptation strategies for global change*, *16*, 407-438.

R Core Team. (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.

Reckien D, Lwasa S, Satterthwaite D, McEvoy D, Creutzig F. (2018). Equity, environmental justice, and urban climate change. In: *Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network*. New York: Cambridge University Press, pp. 173–224.

Reckien, D., Salvia, M., Pietrapertosa, F., Simoes, S. G., Olazabal, M., Hurtado, S. D. G., ... & Heidrich, O. (2019). Dedicated versus mainstreaming approaches in local climate plans in Europe. *Renewable and Sustainable Energy Reviews*, 112, 948-959.

Schlosberg, D. (2007). *Defining environmental justice: Theories, movements, and nature*. OUP Oxford.

Schrock, G., Bassett, E. M., & Green, J. (2015). Pursuing equity and justice in a changing climate: Assessing equity in local climate and sustainability plans in US cities. *Journal of Planning Education and Research*, *35*(3), 282-295.

Shi, L., Chu, E., Anguelovski, I., Aylett, A., Debats, J., Goh, K., ... & VanDeveer, S. D. (2016). Roadmap towards justice in urban climate adaptation research. *Nature Climate Change*, *6*(2), 131-137.

Smeltz, D. (2020). Republican Views on Racial Inequality Starkly Contrast Those of Democrats. *Global Affairs.* https://globalaffairs.org/research/public-opinion-survey/republican-views-racial-inequality-starkly-contrast-those-democrats

Stults, M., & Woodruff, S. C. (2017). Looking under the hood of local adaptation plans: shedding light on the actions prioritized to build local resilience to climate change. Mitigation and Adaptation Strategies for Global Change, 22(8), 1249-1279.

Thomas, J. M. (2018). Planning Contexts in a Hyper-Polarized World. *PLANNING THEORY & PRACTICE*, *19*(4), 593-598.

Trapenberg Frick, K., Weinzimmer, D., & Waddell, P. (2015). The politics of sustainable development opposition: State legislative efforts to stop the United Nation's Agenda 21 in the United States. *Urban Studies*, *52*(2), 209-232.

Turner, B. L., Kasperson, R. E., Matson, P. A., McCarthy, J. J., Corell, R. W., Christensen, L., ... & Schiller, A. (2003). A framework for vulnerability analysis in sustainability science. *Proceedings of the national academy of sciences*, *100*(14), 8074-8079.

US Census Bureau. (2021). *Quick facts.* https://www.census.gov/quickfacts/fact/table/US/PST045222

van den Berg, H. J., & Keenan, J. M. (2019). Dynamic vulnerability in the pursuit of just adaptation processes: a Boston case study. *Environmental Science & Policy*, *94*, 90-100.

Wood, R. S., Hultquist, A., & Romsdahl, R. J. (2014). An examination of local climate change policies in the Great Plains. *Review of Policy Research*, *31*(6), 529-554.

Woodruff, S. C. (2018). City membership in climate change adaptation networks. *Environmental Science & Policy*, 84, 60-68.

Yeganeh, A. J., McCoy, A. P., & Schenk, T. (2020). Determinants of climate change policy adoption: A meta-analysis. *Urban Climate*, *31*, 100547

Supplementary material

Supplementary Table 3-1: Summary of codes for marginalized groups, injustices they experience, and focus areas of distributional justice strategies.

	Marginalized groups identified	Injustices experienced by marginalized groups	Focus areas of distributional justice strategies
Description	Members of the population that may be disproportionately impacted by climate change due to existing social vulnerabilities and current or historic inequalities	Reasons that may contribute to marginalized groups' increased vulnerability to climate change	Scope of sectors addressed by adaptation strategies aimed at advancing justice
Categories	- Low-income individuals - Older adults - Youth - People with pre-existing medical conditions (e.g., those with disabilities, asthma, or other chronic conditions) - Non-English speakers (e.g., immigrants and refugees) - People of color - Outdoor workers (e.g., farmers, construction workers) - Unhoused individuals - Indigenous people	Lack of access to… - Money - Healthcare - Affordable housing - Transportation - Information - Social connections - Food - Cooling - Green infrastructure	- Health and safety - Buildings - Professional development opportunities - Green infrastructure - Food - Transit

Supplementary Figure 3-1: Correlation plot of contextual variables.
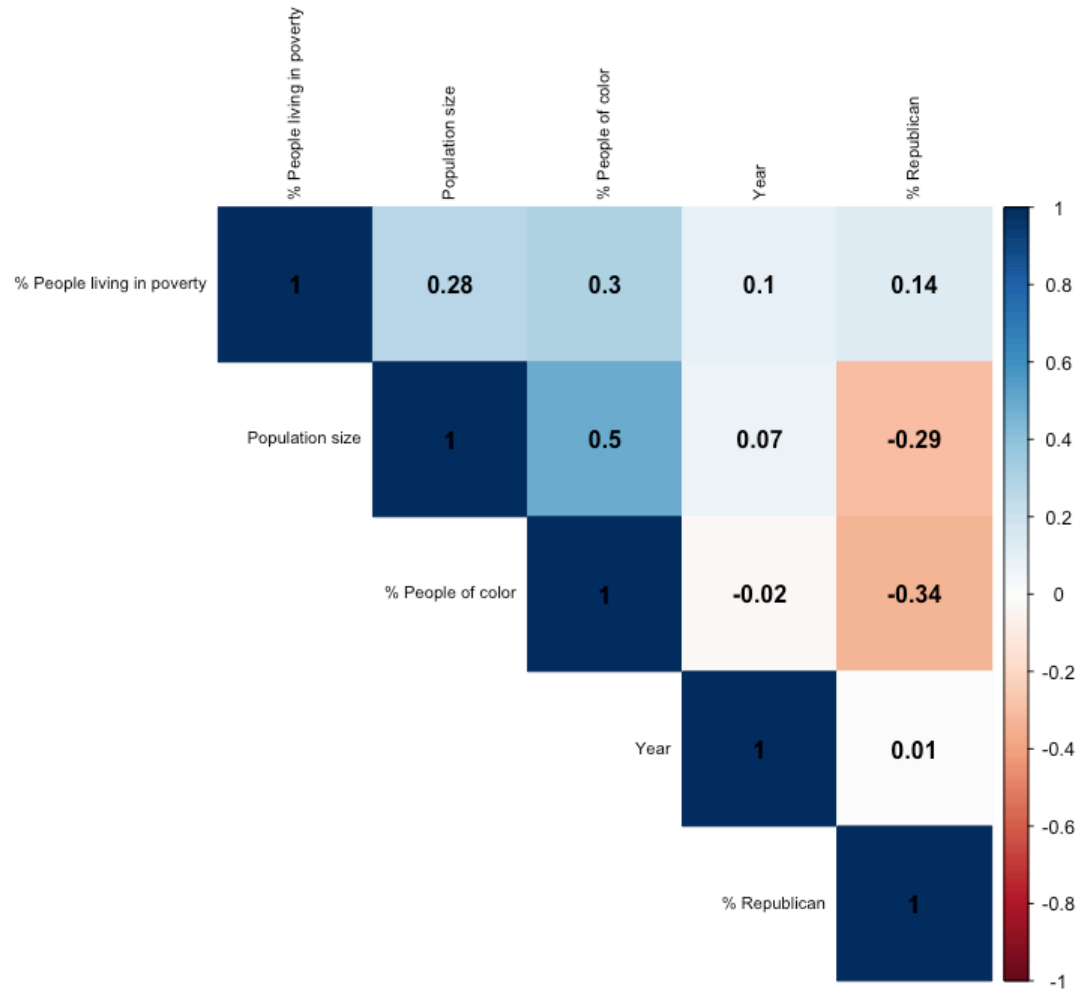
Supplementary Table 3-2: Linear regression results testing for relationships between contextual variables and the total number of marginalized groups identified, injustices addressed, and focus areas of distributional justice strategies identified. We share the standardized beta coefficients (β), standard errors, and p values for each variable in each model, as well an adjust R², F statistic, and p value for each model.

Independent variables	Models								
	# marginalized groups identified			# injustices addressed			# focus areas of distributional justice strategies identified		
	β	SE	p	β	SE	p	β	SE	p
Year	1.305	0.316	<.001	0.740	0.216	<.001	0.683	0.139	<.001
Population size	-0.044	0.334	0.813	0.147	0.228	0.246	0.101	0.147	0.217
% Republican	-0.623	0.340	0.001	-0.454	0.233	<.001	-0.199	0.150	0.018
% People of color	-0.004	0.363	0.986	-0.114	0.248	0.410	-0.044	0.16	0.620
% People living in poverty	0.313	0.332	0.090	0.313	0.227	0.014	0.246	0.146	0.003
Adjusted R²	0.396			0.352			0.484		
F statistic	14.130			11.860			19.750		
Model p value	<.001			<.001			<.001		

Supplementary Table 3-3: Binary logistic regression results testing for relationships between contextual variables and marginalized groups identified. Variables with an asterisk (*) indicate statistical significance for the model beyond the Bonferroni correction threshold (p < 0.002). We share the standardized beta coefficients (β), standard errors, and p values for each variable in each model, as well Nagelkerke's Pseudo-R² and p value for each model.

Independent variables	Models														
	Low-income individuals*			Older adults*			Youth			People with pre-existing medical conditions*			Non-English speakers*		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p
Year	0.838	0.346	<.001	0.277	0.251	0.045	0.341	0.242	0.010	0.334	0.255	0.018	0.681	0.280	<.001
Population size	-0.115	0.303	0.491	-0.014	0.274	0.928	0.100	0.278	0.513	-0.099	0.260	0.492	-0.167	0.263	0.250
% Republican	-0.546	0.363	0.006	-0.588	0.305	<.001	-0.235	0.264	0.106	-0.715	0.318	<.001	-0.305	0.258	0.032
% People of color	-0.057	0.376	0.782	0.039	0.302	0.816	0.076	0.292	0.636	0.207	0.313	0.229	-0.098	0.286	0.536
% People living in poverty	0.422	0.361	0.034	0.274	0.304	0.102	0.295	0.292	0.067	0.346	0.313	0.045	0.046	0.256	0.746
Number of observations	Acknowledged: 76 Didn't acknowledge: 25			Acknowledged: 72 Didn't acknowledge: 29			Acknowledged: 72 Didn't acknowledge: 29			Acknowledged: 64 Didn't acknowledge: 37			Acknowledged: 51 Didn't acknowledge: 50		
Nagelkerke Pseudo-R²	0.484			0.302			0.212			0.428			0.350		
Model p value	<.001			<.001			0.006			<.001			<.001		
Independent variables	Models														
	People of color*			Outdoor workers*			Unhoused individuals*			Indigenous people*					
	β	SE	p	β	SE	p	β	SE	p	β	SE	p			

Year	1.170	0.423	<.001	0.636	0.283	<.001	0.616	0.303	<.001	1.327	0.643	<.001			
Population size	0.115	0.316	0.508	-0.277	0.292	0.085	-0.058	0.262	0.686	0.476	0.357	0.016			
% Republican	-0.390	0.301	0.019	0.066	0.252	0.632	-0.157	0.253	0.260	-0.336	0.356	0.087			
% People of color	-0.196	0.345	0.303	0.122	0.284	0.436	0.067	0.280	0.663	-0.297	0.398	0.176			
% People living in poverty	0.289	0.323	0.105	-0.044	0.243	0.740	0.090	0.251	0.515	-0.122	0.366	0.546			
Number of observations	Acknowledged: 46 Didn't acknowledge: 55			Acknowledged: 41 Didn't acknowledge: 60			Acknowledged: 33 Didn't acknowledge: 68			Acknowledged: 20 Didn't acknowledge: 81					
Nagelkerke Pseudo-R²	0.567			0.288			0.258			0.493					
Model p value	<.001			<.001			<.001			<.001					

Supplementary Table 3-4: Binary logistic regression results testing for relationships between contextual variables and injustices identified. Variables with an asterisk (*) indicate statistical significance for the model beyond the Bonferroni correction threshold (p < 0.002). We share the standardized beta coefficients (β), standard errors, and p values for each variable in each model, as well Nagelkerke's Pseudo-R² and p value for each model.

Independent variables	Models														
	Lack of access to money*			Lack of access to healthcare*			Lack of access to housing*			Lack of access to transit			Lack of access to information		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p
Year	0.625	0.278	<.001	0.218	0.238	0.098	0.662	0.287	<.001	0.551	0.270	<.001	0.320	0.255	0.023
Population size	-0.011	0.276	0.941	-0.079	0.248	0.562	0.224	0.261	0.121	-0.058	0.249	0.671	0.077	0.231	0.546
% Republican	-0.444	0.302	0.008	-0.570	0.287	<.001	-0.429	0.268	0.004	-0.175	0.242	0.191	-0.243	0.256	0.085
% People of color	0.029	0.329	0.875	0.160	0.291	0.321	-0.239	0.296	0.143	-0.040	0.270	0.787	0.064	0.264	0.661
% People living in poverty	0.416	0.328	0.021	0.279	0.287	0.078	0.174	0.267	0.238	0.043	0.242	0.748	0.128	0.240	0.332
Number of observations	Acknowledged: 70 Didn't acknowledge: 31			Acknowledged: 65 Didn't acknowledge: 36			Acknowledged: 50 Didn't acknowledge: 51			Acknowledged: 39 Didn't acknowledge: 62			Acknowledged: 30 Didn't acknowledge: 71		
Nagelkerke Pseudo-R²	0.406			0.319			0.388			0.232			0.155		
Model p value	<.001			<.001			<.001			0.002			0.039		
Independent variables	**Models**														

	Lack of access to social connections			Lack of access to food			Lack of access to cooling			Lack of access to green infrastructure*					
	β	SE	p	β	SE	p	β	SE	p	β	SE	p			
Year	0.413	0.312	0.016	0.533	0.348	0.006	0.302	0.300	0.068	0.998	0.545	<.001			
Population size	-0.046	0.294	0.776	0.148	0.264	0.309	0.155	0.268	0.293	0.321	0.317	0.067			
% Republican	-0.191	0.274	0.207	-0.227	0.291	0.157	-0.276	0.285	0.079	-0.252	0.331	0.167			
% People of color	-0.148	0.305	0.379	-0.075	0.309	0.658	-0.367	0.346	0.055	-0.352	0.386	0.098			
% People living in poverty	0.094	0.261	0.512	0.315	0.277	0.039	0.151	0.266	0.302	0.541	0.351	0.005			
Number of observations	Acknowledged: 22 Didn't acknowledge: 79			Acknowledged: 22 Didn't acknowledge: 79			Acknowledged: 21 Didn't acknowledge: 80			Acknowledged: 20 Didn't acknowledge: 81					
Nagelkerke Pseudo-R²	0.132			0.233			0.143			0.408					
Model p value	0.107			0.005			0.085			<.001					

Supplementary Table 3-5: Binary logistic regression results testing for relationships between contextual variables and types of distributional justice strategies identified. Variables with an asterisk (*) indicate statistical significance for the model beyond the Bonferroni correction threshold (p < 0.002). We share the standardized beta coefficients (β), standard errors, and p values for each variable in each model, as well Nagelkerke's Pseudo-R² and p value for each model.

