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ORIGINAL ARTICLE

Translating and embedding equity-thinking into climate adaptation: an analysis of US cities

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Abstract

Cities increasingly recognize the importance of furthering social equity in their climate adaptation planning. Such efforts are often in response to grassroots mobilizations, yet it is not clear to what extent they translate into urban coalitions, policy designs, and implementation efforts within city governments. In this paper, we respond to this knowledge gap by assessing how equity-thinking is translated into cities' adaptation decision-making and governance arrangements, especially in ways that can lead to more inclusive and just climate adaptation outcomes for historically marginalized communities. We analyze adaptation plans for the 25 largest US cities using deductive and inductive coding strategies to uncover the ideas, rhetoric, and processes that guide equitable plans. We then map these outcomes of equity-thinking across procedural, distributive, and recognitional categories. Our analysis lends support to the operation of two social constructivist mechanisms of equity-thinking in adaptation planning—namely ideology and recognition. In an ideology-driven pathway, where beliefs are shared, adaptation efforts are mobilized through local actors and within public agencies who decide on the appropriateness of social equity definitions. Recognition-driven pathways occur when climate equity rhetoric is reflected and normalized through adaptation planning procedures, where cities strive to be early adopters of equitable climate strategies. This result therefore highlights the multiple ways urban leaders, decision-makers, and planners can have in steering policies and designing different planning and implementation processes.

Keywords Policy diffusion · Climate adaptation · Social equity · Urban planning · Decision-making

Introduction

City-level efforts to better account for social equity and justice objectives in their climate adaptation plans often emerge in response to the reality that historically marginalized communities are disproportionately exposed to climate impacts, have lower capacity to respond, and experience structural forms of vulnerability attributed to long-term exclusion from sources of wealth and well-being (Anguelovski and Carmin 2011; Fitzgerald 2022; Solecki and Rosenzweig 2022; Woodruff et al. 2021). Across many cities, different social movements and grassroots organizations have led the charge towards more just and equitable climate solutions (Chu and Shi 2021; Shi and Moser 2021), but to what extent do these mobilizations translate into formal actor coalitions, policy designs, and implementation strategies within local governments that truly respond to the needs of historically marginalized communities?

The objective of this paper is to answer this question by exploring how equity-thinking in the context of climate adaptation is designed and diffused within urban planning in the largest 25 cities in the United States. Equity-thinking includes the ideals, rhetoric, and processes through which these ideas are communicated and transmitted between those who have a stake in framing and defining social equity—encompassing procedural, distributive, and recognitional

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forms (Amorim-Maia et al. 2022; Chu and Cannon 2021; Meerow et al. 2019; Reckien et al. 2018)—as well as those who are responsible for implementing equitable planning actions on the ground.

To better understand how equity-thinking within climate adaptation is designed and diffused, we need to evaluate how cities build coalitions and design institutions and then identify how these arrangements inform (or not) equitable and socially just climate adaptation solutions. To achieve this, we analyzed publicly available climate adaptation and resilience plans for the 25 largest cities in the USA. We employ both cross-case, based on systematic case selection, and within-case qualitative methods to analyze climate adaptation plans of these cities using both inductive and deductive coding strategies. Given the size of these cities and their role in setting climate adaptation policy in the USA, this case-based approach is critical for unpacking how mobilizations translate into formal actor coalitions, policy designs, and implementation strategies within local governments. The goal of this paper is therefore to empirically trace the mechanisms through which of equity-thinking is framed, diffused, and included in climate adaptation plans and implementation strategies on the ground.

The diffusion of equitable adaptation planning

Recently released reports from the Sixth Assessment cycle of the Intergovernmental Panel on Climate Change (IPCC) all underscore the need for cities to more aggressively combat climate-induced impacts and risks to the economy, environment, and society (e.g., Dodman et al. 2022). At the same time, emerging global efforts have sought to build policy consensus around carbon emissions mitigation, adaptation, and resilience-building actions, including those commitments articulated within the United Nations Sustainable Development Goals (2015) and Paris Agreement (2015). However, as different youth, indigenous, and grassroots social movements have continuously highlighted, many of these global commitments fall short of addressing the entrenched nature of socioeconomic inequality, differentiated climate vulnerability, and disproportionate exposure to climate impacts experienced by historically disadvantaged and marginalized communities around the world. As such broad-based social movements gain ground, their demands are gradually permeating through city halls and local government agencies charged with designing and implementing climate actions within their respective jurisdictions (Ford 2003; Meerow et al. 2019; Singh et al. 2021; Woodruff and BenDor 2016; Diezmartínez and Short Gianotti 2022). What we are seeing, therefore, is the emergence of coalitions and mobilizations advocating for equitable and just climate action from within. Although patterns of learning and emulating policy and mobilization tactics continue to flow from regional to global networks (Woodruff 2018), we increasingly see evidence that the intrinsic rhetorical and ideological strength of social equity and justice ideals are forcing cities to act independently from regional and global networks.

