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Abstract: Climate justice is an interpretive framework to address the various risks, impacts and disparities associated with climate change, yet empirical evaluations of the sources of support for climate justice and its three pillars – procedural, recognition and distributive – remain limited. We follow the literature on climate justice and the variety of institutional and non-institutional climate actions to identify the factors that move individuals to consider supporting the three-pillared justices, such as personal experiences with climate-related events, perceptions of climate change as threats to livelihoods, government preparedness and planning, and civic engagement. We test these factors using a national public opinion survey in Guatemala, a country that combines high vulnerability to climate change threats as well as low adaptive capacity to cope with these threats. Our results show that the sources of support for distributive climate justice align well with climate justice. By contrast, procedural and recognition forms of climate justice are not explained very well by the factors commonly associated with the broader concept of climate justice. Our findings have large implications for the underpinnings of the separate expressions of climate justice and the outcomes they seek to achieve.

Introduction

Climate justice, and its three pillars, procedural, recognition and distributive, is an interpretative frame that speaks to the different risks, impacts, and disparities associated with climate change. One of these impacts is the localized effects created by climate-related extreme weather events, such as rising sea levels, floods, droughts, hurricanes, heat waves, and forest fires (Dolšak & Prakash, 2022). In the Global South, in particular, these localized climate events disproportionally affect large swaths of marginalized and indigenous populations, who depend on land (i.e., agriculture) and the environment for their livelihoods. These frontline communities (Gould & Lewis, 2025) have limited protections from environmental and climate threats (Martínez-Alier, 2025), and to a degree, encounter difficulties in the form of civic engagement to make existing adaptive capacities accountable.[1]

The three dimensions of climate justice are inter-connected, and climate justice scholars suggest that when one pillar is neglected, inequitable solutions to climate change adaptation are likely (Schlosberg, 2004; Fraser, 2009; Young, 2011). Procedural justice focuses on the fairness in decision-making and emphasizes public participation and inclusiveness. Recognition justice draws attention to the lack of representation or misrepresentation of vulnerable groups with an eye toward historic inequities. Distributive justice directs attention to the unfair distribution of costs and benefits of adaptive interventions. We can think of procedural, recognition, and distributive justices as political, cultural, and economic injustices, respectively (Yang and Lo, 2025, p. 3). This paper does not reframe the scope of these climate justices; instead, it draws connections between the three-pillared expressions of justice and the varied forms of climate actions (Almeida et al., 2024), defined as collective efforts undertaken by multiple actors to address the climate crisis. This approach not only allows us to identify more clearly what factors move individuals to consider supporting climate justice but also empirically evaluate them side by side on each of the three pillars of justice. Therefore, we ask: Who supports climate justice? What sets of conditions move individuals to consider some dimensions of climate justice and not others? How do each of three pillars of justice correlate with climate justice?

Public awareness of climate justice as a concept is not very high around the world, yet surveys show that individuals recognize several beliefs related to climate justice, such as the unequal distribution of climate change impacts and the importance of giving voice to frontline communities (Ogunbode et al., 2024).[2] Empirical assessments of climate justice also remain sparse. An extensive review of the climate justice pillars and urban climate change adaptation, for instance, finds a lack of empirical studies deploying the climate justice pillars vis-à-vis adaptive urban form interventions, an overemphasis of normative suggestions and critiques, attention to some pillars (i.e., procedural and distributive) but not others (i.e., recognition), and a dearth of

[1] Adaptive capacity is the ability of a system to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (IPCC, 2001, p. 982).

[2] Ogunbode et al. (2024) conducted an online survey of climate justice awareness and knowledge in 11 countries (Australia, Brazil, Germany, India, Japan, the Netherlands, Nigeria, Philippines, United Arab Emirates, the United Kingdom and the United States) (N = 5,627 adults).

studies delving into the multi-scalar dimensions of climate justice (Mohtat & Khirfan, 2021). Empirical assessments of climate justice also come from emitter countries, such as Norway, and suggest that when individuals consider climate justice, they are on average mostly thinking about distributive justice, and not the other dimensions of justice (Gregersen et al., 2025). One limitation of this study is that when it asks individuals to rate climate justices or injustices, it does so directly, an approach that is likely to influence survey responses as the terms justices or injustices are not necessarily neutral.[3]

Our study departs from existing works on several fronts. First, we focus on Guatemala, a country on the front lines of vulnerability (O'Brien et al., 2004) as it combines high exposure to climate-related extreme weather events and low adaptive capacity to cope with these threats. Second, whereas discussions about climate justice have surfaced predominantly at the international level (Jenkins, 2018), we examine the interpretative frame of climate justice at the individual level and through the lens of public opinion. Third, we assess the inter-connectedness of the three pillars of climate justice and do so indirectly by asking questions that approximate the conceptual definition of procedural, recognition and distributive expressions of justice. Fourth, we pay attention to the different scales of climate justice by focusing on the varied forms of climate action (Almeida et al., 2024), particularly those connecting government and civil society.