Independent variables	Models								
	Health and safety*			Buildings*			Professional development opportunities*		
	β	SE	p	β	SE	p	β	SE	p
Year	0.447	0.239	<.001	0.485	0.243	<.001	0.720	0.305	<.001
Population size	0.086	0.237	0.510	0.068	0.239	0.606	-0.131	0.270	0.377
% Republican	-0.303	0.247	0.026	-0.151	0.239	0.253	-0.356	0.266	0.015
% People of color	-0.130	0.272	0.385	0.061	0.269	0.679	0.029	0.293	0.857
% People living in poverty	0.298	0.262	0.039	0.213	0.245	0.113	0.168	0.265	0.251
Number of observations	Acknowledged: 55 Didn't acknowledge: 46			Acknowledged: 48 Didn't acknowledge: 53			Acknowledged: 42 Didn't acknowledge: 59		
Nagelkerke Pseudo-R²	0.264			0.253			0.378		
Model p value	<.001			<.001			<.001		
Independent variables	Models								
	Green infrastructure*			Food*			Transit*		
	β	SE	p	β	SE	p	β	SE	p
Year	1.127	0.457	<.001	0.976	0.437	<.001	1.015	0.485	<.001
Population size	0.246	0.311	0.151	0.372	0.313	0.031	0.134	0.291	0.402
% Republican	-0.074	0.280	0.632	-0.101	0.287	0.524	-0.279	0.301	0.093
% People of color	-0.230	0.328	0.203	-0.460	0.375	0.026	-0.053	0.318	0.762
% People living in poverty	0.189	0.297	0.247	0.495	0.324	0.006	0.281	0.304	0.093
Number of observations	Acknowledged: 33 Didn't acknowledge: 68			Acknowledged: 29 Didn't acknowledge: 72			Acknowledged: 26 Didn't acknowledge: 75		
Nagelkerke Pseudo-R²	0.474			0.454			0.408		
Model p value	<.001			<.001			<.001		

Enabling factors and constraints for advancing justice through climate adaptation: Evidence from 25 US municipalities implementing climate plans

Abstract

Local governments are increasingly considering how to support marginalized residents that may be disproportionately impacted by climate change. Recent reviews of climate adaptation plans have focused on how these documents consider social justice, with little follow-up to examine how initiatives are implemented. To understand how US municipalities are implementing these plans and addressing social justice, we interviewed employees from 25 communities across a range of contexts that published a plan between 2017 and 2020. We conceptualized social justice through the three-pronged framework of recognitional, distributional, and procedural justice. We asked government employees charged with implementing these plans about the adaptation initiatives their organization has implemented, how they have addressed each type of justice, how they have engaged marginalized groups within these initiatives, and what factors have enabled or hindered them from advancing justice. We found that most local governments had started to implement adaptation strategies aimed at benefiting marginalized groups, but it is still early to assess impacts. Most initiatives engaged marginalized groups at the lower end of the spectrum of participation, stopping short of collaboration or empowerment. Several factors emerged that enabled municipalities to advance justice: formal leadership support, community support, actions to remove barriers to participation, relevance to marginalized residents' lives, boundary spanning, trust building, and capacity building. As other municipalities prepare for climate change, our findings suggest several considerations for advancing social justice and examples of approaches taken by other governments.

Keywords: social justice, climate adaptation, implementation, procedural justice, community engagement

Introduction

Since communities began preparing for climate change roughly two decades ago, local municipalities across the US are increasingly embarking on adaptation planning processes (Moser et al., 2017; Woodruff & Stults, 2016). As defined by the Intergovernmental Panel on Climate Change (IPCC), climate adaptation is "the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities" (IPCC, 2014). Climate adaptation processes can take many forms, but typically involve assessing climate hazards for a certain area, identifying the community's associated vulnerabilities, and developing strategies to address them. Vulnerability is often considered as either biophysical, or the impacts an entity may experience when exposed to climate hazards, or social, which is the focus of this study. Social vulnerability involves how susceptible individuals are to climate impacts based on existing social, economic, and political factors (Adger & Kelly, 1999). Municipalities develop climate adaptation plans both to identify climate vulnerabilities and to develop and articulate strategies to address these impacts (Woodruff & Stults, 2016).

Climate adaptation is increasingly viewed as a social justice issue, as climate change will disproportionately impact some people and exacerbate existing issues of inequality (Hughes, 2020; Shi et al., 2016). We use the term *marginalized groups* to refer to members of the population that may be disproportionately impacted by climate change due to existing social vulnerabilities and current or historic inequalities (Anguelovski et al., 2016; Reckien et al., 2018). Recently, scholars have focused on understanding how social justice is considered in climate adaptation plans (Authors, in prep; Fiack et al., 2021; Mullenbach & Wilhelm Stanis, 2022). Initial reviews found that the first wave of plans published before 2010 acknowledged social justice concerns but rarely addressed these through proposed actions (Bulkeley et al., 2013). Plans published within the past few years have placed greater emphasis on strategies intended to benefit marginalized communities (Fiack et al.,

2021) and described greater engagement of marginalized people in adaptation planning processes (Authors, in prep).

While these documents provide a reference point for understanding how US municipalities are preparing for climate change, there has been little research to understand how proposed initiatives are implemented and advance social justice (Westman & Castán Broto, 2021). When research has assessed adaptive actions, studies have mainly focused on how social justice has been considered when implementing specific programs, like projects that enhance access to green infrastructure (Anguelovski et al., 2018; Shokry et al., 2020). Other studies have assessed how social justice was addressed within a single or handful of case studies (Guadaro et al., 2020; Nguyen & Leichenko, 2022) or considered in climate mitigation efforts (Hughes, 2019; McKendry, 2016; Stein & McKendry, 2023). To understand how social justice is addressed as local governments implement actions, we conducted interviews in 25 communities that published a recent climate adaptation, climate action, or climate resilience plan. We aimed to address these research questions:

- How are local governments addressing social justice as they implement their climate adaptation plans?
- What factors enable and constrain local government officials to address social justice as they implement these plans?

Literature review

Social justice framework

Early definitions of social justice focused mainly on how fairly goods and benefits are distributed among society (Rawls, 1971). In the context of climate adaptation, more recent definitions acknowledge that justice also involves recognizing the links between existing injustices and climate vulnerabilities, as well as engaging marginalized residents in adaptation efforts (Holland, 2017; Schlosberg & Collins, 2014). To adopt a more holistic approach to climate justice, we draw on the three-dimensional theory of justice popularized by Schlosberg (2007), which includes recognitional, distributional, and procedural justice.

Recognitional justice

Recognitional justice acknowledges the historical and current systems that have created injustices, which may prevent marginalized communities from accessing benefits or participating in government programs/services Bulkeley, 2013; Schlosberg, 2004). In the context of climate adaptation, this type of justice focuses on certain individuals' or groups' vulnerability to climate change based on their race, socioeconomic status, age, physical ability, or other elements of their identity (Chu & Michael, 2019; Meerow et al., 2019). How communities consider who is most at-risk informs the strategies they propose, as well as decisions about who to involve in implementing these projects. Communities often determine residents' vulnerability to climate change through social vulnerability assessments (Wood et al., 2021). At their most basic level, social vulnerability assessments evaluate how elements of groups' identities (e.g., age, race, income, ability, pre-existing medical conditions, etc.) may influence how different populations could be impacted by different climate hazards. These assessments often include socio-demographic data for their communities and maps that overlay where marginalized groups live in relation to climate hazards (Fischer et al., 2013).

Distributional justice

Distributional justice focuses on enhancing marginalized groups' access to goods, services, infrastructure, and other opportunities within their communities (Meerow et al., 2019). Examples of adaptation projects targeted towards marginalized residents might include the development of infrastructure (e.g., green space, cooling centers, public transit), outreach programs to enhance social support networks, and educational efforts to raise awareness about the health risks imposed by climate change (Bulkeley et al., 2014; Castán Broto et al.,

2013; Preston et al., 2011). Distributional justice also considers how members of marginalized communities may be negatively impacted by climate adaptation (Anguelovski et al., 2016; Swanson, 2021), as some adaptation projects can exacerbate existing vulnerabilities or create new sources of vulnerability (Eriksen et al., 2021). Unanticipated impacts of climate adaptation planning may include segregation, gentrification, displacement, and inequitable access to infrastructure (Anguelovski et al., 2016; Long & Rice, 2019; Sovacool et al., 2015).

Procedural justice

Procedural justice entails fair, transparent, and inclusive practices (Schlosberg, 2007). In our conceptualization of procedural justice, we focus solely on how marginalized groups have been engaged in adaptation processes. Centering procedural justice by engaging marginalized groups can help ensure adaptation efforts address existing injustices, enhance the legitimacy of decisions, and increase the likelihood of long-term success in implementing adaptation projects (Byskov, 2019; Paavola & Adger, 2006; Guyadeen et al., 2019). If local governments exclude marginalized people from these processes, they risk losing support for adaptation initiatives from the most impacted groups or developing projects that reinforce existing social vulnerabilities or result in negative consequences (Adger, 2016; Anguelovski et al., 2016; Shi et al., 2016).

Trust-building has been described as an important element for collaborative processes (Dirks, 1999), especially for engaging community members (Innes & Booher, 2004). Trust and justice are inherently linked, as trust may inform how just something is perceived to be, while a just relationship between parties may also be conceived as a precondition for trust (Lewicki et al., 2005; Saif et al., 2022). Trust is an individual's willingness to accept vulnerability to another entity in the face of uncertainty (Mayer et al., 1995; Stern & Coleman, 2015). Distrust involves an active negative expectation or emotion associated with a potential trustee (Coleman & Stern, 2018). Stern and colleagues (Stern & Baird, 2015; Stern & Coleman, 2015) propose four dimensions of trust: dispositional, rational, affinitive, and systems-based. *Dispositional trust* is the pre-existing disposition of an individual to trust or distrust other entities. This type of trust serves as the foundation from which other forms may develop through collaborative processes (Stern & Baird, 2015). *Rational trust* is based on the perceived likelihood of a positive outcome resulting from the actions of another entity. This type of trust can be built by exhibiting prior examples of success or competence that could result in benefits for the trustor (Stern, 2018). *Affinitive trust* stems from an affinity towards another entity, which can be generated by shared positive experiences, membership in the same groups, an assumption of shared values, or other positive feelings about the trustees. *Systems-based trust* is based on the procedures, rules, contracts, and other monitoring mechanisms that govern the way entities interact and lessen the risk of the trustor. While collaborative efforts may be successful in the short-term if any one type of trust exists, theory suggests that collaborative processes are more successful in the long term if rational, affinitive, and systems-based trust are all cultivated (Stern & Baird, 2015).

Multiple engagement models categorize the degree of power government authorities share with community members (Arnstein, 1969; Bryson et al., 2013; Fung, 2003; IAP2, 2018). In this study, we consider engagement with marginalized groups through the lens of one of the International Association of Public Participation's (IAP2) Spectrum of Public Participation (IAP2, 2018). This model describes five levels of public participation: informing, consulting, involving, collaborating, and empowering. Empowering is the strongest level of participation, which gives final decision-making power to residents. Table 4-1 includes definitions and examples for each level of public participation relevant to climate adaptation processes. We coded each community within this broader framework following all data collection to gain greater insights on catalysts and barriers to public engagement.

Table 4-1: Different stages of public participation adapted from the IAP2's Spectrum of Public Participation for engaging marginalized residents in climate adaptation processes.

Level of public participation	Definition	Examples
Informing	Share information about the climate plan or available resources, services, or other opportunities within the community but don't seek feedback.	Factsheets, websites, emergency notifications
Consulting	Obtain feedback on proposed strategies or decisions that have been made but don't involve residents in strategy development.	Surveys, public comments, focus groups
Involving	Work with residents to understand what they are concerned about and identify solutions.	Workshops, climate ambassador or champion programs (representatives learn about the climate plan and then share information about this with others in their communities)
Collaborating	Seek advice and recommendations from residents throughout the process. Work together to implement projects/services.	Climate action stakeholder committees, boards, or taskforces
Empowering	Engage residents in decision-making. Support residents or organizations to lead projects or programs.	Frontline-community advisory committees, civic engagement training, community grant programs

Methods

This research serves as a follow-up to an initial review of climate adaptation plans published by US municipalities from 2010-2021 (Authors, in prep.). In this review, the authors explored the extent to which each plan addressed recognitional, distributional, and procedural justice. In this study, we selected a subset of communities that had published a recent plan to explore how they had addressed justice in adaptation planning and implementation since the plan was published. We conducted semi-structured interviews with local government officials working in a variety of contexts. Although the three dimensions of justice informed our analysis, we employed a mainly inductive approach while reviewing the interview data to allow themes to emerge from our conversations. Below, we describe our sample selection, recruitment, and process for conducting interviews and analyzing the data.

Sample selection

From the sample of 101 climate plans reviewed within the earlier study (Authors, in prep), we selected communities for follow-up interviews based on two criteria:

1. **Plans published between 2017-2020**. We selected this time range to allow enough time for strategies from the plan to begin to be implemented, but not so much time that those who helped create the plan would be unable to recall specific details related to the plan.
2. **Plans that operationalized recognitional and distributional justice to some degree (e.g., low or high).** We selected plans that addressed recognitional and distributional justice to some degree according to the scoring system employed in Authors (in prep). This was to ensure we could follow-up on a broad range of examples identified in the plans. More details about the coding scheme and process can be found in Authors (in prep). We did not include procedural justice as a selection criterion, as only 25 plans in the review were coded as addressing it.

Thirty-six plans met the criteria described above. Half of these plans (n=18) also addressed procedural justice to some degree. The communities where these plans were published vary by geographic region, socio-demographic data, and urban-rural classification, which may broaden the potential generalizability of our findings. To assess the urban-rural classification for each community, we referred to the National Center for Education Statistics' (NCES, 2021) locale classification data, which categorized communities both by size (cities and suburbs) and distance from urban centers (towns and rural areas). We referred to the US Census Bureau's data for socio-demographic information for each community.

Recruitment

We aimed to speak with at least one person from each community. We identified our initial point of contact for each community from the plan (i.e., the person listed as responsible for coordinating plan development) or from information on government websites related to the plan (i.e., the person or organization listed as responsible for implementing the plan). These representatives were all local government employees, usually working within the community's planning or community development department. In several cases, our initial point of contact connected us with another employee that they felt was more relevant to the study purpose. If the lead person responsible for developing the plan had not been involved in implementation or no longer worked for the municipality, we still tried to speak with them to learn more about the creation of the plan. In those cases, we also aimed to interview another current employee involved in implementation.

We emailed participants to participate in this study. The emails included information about the study's aims and their rights as a participant (see the Supplementary Material for email text). We also informed interviewees of their rights as a study participant at the beginning of each interview session. We also obtained verbal consent from each participant before conducting each interview (IRB#: 22- 530) (see the Supplementary Material for IRB approval letter).