Until the late 2000s, cities that saw the need to adapt to climate change could only learn about potential strategies through informal knowledge coalitions or transnational networks that were championing those ideas. Cities across the USA and other countries often operated with limited or irregular regulatory guidance on how best to integrate climate priorities into their existing public service, land use, and infrastructure development portfolios (Anguelovski and Carmin 2011; Carmin et al. 2012). As such, cities saw themselves as spaces of opportunity for trialing different strategies to address extreme heat, precipitation, sea level rise, and other climate impacts (Bulkeley 2010; Castán Broto and Bulkeley 2013a, b). At the same time, these local efforts were increasingly responding to social justice advocates' demands for more equitable approaches to planning and decision-making, despite the reality that, in the past, planners were often complicit in exacerbating racial, ethnic, and class divides through discriminatory land use, housing, public health, and environmental protection policies (Fitzgerald 2022; Rothstein 2017). Presently, many local stakeholders, including social justice advocates, continue to push for local governments to take a more aggressive (and progressive) role in furthering climate adaptation efforts, especially under the assumption that local governments are responsible for the infrastructure and services most closely connected to vulnerability reduction and capacity-building needs in response to climate impacts to public health, housing, food, water, and transportation sectors.

In the USA, ideas around equitable and ethical planning call for better approaches to frame the larger social objectives of planning action (Bates 2013). Planners increasingly looked to account for racial disparities more effectively in housing, health, education, and jobs provision through different redistributive efforts. Planners working to further climate action also increasingly placed emphasis on diverse and inclusive decision-making processes, especially those that involved and were co-developed by historically disadvantaged communities (Archer et al. 2014; Chu and Cannon 2021; Mitchell and Graham 2020). The growing prominence of climate change on local government agendas meant that urban planners must again contend with contradictory mandates between capital-driven development and the need to account for social interests of the broader community (Anguelovski et al. 2018a, b). Although questions of social equity in urban development are not new, research into climate equity is increasing (Fitzgerald 2022). There

is evidence that city leaders are spearheading more social equity-thinking (Angelo et al. 2022; Chu et al. 2019) and that transnational or local social movements are making an impact in local decision-making arenas (Chu 2018; Heikkinen et al. 2019; Woodruff 2018); however, there has been few systematic assessments into how social equity-thinking moves between climate change plans or designs and eventual implementation efforts within cities.

Responding to the growing number of cities experimenting with climate adaptation plans and strategies, there has been a corresponding uptick in academic scholarship on climate equity and justice at the city level (see Ford et al. 2011; Olazabal 2017; Reckien et al. 2018; Revi et al. 2020; Singh et al. 2020; Diezmartínez and Short Gianotti 2022). These include emerging comparative studies on how social equity priorities are embedded within urban plans (Meerow and Woodruff 2020; Shi et al. 2016; van den Berg and Keenan 2019) as well as different critical perspectives on how equity and justice concerns should be addressed in decision-making arrangements (Chu and Cannon 2021; Fitzgerald 2022; Meerow et al. 2019). This literature points to general academic interest around questions of how equity is conceived of, how it is applied in policy contexts, and to what extent this translates into more equitable planning actions on the ground.

Much of this scholarship is in response to some level of ambiguity in terms of the criteria behind what counts as equitable planning actions and how to account for it. For instance, researchers highlight the varying levels of public participation and inclusion within planning processes (Chu et al. 2016), the importance of recognizing previous harm in marginalized communities to rebuild trust and advance procedural equity (Fitzgerald 2022), opportunities for excluding the interests of historically marginalized groups in planning action (Anguelovski et al. 2016), the prevalence of capitalistic logics of speculative finance (Long and Rice 2019; Castán Broto et al. 2020), or the reality that many climate adaptation services and infrastructure end up protecting high-value real estate instead of low-income communities (Teicher 2018). These unequal trends have been documented across different domains including green space (Angelo et al. 2022; Anguelovski et al. 2018a, b; Frantzeskaki 2019; Meerow and Newell 2017), public health (Ebi and Hess 2020), housing (Keenan et al. 2018, Kraan et al. 2021; Shi and Varuzzo 2020), and real estate (Hino and Burke 2020).

The ambiguous definition of equitable climate adaptation underscores a need to better understand what counts as "equitable" and how to account for the social, economic, and environmental impacts (including both co-beneficial ones and potential trade-offs) of adaptation actions. This need for a better definition is highlighted by Meerow and Mitchell (2017), while Chu and Cannon (2021) and Amorim-Maia et al. (2022) have sought to advance the conceptual work around codifying relevant evaluation criteria against procedural, distributive, and recognitional dimensions of equity-thinking. Doing so fills a gap in knowledge on a need for more systematic studies into equity-thinking from a policy diffusion perspective. Therefore, this paper not only builds on the emerging literature by evaluating what urban climate adaptation equity and justice should or ought to be, it also furthers the conversation by exploring how equity-thinking is framed, diffused, and translated in local adaptation plans and implementation strategies. Such an approach connects the rich critical literature on climate equity and justice—especially in the context of adaptation planning and decision-making—with the equally rich literature on policy diffusion.