We examine several factors commonly associated with climate justice, such as personal experiences with climate-related events, perceptions of climate change as threats to livelihoods, institutional climate actions through the lenses of government preparedness and planning, and non-institutional climate action from the perspective of civic engagement. Our results show considerable variation in the correlates of the three pillars of climate justice, and similarities only with respect to two variables – perceptions of climate change as threats to livelihoods and government preparedness. The procedural and recognition dimensions of climate justice are not explained very well by the factors often associated with climate justice. Moreover, the results show congruence between distributive justice and climate justice, insofar as their statistical correlates are almost identical. It may well be the case that when Guatemalans are thinking about climate justice, they are also mostly considering distributive justice, and not the other expressions of justice. These findings have broad implications for the underpinnings of the different dimensions of climate justice and the outcomes they seek to achieve. They also provide a pathway for future climate justice actions.

We begin by aligning the literature on climate justice with varied forms of climate actions. We draw on these contributions to formulate our main hypotheses of interest. After explaining the details of our national survey, we discuss our empirical results. We conclude the paper by summarizing our findings and the larger implications of our results.

[3] Gregersen et al. (2025, p. 4) asked the following open-ended survey question: "There is sometimes talk of injustice in relation to climate change. What, if anything, do you think can be unjust? Please write down the first thing you think of. All types of responses are welcome, preferably a couple of sentences, or just a few words if you prefer."

Climate Justice and Climate Actions

The environmental justice and climate justice frames are alike in many ways. The early environmental justice literature in the U.S. speaks to the disparities in health and environmental risks faced by marginalized and poor communities because of their proximity to hazardous facilities (Williams, 1999; Bullard, 2000; Mohai et al., 2009). These risks were compounded by lax regulations and limited resistance by aggrieved populations.[4] Studies later extended the environmental justice frame to conflicts over resource extraction in the Global South as impoverished and vulnerable communities confronted environmental threats by permissive governments which encouraged mineral extraction but limited economic opportunities and public goods to citizens (Alcañiz and Gutiérrez, 2022). In some cases, these mining ventures met significant and violent resistance. The climate justice frame speaks to the localized effects created by climate-related extreme weather events (e.g., rising sea levels, floods, droughts, hurricanes, heat waves, forest fires), which disproportionally impact marginalized and poor communities in the Global South, which possess very low carbon footprints compared to emitter nations. The literature informs us that the inequities resulting from these localized climate events are often associated with climate inaction (Dolšak & Prakash, 2022).[5]

To better grasp the spectrum of climate actions and inactions, we draw on Almeida et al.'s (2024) conceptual classification of climate actions. Climate actions represent the varied collective efforts undertaken by multiple actors to address the climate crisis, and they come in two forms: institutional and non-institutional. Institutional climate action follows routine and formalized procedures to achieve decarbonization and preparations for adaptation and resilience. These activities are initiated mostly by governments and corporate actors, and include strategies such as, climate action planning, policy transitions to green and renewable energies, and cap and trade programs. Non-institutional climate action, in contrast, emerges from organized segments within civil society adopting more disruptive tactics and campaigns to combat the climate crisis. Some examples include transnational climate movements, local level mobilizations against extraction, and fossil fuel divestment campaigns. More importantly, the boundaries between institutional and non-institutional climate actions are fluid and overlap each other. In fact, research has shown that more equitable environmental policies are the byproduct of community mobilization and collaboration with government actors (Méndez, 2020). The same is true for campaigns resisting mineral extraction as they have pressed on the implementation of consultation rights on mining ventures that affect indigenous peoples (Torres-Wong 2023) and modified existing environmental monitoring and licensing to better protect community livelihoods (Jaskoski, 2020; Spalding, 2023).

[4] In the U.S., the 1968 Memphis Sanitation Workers' Strike is often referred to as the first national-level organized protest again environmental injustice (EPA, 2017; Dolšak & Prakash, 2022).

[5] Other dimensions of climate justice include the uneven distribution of costs imposed by mitigation and adaptation policies (costs on carbon-intensity industries) and the uneven distribution of benefits of climate policies (benefits for renewable energy industries) (see Dolšak & Prakash, 2022). These other dimensions are the byproduct of climate policies, which are not the focus of this paper.