Interviews

In August and September 2022, we conducted 27 virtual interviews via Zoom with current or past local government representatives from 25 communities (see the Supplementary Material for complete list of communities and associated socio-demographic data). These employees worked in municipalities across 12 states. Fourteen of these communities were cities, seven were suburbs, and four were classified as towns (NCES, 2021), ranging in population size from 16,854 – 2,269,675 (US Census, 2021). While most of these communities were predominantly white, six municipalities were minority-majority communities. Twenty-two communities were mainly Democratic-leaning (> 50% population Democratic voters, MIT Election Data and Science Lab, 2020). In 15 communities, more than 10% of the population was living in poverty. Supplementary Table 1 summarizes the plan and community characteristics of the 25 communities that our interviewees represented.

During the 27 interviews, we spoke with 31 individuals, as four of the calls involved a pair of employees speaking about the implementation of the plan. One plan involved two communities (One Climate Future-Portland and South Portland), so we conducted separate interviews with the representative for each city. We also conducted two interviews within two communities: one with a past employee that was involved in plan development and implementation before leaving their position and another call with a current employee responsible for implementation.

Eighteen of the interviewees were with sustainability coordinators, managers, or directors. Six were specifically in climate-focused positions (climate action or climate resilience coordinators). Three were in more general roles (e.g., a city planner or program coordinator), while another four were in positions with a narrower scope (e.g., energy coach, recycling program manager, circular economy manager, and community development analyst). Interviewees also varied in terms of their experience working for their municipality.

Twelve had worked for their municipality for 5+ years in their existing position or a similar role, eight were hired before plans were developed with two-to-five years' experience on the job, and 11 had been hired in the past six months-two years after the plans were developed. The interview guide contained entirely open-ended questions designed to elicit examples from participants (see the Supplementary Material). The interview questions delved into how justice was considered during plan development (when relevant to the respondent), what adaptation strategies had been implemented, how marginalized groups had been engaged, and what challenges had been encountered.

The interviews were recorded via Zoom and transcribed using Otter AI software. Interviews ranged from 21 minutes to 68 minutes, with an average of 52 minutes. All personal-identifying information was removed from the transcripts.

Data analysis

The lead author reviewed and coded the interview transcripts in three iterative phases using Dedoose, a software program that allows for transcript coding and organization. While the three dimensions of justice guided initial coding, inductive coding approaches, including open, focused, and axial coding, enabled broader themes to emerge (Saldaña, 2021). The first round of coding consisted of open coding to identify how each type of justice was addressed and emergent themes associated with practitioners' experiences. In the second round of coding, the lead author employed a focused coding approach to better categorize the data, especially types of community engagement approaches and enabling conditions or barriers to justice considerations. The lead author employed axial coding during a third round of coding to identify larger themes, which allowed for comparison of codes and themes across interviews. Throughout each phase of coding, we reviewed and recategorized our findings until we sufficiently represented the interviewees' responses and ideas. We kept a database of codes in a codebook, which included the parent and child codes, descriptions of each code, and examples from the data for reference (Saldaña, 2021) (see the Supplementary Material for full codebook). The lead author wrote several memos and consulted the literature throughout the process to highlight patterns and understand how government practitioners were addressing social justice across contexts. Themes were discussed with the second author on a regular basis throughout the process.

Results

While we share findings relevant to recognitional, distributional, and procedural justice, most interviewees spoke mainly about procedural justice and factors that enabled or constrained their engagement with marginalized groups.

Recognitional justice

All interviewees described certain groups in their community as more vulnerable to climate impacts than others. While we mainly refer to *marginalized groups* when speaking about people that may be disproportionately impacted by climate change, interviewees also referred to them as *frontline community members.* When asked which groups they were most concerned about, interviewees mainly referred to low-income individuals, people of color, non-English speakers (including immigrants and refugees), older adults, disabled individuals, and those with other pre-existing medical conditions.

Only nine plans in our sample explicitly noted social vulnerability assessments as part of their planning process. Seven of them talked about how their social vulnerability assessments were used since their plan was developed. Four of these communities used the results of their social vulnerability assessments to inform adaptation project design/implementation, such as prioritizing locations for tree plantings. The other three participants recognized the value in using quantitative data to inform decision-making but acknowledged that the results have not been widely used. One interviewee lamented that lack of use of a social vulnerability mapping exercise.

"One of the things I'll say about our equity mapping efforts is that everybody loves the idea that we have an equity map. No one has asked to see it. I think about, like, the kind of staff time that goes into tracking down that data and creating a nice GIS map. And what if that staff time had been spent, let's say it was five or six hours? What if those five or six hours had been spent having a very targeted conversation with an immigrant community within Iowa City?"

Distributional justice

All interviewees described existing adaptation initiatives that were developed to enhance marginalized communities' access to resources, services, or other opportunities. Most of these programs were launched within the past year. Therefore, the impacts or benefits to marginalized people were not yet evident. Most efforts focused on expanding energy efficiency, weatherization, or retrofitting programs for low-income households (n=17) and planting trees in underserved areas (n=7). Only six interviewees discussed metrics/indicators to evaluate programs and their impacts on marginalized people. In each case, these metrics were still being developed, rather than actively being used to track how their programs impacted intended audiences.

Procedural justice

We categorized each local government's engagement with marginalized groups based on the IAP2's Spectrum of Public Participation (Table 4-1). We categorized the plurality of cases (n=9) as *informing*, in which municipalities would inform marginalized communities of existing programs or share other information, such as notifications during weather-related events or evacuation information. We categorized three cases as *consulting*, in which local governments would solicit input from marginalized residents, often through surveys or meeting with residents to ask about their concerns about programs. We categorized four cases as *involving*, in which local governments directly involved marginalized residents in their planning efforts, which included hosting workshops to understand how they felt about programs and develop approaches to improve access to their services. We categorized two cases as *collaborating*, as they both involved stakeholder advisory committees that included marginalized residents that provided recommendations to the government about climate and justice related issues/strategies. We categorized four cases as examples of *empowering*. In one community, the local government started a community grant program that provided residents with funding to implement their own adaptation projects. In two communities, the local government supported climate justice committees composed almost entirely of members of marginalized groups with the power to decide the work they wanted to take on. In the other community, the interviewee developed a capacity-building program focused on how to participate in civic engagement, including serving on city boards or councils. Interviewees from three communities did not describe any public engagement with marginalized groups, so we had insufficient information to categorize their efforts.

Elements that may enable or constrain efforts to advance social justice through adaptation

Seven themes emerged as key enablers or constraints to considerations of justice in climate adaptation work. These include formal leadership support, community support, actions to remove barriers to participation, relevance to marginalized residents' lives, boundary spanning, trust building, and capacity building. We explore the links between each of these themes and social justice below.

Formal leadership support

Most interviewees (n=14) spoke to the importance of formal leadership support to advance justice and prioritize climate adaptation work, referring to top-level elected or appointed officials such as mayors, city managers, town supervisors, or town council members. Support took multiple forms, which we categorized as: 1. articulating a clear vision around social justice, 2. integrating this vision across departments, and 3. dedicating staff, time, funds, and other resources to support these goals. Eleven interviewees reported that their organization had a clear vision of social justice and/or equity within their organization. In one

municipality, the council's vision to advance social justice initiatives helped the government employee pursue justice-oriented work and shield them from some residents' opposition.

"I get the phone calls from angry people who are like, why are you focusing on outreach in these areas when we all need this help? They're the same people that will then call city council and say, this is a racist program because they flyered the black area of town, but they didn't flyer my neighborhood…I feel like if I got sued, because of some outreach effort that I did in a community of color, that the city would be like, nope, we're here with you. 100%. And I think in other places, that might be more of a challenge."

Seven participants felt like their departments coordinated well around advancing climate adaptation and social justice initiatives. These interviewees emphasized the importance of appointing people to head departments that are bought into this shared mission and finding these internal allies. Only interviewees from five communities described how all three elements of leadership support were present.

Our conversations revealed that 15 communities lacked one, two, or all three elements of elected leaders' support, which constrained efforts to advance climate adaptation and social justice. Interviewees from all 15 communities acknowledged that staff, funding, and/or time were necessary to advance these efforts but felt that one or all these elements were lacking. To enact more transformative action, interviewees from ten communities indicated that leadership should hire more staff or hire staff explicitly focused on advancing justice and equity. Seven interviewees discussed funding issues impeding their efforts, whereas only four interviewees attributed the failure of justice efforts to insufficient time dedicated towards engagement processes. In one case, an interviewee was unable to create a frontline community-led climate task force because they lacked support from their superiors to allocate time towards this. In ten communities, interviewees noted that a lack of coordination internally held their community back from taking more transformative action. They struggled to get other departments to recognize adaptation within their work. Three participants described missed opportunities to link climate adaptation initiatives and internal efforts to address justice and equity. Four interviewees reported that their lack of direction from elected leaders caused confusion within their organization around goals and actions to take to advance justice.

Even when one or two elements were present, a lack of clarity around social justice, integration across departments, or allocation of resources challenged employees' efforts. In one community, an interviewee noted that people within their organization would express that equity and justice were important ideas, but uncertainty around what it meant to *"lead with equity"* resulted in unjust climate mitigation initiatives. They worried this could also occur with adaptation efforts in the future.

"A recent situation that we encountered is we banned gas-powered leaf blowers. And virtually all the pressure to do this came from affluent white residents, who are now mostly working from home and really hated the noise…When people started to bring up the equity concerns with demographically who was working at these businesses, who owned these landscaping businesses, and how they would be financially impacted by this, it was kind of like, well, we selectively care about equity. We care about equity when it's convenient for us to care about it. But when it comes to banning leaf blowers, no, we just want them to go away, regardless of whose businesses this impacts…I think with leadership at the top of the organization, there has to be commitment with city council and the city manager. And an understanding of what it means to lead with equity and make sure that all decision making is centered in equity. I don't think that we're there yet. There's a lot of people who talk about how important it is. But like I had mentioned with the leaf blower thing, it's important until it conflicts with some other goal."

In another case, an interviewee described general support from their mayor to pursue climate and justice initiatives, but a lack of integration across departments.

Community support

Eight interviewees also noted how support from community members, not just marginalized groups, pressured administrations to prioritize social justice and adaptation initiatives. One community adopted an Environmental Justice Resolution to address existing injustices related to air quality and other environmental issues because of pressure from community members. Since the resolution was adopted, residents criticized their municipality's lack of action, which influenced decision makers to focus on implementing recommended strategies in the Resolution. In three communities, opposition from community members held back more transformative efforts. One interviewee from a small town described an *"us vs. them in terms of locals and non-locals"* mentality where residents were passionate about initiatives that supported those who have lived there for a while and less often focused on the needs of transient populations or newcomers, like immigrants and refugees. This resulted in the government taking incremental steps to address justice, rather than transformative approaches so as not to scare residents with big changes.

Actions to remove barriers to participation

When interviewees spoke about getting marginalized groups engaged in adaptation work, many (n=15) focused on removing barriers to participation. Twelve interviewees described efforts to translate material to inform non-English speakers about what is going on. Eight also mentioned trying to meet residents where they are and bring the events to them by sharing information, services, or products at community events or meetings of community-based organizations that serve marginalized residents. One employee noted that they've hosted Spanish language events explicitly dedicated to emergency preparedness that were poorly attended. They thought no one came because *"people didn't want to come out to the library and learn about the worst day of their lives."* Instead, they are now trying to share this information at a booth at community events that people are attending anyway, rather than dedicating events to emergency planning that may be depressing. Few participants (n=5) mentioned other efforts to overcome barriers to participation, like providing stipends, transportation, and/or childcare to encourage attendance. Some interviewees acknowledged challenges with finding money for stipends through both internal funding sources and external grants.

Relevance to marginalized residents' lives

Fewer interviewees (n=6) acknowledged the importance of linking material or programs with issues these residents care about to encourage broader participation. One individual attributed the diversity of taskforce members to their ability to connect climate initiatives with issues they care about. To convince residents from communities of color to join, they said:

"If you're working already on a healthy housing campaign, can you turn it into a healthy and resilient housing campaign and add climate resilience in and then you can kill two birds with one stone and have something that's funding a project you're already thinking about?"

In another community that worked with a large population of Marshallese islanders, the interviewee described how initial conversations about climate change, especially when they referred to the impacts to their home islands, were challenging and very emotional. To improve engagement and reach a larger audience, they shifted their approach to avoid using terms like *climate change* and center community conversations around more localized issues.

"We've done a couple of community conversations, where it's like small groups of people come and talk about just everyday challenges. Then I link it to the Climate Action Plan. They're like, I have high energy bills. I can't get to work because there's no public transportation. And then it's like, okay, you don't have to call it climate action. I can make the linkages and then plan solutions, but I need to hear what your challenges are."

Boundary spanning

Interviewees from most communities (n=17) emphasized the importance of building relationships with marginalized residents to advance justice and climate adaptation initiatives. However, only interviewees from 12 municipalities viewed community engagement as part of their role. Participants from fewer communities (n=8) described their role as a bridger, bringing concerns from the local community to government departments and vice versa. One interviewee shared this example about bridging the gap between residents and government officials:

"I see myself as a translator, as a professional interpreter. I find that when I'm among my colleagues in the city, I find myself often reminding people that I have an MS, and these are the reasons that you need to listen to and respect what the community is saying. Yes, it (comments from community members) might have sounded like a lot of vitriol. But if you slow your heart rate down a little bit, this is what they were actually saying in that really heated meeting. And then when I go out to the community, I kind of switch hats. I'm kind of the one saying, okay, well, let me break down what these numbers actually mean. And here's how these policies are likely to come home to roost in your neighborhood. I feel like I'm constantly in this interpretation role. It's challenging, but it can also be really rewarding when you kind of connect the dots."

Trust building

To build relationships with marginalized residents, interviewees from 17 communities described building elements of trust, with greater attention toward affinitive trust (n=14) than systems-based (n=6) or rational trust (n=2). Efforts to build affinitive trust included spending time together at community events or showing up at other organizations' meetings, often unrelated to any climate initiatives, to build relationships. Interviewees from 11 communities indicated that they engaged marginalized residents through trusted community organizations or local leaders, who they described as prominent and respected figures within their communities. We refer to these marginalized community members as local champions, or people who are committed to involving others to advance initiatives towards shared goals (Hanleybrown et al., 2012). These champions often had things in common with members of these marginalized groups, like growing up in the same neighborhood, speaking the same language, or being a member of the same ethnic community. While these figures provided valuable links to groups often excluded from civic processes, one interviewee described how vulnerable their connections to groups were, as a couple key individuals lost interest over time as projects changed or failed to resonate with issues they cared about. They struggled to find new champions to connect them with certain neighborhoods, which they acknowledged was likely compounded by COVID.

Turnover emerged as a challenge to maintaining affinitive trust. For example, one interviewee described how trust eroded when a staff person left due to burnout. Members of the frontline community-led task force felt angered and hurt, blaming leadership for the staff member's departure. To rebuild this trust, the interviewee arranged to contract with the departed staff member to continue their involvement in the work of the task force.