Building a theoretical framework: bridging climate adaptation, equity-thinking, and policy diffusion

This paper specifically tackles questions of how equity-thinking diffuses within cities—such as through its units or actors—and across different cities by moving beyond existing ideas on policy learning, emulation, and conflict (Peck and Theodore 2010; Peck 2011; Weible et al. 2012; Wolfram et al. 2018). Scholars of policy diffusion define it as a process between different policy actors or coalitions of actors that is driven by both internal and external factors (Berry and Berry 2018; Blatter et al. 2021; Graham et al. 2013; Simmons et al. 2006), which may ultimately lead to varying patterns of policy adoption (Gilardi 2012; Shipan and Volden 2008) and outcomes (Auld et al. 2014). Recently, researchers have emphasized the influence of external factors as policy decisions rarely happen in a vacuum. For instance, researchers have considered geographic proximity and interdependencies as some of the most influential factors in policy diffusion (Kammerer and Namhata 2018). Some others have noted the role of politics and political culture in driving climate and environmental policy diffusion (Matisoff and Edwards 2014), while others consider the increasing interconnectedness due to globalization (Kammerer and Namhata 2018). Policy diffusion is again mirrored in the literature on transnational municipal networks and social movements that are promoting, resourcing, and supporting climate action in cities around the world, often with a focus on learning and emulating from peers (Bansard et al. 2017; Bellinson and Chu 2019; Giest and Howlett 2013; Kern and Bulkeley 2009; Patterson 2021).

Taken together, this literature has informed our understanding of how and why climate adaptation policies spread across cities globally. Yet critiques of classical policy diffusion mechanisms, especially that they are not conceptually distinct (see Blatter et al. 2021), has led to new theories of diffusion mechanisms and pathways that may be more

useful for studying climate adaptation (Schoenefeld et al. 2022). These novel diffusion mechanisms—namely interests, rights and duties, ideology, and recognition—provide specific motivations that can help to explain policy diffusion (Blatter et al. 2021). Our research aims to test whether equity-thinking, as a normative construct, diffuses via two different social constructivist modes: ideology- and recognition-driven mechanisms (see Blatter et al. 2021). Ideology-driven mechanisms are characterized by shared, substantial beliefs of actors while recognition-driven mechanisms are characterized by shared procedures and processes by which policies are created and enacted (Blatter et al. 2021). The rationalist modes in Blatter et al.'s (2021) framework—namely interests and rights and duties—are not as well suited to our investigation of equity-thinking given that the implementation of equity-thinking in adaption planning in US cities is relatively nascent. Moreover, ideology- and recognition-driven diffusion may play a major role for the spread of equity-thinking given how it is in and of itself a normative construct—that climate adaptation should be equitable for all residents—thus, it more readily lends itself to the constructivist modes of policy diffusion.

Ideology-driven policy diffusion typically plays out when multiple actors familiarize themselves with policies in other contexts (such as other countries or cities) and interpret their appropriateness (or not) for their current context by recognizing the values internal to that context (Blatter et al. 2021). Whereas ideology-driven policy diffusion occurs as actors legitimize multiple policies as expressions of divergent values, recognition-driven policy diffusion plays out when policies are legitimized through reflexive processes and actors (Blatter et al. 2021). For example, recognition-driven diffusion occurs when actors identify policies to create or consolidate a reputation of being equitable in climate adaptation planning. Coalition actors and their institutions, such as governmental organizations, play a major role not only in how policies diffuse but also in how climate adaptation planning is designed and implemented, including whether equity-thinking informs relevant policies. Ideology- and recognition-driven mechanisms may help to illuminate the role coalition actors and institutions play in the spread of equity-thinking in adaptation planning in US cities. This new approach is needed because the classical mechanisms of policy diffusion—such as coercion, competition, learning, and emulation—are not conceptually distinct, hindering their ability to fully explain why policies are the way they are for cities. New theories can therefore help to understand the US context specifically, where climate regulation has been generally lacking, and when climate action does occur, cities embark on it voluntarily. Also importantly, there are few legal requirements for climate justice and equity, while the development and implementation of policies that do exist lack transparency.

As demonstrated in these sections, a gap in this literature is found in evaluating the connection between policy diffusion and climate equity and justice, especially in terms of whether and how equity-thinking and equity-oriented implementation approaches are diffusing within and across urban planning arrangements (Runhaar et al. 2018). To fill this gap, we draw on prior research on climate adaptation planning (see Chu and Cannon 2021; Fitzgerald 2022) that characterizes equity and justice criteria into procedural, distribution, and recognitional categories, which aligns with environmental justice scholarship across these three distinct types of equity and justice (Schlosberg 2013). Generally, procedural equity-thinking refers to the quality of outreach, participation, and engagement regarding adaptation planning, whereas distributive equity-thinking refers to the distribution of benefits and losses of planning outcomes, while recognitional equity-thinking refers to acknowledging inequalities, disparities, and their drivers (Anguelovski et al. 2016). By implementation approaches, we refer to the implementation of equity-thinking within the plans.

