

ACCEPTED VERSION – Accepted by Local Environment May 11, 2024

**Unequal considerations of justice in municipal adaptation planning: an
assessment of US climate plans over time and by context**

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To cite this article: Jennifer J. Brousseau, Marc J. Stern & Lara J. Hansen (26 Jun 2024):
Unequal considerations of justice in municipal adaptation planning: an assessment of US climate
plans over time and by context, Local Environment, DOI: 10.1080/13549839.2024.2368532

To link to this article: <https://doi.org/10.1080/13549839.2024.2368532>

Unequal considerations of justice in municipal adaptation planning: an assessment of US climate plans over time and by context

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 climate adaptation 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 marginalisation, 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 marginalised residents in adaptation. 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 include strategies for monitoring the impacts to marginalised people. Plans from communities with a larger percentage of residents living in poverty addressed distributional justice more often and acknowledged more injustices faced by marginalised groups more often. We observed no trends in the treatment of procedural justice related to racial demographics or income. We discuss potential reasons for these trends and their implications.

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

Introduction

While climate adaptation discussions happen at global, national, and regional scales, 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 addressing these impacts (Measham et al. 2011; Naess et al. 2005). As local governments in the United States prepare for climate change, some elect to create climate adaptation plans, which provide strategic roadmaps that outline strategies to address projected climate impacts. These plans are expected to help communities prepare for climate change and lower the cost of climate-related impacts (Preston, Westaway, and Yuen 2011). While little research to date has tracked the implementation or effectiveness of these plans, insights from the wider strategic planning literature indicate that strategic plans can have meaningful positive effects on subsequent performance and effectiveness (George, Walker, and Monster 2019). The content of climate adaptation plans and the strategies proposed within them can vary considerably, as they are powerfully shaped by local context (Owen 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, Wood, and Romsdahl 2017; Wood, Hultquist, and Romsdahl 2014; Yeganeh, McCoy, and Schenk 2020). Yet other factors, such as funding, previous climate-related events, local champions, policy mandates, and the makeup of the surrounding community, also influence how communities prepare for climate change (Dilling et al. 2017; Owen 2020).

Climate change is increasingly viewed through a social justice lens, as some of the most socially vulnerable and marginalised people in a community may also be most affected by climate change (Hughes and Hoffmann 2020; Klinsky et al. 2017). Marginalised people 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 conceptualise social justice through the three-pronged framework popularised 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, or other factors of inequality or historical marginalisation (Chu and Michael 2019; Meerow, Pajouhesh, and Miller 2019). Distributional justice is concerned with ensuring marginalised 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/programmes (Anguelovski et al. 2016). Procedural justice aims to enable marginalised 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, Pajouhesh, and Miller 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 (Schrock, Bassett, and Green 2015; van den Berg and Keenan 2019). While federal guidance on adaptation planning is increasing (e.g. Justice 40), the lack of consistent guidance in

the past, as well as a lack of research to understand which approaches are effective, may have contributed to significant variation in approaches (Shi and Moser 2021). Understanding trends in how social justice is addressed in climate adaptation planning can inform how discussions around government 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). Earlier reviews have sought to explain variation in social justice considerations across other forms of municipal planning, like sustainability plans (Liao, Warner, and Homsy 2019; Opp and Saunders 2013), comprehensive plans (Loh and Kim 2021), and climate mitigation plans (Diezmartínez and Short Gianotti 2022; Hess and McKane 2021). However, we have been unable to uncover any such studies of climate adaptation plans beyond qualitative reviews solely focused on urban areas, which documented an increased focus on social justice over time (Fiack et al. 2021; Mullenbach and Wilhelm Stanis 2024). To improve our understanding of what factors are associated with justice considerations in adaptation planning, we systematically reviewed climate adaptation related plans from communities in the United States published between 2010–2021. We also sought to understand how specific elements of each dimension of justice (e.g. identification of marginalised groups, recognition of injustices, and focal areas of distributional justice strategies) varied over time and across contexts within these municipalities' plans, nuances we have yet to observe captured within existing literature. 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 presence of marginalised groups) are associated with how justice has been addressed in climate adaptation planning?

This work expands upon findings from a companion piece, where we summarise how justice was considered generally within climate adaptation and related plans published within the US over the past decade (Brousseau et al. In prep). In this study, we draw upon plan details and sociodemographic data for each community to assess patterns in the incorporation of social justice through a series of regression analyses.