"The thinking around keeping the through line with [name] is because she built so many of the community relationships, and the goal was to continue to make her part of the work so that we didn't deepen this idea of what you'll hear a lot of our taskforce community members talk about: "disposable leadership." The community can be intact, even if the roles change."

Elements of systems-based trust emerged from our conversations with interviewees from six communities and seemed to enhance marginalized residents' feelings of legitimacy in these initiatives. These mainly revolved around efforts to increase transparency around their work and policies/systems developed together with their stakeholder advisory committees. Two interviewees spent a year working with their stakeholder advisory committees to clarify their vision and scope of work, iron out how they would get things done, and ensure committee members were happy with their approach. One interviewee developed several policies/procedures together with task force members to ensure their frontline community-led task force was not just a *"check-the-box"* type of engagement.

"When a lot of people were coming to [the task force] with projects, and their deep suspicion is, and they've told me this repeatedly, we do not want to be a check the box. We don't want to do a bunch of work, which might be good work, and then just have one session where they bring it to us, tell us about it, and we give them a few things to think about. And then they can check the box that they want to the task force. We co-developed an intake process. And in fact, on the intake, we ask what kind of engagement are you looking for from the task force. I had added, like, presenting at a meeting and they were like don't even put that on one time. We will not even consider a one-time coming to us."

One interviewee emphasized the value in co-developing criteria to track impacts of proposed strategies with frontline community members and government officials to ensure monitoring plans are feasible and legitimate. Frontline community members refined the measures based on the benefits and impacts they saw in their communities, while government officials were there to comment on the feasibility of measuring proposed criteria.

Rational trust was only mentioned by two interviewees, both in the context of energy efficiency programs. They described their efforts to communicate the benefits of these initiatives to overcome residents' initial skepticism.

Four interviewees referred to issues of distrust between residents and their local government that they felt needed to be addressed before engaging residents further. When asked about what could lead to more meaningful engagement with the community, one individual said, *"trust, tough questions, examples of success."* This interviewee believed their recent heat mapping campaign and the engagement that went into that was a good example to show residents what they are capable of. Another interviewee emphasized how distrust was the main thing holding back their engagement with one underserved, low-income, predominantly Spanish speaking area of town who they consulted with.

"That side of town has had a lot of issues with the city, so trust needs to be rebuilt. Specifically, the mobile home parks around that side of town have all been bought by private companies outside of the state. A lot of practices, a lot of illegal practices, were going on in the city due to our ordinance. We couldn't really step in. As the city, we contact the attorney general, and say, hey, this is what's going on. This is what's happening to our residents in this side of town. That was us trying to support our residents and what they're going through. There's a big lack of trust on that side of town. I don't think I can get anything done without rebuilding that trust."

To try to repair trust with that community, they partnered with an individual from a trusted local organization to encourage community members to sign up for home energy audits, but it is unclear how this partnership has influenced community engagement to date.

Capacity building

Six interviewees approached engagement with marginalized residents as sustained, iterative initiatives, rather than one-off opportunities. To do this, they focused on reducing the complexity of climate planning and building marginalized residents' capacity to engage. Two interviewees spent the first year working with their respective stakeholder advisory boards to build a shared understanding of their climate plans and what their expectations were for engaging with the committee. They acknowledged that these conversations were not easy and were time consuming, but they felt they were necessary to ensure they felt like they could meaningfully contribute to future adaptation work, while building trust. Another representative adapted a training program from Portland, Oregon that built residents' capacity to be civically engaged within their communities, with a specific focus on individuals who have typically been excluded from these processes. They described these details about the program and impacts they have observed so far.

"It's a six-week course, 36 hours of civic engagement training. We practice testifying in front of city council in council chambers. They got to meet all the city councilors. They did a photo journal of problems they see around town and then created solutions of how they might address it. They met state reps. And we talked about, like, what organizing looks like? How do you organize for a campaign? How do you run for office? Then in every session, we talked about sustainability and climate change and all the things that are impacts, so that this is why I call it my long game. Hopefully when they all run for office, they're thinking about climate change. X (the city the interviewee represents) is 92% white. Our cohort was 17 people. It was two Latinos, one white woman, and the rest were all black. One ran for city council. One ran for school board. Five joined city boards and commissions after going through. That type of empowerment work is how you get to the vision. If they have the vision, they just need it to be coaxed out of them and then the means to figure out how government works to get it done."

Levels of Public Participation

To better understand the relationship between these factors and how municipalities addressed justice, we examined differences between communities that we categorized as (1) *informing* (n = 9); (2) *consulting* or *involving* (n = 7); and (3) *collaborating or empowering* (n = 6) marginalized residents. Our analysis revealed key differences in formal leadership support, approaches to community engagement, pre-existing distrust in these communities, and capacity building.

Only communities coded as *collaborating* and *empowering* as exhibited all three forms of formal leadership support discussed above: 1. articulated a clear vision around social justice, 2. integrated this vision across departments, and 3. dedicated staff, time, funds, and other resources to support these goals. Elected leaders' support enabled interviewees to devote more of their time towards engaging marginalized residents, focus on projects that will help address their needs, and build an internal team of allies to advance adaptation and justice initiatives. In other communities, one or more of these elements was lacking, and public engagement was less extensive. Interviewees from *informing* cases noted a lack of direction around social justice, a lack of coordination across departments, and insufficient staff to engage with marginalized residents or implement adaptation initiatives.

Interviewees in all six of the communities coded as *collaborating* or *empowering* described community engagement as a core part of their job and embodied boundary spanning traits. In contrast, interviewees from other communities with lower levels of public participation of marginalized groups typically described community engagement as less central to their day-to-day work. Most interviewees (n=5) within the *informing* cases relied on community-based organizations, like neighborhood associations, faith groups, or immigrant-serving entities, to connect marginalized residents with information about government programs/services or described community engagement as the responsibility of over departments. Within communities coded as *consulting* or *involving* residents, most interviewees (n=6) built relationships by engaging with marginalized residents at community events often unrelated to climate change or by partnering with local champions within these communities, especially during initial engagement. Interviewees in the *collaborating* and *empowering* cases integrated community engagement into their regular work and served as a bridge between different groups, which was partly due to their perspective towards their role and elected leaders' support. These participants also recognized the importance of linking engagement opportunities and material with issues marginalized residents cared about, which broadened participation to communities often excluded from these processes.

Only communities coded as *collaborating* and *empowering* (n=6) described efforts to enhance marginalized residents' capacity to engage, especially with their stakeholder advisory committees. As these interviewees built a shared understanding of the content within these plans and expectations of residents' involvement, they also built systems-based trust in their engagement processes. Elements of systems-based trust were nearly unique to these cases, as only one other case coded as *informing* described community engagement policies that we categorized as systems-based trust. These efforts enhanced legitimacy and encouraged sustained engagement with marginalized residents.

Communities with lower levels of public participation also more commonly noted opposition from residents. Distrust, however, was only discussed by interviewees from *consulting* and *involving* cases as a factor holding back their efforts to engage marginalized communities. Interviewees in these cases also described challenges with finding local champions to engage with, which was not described as a specific challenge by participants within the other groups. Thus, resources (money and staff) alone appear to be insufficient for enhancing social justice initiatives in these cases.

Discussion

Most of our cases were still in the early stages of implementing their climate plans. Most interviewees described marginalized groups as communities of color, low-income households, non-English speakers, older adults, and individuals with pre-existing health conditions. They discussed adaptation projects in progress targeted towards marginalized residents, but it is still early to assess how marginalized groups will be impacted. Our conversations were dominated by examples and stories centered around how these governments engaged marginalized communities as they adapt to climate change, with most municipalities categorized as *informing*, *consulting*, or *involving* residents in their processes. We discuss the elements that emerged from our discussions that seemed to be enable stronger considerations of justice, highlight the implications of these findings, and suggest several considerations for advancing social justice as these municipalities and others prepare for climate change. Based on our findings from these interviews, we propose a model for facilitating more meaningful, inclusive community engagement in adaptation approaches and enabling factors that can help do so (Figure 4-1).
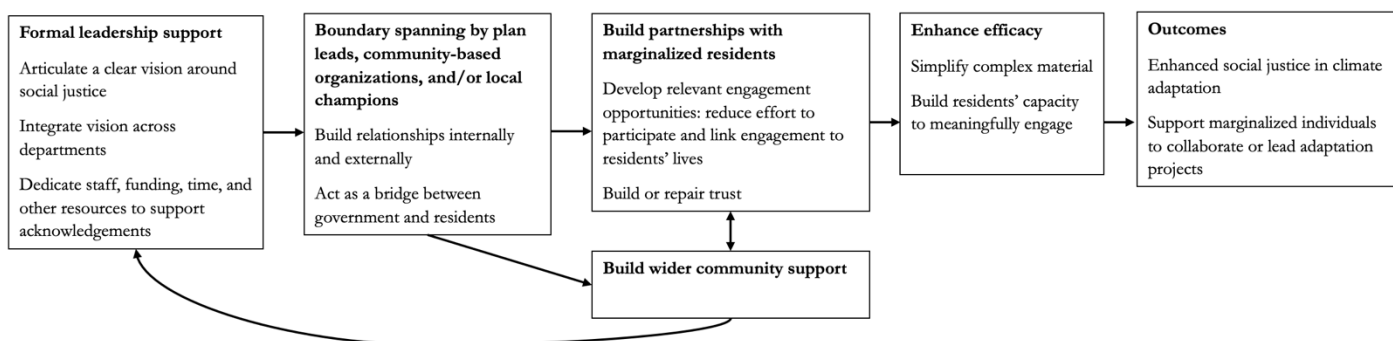

Figure 4-1: Model for facilitating inclusive community engagement in climate adaptation.

Formal leadership support

Formal leadership can be critical throughout collaborative engagement processes to empower and mobilize stakeholders to achieve collective results (Morse, 2010; Page, 2010), especially in shaping how climate adaptation initiatives and social policies are prioritized (Barber, 2013; Meijerink & Stiller, 2013; Shi et al., 2015). Our conversations revealed that elected leaders, like mayors, city managers, and town councils, played a large role in enabling how these municipalities addressed social justice and climate adaptation, sometimes hindering efforts completely. Their support took multiple forms, including: 1. articulating a clear vision around social justice, 2. integrating this vision across departments, and 3. dedicating staff, time, funds, and other resources to support these goals. In the communities that we coded as *collaborating* or *empowering* marginalized residents, leaders reportedly embodied all three of these functions, whereas certain elements of leadership were lacking and constrained efforts in other cases.

The three functions of elected leaders that emerged from our conversations align closely with the direction, alignment, and commitment (DAC) leadership theory developed by Drath et al. (2008). Direction refers to agreement within a group about the goals of their work. Alignment is the coordination of knowledge, resources, and work within a group. Commitment emphasizes the willingness of individual members to work towards collective goals even if this may be at a cost to their own goals. Our findings align with existing evidence that suggests all three elements are important to manage and implement strategic plans across organizations (Bryson, 2018; Johnson et al., 2020). DAC theory also argues for the idea of shared leadership, suggesting that DAC is most effective if these elements are shared, embraced, and fostered across departments (Bryson et al., 2021; Drath et al., 2008). Evidence from the interviews also indicated that a lack of integration across departments can be problematic. Elected leaders can promote socially just climate adaptation when they build a shared sense of direction, alignment, and commitment internally around social justice and adaptation initiatives, rather than acting as solely as gatekeepers with the power to identify priorities and allocate resources (Crombez et al., 2006).

Boundary spanning

Interviewees across cases emphasized the importance of building relationships with marginalized residents, but we observed a key difference in the *collaborating* and *empowering* cases compared with the other communities we spoke with. Interviewees from *informing* communities relied on community-based organizations to share information with marginalized residents, rather than viewing engagement as part of their role. Interviewees from cases with greater public participation also relied on local organizations or champions to bring more residents to the table, which aligns with observations from studies of environmental planning processes (Allen & Slotterback, 2021; Connolly et al., 2013; Rudge, 2021). Deeper engagement within the *collaborating* and *empowering* cases was driven by plan leads that viewed relationship building, and specifically bridging ties between residents and government departments, as a core part of their role.

These community-based organizations, local champions, and government employees embodied the traits of boundary spanners, serving as a connection between two or more groups and disseminating knowledge between them (Williams, 2002). Entities that possess boundary spanning traits are increasingly viewed as important to address environmental challenges through collaborative and inclusive processes (Bednarek et al., 2018; Coleman & Stern, 2018; Goodrich et al., 2020). Prior research suggests the importance of these boundary spanning efforts in climate adaptation, as process leaders are increasingly expected to transcend their traditional roles by working with technical experts to simplify climate information and effectively communicate the feasibility and benefits of initiatives to residents and elected officials (Briley, 2015; Dabrowski, 2018). However, boundary spanning is often an unrecognized, informal part of government employees' roles that they take on in addition to their formal responsibilities (Goodrich et al., 2020; Masuda et al., 2018). This may make it challenging for them to prioritize boundary spanning responsibilities or render them vulnerable to burnout by taking on too much (Crosno et al., 2009) and may explain why these traits were rare in our cases. For individuals to serve as boundary spanners, they must be well-connected within their home organization but also with external groups to bridge across boundaries and share information (Tushman & Scanlan 1981). Partnering with community-based organizations with existing connections to engage marginalized residents and championing boundary spanning within their own ranks may help municipalities better allocate their resources toward incorporating justice into adaptation planning. This may require revisions to job descriptions, training, and time allocations for government employees to develop new skills and put them to use (Goodrich et al., 2020).

Building partnerships with residents

Developing relevant engagement opportunities: reducing effort to participate and linking engagement to residents' lives

To get marginalized community members to the table, most interviewees spoke about overcoming logistical hurdles to participation, especially by removing language barriers and bringing events to the people. Existing literature suggests that certain strategies, such as offering multiple types of outreach, providing childcare and

transportation, choosing convenient locations, and offering translation, can encourage diverse participation (Bryson et al., 2013; Innes & Booher, 2004). However, our results suggest that addressing these logistical considerations may be insufficient to encourage engagement. Our findings align with those from case studies of urban planning, which have found that reducing logistical hurdles enabled residents to join but linking material with issues they cared about encouraged meaningful participation (Allen & Slotterback, 2021; Phadke et al., 2015). Planners or other government employees can remove barriers to engagement, but if community members feel like adaptation efforts are irrelevant to their daily lives, they may lack an incentive to engage, especially when they may be juggling a range of other stressors (Phadke et al., 2015). Reframing material to resonate with marginalized residents' goals or issues they care about can help draw people in and encourage sustained engagement (Cash et al., 2003; Simon, 2016). Evidence from our study and existing research suggests that broader community support can influence how elected officials advance climate adaptation and social justice initiatives (Pastor et al., 2015; Yeganeh et al., 2020), so planners may need to consider how to frame efforts to appeal to different groups' concerns (Foss, 2018a; Foss 2018b).