Data and methods

This paper employs both cross-case, based on systematic case selection, and within-case qualitative methods, such as content analysis (Starke 2013), to examine how equity-thinking is framed, diffused, translated, and embedded in climate adaptation plans of the largest 25 US cities. Qualitative methodologies are useful for handling empirical challenges of policy diffusion (Starke 2013). They are particularly helpful for answering questions of how policies diffuse (Shipan and Volden 2008), identifying specific mechanisms of diffusion (George and Bennett 2005), and evaluating how equity-thinking can inform climate adaptation policy (Chu and Cannon 2021). The systematic case selection is of the 25 largest US cities by metropolitan area for three main reasons. First, these cities represent approximately 10% of the U.S. population. Second, this case selection provides good coverage across the U.S. with each major regions (e.g., Northeast, Southeast, Midwest, and West). Third, these are cities for which climate adaptation plans were publicly available.

City adaptation plans are important sites for analysis as they lay out the theoretical grounding, policies, and procedures local governments intend to undertake to further their climate adaptive strategies. We sourced city adaptation plans in three ways: (1) the adaptation clearing house, an online repository for adaptation plans; (2) city websites; and (3) through a city's office of sustainability website. Following prior research by Reckien et al. (2018), we analyzed standalone plans for each city to narrow the study's scope. Responding to calls for innovative and novel

research designs (see Maggetti and Gilardi 2022) and to begin tracing the mechanisms from policy ideas to implementation approaches, we identified the major coalition actors that were named in the documents as contributing to the development of the plans for each city. To investigate the process of policy diffusion over time, we traced how diffusion may have occurred by looking at the diffusion outcomes (i.e., adaptation plans) and the actors involved. We characterized these actors into five major groups: internal city actors (e.g., Office of Sustainability, Mayor's office), transnational municipal networks (e.g., 100 Resilient Cities, 40 Cities, Global Covenant of Mayors), civil society groups (e.g., local university, non-profits, or grassroots/community-based organizations, such as Detroiters Working towards Environmental Justice), regional collaborative arrangements (e.g., county involvement, regional area of governments councils), and the private sector (e.g., Shell, FedEx). This methodology leverages Maggetti and Gilardi's (2022) identification of key indicators—specifically geographic proximity, joint membership, and structural equivalence—to offer conceptual clarity in evaluating how a coalition of actors relates to different cities and the equity-thinking outcomes they produce. A list of cities included in the sample, their planning documents, and various coalition actors are provided in Appendix 1.

Atlas.ti was used for data management and analysis. For our analysis, we led with the following questions: Where does equity-thinking come from? What does it look like in theory and in design? Who is doing it? Armed with these questions, we analyzed plans using diverse keyword searches that included the following: "equit," "vulnerab," "equa," "frontline," "marginal," "elderly," "underserved," "disadvantaged," "minority," "low-income," "histor," "engage," "participat," "outreach," "workshop," "inclusi," "just," and "reconciliation." Word fragments used to capture multiple versions of a term (e.g., "inclusive" and "inclusion"). Sentences and their contexts were analyzed using a coding protocol for their meaning. The coding protocol is how we operationalized the key theoretical concepts discussed above. Table 1 presents the equity-thinking category (i.e., procedure), with a description or notes of the different kinds of equity-thinking within each category (i.e., unidirectional, bidirectional, interactive, and accountability) along with illustrative examples drawn from analysis of the selected plans.

Interrater reliability of coding was conducted by two authors analyzing each plan. Findings were discussed by the authors in research meetings (e.g., Creswell and Creswell 2017). Plans were subsequently analyzed again deductively by one author and checked by another author to identify trends of climate actions across cities and their linkages to equity-thinking outcomes (e.g., Schlosberg 2013).

From ideas to implementation: tracing multiple diffusion pathways of equity-thinking

Our analysis yielded major insights pertaining to the equity-thinking ideas within climate adaptation policy, coalitions of actors that foster equity-thinking, and diffusion pathways of equity-thinking, specifically those driven by ideology and recognition. In the sections below, we identify and evaluate the mechanisms through which equity-thinking ideas are included in adaptation plans. We unpack the components of equity-thinking generated among the different typologies of local coalitions and trace how these ideas link to categories of equity-thinking outcomes (e.g., procedural, distributive, and recognitional). Taken together, we describe the different kinds of policies found within cities that drive adaptation planning efforts, thereby shedding light on the "implementation gap" (see Shipan and Volden 2012) in policy diffusion studies by identifying mechanisms enabling the diffusion of equity-thinking.

Emerging actor coalitions in equity-thinking and adaptation

To understand the spread of equity-thinking in climate adaptation, it is necessary to identify the coalition actors and their accompanying equity-thinking ideas in developing urban climate adaptation plans. Specific coalition actors in adaptation planning have their own ideas that emphasize their own values, biases, and approaches to equity-thinking. For instance, transnational municipal networks like 100 Resilient Cities and C40 Cities Climate Leadership Group advance ideas around urban resilience to the combination of experiences of multiple acute shocks (e.g., flooding, heat) and chronic stressors (e.g., poverty, social inequality) through risk-based communication of capacities and risks for municipalities, often highlighting the need for meaningful engagement with the most vulnerable residents. Moreover, transnational municipal networks help to marshal adaptation efforts to recognize and plan for potential losses and benefits through climate actions (Chu 2018; Woodruff 2018).