We can establish connections between the varied forms of climate actions, particularly those connecting government and civil society, and the three-pillared justices. Institutional climate action and perceptions of government readiness and planning should align with distributive justice given its economic implications. Non-institutional climate action and indicators of civic engagement should be closer to procedural justice as public participation is front and center.[6] Recognition justice may be more difficult to pin down. It receives the least attention compared to procedural and distributive justices (Benjaminsen et al., 2022). Scholars of climate justice also debate whether recognition of vulnerable groups should precede discussions of procedural justice to prioritize meaningful involvement (Chu & Michael, 2019; Bulkeley et al., 2014). Other scholars move recognition of vulnerable groups closer to distributive justice to harness fair benefit sharing (Ogunbode et al.,2024; Piroli, 2025). Recognition justice may fall in between institutional and non-institutional climate actions as recognition of vulnerable groups implies explicit approval by the state and some degree of civic engagement demanding recognition.

Guatemala is an ideal case to explore the correlates of climate justice and its connections to varied forms of climate actions. The country is highly vulnerable to climate-related events, and its adaptive capacity is comparatively low. It ranks in the top five countries in the world most affected by floods, hurricanes and earthquakes, with approximately 40 percent of the population exposed to five or more harms simultaneously.[7] According to the ND-GAIN Country Index (University of Notre Dame, 2025), Guatemala is among the group of countries with low readiness scores.[8] Madariaga et al. (2025) also situate the country as having medium to low levels of climate planning. As in most of the Global South, climate change in Guatemala operates as a stressor that pushes people and existing adaptive capacities "over the edge" (O'Brien et al., 2004, p. 12).

Our national public opinion survey allows us to explore several factors generally associated with climate justice, such as personal experiences with climate-related events, perceptions of climate change as threats to livelihoods, institutional climate actions through the lenses of government preparedness and planning, and non-institutional climate action from the perspective of civic engagement. We outline our main hypotheses next.

Hypotheses

[6] Local participation (non-institutional climate action) in prior consultation frameworks established and regulated by governments (institutional climate action) is an example of the fluidity of various climate actions. In Latin America, these participatory frameworks are weak and are politicized by Indigenous peoples with legal standing in different ways, for instance, they can decline to participate, contest their omission when they are absent, or challenge their legitimacy when they are present (Torres-Wong, 2023; Jaskoski, 2020). For a review of consultation rights and its limitations in Guatemala, see Xiloj (2019).

[7] About 83 percent of Guatemala's gross domestic product originates in areas with the highest risk exposure to harms (World Bank, 2024). Food insecurity because of extreme weather events is also a major concern (Schmidtke & Ober, 2023).

[8] See https://gain.nd.edu/ourwork/country-index/rankings/

We characterize personal experiences with climate-related extreme weather events as "climate bads." Like threats or negative conditions, "climate bads" are a powerful driver of collective action and individuals embrace joint action to lessen the impact of these worsening conditions (Almeida, 2018; Almeida et al., 2025). Threats and losses are also associated with greater collective action levels compared to opportunities or gains (Almeida et al., 2025).

Yet the link connecting threats to climate action is not always a straight line. For one thing, there are different ways to capture the variation of threats, including frequency, geographic location, and severity or intensity. Moreover, scholars debate whether perceptions of climate threats are sufficient to warrant a response to climate change compared to lived experiences or objective conditions (Slovic, 2000; Leiserowitz, 2006; van der Linden, 2015). In other words, recalling the frequency of droughts or floods in a particular area or time may be insufficient to push climate action vis-à-vis lived experiences surrounding economic losses or physical harms because of localized climate events. Taking these considerations into account, we hypothesize that personal experiences with "climate bads" will be associated with greater support for climate justice.

> H1: The more respondents experience "climate bads," the more likely they are to consider supporting climate justice.

Prior research has shown that climate change perception plays an important role in supporting various types of climate action, including local climate adaptation policies (Yazar & York, 2022), and considerations about migration (Koubi et al., 2016, Maboudi et al., 2025). Perceptions of climate change as threats may be shaped by experiences with "climate bads," and in our analysis, we examine these variables jointly and separately. We hypothesize that people who believe that climate change is a serious threat to livelihoods should be more likely to support climate justice.

> H2: The more respondents believe that climate change is a serious threat, the more likely they are to consider supporting climate justice.