Building and repairing affinitive, rational, and systems-based trust

In most cases, interviewees' efforts to initially engage marginalized residents focused primarily on building affinitive trust, such as spending time at community events getting to know residents. Interviewees described these shared experiences and initial connections as critical to advancing justice, but relationships built largely on this form of trust may be particularly vulnerable to staff turnover (Coleman et al., 2021; Stern & Baird, 2015), as demonstrated in at least one case in this study. Elements of rational and systems-based trust were only evident in a handful of communities. We found that efforts to build systems-based trust were associated with deeper, sustained engagement. Our findings align with prior research suggesting the importance of affinitive trust in early stages of collaboration and the value of systems-based trust in sustaining engagement over time (Coleman & Stern, 2018). Distrust was also referenced in several communities as holding back their efforts to advance justice, especially rational distrust, as residents felt skeptical towards local government based on their past wrongdoings. Our findings suggest that efforts to repair trust, especially rational trust, may be needed to engage certain groups.

While each type of trust and distrust may serve different functions depending on the context (Pirson & Malhotra, 2015; PytlikZillig et al., 2016), our findings lend support to the theory that resilient collaborations may require adequate stores of rational, affinitive, and systems-based trust. Stern and Baird (2015) suggest that as groups work together and challenges arise, if one form of trust is called into question or degraded, the other forms can buffer the system while actors work to rebuild that form of trust. For example, if a government agency makes a mistake or doesn't fulfill a promise (i.e., degrading rational trust), residents can rely on the policies in place to hold government entities accountable for their actions (i.e., presence of systems-based trust to act as a buffer). As municipalities move beyond initial stages of implementation, evidence suggests that all three types may help entities work together and cultivate other forms of trust (Coleman & Stern, 2018; Mayer et al., 1995). Creating safe spaces for engagement (i.e., systems-based trust) may provide opportunities for affinitive and rational trust to develop. However, there are limits to the role trust plays in engagement processes, as an overabundance of trust can also result in complacency and disengagement (Stern, 2018).

Enhancing efficacy

Capacity building opportunities seemed key to enabling more meaningful participation in communities we coded as *collaborating* or *empowering* marginalized residents. Interviewees from these communities recognized the inherent complexity of climate adaptation plans and proposed approaches to build residents' feelings of self-efficacy, or beliefs in their capacity to contribute or take action (Bandura et al., 1999). Our findings align with existing public engagement literature that suggests sustained engagement opportunities are valuable to develop the skills and habits necessary to engage in government processes, rather than one-off opportunities that may result in inadequate time and unrealistic expectations for residents contributing (Selin et al., 2016).

Existing theory and empirical research suggest that building feelings of efficacy can motivate people to engage in meaningful ways (Ozer & Bandura, 1990; Rawlett, 2014), especially in the context of climate adaptation (Thaker, 2012; van Valkengoed & Steg, 2019). In the context of adaptation processes, enhancing efficacy through participatory processes may involve simplifying complex material, highlighting individual and community strengths, and focusing on initiatives that are within residents' control (Stern et al., 2023). In her book *the Art of Relevance,* Nina Simon (2016) suggests that rather than adopting a typical needs-based service model, institutions can focus on building on the "assets" community members bring to the table. Reframing initiatives around residents' strengths could be more empowering than focusing on what they lack. For example, existing social networks among neighbors could be leveraged to develop community response teams for emergencies, which one interviewee shared as an example project that their local government could support and empower marginalized communities to lead. While our conversations yielded some examples of building efficacy among marginalized residents, most municipalities we spoke with may have still been too early in the implementation phase to consider capacity building efforts (i.e., have not begun to engage with members of many marginalized groups). Moving forward, local municipalities may find value in investing in iterative engagement opportunities to reframe adaptation conversations around what marginalized residents want and how local governments can best support residents in implementing these initiatives.

Study limitations

There are several limitations to consider regarding our findings that may also present opportunities for future research. We only spoke with a subset of the many jurisdictions in the US undertaking adaptation efforts, so while we interviewed individuals from a range of communities, this may limit the generalizability of our findings. Future research could also expand on these questions beyond the US. As we only spoke with one or two individuals within each community, their viewpoints provide only a limited snapshot of community engagement and social justice initiatives in each case. Our interviews were also limited to government employees' perspectives. Nonprofits and community-based organizations are likely adopting climate actions and could offer their perspectives on how communities are addressing social justice (Westman & Castán Broto, 2021). Future research could seek the perspectives of grassroots organizers or members of these marginalized groups. Checking in with municipalities only 2-5 years after they published their plans represents another limitation, especially given the time it may take to develop meaningful justice initiatives (e.g., Baral et al., 2007; Kates et al., 2012; Shi & Moser, 2021). Future research could check in with communities 5-10+ years post-plan and/or more regularly to better understand how climate adaptation and social justice interact over time and in different contexts.

Conclusion

To our knowledge, this is the first study to look across multiple cases to understand how local governments are implementing adaptation plans and addressing social justice as they do so. In most cases, local governments were still in the early stages of implementation, so outcomes are not yet clear. Most of our conversations centered around how their organizations engaged marginalized residents in adaptation efforts or faced challenges in doing so. We identified seven elements that seemed to enable or constrain justice considerations in these communities: formal leadership support, community support, actions to remove barriers to participation, relevance to marginalized residents' lives, boundary spanning, trust building, and capacity building. Based on our findings, we developed a model for facilitating inclusive, deeper engagement and suggest several areas for municipalities to consider as they start to implement adaptation strategies. The model stresses the importance of formal leaders working to develop a shared sense of direction, alignment, and commitment within their organizations; enabling boundary spanning efforts on behalf of government employees by allocating time and resource to these efforts; addressing logistical barriers to participation; partnering with marginalized communities to ensure that adaptation initiatives are relevant to their immediate concerns; focusing on the cultivation of rational, affinitive, and systems-based trust with marginalized communities; and providing capacity-building opportunities to enhance residents' feelings of efficacy within climate adaptation planning and implementation.

References

Adger, W. N. (2016). Place, well-being, and fairness shape priorities for adaptation to climate change. *Global Environmental Change*, 38, A1-A3.

Allen, R., & Slotterback, C. S. (2021). Building immigrant engagement practice in urban planning: The case of Somali refugees in the Twin Cities. *Journal of Urban Affairs*, *43*(6), 740-755.

Anguelovski, I., Connolly, J., & Brand, A. L. (2018). From landscapes of utopia to the margins of the green urban life: For whom is the new green city?. *City*, *22*(3), 417-436.

Anguelovski, I., Shi, L., Chu, E., Gallagher, D., Goh, K., Lamb, Z., Reeve, K., & Teicher, H. (2016). Equity impacts of urban land use planning for climate adaptation: Critical perspectives from the global north and south. Journal of Planning Education and Research, 36(3), 333-348.

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of planners*, *35*(4), 216-224.

Baker, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. Landscape and urban planning, 107(2), 127-136.

Bandura, A., Freeman, W. H., & Lightsey, R. (1999). Self-efficacy: The exercise of control.

Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on psychological science*, *1*(2), 164-180.

Baral, N., Stern, M. J., & Heinen, J. T. (2007). Integrated conservation and development project life cycles in the Annapurna Conservation Area, Nepal: Is development overpowering conservation?. *Biodiversity and Conservation*, *16*, 2903-2917.

Barber, B. R. (2013). *If mayors ruled the world: Dysfunctional nations, rising cities*. Yale University Press.

Bednarek, A. T., Wyborn, C., Cvitanovic, C., Meyer, R., Colvin, R. M., Addison, P. F., ... & Leith, P. (2018). Boundary spanning at the science–policy interface: the practitioners' perspectives. *Sustainability Science*, *13*, 1175-1183.

Briley, L., Brown, D., & Kalafatis, S. E. (2015). Overcoming barriers during the co-production of climate information for decision-making. *Climate Risk Management*, *9*, 41-49.

Bryson, J. M. (2018). *Strategic planning for public and nonprofit organizations: A guide to strengthening and sustaining organizational achievement*. John Wiley & Sons.

Bryson, J. M., Barberg, B., Crosby, B. C., & Patton, M. Q. (2021). Leading social transformations: Creating public value and advancing the common good. *Journal of Change Management*, *21*(2), 180-202.

Bryson, J. M., Quick, K. S., Slotterback, C. S., & Crosby, B. C. (2013). Designing public participation processes. *Public administration review*, *73*(1), 23-34.

Bulkeley, H., Carmin, J., Broto, V. C., Edwards, G. A., & Fuller, S. (2013). Climate justice and global cities: Mapping the emerging discourses. *Global Environmental Change*, 23(5), 914-925.

Byskov, M. F., Hyams, K., Satyal, P., Anguelovski, I., Benjamin, L., Blackburn, S., ... & Venn, A. (2019). An agenda for ethics and justice in adaptation to climate change. *Climate and Development*, *13*(1), 1-9.

Cash, D. W., Clark, W. C., Alcock, F., Dickson, N. M., Eckley, N., Guston, D. H., ... & Mitchell, R. B. (2003). Knowledge systems for sustainable development. *Proceedings of the national academy of sciences*, *100*(14), 8086-8091.

Chu, E., & Michael, K. (2019). Recognition in urban climate justice: Marginality and exclusion of migrants in Indian cities. *Environment and Urbanization*, 31(1), 139-156.

Coleman, K. J., Butler, W. H., Stern, M. J., & Beck, S. L. (2021). "They're Constantly Cycling Through": Lessons about Turnover and Collaborative Forest Planning. *Journal of Forestry*, *119*(1), 1-12.

Coleman, K., & Stern, M. J. (2018). Boundary spanners as trust ambassadors in collaborative natural resource management. *Journal of Environmental Planning and Management*, *61*(2), 291-308.

Coleman, K., & Stern, M. J. (2018). Exploring the functions of different forms of trust in collaborative natural resource management. *Society & Natural Resources*, *31*(1), 21-38.

Connolly, J. J., Svendsen, E. S., Fisher, D. R., & Campbell, L. K. (2013). Organizing urban ecosystem services through environmental stewardship governance in New York City. *Landscape and Urban Planning*, *109*(1), 76-84.

Crombez, C., Groseclose, T., & Krehbiel, K. (2006). Gatekeeping. *The Journal of Politics*, *68*(2), 322-334.

Crosno, J. L., Rinaldo, S. B., Black, H. G., & Kelley, S. W. (2009). Half full or half empty: The role of optimism in boundary-spanning positions. *Journal of Service Research*, *11*(3), 295-309.

Dąbrowski, M. (2018). Boundary spanning for governance of climate change adaptation in cities: insights from a Dutch urban region. *Environment and Planning C: Politics and Space*, 36(5), 837-855.

Dirks, K. T. (1999). The effects of interpersonal trust on work group performance. *Journal of applied psychology,* 84 (3), 445.

Drath, W. H., McCauley, C. D., Palus, C. J., Van Velsor, E., O'Connor, P. M., & McGuire, J. B. (2008). Direction, alignment, commitment: Toward a more integrative ontology of leadership. *The leadership quarterly*, *19*(6), 635-653.

Fiack, D., Cumberbatch, J., Sutherland, M., & Zerphey, N. (2021). Sustainable adaptation: Social equity and local climate adaptation planning in US cities. *Cities*, 115, 103235.

Fischer, A. P., Paveglio, T., Carroll, M., Murphy, D., & Brenkert-Smith, H. (2013). Assessing social vulnerability to climate change in human communities near public forests and grasslands: A framework for resource managers and planners. *Journal of Forestry*, *111*(5), 357-365.

Foss, A. (2018a). Divergent responses to sustainability and climate change planning: The role of politics, cultural frames and public participation. *Urban Studies*, 55(2), 332-348.

Foss, A. W. (2018b). Planning and climate change: Opportunities and challenges in a politically contested environment. *Planning Theory & Practice*, *19*(4), 604-608.

Fung, A. (2003). Survey article: Recipes for public spheres: Eight institutional design choices and their consequences. *Journal of political philosophy*, *11*(3), 338-367.

Goodrich, K. A., Sjostrom, K. D., Vaughan, C., Nichols, L., Bednarek, A., & Lemos, M. C. (2020). Who are boundary spanners and how can we support them in making knowledge more actionable in sustainability fields?. *Current Opinion in Environmental Sustainability*, *42*, 45-51.

Guardaro, M., Messerschmidt, M., Hondula, D. M., Grimm, N. B., & Redman, C. L. (2020). Building community heat action plans story by story: A three neighborhood case study. *Cities*, *107*, 102886.

Guyadeen, D., Thistlethwaite, J., & Henstra, D. (2019). Evaluating the quality of municipal climate change plans in Canada. *Climatic Change*, *152*, 121-143.

Hanleybrown, F., Kania, J., & Kramer, M. (2012). *Channeling change: Making collective impact work* (pp. 56-78). Boston, MA, USA: FSG.

Holland, B. (2017). Procedural justice in local climate adaptation: political capabilities and transformational change. *Environmental Politics*, *26*(3), 391-412.

Hughes, S. (2019). *Repowering cities: governing climate change mitigation in New York City, Los Angeles, and Toronto*. Cornell University Press.

Hughes, S. (2020). Principles, drivers, and policy tools for just climate change adaptation in legacy cities. *Environmental Science & Policy*, *111*, 35-41.

Innes, J. E., & Booher, D. E. (2004). Reframing public participation: strategies for the 21st century. *Planning theory & practice*, *5*(4), 419-436.

International Association of Public Participation (IAP2). (2018). *IAP2 Spectrum of Public Participation*. Accessed from: https://iap2.org.au/wp-content/uploads/2020/01/2018_IAP2_Spectrum.pdf

IPCC. (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A.

Johnson, G., Whittington, R., Regnér, P., Angwin, D., & Scholes, K. (2020). *Exploring strategy*. Pearson UK.

Kates, R. W., Travis, W. R., & Wilbanks, T. J. (2012). Transformational adaptation when incremental adaptations to climate change are insufficient. *Proceedings of the National Academy of Sciences*, *109*(19), 7156-7161.

Klinsky, S., Roberts, T., Huq, S., Okereke, C., Newell, P., Dauvergne, P., ... & Bauer, S. (2017). Why equity is fundamental in climate change policy research. *Global Environmental Change*, 44, 170-173.

Lewicki, R. J., Wiethoff, C., & Tomlinson, E. C. (2013). 8 What Is the Role of Trust in Organizational Justice?. *Handbook of organizational justice*, 247-270.

Long, J., & Rice, J. L. (2019). From sustainable urbanism to climate urbanism. *Urban Studies*, 56(5), 992-1008.

Masuda, Y. J., Liu, Y., Reddy, S. M., Frank, K. A., Burford, K., Fisher, J. R., & Montambault, J. (2018). Innovation diffusion within large environmental NGOs through informal network agents. *Nature Sustainability*, *1*(4), 190-197.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of management review*, *20*(3), 709-734.

McKendry, C. (2016). Cities and the challenge of multiscalar climate justice: climate governance and social equity in Chicago, Birmingham, and Vancouver. *Local Environment*, *21*(11), 1354-1371.

Meerow, S., Pajouhesh, P., & Miller, T. R. (2019). Social equity in urban resilience planning. *Local Environment*, 24(9), 793-808.