Our results highlight the coalition actors instrumental to the diffusion of equity-thinking in proposed adaptation plans and actions on the ground. All cities ($n=25$) had local coalition actors from municipal agencies and offices, such as the mayor's office or city departments (e.g., planning, environment, and public health departments). Several cities ($n=14$) also had some relationship with transnational municipal networks such as 100 Resilient Cities, C40, Cities Climate Leadership Group, and the Global Covenant of Mayors. Civil society, which included both local universities, such as Rice University in the case of Houston, and environmental justice organizations, such as Detroiters Working towards Environmental Justice, were frequent

Table 1 Equity-thinking categories, the types of outcomes, and illustrative examples from analyzed U.S. city climate adaptation plans

Equity category	Notes	Illustrative examples
Procedure	References unidirectional and more passive inputs (e.g., surveys, public comments, posters, websites, advertisements) with relatively limited information on feedback to decision-making	Participation, survey, website, email, public comments, Advertisement, campaign, technical assistance, engagement (depending on context), letters, phone calls
	References bidirectional, communicative, and more active engagements such as interviews, public meetings, digital applications with reporting functions, etc	Interviews, public meetings, open house, digital applications, focus groups
	References interactive and discursive approaches such as community visioning workshops, scenario building events, knowledge co-creation opportunities, etc	Visioning workshop, Charette, scenario building events
	References processes in place to enhance process quality in terms of legitimacy, accountability, transparency, confidentiality, and representativeness	Dashboard, indicators, data transparency protocols
Distribution	References unequal exposure of certain communities or neighborhoods to climate impacts and risks. Mentions social, economic, cultural, or economic drivers (such as lack of social safety nets, employment insecurity, discrimination, etc.) of vulnerability unpinning unequal ability to adapt to changes	Frontline, marginalized (in relation with climate risks)
	References unfair baseline conditions at the individual and community levels. This includes lower class status, health outcomes (such as cancer and heart disease rates), educational attainment levels, and higher income unequal across racial, gender, and age groups	Chronic health conditions, income, race, gender, children, elderly, English speaking household, Vulnerable
	References unequal access to resources and capacities to support adaptation to ongoing/future climate impacts. This includes fair access to adequate housing, education, water, sanitation and health services, green space, financial assets, etc. for the purposes of building climate resilience	Access to services, access to food, access to green infrastructure
Recognition	References historically entrenched forms of exclusion based on race, ethnicity, gender, age, ability, etc. This includes mentions of systemic inequality, racism, sexism, homophobia, age discrimination, etc	Marginalized, frontline, people of color, low income, race/ethnicity, structural injustice, racism, language, linguistic isolation
	References diversity and inclusion in ongoing policy making and planning. This includes mentions of civil society/non-profits, community asset development agencies, rights and welfare-based associations, BIPOC activism, youth organizing, etc	Black, indigenous, and people of color (BIPOC), youth, activism, culture, inclusive/diverse
	References longer term aspirations, values, and imaginaries of a just future. This includes mentions of racial/ethnic reconciliation, intersectional feminist ideals, feminist/queer liberation, climate transformations, Green New Deal, etc	Future generation, Green New Deal, transition and transformation, reconciliation

planning partners ($n = 10$). Regional actors, such as regional government councils like the Association of Bay Area Governments in the case San Francisco, participated in plans at a similar rate as civil society actors ($n = 10$). Involvement by the private sector, such as different corporations or a city's private or public/private utility company, was seen the least often in the sampled cities (n = 7).

These different arrangements of actors (e.g., civil society, transnational municipal networks) play a role in climate adaption because public sector agencies across the USA often experience perennial constraints in funding and staffing capacities (Shi and Moser 2021). Private and civil society actors operating outside, but in partnership with local governments, often bring their own ideas about how to incorporate social equity and justice priorities into work plans and programs. Private actors are typically incentivized by different corporate responsibility and ethical guidelines, such as those that circumscribe performance that is accountable and transparent. For instance, many consulting firms that participate in local level climate adaptation articulate their own equity principles (e.g., Climate Resilience Consulting). Across civil society actors, including community-based or grassroots groups, priorities around climate equity and justice are sometimes strong, with many groups noting

the unequal exposure to climate impacts experienced by historically disadvantaged communities. In recent years, emerging grassroots movements around gender, race, youth, and indigenous community representation have emerged in support of more equitable and just climate actions (Chu and Shi 2021). These groups often emphasize the unequal distribution of climate losses and damages, the nonrecognition of particular worldviews and interests in decision-making, and the absence of considering historically entrenched socioeconomic inequalities in the planning and visioning of future resilient development scenarios (Fitzgerald 2022).