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 marginalised 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 prioritise (Fainstein 2010). In recent years, communities in the US, especially urban centres, have experienced a rise in progressive politics and grassroots advocacy directing attention to efforts that advance justice (Krieger 2020; Pastor, Benner, and Matsuoka 2015). Accompanying this is the development and rise of the “climate justice” movement, emerging from the intersection of grassroots environmental movements and recognition of the impacts of climate change on the most vulnerable (Schlosberg and Collins 2014). Over the past decade, there has also been a rise in funding opportunities to advance social justice in low-income communities and communities of colour as these areas prepare for climate change. Examples include the Kresge Foundation’s

Climate Resilience and Urban Opportunity Grants launched in 2014 (Kresge Foundation 2023) and the Federal Emergency Management Act's (FEMA) recent influx of support for at-risk census tracts designated as Community Disaster Resilience Zones (FEMA 2023). 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 prioritise social justice in climate planning (Cannon et al. 2023; Fitzgerald 2022). Similar plans, such as climate mitigation plans, also found greater consideration of justice and equity in newer plans, especially those published after 2017 (Caggiano et al. 2023; Diezmartínez and Short Gianotti 2022). Therefore, we expected that more recently published climate adaptation plans, specifically those published after 2017, would consider justice more than older plans.

Political orientation

Increasingly, state institutions and local governments have been recognised for their role in proposing and implementing climate policy interventions (Bulkeley and Betsill 2003; Rice 2010). As inter- national and national interventions have faced challenges in advancing action, local governments have integrated climate change into their policy agendas to different degrees, which is often shaped by contextual factors like political leadership and culture, existing governance systems, and coordination with non-profits, grassroots activists, and other entities (Castán Broto 2017; Rice 2014). This local governance of climate policy reflects a shift from top-down approaches to complex, multi-scalar approaches to advance climate initiatives (Bulkeley and Betsill 2013; Bulkeley and Moser 2007). Local governments may propose climate policies to build support for other issues within their communities (Rice 2010) or address

longstanding infrastructure/service improvements (Baker 2012; Satterthwaite et al. 2012). Local governments have increasingly linked climate adaptation policies with development policies that advance social justice, such as upgrading housing and other services for low-income communities (Stein and Moser 2014).

However, tackling climate change and addressing social justice are both issues more commonly prioritised by Democrats than Republicans in the US (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). Existing studies support these trends, showing that Democratic areas were more likely to engage in municipal mitigation efforts (Krause 2011; 2013) and incorporate equity considerations within their sustainability plans (Hess and McKane 2021). We have yet to uncover research that documents trends between political orientation and social justice considerations in adaptation planning. 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 and Godschalk 2009) and stronger considerations of justice in climate action plans (Diezmartínez and Short Gianotti 2022)

and climate adaptation plans (Chu and 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 (Loh et al. 2022). While marginalised groups are often present in rural communities, dense, urban areas often have a greater presence of vulnerable residents, which may warrant greater consideration of justice (Flanagan et al. 2011). Therefore, we expected that plans from larger, urban areas with higher population size would address justice to a greater degree than those from smaller municipalities.

Presence of marginalised residents

Local governments may be more likely to address justice when more members of marginalised groups live in these communities, such as a higher percentage of people of colour or low-income residents (Schrock, Bassett, and Green 2015). The presence of more residents of colour and individuals living in poverty is commonly linked with the presence of greater vulnerability for residents, particularly regarding income, housing, healthcare, and other community resources/services (Reckien et al. 2018; White-Newsome, Meadows, and Kabel 2018).

Communities where more members of these groups reside may be more likely to prioritise efforts that advance social justice, as community activists and non-profits have tangible concerns for government action (Schrock, Bassett, and Green 2015). While reviews of other types of plans observed mixed results related to socio-economic demographics and justice (Diezmartínez and Short Gianotti 2022; Hess and McKane 2021), we expected that adaptation plans from communities with higher percentages of communities of colour and residents living in poverty would address justice more than those from communities with fewer residents from these marginalised 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. Within our review, we also included all plans in a city or county that met our criteria during the study period. Only three communities published an original 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).