Meijerink, S., & Stiller, S. (2013). What kind of leadership do we need for climate adaptation? A framework for analyzing leadership objectives, functions, and tasks in climate change adaptation. *Environment and Planning C: Government and Policy*, *31*(2), 240-256.

MIT Election Data and Science Lab. (2020). *County Presidential Election Returns.* https://electionlab.mit.edu/data

Morse, R. S. (2010). Integrative public leadership: Catalyzing collaboration to create public value. *The Leadership Quarterly*, *21*(2), 231-245.

Moser, S. C., Coffee, J., & Seville, A. (2017). Rising to the challenge, together. *The Kresge Foundation*.

Mullenbach, L. E., & Wilhelm Stanis, S. A. (2022). Climate change adaptation plans: Inclusion of health, equity, and green space. *Journal of Urban Affairs*, 1-16.

National Center for Eduation Statistics (NCES). (2021). NCES Locale Lookup. Accessed from: https://nces.ed.gov/programs/maped/LocaleLookup/

Nguyen, K. H., & Leichenko, R. (2022). Operationalizing Urban Climate Justice: A Case Study of Sunset Park, Brooklyn, New York City. Journal of Extreme Events, 2241004.

Ozer, E. M., & Bandura, A. (1990). Mechanisms governing empowerment effects: a self-efficacy analysis. *Journal of personality and social psychology*, *58*(3), 472.

Paavola, J., & Adger, W. N. (2006). Fair adaptation to climate change. *Ecological economics*, *56*(4), 594-609.

Page, S. (2010). Integrative leadership for collaborative governance: Civic engagement in Seattle. *The Leadership Quarterly*, *21*(2), 246-263.

Pastor Jr, M., Benner, C., & Matsuoka, M. (2015). *This could be the start of something big: How social movements for regional equity are reshaping metropolitan America.* Cornell University Press.

Phadke, R., Manning, C., & Burlager, S. (2015). Making it personal: Diversity and deliberation in climate adaptation planning. *Climate Risk Management*, *9*, 62-76.

Pirson, M., & Malhotra, D. (2011). Foundations of organizational trust: What matters to different stakeholders?. *Organization science*, *22*(4), 1087-1104.

PytlikZillig, L. M., Hamm, J. A., Shockley, E., Herian, M. N., Neal, T. M., Kimbrough, C. D., ... & Bornstein, B. H. (2016). The dimensionality of trust-relevant constructs in four institutional domains: Results from confirmatory factor analyses. *Journal of Trust Research*, *6*(2), 111-150.

Rawlett, K. E. (2014). Journey from self-efficacy to empowerment. *Health Care*, *2*(1), 1-9.

Rawls, J. (1971). *A Theory of Justice.* Cambridge, MA: Harvard University Press.

Reckien, D., Salvia, M., Heidrich, O., Church, J. M., Pietrapertosa, F., de Gregorio-Hurtado, S., ... & Dawson, R. (2018). How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28. *Journal of cleaner production*, *191*, 207-219.

Rudge, K. (2021). Participatory climate adaptation planning in New York City: Analyzing the role of community-based organizations. *Urban Climate*, *40*, 101018.

Saif, O., Keane, A., & Staddon, S. (2022). Making a case for the consideration of trust, justice, and power in conservation relationships. *Conservation Biology*, *36*(4), e13903.

Saldaña, J. (2021). The coding manual for qualitative researchers. *The coding manual for qualitative researchers*, 1-440.

Schlosberg, D. (2004). Reconceiving environmental justice: global movements and political theories. *Environmental politics*, *13*(3), 517-540.

Schlosberg, D. (2007). *Defining environmental justice: Theories, movements, and nature.* OUP Oxford.

Schlosberg, D., & Collins, L. B. (2014). From environmental to climate justice: climate change and the discourse of environmental justice. *Wiley Interdisciplinary Reviews: Climate Change*, 5(3), 359-374.

Selin, C., Rawlings, K. C., de Ridder-Vignone, K., Sadowski, J., Altamirano Allende, C., Gano, G., ... & Guston, D. H. (2017). Experiments in engagement: Designing public engagement with science and technology for capacity building. *Public Understanding of Science*, *26*(6), 634-649.

Shi, L., Chu, E., Anguelovski, I., Aylett, A., Debats, J., Goh, K., ... & VanDeveer, S. D. (2016). Roadmap towards justice in urban climate adaptation research. *Nature Climate Change*, 6(2), 131-137.

Shi, L., Chu, E., & Debats, J. (2015). Explaining progress in climate adaptation planning across 156 US municipalities. *Journal of the American Planning Association*, *81*(3), 191-202.

Shi, L., & Moser, S. (2021). Transformative climate adaptation in the United States: Trends and prospects. *Science*, *372*(6549), eabc8054.

Shokry, G., Connolly, J. J., & Anguelovski, I. (2020). Understanding climate gentrification and shifting landscapes of protection and vulnerability in green resilient Philadelphia. *Urban Climate*, *31*, 100539.

Simon, N. (2016). The art of relevance. Santa Cruz, CA: Museum 2.0.

Stein, C., & McKendry, C. (2023). A New Phase of Just Urban Climate Action in the Rocky Mountain West. *Urban Planning*, *8*(1).

Stern, M. J. (2018). *Social science theory for environmental sustainability: A practical guide.* Oxford University Press.

Stern, M. J., & Baird, T. D. (2015). Trust ecology and the resilience of natural resource management institutions. *Ecology and Society*, *20*(2).

Stern, M. J., & Coleman, K. J. (2015). The multidimensionality of trust: Applications in collaborative natural resource management. *Society & Natural Resources*, *28*(2), 117-132.

Stern, M. J., Hurst, K. F., Brousseau, J. J., O'Brien, C., & Hansen, L. J. (2023). Ten Lessons for Effective Place-Based Climate Adaptation Planning Workshops. *Climate*, *11*(2), 43.

Thaker, J. (2012). *Climate change in the Indian mind: Role of collective efficacy in climate change adaptation.* George Mason University.

Tushman, M. L., & Scanlan, T. J. (1981). Boundary spanning individuals: Their role in information transfer and their antecedents. *Academy of management journal*, *24*(2), 289-305.

US Census Bureau. (2021). *Quick facts.* https://www.census.gov/quickfacts/fact/table/US/PST045222

van Valkengoed, A. M., & Steg, L. (2019). Meta-analyses of factors motivating climate change adaptation behaviour. *Nature climate change*, *9*(2), 158-163.

Williams, P. (2002). The competent boundary spanner. *Public administration*, *80*(1), 103-124.

Westman, L., & Castán Broto, V. (2021). Transcending existing paradigms: the quest for justice in urban climate change planning. *Local Environment*, *26*(5), 536-541.

Wood, E., Sanders, M., & Frazier, T. (2021). The practical use of social vulnerability indicators in disaster management. *International Journal of Disaster Risk Reduction*, *63*, 102464.

Woodruff, S. C., & Stults, M. (2016). Numerous strategies but limited implementation guidance in US local adaptation plans. *Nature Climate Change,* 6(8), 796-802.

Yeganeh, A. J., McCoy, A. P., & Schenk, T. (2020). Determinants of climate change policy adoption: A meta-analysis. *Urban Climate*, *31*, 100547

Supplementary material

Recruitment email text for government representatives

Draft letter invitation

Subject:

Interview about XXX Climate Adaptation Plan

Body:

Dear XXX.

I hope you are doing well. My name is Jenn Brousseau, and I am a graduate student at Virginia Tech. I have been working on a research project focused on understanding how climate plans around the US are considering equity in their adaptation approaches. Our team reviewed XXX's plan as part of this study, along with 100+ climate plans from other communities.

As a follow-up to that initial review, I'm interested in speaking with you or someone else from your community that has been involved with the plan to understand what has happened since it was created. I'm hoping to chat for about 30 minutes to understand how your community is considering equity as you implement strategies from the plan or further plan to implement these strategies. I'd love to learn more about what has worked well but also what hasn't gone as planned. I'm hoping to use this information to help inform other communities who are adapting to climate change and want to do so in an equitable way.

If you're willing to speak with me, please follow this link and select a time slot that works best for you over the next few weeks:

INSERT CALENDLY LINK HERE TO SCHEDULE INTERVIEWS

Once you've picked a slot, you should receive a calendar invite with a Zoom link.

Your identity will be kept confidential in any write-up of our findings. We will not be linking any data with any specific individual in our reporting. We will also share our report with all participants of the study. Your participation is voluntary, and you can discontinue your involvement at any time. We'd like to record our conversation so that we don't miss anything important.   You will also have the option to decline being recorded. If you have concerns about your rights as a research subject, you may contact the Virginia Tech Human Research Protection Program at irb@vt.edu. The protocol number is IRB # 22- 530.

I will share a bit more about the research at the start of our call, but if you have any immediate questions feel free to email me at jenniferjb@vt.edu. I look forward to hearing back from you.

Sincerely,

Jenn Brousseau

VT VIRGINIA TECH.

**Division of Scholarly Integrity and
Research Compliance**
Institutional Review Board
North End Center, Suite 4120 (MC 0497)
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-3732
irb@vt.edu
http://www.research.vt.edu/sirc/hrpp

MEMORANDUM

DATE: June 13, 2022

TO: Marc J Stern, Jennifer Joyce Brousseau, Caleb O'Brien

FROM: Virginia Tech Institutional Review Board (FWA00000572)

PROTOCOL TITLE: Understanding how equity is considered in adaptation planning

IRB NUMBER: **22-530**

Effective June 13, 2022, the Virginia Tech Human Research Protection Program (HRPP) determined that this protocol meets the criteria for exemption from IRB review under 45 CFR 46.104(d) category (ies) 2(ii).

Ongoing IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities impact the exempt determination, please submit an amendment to the HRPP for a determination.

This exempt determination does not apply to any collaborating institution(s). The Virginia Tech HRPP and IRB cannot provide an exemption that overrides the jurisdiction of a local IRB or other institutional mechanism for determining exemptions.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

https://secure.research.vt.edu/external/irb/responsibilities.htm

(Please review responsibilities before beginning your research.)

PROTOCOL INFORMATION:

Determined As: **Exempt, under 45 CFR 46.104(d) category(ies) 2(ii)**
Protocol Determination Date: **June 13, 2022**

ASSOCIATED FUNDING:

The table on the following page indicates whether grant proposals are related to this protocol, and which of the listed proposals, if any, have been compared to this protocol, if required.

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
An equal opportunity, affirmative action institution

*Supplementary Table 4-1: Summary table of plans that met our criteria and associated socio-demographic information. We obtained voting data from MIT's Election Data and Science Lab (2020). We obtained population and demographic data from the US Census Bureau's Database (2021). *CAP: Climate Action Plan; AP: Climate Adaptation Plan; CAP + AP: Climate Action and Adaptation Plan; Climate Resilience Plan: CRP.*

Plan	Year	State	Plan type*	Community classification	% Republican voters	Population size	% Population that identify as people of color	% Population living in poverty
Alameda Climate Action and Resiliency Plan	2019	CA	CAP + AP	Suburb	17.6	78,611	59.1	7.1
Albany Climate Action and Adaptation Plan	2019	CA	CAP + AP	Suburb	17.6	20,038	55.7	8.5
Climate Ready Truckee	2020	CA	AP	Town	41.1	16,854	16.9	7.0
Oakland Equitable Climate Action Plan	2020	CA	CAP	City	17.6	439,349	71.5	14.6
South Lake Tahoe Climate Action Plan	2020	CA	CAP	Town	53.2	21,344	38.3	11.6
Evanston Climate Action and Resiliency Plan	2018	IL	CAP + AP	City	24.0	79,035	41.7	11.7
Park Forest Climate Action and Resilience Plan	2019	IL	CAP + AP	Suburb	24.0	21,701	77.1	12.6
Dubuque Climate Action Plan	2020	IA	CAP	City	50.5	59,639	12.2	13.2
Iowa City Climate Action and Adaptation Plan	2018	IA	CAP + AP	City	27.3	74,373	25.2	27.3
One Climate Future-Portland's and South Portland's Climate Action and Adaptation Plan (Portland)	2020	ME	CAP + AP	City	30.8	68,402	18.2	13.9
One Climate Future-Portland's and South Portland's Climate Action and Adaptation Plan (South Portland)	2020	ME	CAP + AP	City	30.8	27,026	11.7	6

City of Newton Climate Change Vulnerability Assessment and Action Plan	2018	MA	CAP + AP	City	26.3	88,787	26.5	4.3
Somerville Climate Forward Plan	2018	MA	CAP+AP	Suburb	26.3	81,054	30.2	11.3
Winchester Climate Action Plan	2020	MA	CAP	Suburb	26.3	22,662	22.7	2.8
Faribault Climate Adaptation Plan	2020	MN	AP	Town	48.9	24,457	31.7	16.3
Northfield Climate Action Plan	2019	MN	CAP	Town	48.9	20,739	18.5	9.9
Saint Paul Climate Action and Resilience Plan	2019	MN	CAP + AP	City	26.1	311,448	49.3	17.9
Columbia Climate Action and Adaptation Plan	2019	MO	CAP + AP	City	42.3	125,691	26.3	20.2
Climate Ready Missoula	2020	MT	AP	City	36.8	73,746	12.7	16.8
Cleveland Climate Action Plan Update	2018	OH	CAP	City	32.3	373,091	65.8	32
Ashland Climate and Energy Action Plan	2017	OR	CAP	Suburb	50.2	21,413	16.8	18.7
Beaverton Climate Action Plan	2019	OR	CAP	City	30.9	97,521	37.3	9.8
Lake Oswego Climate Action Plan	2020	OR	CAP	Suburb	42.9	40,786	21.3	3.2
Dallas Environmental and Climate Action Plan	2020	TX	CAP	City	33.3	1,304,442	71.2	18.1
King County Climate Action Plan	2020	WA	CAP	City	22.2	2,269,675	43.9	7.6

Semi-structured interview guide

INTERVIEW GUIDE FOR GOVERNMENT EMPLOYEES RESPONSIBLE FOR IMPLEMENTING PLAN

Specific questions may vary based on the nature of each plan. However, this list of questions covers what we will be asking in a general sense to each plan lead.

Introduction
Thank you again for agreeing to speak with me about the XXX adaptation/action plan. I reviewed your city's plan as part of a study to understand how communities have considered equity in their adaptation plans. I reviewed about 100+ plans that were published between 2010-2021.

As a follow-up to that initial review, I selected some communities whose plan had some elements of equity built in to understand what has happened since the plan was created. I'm hoping to use this interview to understand how your community is considering equity as you implement strategies from the plan or further plan to implement these strategies. I'd love to learn more about what has worked well but also what hasn't gone as planned. I'm hoping to use this information to help inform other communities who are implementing adaptation strategies and want to do so in an equitable way. I expect the interview to last 30-60 minutes.

Is it okay with you if I record this call so we can accurately transcribe your comments?

Your identity will be kept confidential in any write-up of our findings. We will not be linking any data with any specific individual in our reporting.

Do you have any questions for me before we begin?