Assessing different equity-thinking outcomes in cities

Building on the circulation of equity-thinking ideas, our results show complex processes through which equity-thinking is conceived of and translated into decision-making and implementation efforts in cities. As illustrated in Fig. 1, all 25 cities included in our research rely on complex networks of civil society organizations, private sector firms, city networks, and internal planning capacities within local and regional governments to evaluate different social equity and justice needs when confronted with uncertain climate change impacts and risks. Figure 1 demonstrates there are many different kinds of coalitions that emerge during adaptation planning, and they work together to enable diverse equitable outcomes. On the left of Fig. 1 are the four major types of actor coalitions: private sector, transnational municipal networks, civil society, and regional networks. Lines in the figure connecting actors to cities show which types of actor coalitions are involved in each city according to that city's adaptation plan. In the middle are the sampled cities and on the right are the three major categories of equity-thinking: procedural, distributive, and recognitional. Lines from the cities to the categories show which types of equity-thinking they are engaging in, with the thicker lines showing the most frequent equity-thinking category for each city.

For example, Atlanta's plan was generated by the Mayor's Office and as a member of 100 Resilient Cities—a transnational municipal network—that aimed to establish a citizen advisory group to advise on the plan and its implementation approach (see Fitzgibbons and Mitchell 2019). This is an example of procedural equity-thinking, one where the city developed strategies to include residents in a meaningful way in adaptation planning. Baltimore, working with the Planning Commission, Office of Sustainability, and through funding from the federal American Recovery and Reinvestment Act (2009), convened a town hall for residents to provide feedback and vote on the climate adaptation actions developed by the city. And finally, Sacramento's adaptation planning team had coalition partners from the Mayor's Office, local non-profit organizations, businesses, and regional groups. Other illustrative examples of equity-thinking outcomes drawn from the local adaptation plans are presented in Table 2. These examples highlight the procedural, distributive, and recognitional activities that cities are implementing as a result of their equity-thinking.

Although procedural outcomes were the most common across the sampled cities, there were a few cities that prioritized distributive equity-thinking. For example, Memphis, with a coalition of city departments, FedEx, Memphis Light, Gas, and Water (MLGW), and with a transnational municipal network (the Global Covenant of Mayors) developed an equitable energy strategy to improve energy affordability, particularly around heating and cooling uses, for the most

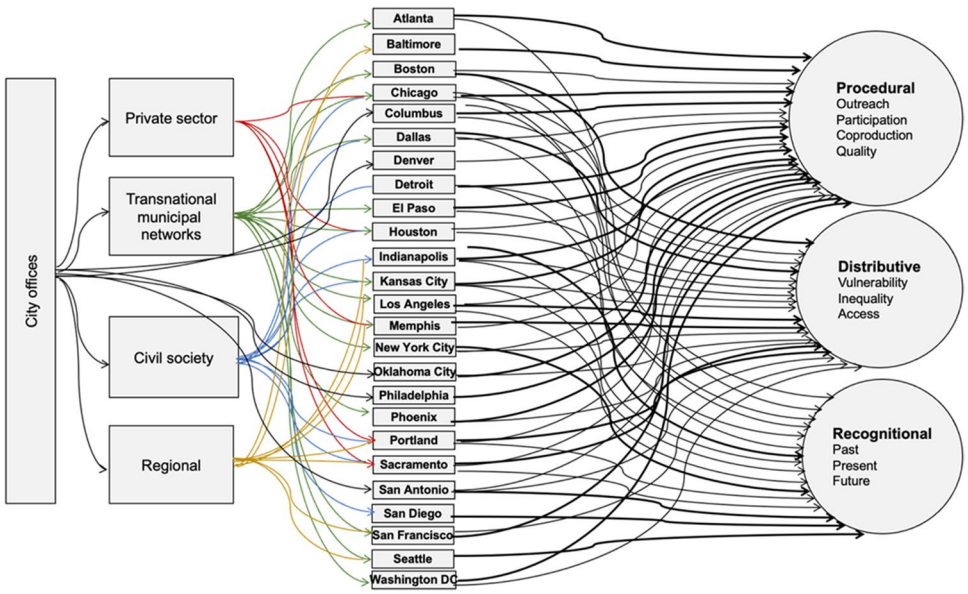

Fig. 1 Diffusion of ideas to implementation across coalition actors with equity-thinking outcomes for each city in the sample. Thicker lines represent the most frequent equity-thinking category for each city

Table 2 Illustrative examples of procedural, distributive, and recognitional equity-thinking outcomes by city

Equity-thinking outcome	Summary of illustrative examples (city)
Procedural	• Create citizen advisory boards (e.g., Atlanta, Baltimore, Boston, Dallas, Houston, New York City, Sacramento, San Antonio) • Benchmarking and transparent data and analysis (e.g., Atlanta, Chicago, Dallas, Detroit, Houston, New York City, Oklahoma City, Philadelphia, Portland, San Antonio, San Diego San Francisco) • Hold participatory workshops, surveys, town halls, and round tables (e.g., Atlanta, Baltimore, Boston, Chicago, Houston, New York, Oklahoma City)
Distributive	• Increase access to renewable energy for low-income residents (e.g., Boston, Chicago, Dallas, Indianapolis) • Workforce development and vocational training for vulnerable residents (e.g., Chicago, Dallas, Houston, Indianapolis, Kansas City, Memphis, New York City, Portland, Sacramento, San Antonio) • Increase green infrastructure access and tree canopy in vulnerable communities (e.g., Baltimore, Dallas, Houston, Los Angeles, Memphis, New York City, Phoenix, Portland, Sacramento, San Antonio, San Diego, San Francisco, Washington D.C.)
Recognitional	• Acknowledge racial inequality or racism (e.g., Atlanta, Boston, Chicago, Dallas, Houston, New York City, San Antonio) • Acknowledge environmental injustices from historic and systemic discrimination and disinvestment (e.g., Boston, Dallas, Houston, Indianapolis, Kansas City, Portland, Sacramento, San Antonio)