We found 112 plans that met our criteria through searches on adaptation clearinghouses (EcoAdapt 2022; Georgetown Climate Center 2022a; Georgetown Climate Center 2022b) and Google. Twelve plans in our sample were from the same region in New York, created by the same planning organisation, 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 all analyses within this study and excluded the other 11 plans, resulting in a final sample of 101 plans (see Supplementary Material for complete list of plans).

Coding scheme

Drawing on relevant literature (Meerow, Pajouhesh, and Miller 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 characterise plan quality (Baker et al. 2012; Guyadeen, Thistlethwaite, and Henstra 2019; Stults and 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 coded all examples that identified groups as vulnerable to climate change, addressed the historical and continuing injustices these groups face, and illustrated how these groups will experience climate impacts. In coding distributional justice strategies, we identified any adaptation approaches that highlighted benefits to marginalised groups (e.g. enhancing access to goods, services, and other opportunities within the community). Procedural justice codes encompassed any initiatives proposed within plans to engage marginalised groups in plan development and/or implementation. We sought out examples that explicitly talked about justice and marginalised groups but also coded any examples that implicitly considered groups that may be more vulnerable to climate change. For more detail and specific examples of these codes, see Brousseau et al. (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 Brousseau et al. (In prep) for more detail on scoring).

Data analysis

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

Dependent variables

Each plan's score for recognitional justice, distributional justice, procedural justice, and monitoring/evaluation served as the dependent variables of our ordinal logistic regression analyses. We also conducted linear regression analyses to examine the relationship between contextual variables and the number of categories of marginalised groups, injustices, and focal areas for distributional justice strategies identified in the plans.

Contextual factors/predictor variables

Table 1 describes how we operationalised 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 and McKane 2021; Loh et al. 2022; Schrock, Bassett, and Green 2015). To understand if the presence of marginalised groups 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: low-income, people of colour. 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.

We first tested independent and dependent variables for collinearity by conducting Spearman Rank bivariate correlation tests. 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 marginalised groups, specific injustices, and focus areas of adaptation strategies identified in each plan. 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 logistic regression analyses (R Core Team 2022). 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 minimise the likelihood of false positives, we report a Bonferroni correction for these analyses ($p < 0.0025$). We then ran additional regression analyses (four ordinal logistic regressions and three linear regressions) controlling for year to test whether any other contextual variables were independently predictive of justice considerations. This entailed two series of regression analyses.

We ran binary logistic regression analyses to examine the relationship between contextual variables and whether specific marginalised groups, specific injustices, and specific focal areas of distributional justice strategies were identified. This amounted to nine marginalised groups, nine identified injustices, and six focus areas, serving as dependent variables within the series of binary logistic regressions. We excluded renters and pregnant women from our analyses, because few plans identified these groups as more vulnerable to climate change (<20 plans). To minimise

the likelihood of false positives, we report a Bonferroni correction for these analyses ($p < 0.002$). The full results of these more detailed analyses are included in the Supplementary Material.

Results

Trends over time

More recent plans in our sample addressed each dimension of justice more often and to a higher degree (see Figure 1 and Table 2). In two of the three communities in our sample with an earlier plan and an updated version, we found greater attention to each type of justice in the more recent update. Of the 50 plans that addressed procedural justice, 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.

Recognitional justice

From our linear regression analysis, we observed that local governments recognised significantly more groups as marginalised over time ($\beta = 1.297$, $p < .001$). Plans published between 2010-2017 ($n=45$) identified an average of four marginalised groups, whereas plans from 2018-2021 ($n=56$) recognised an average of eight groups. The increased recognition of people of colour as more vulnerable to climate impacts is particularly acute. Before 2015, none of the plans in our sample described people of colour as more vulnerable to climate impacts. However, from 2015 onwards, plans began to note the disproportionate impacts facing people of colour, with more than 70% of the plans from 2019-2021 identifying them as vulnerable. The linear regression analysis also revealed that more recent plans acknowledged significantly more injustices that marginalised groups face that may exacerbate their vulnerability to climate change ($\beta = 0.751$, $p < .001$). Plans

published between 2010-2017 recognised an average of two such injustices, compared with an average of five addressed in plans from 2018-2021. Only plans published since 2017 discussed how historical policies created these injustices.