Questions
Plan development
-Describe plan development + community engagement summarized in the plan. Does that seem right to you? Any other community engagement that contributed to the plan? How did you decide on this strategy?
-Any challenges you encountered while developing this plan? How did you decide to structure the plan the way you did?
- I noticed that elements of equity emerged in multiple parts of your planning document. How did these elements come to be incorporated in the plan?
Plan integration
-When you started developing this plan, was everyone on board with bringing equity in? (Follow-ups: why/why not? How did you make it happen? Were there external factors that changed people's perspectives?)
-What has happened since you developed the plan? (and what hasn't happened)
- Have you encountered any challenges with implementing strategies related to equity from the plan? What factors are driving adaptation work in your community?
Follow-up questions for each type of equity
Procedural equity
- In the plan, the city identified several groups as vulnerable to climate impacts, including older adults, people of color, youth, outdoor workers, low-income, etc. *(adjust depending on the community)*. Have you engaged these groups since the creation of the plan? How so?
        - Have you faced any challenges engaging these groups?
Recognitional equity
- Which groups/stakeholders have been identified as vulnerable to climate impacts? How have specific needs for these groups been considered?
Distributional equity

- The plan identified several strategies aimed at enhancing access to services and opportunities within your community. I'd like to follow-up with you on a few of them. *(I'll be asking about specific elements of each city's plan, so each interview guide will vary based on what the plan covered. Listed below are some examples.)*

    - The city aimed to install cooling centers, promoting access for these vulnerable groups. Have you made any headway on this? How has that gone?

    - Enhancing vulnerable groups' access to energy retrofits for their homes and AC was listed as a priority within the plan. Has anything happened on that front?

    - The city proposed developing a heat response plan, focusing on these vulnerable populations. Has the plan been created? How did that go?

- Have you encountered any challenges as you've started to implement these strategies? How have you addressed these challenges?

-Stepping back, how would you characterize these actions? Are they small but meaningful steps or something more transformational? What's holding your community back from taking bolder action, if anything (e.g. politics, competing challenges to address, uncertainty, lack of capacity or resources)?

Monitoring and evaluation

- Is there any plan to evaluate how equitably these strategies are implemented? How?

- Are there any additional initiatives related to adaptation and equity that we haven't already touched upon? Anything else you think is important for us to know?

Additional questions if time allows

- Were there any particular resources you found helpful for addressing equity issues within your adaptation plan? Or as you move towards implementation?

Supplementary Table 4-2: Codebook for follow-up interviews.

Coding category	Description	Examples
Enabling conditions to address justice		
Formal leadership support	Any mention of mayors, supervisors, councils, or other formal government leadership supporting a focus on social justice, climate justice, or efforts to advance equity.	*"I get the phone calls from angry people who are like, why are you focusing on outreach in these areas when we all need this help? They're the same people that will then call city council and say, this is a racist program because they fliered the black area of town, but they didn't flyer my neighborhood…I feel like if I got sued, because of some outreach effort that I did in a community of color, that the city would be like, nope, we're here with you. 100%. And I think in other places, that might be more of a challenge."*
Connectivity across focus areas	Any mention of linking adaptation work with existing programs or integrating this work across departments, so that everyone feels this is a part of their work. This also includes any efforts made to link equity or social justice initiatives with adaptation projects.	*"We have an Office of Economic Opportunity here in the city. This sort of like our DEI office. In fact, we're going to rebrand it as the DEI department this year. We were worked with that group, because they do have a lot of relationships. They do a lot of work with immigrants and refugees here in X, so they help us translate materials. And there's more things we can do. So, you know, they think it's really a work in progress. They have ambassadors from different immigrant communities that have been working on how do we incorporate climate action and adaptation into the training they do for their community ambassadors, so they could be more aware of what we're working on and get engagement from their neighborhoods. I think that I'm really optimistic about how that will work, because that office is going to go into a little transition at the moment."*
Boundary spanning	Any mention of the interviewee's efforts to engage with community members where the person talked about building relationships internally and externally (i.e., not just one or the other), serving as a bridge between local government and community members, building trust, acknowledging diverse perspectives/different types of knowledge, communicating material across diverse audiences, and/or addressing power dynamics. Representatives had to describe their work that fit at least one of these elements, but some of these individuals covered multiple elements of boundary spanning within their role.	*"I see myself as a translator, as a professional interpreter. I find that when I'm among my colleagues in the city, I find myself often reminding people that I have an MS, and these are the reasons that you need to listen to and respect what the community is saying. Yes, it (comments from community members) might have sounded like a lot of vitriol. But if you slow your heart rate down a little bit, this is what they were actually saying in that really heated meeting. And then when I go out to the community, I kind of switch hats. I'm kind of the one saying, okay, well, let me break down what these numbers actually mean. And here's how these policies are likely to come home to roost in your neighborhood. I feel like I'm constantly in this interpretation role. It's challenging, but it's also it can also be really rewarding when you kind of connect the dots."* *"I think sometimes I feel a bit like a community organizer and local government."*
Community support	Any mention of support from community members to advance social justice and/or climate change initiatives. In some communities, this may be the driving factor pushing the local government to prioritize these issues.	*"I would say it's (equity) something that really matters quite a lot to the citizens of X and our leadership. And I think, because those conversations are being held so regularly, there does seem to be some consensus on it. Actually, it's kind of interesting. I was recently talking to the director of our library, who was saying one of the challenges they have in actually delivering equitable services is that equity is so much on the forefront of the minds of residents, that when they put out a request for feedback on a project, or what do you want to see from your library, he said, it's actually very difficult to get people to speak to their own personal needs. Because everybody wants to speak to the perceived needs of vulnerable members of the community."*
Engaging marginalized individuals		

Building trust	Any mention about the importance of building trust to develop relationships with marginalized individuals or to better engage them in adaptation work.	*"I mean, I feel like I've said a bunch of this already. But for me, the how you do the work is is so important. And it's not just about what you're doing. And the best of intentions are, are moot if you haven't built the relationships and built the trust. Because you can create, for example, you could create a big fund to support you know, frontline communities that are facing climate resilience issues. But if you haven't built that trust, and built relationships and awareness, then they probably don't even know about it."* *"I'm really optimistic about this community engagement policy. I'm hoping that that makes a really big difference because it will mean that all of our city communications will have to go through this process to make sure that everyone's included."*
Addressing logistical barriers	Any mention of trying to address conditions within marginalized individuals' lives that might prevent them from participating, such as translating material into different languages, holding events are convenient locations, and providing stipends, childcare, food, or other resources to overcome barriers.	*"The other thing that we were able to do, and we prioritize, was we used some of our grant funding for gift cards to compensate people for the time, because without their time, we would have no data collection, wouldn't have any project going forward."* *"But you know, if you're going to do a flyer, if you're going to do a brochure, if you're going to create content on a website, all of that should be translated. And that extends to the report to a certain extent. The final Climate report that comes out this year, I've put in the RFP that we want there to be a summary report, that can be translated. For the greenhouse gas inventory that's coming out this year, we've also highlighted that we really want to emphasize like that the graphics need to be readable. The language should be understandable. And be mindful of like those technical terms that might not be translatable into other languages directly. And we are going to translate those summary documents for both the greenhouse gas inventory and for the Climate Forward Report so that things that have never been translated into other languages before we can then share that out with the community in ways that we just haven't in the past."*
Making engagement relevant	Any mention of trying to connect material or initiatives related to climate adaptation to things that community members value and prioritize to enhance their engagement.	*"We've done a couple of community conversations, where it's like small groups of people come and talk about just everyday challenges. Then I link it to the Climate Action Plan. They're like, I have high energy bills. I can't get to work because there's no public transportation. And then it's like, okay, you don't have to call it climate action. I can make the linkages and then plan solutions, but I need to hear what your challenges are."*
Enhancing efficacy	Any mention of trying to help marginalized individuals feel like they can get involved in climate adaptation efforts. This may include simplifying material from the climate plan or spending time to ensure everyone feels like they can provide input on what is going on.	*"It's a six-week course, 36 hours of civic engagement training. We practice testifying in front of city council in council chambers. They got to meet all the city councilors. They did a photo journal of problems they see around town and then created solutions of what how they might address it. They met state reps. And we talked about like, what organizing looks like? How do you organize for a campaign? How do you run for office? Then in every session, we talked about sustainability and climate change and all the things that are impacts, so that this is why I call it my long game. Hopefully when they all run for office, they're thinking about climate change. X is 92% white. Our cohort was 17 people. It was two Latinos, one white woman, and the rest were all black, which is never a space that you go into a city space that's given to you (check wording). One ran for city council. One ran for school board. Five joined city boards and commissions after going through. That type of empowerment work is how you get to the vision. If they have the vision, they just need it to be coaxed out of them and then the means to figure out how government works to get it done."*
Internal challenges encountered		

Lack of formal leadership support	Any mention of mayors, supervisors, councils, or other formal government leadership not supporting or prioritizing climate adaptation and/or social justice initiatives. This may include not creating a vision across their organization about addressing these issues, not prioritizing this within the work of the person charged with implementing the plan, or not providing money, time, staff, or other resources to address these issues.	*"We'll get randomly a council member who wants a report on something we're doing with the task force, and they ask, are you still paying them? I have to get coaching from other people who have done this longer to figure out how to answer those questions so that it doesn't create more problems. Of course we are because that's current county guidelines and not providing specific so that people are not finding themselves appalled that specific numbers for whatever reasons, right, whatever is their internal sense of what what is appropriate and what is not appropriate? Or maybe there's not yet accounting policy on that. And you're still you're trying to get this established, and hey, this is part of best practice. And yet, there's no official county policy on that to fall back on."*
Lack of coordination/disconnect across departments	Any mention of lack of coordination across local government departments in working on climate adaptation or justice initiatives or lack of accountability that this is something that is part of their work.	*"There's definitely siloing I would say. People are generally wanting to be on board, but at the same time, it's like I'm making demands of them and not necessarily bringing them more resources, right. It's a tough space. And I recognize that I've been around long enough to know when I'm doing that and to try to at least acknowledge it and be like, let me know the limits of what we can do here within reason…Right now, it's almost like I'm both an internal consultant and an internal pest, because I'm making demands without necessarily bringing resources now."*
Uncertainty about what to do	Any mention of feeling unsure about how to prepare for climate change and advance social justice in the process, ensuring the most marginalized, vulnerable residents will be equipped to adapt.	*"And we also want to make sure we're prioritizing communicating with community members who don't primarily speak English, which we try to do in a lot of our, like general city work. But it's still challenging because the guidelines are like, provide information in the top five languages spoken in the community. But we know that there's way more than five languages spoken in our community. So what happens to someone who speaks the 15th most popular language in the community? So I think those are two big issues."*

Challenges encountered with community members

Distrust	Any mention of historical or current issues of distrust between residents and local government.	*"Trust is really big. That side of town has had a lot of issues with the city. And so trust needs to be rebuilt, specifically the mobile home parks around that side of town have all been, most of them been bought by private companies outside of the state. A lot of practices, a lot of illegal practices, were going on in the city due to our ordinance. We couldn't really step in. So as the city we contact the attorney general, hey, this is what's going on. This is what's happening to our residents in this side of town. That was us trying to support our residents and what they're going through. So there's a really big lack of trust on that side of town. I don't think I can get anything done without rebuilding that trust."*
Opposition to social justice initiatives	Any mention of members of the public not supporting social justice initiatives, such as feeling offended or resentment towards initiatives that are targeted towards certain groups (i.e., not benefit ing them).	*"I get the phone calls from the angry people who are like, yeah, why are you focusing on outreach in these areas when we all need this help. And they're the same people that will then call city council and say like, this is a racist program because they fliered the black area of town, but they didn't flyer my neighborhood."* *"The other interesting thing that we have culturally is just, there's definitely a lot of like, us versus them in terms of locals, non locals, and just a real tension that has become even stronger in terms of that. And so I think, while people are really passionate about like, oh, protect the locals, it's not necessarily the same applied to protect everyone, including the people at the bottom, necessarily."*

Lack of relevance to their lives	Any mention of marginalized individuals having other priorities and issues that are important to them in their lives and attributing a lack of engagement as they don't feel like tackling climate change is relevant to the things they care about.	*"You don't see that in lower income cities, because that's not a priority for them. That's not where their focus. They are paying bills, figuring out where they can go to get the most bang for their money when it comes to grocery shopping. Those are communities that I think are more vulnerable as our lower income, you know, BIPOC communities. I don't think it's because I've heard some comments in the community of, oh, they just don't care. I don't think that's it at all, I think they don't have the luxury of having that being a priority of that being their focus, because they're worried about paying their bills and make sure there's food on the table or this and that. It's not the biggest priority to them."*
Logistical barriers	Any mention of conditions of marginalized individuals lives that may prevent them from getting engaged, such as language challenges and lack of money, transportation, childcare, and other factors that may limit their ability to participate.	*"And my role really, which makes my job really hard to be quite honest and slows me down tremendously, is that everything I do has to first be vetted with a taskforce. And because they only meet monthly, because they have their own capacity issues, it's incredibly difficult to move quickly. It simply can't happen."* *"That's our focus is making sure that we're having meetings and locations that are accessible. We have, the way that our civic center is structured is it's very, it's kind of like a castle on a hill style. And it's not extremely accessible to people. We're hoping to go into neighborhoods themselves and actually interact with people in a in a better way, instead of having kind of the same demographics attend our castle on a hill meetings."*

Chapter 5

Conclusion

Introduction

Similar to many students who completed their dissertations during COVID, I deviated considerably from my initial research proposal. For the first couple years of my program, I was solely working on an NSF - funded project focused on investigating effective design elements and impacts of place-based climate adaptation workshops in the US. This grant involved three parts, but the most substantial project I helped coordinate involved eight long-term case studies of US communities that hosted a climate adaptation workshop facilitated by our partner, EcoAdapt. We have been tracking the short-term and long-term impacts of these climate adaptation workshops before, during, and up to 2 years after the workshops through surveys, interviews, and observations of participants. This research was delayed and workshops pivoted to Zoom due to COVID, resulting in a different research project and timeline than planned for. As I began to conduct this research, I was inspired to investigate how local governments were considering their most vulnerable residents as they prepared for climate change. What began as a side project and reviewing a few government adaptation plans morphed into an idea for an alternative dissertation. With setbacks related to my original research plan came new opportunities to explore how social justice was considered in a large sample of climate plans published by US municipalities and understand how these plans translate into action through interviews with government employees. While this research was not what I originally planned for my dissertation, I was able to develop a sound understanding of the fields of social justice and municipal adaptation planning and begin to investigate how collaborative environmental processes happen, which is a broader area of research that I hope to explore in the future. In this conclusion, I will highlight how each dimension of social justice (recognitional, distributional, and procedural justice) was addressed throughout this dissertation, reflect on my experiences, and share my hopes for my career and future research.