vulnerable communities. Sacramento created a plan for green infrastructure in historically marginalized communities. Portland, whose coalition includes the Mayor's Office, the Institute for Sustainable Solutions at Portland State University, and regional input from Multnomah County plans to develop equitable energy retrofits of buildings that reduces financial burdens to low-income residents by creating funding structures that neutralize the cost burden on these residents.

Recognitional equity-thinking occurred the least frequently across the sampled cities. Houston, whose coalition included actors from the city, civil society such as Rice Kinder Institute for Urban Research, the private sector (including problematic entities like fossil fuel companies contributing to climate change such as Shell), and transnational municipal network C40, provided examples of thinking around how residents still experience segregation, and that job growth alone is not solving the income inequality problem. Seattle—whose coalition partners drew heavily from city offices with regional and transnational municipal network partners—together with New York City were the only plans that named the need to include the LGBTQ + community in adaptation planning and in equity-thinking outcomes. The Seattle plan also notes the importance of including communities of color in the design and implementation of climate actions so that their leadership in policy change reflects the interests of those that have been marginalized. While the New York City plan notes the rates of unemployment and insecure housing experienced by the LGBTQ + community that makes them especially vulnerable to climate risks. New York City plan specifically called out gender inequality through the gender wage gap and how such financial disadvantages create vulnerability to climate risks.

Assessing patterns in the diffusion of equity-thinking

Our research shows that policies emerge across different cities' actor coalitions—including combinations of approaches—to mobilize different procedural, distributional, and recognitional equity outcomes. These actor coalitions and networks may be informed by the specific political, economic, cultural, and geographic contexts found in each place and how climate impacts create distinct equity and justice concerns across space and scale. For instance, cities such as San Francisco and New York City are confronted with sea level rise and coastal inundation, which create cascading risk for coastline infrastructure, housing, and green space. Other cities such as Phoenix and Sacramento are faced with extreme heat and drought. In both cases, these climate impacts interact with the existing demographic, economic, and the built environment profiles of cities to create distinct inequalities and differential exposure to climate risks by historically disadvantaged communities.

Our results show that some cities have strong political leadership around equity planning, such as Boston, while other cities rely on strong programmatic support from external city networks or are responding to grassroots mobilizations, such as Memphis. Since there is no legal, formal guidance on how climate adaptation can be designed or implemented—including relevant standards, guidelines, or benchmarks—cities are left to develop and interpret norms and expectations around climate equity planning on their own. Given the sheer diversity of actors and outcomes identified in our analysis across the 25 cities, it is evident that the intentional design of equity and justice processes and implementation approaches matter a great deal. For instance, cities must navigate the often-vague definitions and ideals

presented around equity and justice presented by different civil society and non-profit groups. Cities must also interpret these ideas in the context of the distinct socioeconomic stressors and climate impacts experienced within their jurisdiction. As such, cities must intentionally design participatory planning arenas and decision-making processes that bring together climate science, socio-demographic projections, and recognition of voices and interests of historically disadvantaged communities. By making sense of these complex networks and mechanisms, we can then identify and compare distinct opportunity structures across cities to inform or enable more equity-thinking and just outcomes.

Ideology- and recognition-driven policy diffusion pathways

Our analysis sheds light on how cities tie together those structuring the meaning of equity-thinking with those that are implementing equitable adaptation on the ground (Shipan and Volden 2012). Our analysis lends support to these specific pathways rather than the "classical" mechanisms of policy diffusion (e.g., Berry and Berry 2018; Shipan and Volden 2012; Simmons et al. 2006) in response to critiques that these mechanisms contain too much conceptual overlap and inconsistencies (Blatter et al. 2021).

Regarding ideology-driven mechanisms, actors tend to work together due to shared beliefs (Schoenefeld et al. 2022; Weible et al. 2009). Crucially, we find actors within public agencies may have shared policy beliefs that make equity-thinking diffuse across cities and that these pathways, at least with respect to equity-thinking, do not solely belong or operate in the domain of transnational actors and networks, but also occur across local public actors and institutions. This analysis shows ideology mobilizing certain kinds of policies. In this sense, equity-thinking itself is ideologically driven—i.e., that climate adaptation planning can address current and historical systemic inequalities (Amorim-Maia et al. 2022; Chu and Cannon 2021; Meerow et al. 2019). We find that policies are mobilized through actors at local levels and within public agencies who decide the appropriateness of social equity and justice definitions, reifying these values through the adaptation planning process.