Distributional justice

Through our review of climate adaptation plans, we identified adaptation strategies that aimed to enhance access for marginalised individuals across six focus areas: health and safety, green infrastructure, food, buildings, transit, and professional development opportunities. A linear regression test revealed that more recent plans described adaptation strategies related to social justice across significantly more focus areas over time ($\beta = 0.694$, $p < .001$). Within each of these focus areas, we identified 20 distinct adaptation strategies and tracked their appearance in plans over the years (Table 3). 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 programmes, and energy efficiency and flood retrofitting programmes. During this period, few plans addressed strategies aimed at enhancing marginalised 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, enhancing access to green jobs, enhancing access to public transit, developing community gardens, developing housing policies, and expanding greenspace development.

Procedural justice

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

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 than 2010-2017 ($\chi^2= 14.235$, $p <.001$). Specific metrics or indicators to track the impacts of adaptation strategies on marginalized communities were proposed in 36% of plans published between 2018-2021, compared with only 6% of plans published between 2010-2017.

Influence of context and engagement factors

Table 4 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 marginalised audiences and the social justice issues they face, as well as the focus areas of distributional justice strategies (see Table 5). 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 marginalised groups, described fewer injustices these groups may face, and identified a narrower range of distributional justice strategies. Overall, plans from communities with higher poverty levels identified more injustices faced by marginalised individuals and addressed more focus areas through the distributional justice strategies they proposed related to climate adaptation. Population size and the proportion of people of colour living in these communities had no statistically significant relation with the consideration of these additional elements of justice. We ran additional ordinal logistic regression and linear regression models to examine the potential interaction effects between the contextual variables, but none were statistically significant.

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 recognition 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.

Trends over time

Aligning with another recent evaluation of climate mitigation plans (Caggiano et al. 2023; Diezmartínez and Short Gianotti 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, more recent plans were more likely to consider recognitional justice (historical marginalisation, focus on racial justice) and engage marginalised individuals in adaptation work. Our findings also show that plans over time have broadened their idea of who is most vulnerable to climate change, originally centring around elderly, youth, and people with pre-existing medical conditions and more recently expanding to include low-income individuals, non-English speakers, people of colour, outdoor workers, unhoused individuals, and indigenous people. More recent plans also propose a wider array of adaptation strategies to enhance marginalised individuals' capacity to prepare for climate change, such as improving access to greenspaces, public transit, or community gardens. While recently published plans have started to include approaches to monitor the justice-related impacts of adaptation projects, more than half of those published within the past few years still lack these details. These findings lend support to the call for a larger evidence-base about what is and what is not working for justice-informed adaptation actions through monitoring/evaluation approaches shared among communities (Caggiano et al. 2023; Diezmartínez and Short Gianotti 2022).

This broadened definition of marginalised groups, scope of distributional justice strategies, and inclusion of monitoring criteria may be a result of engaging more voices in plan development (i.e. an 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 programmes do not

perpetuate injustices (Ajibade and Adams 2019; Byskov et al. 2019; Healey 2020; Innes and Booher 2004). These trends are consistent with growing attention to the disproportionate impacts of climate change on marginalised 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 have further strengthened these trends (Henrique and Tschakert 2021). Recent policy mandates to address social or environmental justice in municipal planning may also help explain the increased attention over time. In California, the Senate passed a mandate requiring municipalities to address environmental justice in general plans published after 2017 by mitigating the harms of living near environmental hazards, providing equitable access to community amenities and engaging residents in planning processes (Authority for and Scope of General Plans, Cal. Gov. Code, § 65302(h) 1965). This mandate may have drawn greater attention to justice in the 15 California plans we reviewed from that period, but to our knowledge, this is the only state with a mandate of this type (Brinkley and Wagner 2024; Zuñiga and Méndez 2023).

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. Through these networks, municipalities' approaches to adaptation planning may be becoming institutionalised and diffusing through- out local governments, causing organisational

processes to be more similar (DiMaggio and Powell 1983). For example, Cannon and colleagues (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. 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, are influenced by growing social movements, and take advantage of the growing body of climate justice literature (Diezmartínez and Short Gianotti 2022), as well as the increase in climate justice funding available (e.g. Kresge Foundation, Justice40 Initiative).