Cross-cutting themes

Social justice in adaptation planning and implementation

The chapters within this dissertation summarize examples and trends of how social justice is considered in climate adaptation, climate action, and climate resilience plans, with a follow-up with a subset of local governments to see how these plans have translated into action. Overall, our findings in Chapter 2 demonstrated that most plans in our sample addressed justice to some extent in climate adaptation planning, but most commonly only considered recognitional and distributional justice. Within these data, we observed some trends and patterns in how each type of justice was addressed. Our regression analyses in Chapter 3 revealed that each type of justice was considered by more plans over time, including procedural justice, suggesting growing attention to the disproportionate impacts of climate change on marginalized populations and shifting norms within municipal climate planning to engage those who will be most impacted. Plans from more Republican areas considered recognitional and distributional justice to a lesser degree than those from more Democratic-leaning areas. Plans from larger communities were more likely to address procedural justice and included plans for monitoring the impacts to marginalized people. Plan from poorer areas addressed distributional justice more and acknowledged more injustices marginalized groups may face. These variations by community reveal that conditions within these communities may influence how local governments consider justice in their adaptation approaches.

Our follow-up discussions with government employees revealed that, across most communities, it is still early to tell how adaptation strategies will benefit or impact intended marginalized audiences. The findings summarized in Chapter 4 suggest several factors that may enable local municipalities to consider justice to a greater degree. These include formal leadership support, community support, actions to remove barriers to

participation, relevance to marginalized residents' lives, boundary spanning, trust building, and capacity building.

Recognitional justice

Throughout this dissertation, we investigated four elements of recognitional justice in the context of adaptation, which included which marginalized groups were acknowledged, how these groups may be impacted by climate change, what injustices they face, and how historic exclusionary practices have contributed to their vulnerability. In our review of adaptation plans in Chapter 2, we found that most governments acknowledged some groups as disproportionately vulnerable to climate change, but fewer acknowledged historical policies and how this contributed to marginalized individuals' existing vulnerability. Without acknowledging past discrimination and governments' role in perpetuating these injustices, these municipalities may miss an opportunity to repair feelings of distrust among impacted communities and hold themselves accountable to rectifying past harms. As governments continue to plan for adaptation, they might consider coupling historical analyses as they map out social vulnerabilities to climate change, which might entail pinpointing specific policies that have created and perpetuated injustice. This could enhance feelings of legitimacy among residents, inform the design of adaptation strategies, and may be a first step towards centering justice in community processes.

When local governments are implementing these plans, many of the marginalized groups identified in these documents are at the top of employees' minds when considering increased vulnerability to climate change (e.g., low-income individuals, people of color, non-English speakers (including immigrants and refugees), older adults, and people with pre-existing medical conditions). As most adaptation initiatives are just kicking off or still in the works, social vulnerability assessments have not been used by many communities, but this will be an interesting area to check in and see how these assessments inform adaptation projects.

Distributional justice

When we conceptualized distributional justice, we sought out both adaptation strategies that were intended to benefit marginalized individuals but also considered how local governments are planning for potential negative impacts of these projects. In Chapter 2, we found that plans identified adaptation strategies across six focus areas (e.g., health and safety, buildings, green infrastructure, professional development, food, and transit), but plans focused more attention on certain sectors and on expanding existing programs than new projects or policies. Based on our regression analyses in Chapter 3, more recent plans (2018-2021) more commonly considered projects aimed at enhancing access to green jobs, enhancing access to public transit, developing community gardens, developing housing policies, and expanding greenspace development. Our results suggest a broadening understanding by municipalities about what programs might fall under the label of "climate adaptation" and potentially the development of more innovative approaches to ensure marginalized residents are prepared and more resilient in response to climate change. It is still too early to understand how these initiatives are being implemented and how they will impact marginalized groups.

Throughout all three chapters, we also found that governments focused more on the benefits to marginalized groups, with less consideration of the potential negative impacts to these individuals from these strategies as they plan for adaptation and implement programs. In Chapter 4, few interviewees described efforts to evaluate programs once implemented and the impacts to marginalized individuals. Those that did mentioned metrics as still being developed, rather than actively being used to track how their programs impact intended audiences. Unintended consequences appear to be infrequently considered in climate adaptation planning, which may result in adaptation strategies that exclude or negatively impact individuals intended to benefit from these efforts. Without plans to track the impacts of these initiatives, municipalities may be unable to ensure their programs are reaching the intended audiences.

Procedural justice

Engaging marginalized groups in both adaptation planning and implementation is still an area that many communities seem to struggle with. Our findings from Chapters 2 and 3 revealed that while more plans over time described efforts to engage marginalized residents in developing these plans, these were often limited to one-off opportunities, rather than more extensive engagement or involvement in decision-making. In our follow-up calls for Chapter 4, we found that most individuals we spoke with described engagement we coded as *informing, consulting, or involving* marginalized residents through these one-off opportunities. They may aspire towards more empowering, deeper engagement but they struggle to get financial backing from their superiors or dedicate the time to these initiatives, as what is necessary to advance procedural justice may often be at odds with the bureaucratic processes of local governments. Even when communities have the time and resources to support these initiatives, they may struggle to get marginalized individuals to the table in the first place due to existing issues of distrust, lack of awareness, or lack of relevance they may feel with their lives.

Engaging marginalized groups in adaptation planning and implementation can help enhance the legitimacy of these initiatives and ensure programs address existing injustices and more successful/sustainable long-term. By empowering these individuals through shared decision-making, residents may be more likely to feel they have the agency to affect change and take responsibility for implementing some of these adaptation initiatives. On the other hand, if adaptation planning processes exclude marginalized individuals, governments risk reinforcing existing social vulnerabilities and fail to generate support, or draw active opposition, from those that stand to be most impacted. To advance justice in climate adaptation planning, local governments may need to institutionalize norms that address these concerns and encourage relationship building and culturally responsive practices, create spaces for hearing community members' perspectives, and empower marginalized individuals to act.

Reflection

I came to Virginia Tech after living and working in Indonesia for several years, with little background in social science or knowledge about climate adaptation. During my first semester, I was given the freedom to delve into relevant literature and explore topics that interested me or questions I'd like to answer through the NSF-funded climate adaptation workshop project. For some reason, I found myself drawn to questions about how entities involved in climate adaptation work connect and learn from one another at these workshops and how these connections influence adaptive action within their community. I believe these questions also sparked my interest in climate justice to understand who is often not engaged in adaptation work and how that might influence outcomes, but I initially focused my dissertation around the influence of social networks. My advisor and committee supported my obsession with social networks, and I was able to develop an entire research proposal with questions about how the quality and structure of social networks can influence how communities adapt. I also became fascinated by the idea of social network maps as tools or boundary objects to enhance learning and collaboration among workshop attendees. Through many brainstorming and feedback sessions with our lab and EcoAdapt, I developed a network mapping website that we incorporated into each of the eight adaptation workshops to support participants as they considered how to implement proposed adaptation strategies. Through this grant, I have also engaged in other research projects that involved conducting a Delphi study of adaptation workshop facilitators to identify valued workshop practices and outcomes (Stern et al., 2020; Stern et al., 2023), surveying online climate conference attendees to understand what they gained from these events (Merritt et al., 2022), and mixed-methods studies of recent climate adaptation workshops to assess workshops' impacts. This is all to say that I have been incredibly fortunate to work on a variety of different research projects during my four years at Virginia Tech and will be leaving with knowledge and experience about a range of quantitative and qualitative methods.

When I reflect on my time at Virginia Tech, I also think about all the researchers and incredible, passionate practitioners I was fortunate enough to interact with. My favorite part of this social science journey has been to interview folks doing this work on the ground, whether that be individuals from government agencies,

municipal departments, nonprofits, community-based organizations, or passionate activists engaged in their communities. I hope to continue to work with some of these individuals or keep track of what work they are up to.

The following points summarize a few lessons I took away from the research I've participated in throughout my dissertation:

1. ***Understanding how communities are adapting is challenging:*** When I started this research, I expected each adaptation plan would have a person or two charged with implementation, and these individuals would have a good sense of what other departments and organizations were doing to prepare for climate change. While most plans had a government employee overseeing implementation, only a handful of individuals (i.e., those that exhibited boundary spanning traits) seemed able to provide an overview of internal and external adaptation efforts going on within their communities. In other interviews related to the adaptation workshops, I also found it challenging for interviewees to think about work going on outside their organization and speak to the wider picture of how their community is adapting. In some cases, I think this is due to the size of the municipality and their staff (e.g., King County with 10,000+ employees). However, the wide scope of adaptation and how it intersects with so many issues may also challenge efforts to understand how a community is adapting. As evidenced from this research, municipalities struggle to integrate climate adaptation across departments and help these offices see preparing for climate change as part of their respective work. This may be the same case for nonprofits or community-based organizations that don't have "climate change" within their day-to-day responsibilities but are working on issues that are inherently linked to adaptation, like housing or food security. The role of formal leadership and boundary spanners to help make these connections for others and coordinate this vision across departments and organizations is needed now more than ever, as some of these communities are already experiencing the impacts of climate change.

2. ***Municipalities struggle to move from planning to action:*** Climate adaptation and action plans are becoming an increasingly common resource for municipalities to help prepare for climate change. While reviews of these documents can give researchers a general sense of how municipalities are preparing for climate change, these plans are non-binding and often designed with minimal implementation details. Some argue that strategic plans should include few details to encourage flexibility as conditions change(Miller & Cardinal, 1994; Mintzberg, 1990), while others suggest more details can help hold governments accountable to actions and increase the likelihood actions will be implemented (Meerow et al., 2019; Stults & Woodruff, 2017). Threading the needle between these competing challenges might require thinking about which procedures should be established ahead of time, and which should be left open and flexible. More detailed plans may also be helpful in certain contexts and irrelevant in others, but more research is needed to connect plan quality with outcomes.

   While this research suggests that many municipalities are considering adaptation strategies, in many discussions I've had with government officials and community members throughout this degree, climate mitigation efforts seem to be prioritized over adaptation. If communities are not currently experiencing the impacts of climate change, it may not be as prevalent a concern to address. Climate mitigation and reducing greenhouse gas emissions also can provide tangible, more immediate impacts than climate adaptation projects. Many communities may also struggle to understand how to adapt, as there is less information available about successful adaptation efforts or criteria to measure the success of these initiatives. I hope that this research adds to the growing body of information available to support communities as they prepare for climate change, especially examples of how other municipalities are preparing.

3. ***More attention, time, and resources will be needed if municipalities hope to advance adaptation and justice efforts:*** While it may seem convenient to try to mainstream adaptation and justice

initiatives into ongoing efforts, our results reveal that without dedicated time, staff, and financial resources, municipalities struggle to advance justice efforts and meaningfully engage members of marginalized groups. This may seem like an obvious lesson to take away from this research, but more funding and resources seem essential to facilitating deeper community engagement and ensuring adaptation strategies/projects are implemented. I am hopeful that recent federal initiatives, like *Justice 40,* will provide local municipalities with additional funding to devote to these initiatives, but it is unclear if government employees have the capacity or bandwidth to take advantage of these opportunities.

Future plans and research

Overall, this PhD has been an incredibly humbling experience. I honestly entered this program believing that I didn't need a PhD. I thought that I learned enough during my experiences working in conservation that I could teach a university field course without these credentials. That was my goal at the time. I thought that my experiences working in the field with orangutans singled me out as someone special, but in both good and bad ways, I was completely mistaken. I've taken away many important lessons from this experience, everything from writing a research proposal to managing logistics of a large course, which I intend to take with me as I move forward.

Someone told me before coming to Virginia Tech that I wasn't cut out for a PhD and academic life, because he said I wasn't a "shark". While I don't think that you need to be a shark, I've learned that hard work is not always enough to shine in this academic world. You more than likely need to sacrifice weekends, vacations, and personal time to ensure you are checking all the boxes to even get an interview for a faculty position. And yet I still find myself gravitating towards a future in academia, because the positives of this type of work and passion I have for teaching and research have only strengthened throughout this program. I am not a naturally gifted researcher, writer, or teacher, but I've realized that my strengths lie in my tenacity and persistence to get the job done and my empathy towards others I meet. I may not be a shark, but being a nice person who cares about helping other people must count for something, right?

In the future, I hope to stay in academia and become a professor at an institution that aligns with my priorities in teaching, mentorship, and research, like prioritizing hands-on, experiential learning and engaging undergraduate students within my research. The projects that I have had the opportunity to work on throughout my PhD have also informed my aspirations to work on incredibly applied research. I hope my future research can help address the needs of those working in conservation and natural resource management, whether that be practitioners, government employees, or the communities they serve. Drawing from my interdisciplinary background and previous work as a conservation practitioner, I aim to engage in research that is developed with people who are doing this work on the ground to understand the contexts in which they work and produce material that will be valuable for them. While I would still be interested in pursuing research questions related to climate justice, I'm also generally interested in understanding what influences collaboration in natural resource management, how equitable these processes are, and how collaborative processes influence outcomes.

Within these broad areas, there are a few research questions that I began to consider within my initial research proposal that I am still excited to explore. I'm interested in drawing on my knowledge of social network analysis to learn more about how dynamics of social networks influence outcomes in natural resource management, whether that be related to climate adaptation or other environmental challenges. For example, as part of the NSF grant, I began to investigate how elements of network quality, such as trust and boundary spanning, influence how communities in various contexts respond to climate change. This is research that I intend to finish post-graduation and potentially investigate these questions in other fields as I move on to other research projects. I'm also interested in understanding how boundary objects, like maps, games, reports, or other resources, enhance learning and collaboration amongst multi-stakeholder collaborative groups.

As I move onto a postdoc opportunity elsewhere, I feel incredibly fortunate to leave Virginia Tech equipped with a wide range of knowledge, skills, and experiences to guide future research and teaching opportunities I pursue.

References

Meerow, S., Pajouhesh, P., & Miller, T. R. (2019). Social equity in urban resilience planning. *Local Environment*, 24(9), 793-808.

Merritt, E. G., Brousseau, J. J., Stern, M. J., & Hansen, L. J. (2022). Walking the Walk toward Increasing Access and Reducing Emissions: The Promise and Challenges of Virtual Climate Adaptation Convenings. *Sustainability*, *14*(19), 12586.

Miller, C. C., & Cardinal, L. B. (1994). Strategic planning and firm performance: A synthesis of more than two decades of research. *Academy of management journal*, *37*(6), 1649-1665.

Mintzberg, H. (1990). The design school: reconsidering the basic premises of strategic management. *Strategic management journal*, *11*(3), 171-195.

Stern, M. J., Brousseau, J., O'Brien, C., Hurst, K., & Hansen, L. J. (2020). Climate adaptation workshop Delphi study report: facilitators' viewpoints on effective practices. *Virginia Tech: Blacksburg, VA, USA.*

Stern, M. J., Hurst, K. F., Brousseau, J. J., O'Brien, C., & Hansen, L. J. (2023). Ten Lessons for Effective Place-Based Climate Adaptation Planning Workshops. *Climate*, *11*(2), 43.

Stults, M., & Woodruff, S. C. (2017). Looking under the hood of local adaptation plans: shedding light on the actions prioritized to build local resilience to climate change. Mitigation and Adaptation Strategies for Global Change, 22(8), 1249-1279.