Our results also provide evidence for recognition-driven policy diffusion of equity-thinking in climate adaptation. Recognition-driven diffusion pathways occur where climate justice rhetoric gets reflected and normalized through procedures of climate adaptation planning (see Schoenefeld et al. 2022). For instance, we find cities are mostly developing procedural equity policies, as evidenced in Fig. 1 by the greatest number of emboldened arrows leading to it as an equity outcome, with only some evidence of distributive equity outcomes and the least amount of evidence for recognitional equity outcomes. We find that there are most likely internal processes for legitimizing climate discourses through reflective mechanisms and actors. Necessarily, equity-thinking and its procedural, distributive, and recognitional outcomes are normative in that they prescribe and describe what ought to occur in the design and implementation of climate actions.

Taken together, these findings offer empirical support of Blatter et al.'s (2021) policy diffusion pathways of ideology and recognition, which point to how cities consolidate and establish their reputation for climate equity action. Blatter et al.'s (2021) novel framework including ideology- and recognition-driven pathways thus helps illustrate the trends across the sampled cities beyond insights drawn from "classical" policy diffusion frameworks of learning, emulation, and coercion.

Conclusions

In sum, our empirical research corresponds to insights by Blatter et al. (2021) and Bulkeley et al. (2014) that seek to illustrate how and why normative policy priorities like climate justice—which historically was supported by few regulatory mandates in the USA—are adopted and implemented. Although our results highlight a key role that transnational and national/regional municipal networks play in sharing and mobilizing ideas, cities actually rely much more on the normative power of equity and justice and its support from grassroots and social movements to facilitate the uptake of equity-thinking. The implication of this is that cities—rather than solely relying on mechanisms of learning from external agents (e.g., Peck and Theodore 2010; Peck 2011; Wolfram et al. 2018)—also need to develop internal normative goals and visions (e.g., Blatter et al. 2021) to justify the pursuit of climate equity and justice. As a result, in addition to engaging external policy networks, urban policymakers should engage with local grassroots groups and advocacy networks to better identify and broaden contextually appropriate equity and justice goals, facilitate internal institutional arrangements that embody these normative visions and criteria, and design planning and policy benchmarking tools to ensure that equitable plans are grounded in local needs and implemented consistently and inclusively.

Conceptually, our research also suggests that there is no one-size-fits-all approach to equity and justice in the context of urban climate adaptation. Social needs depend on contextual factors such as experience of climate impacts, existing socioeconomic vulnerabilities of the community, and historic patterns of structural inequality in cities (Solecki and Rosenzweig 2022; Woodruff et al. 2021). The way in which equity-thinking permeates through city decision-making and governance arrangements then depends on the varying roles of leadership, internal capacity, external ideas

and resource support, and collaboration with local/regional civil society groups, non-profits, and private business—all of which combine to create a unique opportunity space for action. This opportunity space is reified by internal, normative ideals around equitable and just development. To uncover pathways towards this opportunity space therefore requires foresight, intentional design, and deliberate steps taken to ensure equitable and just climate adaptation solutions that truly respond to the needs to climate vulnerable and marginalized communities. More practically, our research highlights the multiple options cities have to realize climate equity and justice, highlighting the role that urban leaders, decision-makers, and planners have in steering policies and intentionally designing planning and implementation processes from the beginning to account for the right kinds of resources, partners, and ideals given a city's context.

Still, there are several limitations to the current analysis. First, there may be differences that exist across cities of different sizes located across the USA given financial, geographic, political, and climatological differences. Second, this study is contained to US cities, though some of the findings and implications should be assessed through future research in different contexts including across both developed and developing countries. Third, given the data analyzed were climate adaptation plans, we are only able to speak to implementation approaches and strategies, not the implementation actions. Future research should gather data that can help evaluate the effectiveness of these implementation strategies and climate actions, particularly as they relate to promoting equity and justice.

Finally, from a methodological standpoint, our research identifies and unpacks the complexities of institutional players and equity and justice ideals in climate adaptation plans. We show how cities pursue diverse coalitions to varying effect to implement equity-thinking, often built around particular normative understandings of what equitable and just climate adaptation efforts ought to be or look like when implemented. We developed a methodology to trace these different pathways to assist other cities interested in furthering equity and justice in their climate action plans. This methodology speaks to opportunities for other cities to employ equity-thinking that fits their local context. We see that although there are distinct ways in which cities can pursue equity and justice outcomes, there are nonetheless common ingredients such as strong leadership, civic mobilization, and participation in local, regional, and/or transnational networks (e.g., 100 Resilient Cities, C40 Cities Climate Leadership Group, Global Covenant of Mayors). Though we are able to provide evidence of ideology-driven and recognition-driven diffusion by identifying trends across large US cities, the patterns themselves are not strong enough to tell us which kinds of actor coalitions lead to which kinds of equity outcomes. The plans used in this analysis do not provide specific information on which ideas emerged from which of the coalition actors and the extent of their involvement. Additional research is therefore needed to further examine the role of coalition actors and their contributions to climate adaptation planning in US cities.

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Data Availability Data are publically available.

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