Political context

Our findings lend support to existing literature about the political nature of climate change policies, which are often influenced by local political culture, governance systems, and interactions among relevant entities (Castán Broto 2017; Rice 2014). Plans from communities with more Republican voters described a narrower range of marginalised people, injustices they may encounter, and distributional justice initiatives. This narrower focus may be driven by residents' interests, as Republican voters tend to oppose mainstream social justice efforts and commonly prioritise 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 in alignment with residents' values, emphasising cost-saving measures and public health benefits (Foss 2018a; Foss and Howard 2015; Frick 2014). Depending on who these initiatives benefit, these could be considered distributional justice approaches. Many local

governments may also advance climate policies through infrastructure or sustainability initiatives (Baker 2012; Rice 2010), which may be addressed in other municipal plans that were not included in this study.

As climate-related planning and social justice concerns become increasingly polarised, 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, Warner, and Homsy 2020). Prior research suggests that planners may be insufficiently prepared to address controversial issues and engage community members in dialogues that legitimise their interests, identify areas of shared concern, and frame initiatives around issues they care about, especially in politically conservative areas (Foss 2018a; 2018b; Meerow and Mitchell 2017). The trends we observed in Republican-leaning communities suggest a need for more resources or capacity building for planners about how they can tailor adaptation planning to residents' concerns and productively address justice considerations. Inclusion of justice considerations may also benefit from policies at other jurisdictional levels that result in funding to support adaptation implementation.

Population size

Plans from larger communities (in terms of population size) addressed procedural justice and monitoring/evaluation to a somewhat greater degree than plans from smaller less populated areas. 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 and Short Gianotti 2022; Hess and McKane 2021). Smaller municipalities may lack the funding and staff to facilitate robust community engagement processes and to implement monitoring programmes (Innes and Booher 2004; Lioubimtseva and

Da Cunha 2020). In recent years, large, urban areas have also prioritised and embraced climate policies as mechanisms to address other issues, like infrastructure improvements and social justice (Rice 2010; Satterthwaite et al. 2012). In smaller communities, there may also be a smaller network of community-based organisations, which local governments often rely on to connect with marginalised groups (Lioubimtseva and 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, including how to engage marginalised individuals, as they are often members of national adaptation networks (Lioubimtseva 2022; Woodruff 2018). It is also possible that in some communities, evidence of community engagement may not be readily available, as staff capacity or standard practice may not include documenting these activities in published plans. 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 marginalised residents

Our results suggest that higher levels of poverty may influence the types of adaptation strategies proposed and injustices considered. Similar to other evaluations of climate action plans and sustainability plans (Diezmartínez and Short Gianotti 2022; Liao, Warner, and Homsy 2019; Schrock, Bassett, and Green 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 and 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. Neither race nor income levels were

consistently related to procedural justice considerations in the reviewed plans. A stronger presence of marginalised communities may provide grassroots activists or non-profits with more 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, Warner, and Homsy 2019; Schrock, Bassett, and Green 2015). In their review of sustainability plans, Liao, Warner, and Homsy (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, making this another area to explore in future research.

Study limitations

Our selection criteria led primarily to the inclusion of documents from large, urban areas and sub-urban communities, with few plans from smaller towns or rural communities, as classified by the National Center for Education Statistics' (NCES 2021). 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 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 addressed (or not) through local climate adaptation efforts.

Conclusion

Our results suggest that a mix of internal and external factors are related to justice considerations and may be driving the trends we observed, 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. A greater presence of low-income residents may bring justice concerns to the forefront, but these conditions alone have been insufficient to encourage procedural justice. 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 (or document) 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. Greater consideration, policies, and/or resources may be needed to support planners in conservative areas to address climate change and social justice issues that are increasingly viewed through a partisan lens. Our findings 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.

Acknowledgements

This material is supported by the National Science Foundation under award numbers 1810851 and 1811534.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

The data that support the results of this study are publicly available at the Harvard Dataverse through this link: <https://doi.org/10.7910/DVN/PRKACP>

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Table 1: 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 colour	Percentage of people that identified as races other than white alone (US Census Bureau, 2021)	8.80-90.80	39.79	20.74

Table 2: Ordinal logistic regression results of year regressed on each dimension of justice. We share the standardised beta coefficients (β), standard errors, and p values for each model.

Justice dimensions	Scoring distribution	Predictor	β	SE	p
Recognitional justice	Didn't address (0): 13 Low degree (1): 59 High degree (2): 29	Year	0.441	0.218	<.001
Distributional justice	Didn't address (0): 21 Low degree (1): 23 High degree (2): 57	Year	0.684	0.233	<.001
Procedural justice	Didn't address (0): 51 Low degree (1): 23 High degree (2): 27	Year	0.673	0.253	<.001
Monitoring/evaluation	Didn't address (0): 67 Low degree (1): 11 High degree (2): 23	Year	0.588	0.282	<.001

Table 3: 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. 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
<i>Health and safety</i>					
Enhance access to emergency shelters and resources	34	22% (10)	43% (24)	5.765	0.016
Develop or expand services to support marginalised individuals during emergencies	30	16% (7)	41% (23)	8.533	0.003
Consider marginalised 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
<i>Buildings</i>					
Expand energy efficiency programmes	35	20% (9)	46% (26)	8.257	0.004
Enact housing policies/standards that require or incentivise 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 programmes	8	4% (2)	11% (6)	2.000	0.157

<i>Professional development opportunities</i>					
Enhance climate education within schools or adult education programmes	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 programmes to support adaptation projects led by marginalised individuals or groups working with them	3	0% (0)	5% (3)	3.000	0.083
<i>Green infrastructure</i>					
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
<i>Food</i>					
Encourage local food production through community gardens*	21	0% (0)	38% (21)	21.000	<.001
Increase participation in food assistance programmes	19	7% (3)	29% (16)	8.895	0.003
Develop food security policies or assessments	7	0% (0)	13% (7)	7.000	0.008
<i>Transportation</i>					
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

Table 4: 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 standardised beta coefficients (β), standard errors, and p values for each variable in each model, as well Nagelkerke's Pseudo- R^2 and p value for each model.

Independent variables	Models											
	Recognitional justice			Distributational 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 colour	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- R^2	0.355			0.427			0.367			0.270		
Model p value	<.001			<.001			<.001			<.001		

Table 5: Linear regression results testing for relationships between contextual variables and the total number of marginalised groups identified, injustices addressed, and focus areas of distributional justice strategies identified. We share the standardised beta coefficients (β), standard errors, and p values for each variable in each model, as well an adjust R^2 , F statistic, and p value for each model.

Independent variables	Models								
	# marginalised 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 colour	-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 R^2	0.396			0.352			0.484		
F statistic	14.130			11.860			19.750		
Model p value	<.001			<.001			<.001		

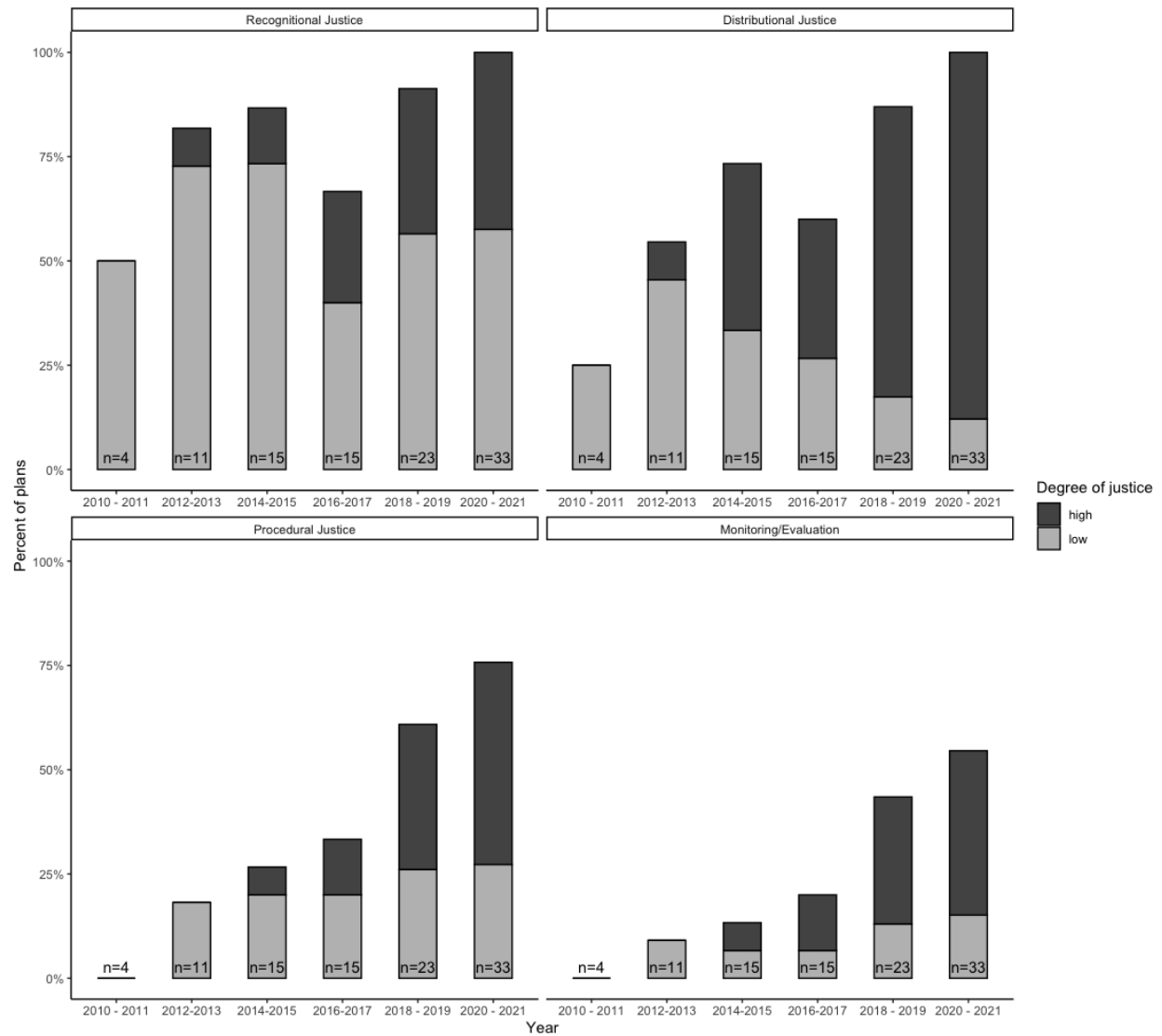


Figure 1: Summary scoring of the degree to which plans addressed recognition justice, distributional justice, procedural justice, and monitoring/evaluation.

Supplementary material

Supplementary Table 1: List of analysed 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 labelled 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

Milwaukie	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: Summary of codes for marginalised groups, injustices they experience, and focus areas of distributional justice strategies.

	Marginalised groups identified	Injustices experienced by marginalised 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 marginalised 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 colour • 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 Table 3: Summary of statistically significant relationships within regression analysis between contextual variables and justice themes in reviewed plans. See Supplementary Material for complete regression results. We use + to indicate positive relationships and – to indicate negative relationships. 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 colour	% People living in poverty
Marginalised groups identified					
Total number of marginalised groups identified	+++		--		
Identification of specific groups					
Low-income individuals*	+++		--		+
Elderly*			---		
Youth	+				
People with pre-existing medical conditions*	+		---		
Non-English speakers*	+++		-		
People of colour*	+++		-		
Outdoor workers*	+++				
Unhoused individuals*	+++				
Indigenous people*	+++	+			
Injustices addressed					
Total number of injustices addressed	+++		---		+
Addressed marginalised 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*	+++				

Supplementary Table 4: Binary logistic regression results testing for relationships between contextual variables and marginalised groups identified. Variables with an asterisk (*) indicate statistical significance for the model beyond the Bonferroni correction threshold ($p < 0.002$). We share the standardised beta coefficients (β), standard errors, and p values for each variable in each model, as well Nagelkerke's Pseudo- R^2 and p value for each model.

Independent variables	Models														
	Low-income individuals*			Elderly*			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 colour	- 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-R ²	0.484			0.302			0.212			0.428			0.350		
Model p value	<.001			<.001			0.006			<.001			<.001		
Independent variables	Models														
	People of colour*			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 colour	- 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-R ²	0.567			0.288			0.258			0.493					
Model p value	<.001			<.001			<.001			<.001					

Supplementary Table 5: 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 standardised beta coefficients (β), standard errors, and p values for each variable in each model, as well Nagelkerke's Pseudo- R^2 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 colour	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-R ²	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 colour	-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-R ²	0.132			0.233			0.143			0.408					
Model p value	0.107			0.005			0.085			<.001					

Supplementary Table 6: 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 standardised beta coefficients (β), standard errors, and p values for each variable in each model, as well Nagelkerke's Pseudo- R^2 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 colour	- 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-R ²	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 colour	- 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-R ²	0.474			0.454			0.408		
Model p value	<.001			<.001			<.001		