Personal experiences with "climate bads," including perceptions of climate change as threats to livelihoods, are context dependent. They are shaped by the political, institutional, economic and social settings in which individuals are embedded. In line with the IPCC (Intergovernmental Panel on Climate Change) risk assessment framework (IPCC, 2020), the threats of climate-related extreme weather events interact with the exposure and vulnerability of people (i.e., a densely populated area with inadequate infrastructure will have greater exposure and vulnerability compared to a sparsely populated area with adequate infrastructure), as well as human responses to climate change (i.e., government preparedness to manage or reduce these climate threats and civil society engagement on climate issues). These human responses can be reorganized as institutional and non-institutional climate actions, respectively.

Starting with institutional climate action, research has mainstreamed the importance of government planning and preparedness (Desmond, 2018; Heidrich et al., 2013; Hürlimann et al., 2022). Climate action planning, including programming and design, is arguably the most common form of institutionalized climate action, and it can be traced down to local or municipal levels

(Almeida et al., 2024). Moreover, effective climate action can reduce exposure and vulnerability to extreme weather events through proper hazard identification, community preparedness, integrated response efforts, and sophisticated early-warning and evacuation systems (Ribot, 2010). The opposite scenario would be a case of maladaptive outcomes, i.e., when adjustments made by one group increase the risks of another group (Ribot, 2011, p. 1161; Barnett & O'Neill, 2010). Therefore, we hypothesize that when individuals perceive the government to be prepared to address climate change, they will be supportive of climate justice.

> H3: The greater the perceived preparedness of government, the more likely they are to consider supporting climate justice.

Turning to non-institutional climate actions, an extensive literature suggests that civic engagement is key to achieving various "climate goods," such as closing implementation gaps in environmental governance (Herrera, 2024), greater environmental protection over looming resource extraction (Jaskoski, 2020) as well as greater climate resilience and mitigation planning (Almeida et al., 2023). Community organizations representing civil society are a pathway to civic engagement. They encourage trust and provide resources and networks where individuals learn capacity building in civic skills (Putnam, 1993; Almeida et al., 2023) and cooperative behaviors. Boulding and Holzner (2021) show that participation in community organizations is high in Latin America, and these organizations have become a source of social insurance in the presence of adverse circumstances. Community organizations reduce the costs of collective action and can make the difference on whether the poor participate in politics, including climate actions. We hypothesize that civic engagement will correlate positively with support for climate justice.

> H4: The more civically engaged respondents are, the more likely they are to consider supporting climate justice.

Scholars of climate justice see the three-pillared justices as inter-dependent, requiring simultaneous attention to its trivalent conception (Schlosberg, 2004; Bulkeley et al., 2014). Figure 1 shows the percentage of survey respondents who supported: (1) public participation in environmental decision-making, (2) protection of vulnerable citizens from the harms of climate change, and (3) basic compensation for victims of climate change, which we use to categorize the procedural, recognition and distributive dimensions of climate justice, respectively. The figure reveals almost equal support for the three-pillared justices. In our analysis, we test the above hypotheses on each of the three pillars as well as on climate justice, an index created by adding the three dimensions. If the factors that move individuals to consider supporting each of the three pillars align well with climate justice, we speak of congruence and this outcome will be consistent with the multivalent approach suggested by climate justice scholars. By contrast, any dealignment between the three pillars and climate justice suggests that the factors supporting each of the pillars are dissimilar and that individuals may weigh more one pillar of climate justice over others.

*** Figure 1 about here ***

Data and Methods

To test our main hypotheses, we use an original public opinion survey conducted in Guatemala between May and June 2023. The survey was fielded by Borge y Asociados (B&A), a well-known regional public opinion and market research company based in Costa Rica. The survey was conducted using a face-to-face method and it included a national sample of 950 adult respondents. To ensure we have enough respondents from drought and flood prone regions, we included an oversample of 400 adult respondents from climate change vulnerable areas (201 individuals from the drought-prone municipality of Progreso in the central Los Albores region, and 199 individuals from the flood-prone municipality of Nueva Concepción on the Pacific Coast).

The participants were randomly sampled from the adult citizen population according to a multistage design stratified by region. The proportion of urban to rural population corresponded to the Guatemalan 2018 Census data. After stratifying by urban/rural administrative units, a Population Proportional to Size (PPS) method was used to randomly select blocks within administrative units. A random route household selection within each sampling point was used to identify blocks in rural and urban areas. Next, survey managers randomly selected one individual per household using last/next birthday method. Last, post-stratification weights were computed using gender, education, and age.

Prior to fielding the survey, the survey company and the researchers conducted three preliminary analyses. First, B&A conducted a pretest of the questionnaire to (1) review the logical sequence of questions and responses, (2) validate questionnaire length, (3) examine the attitude of the respondent toward the topics and questions, (4) and evaluate the understanding of the questions and consistency of responses. Second, the survey pretest was followed by a cognitive interview of 10 respondents to have a deeper look at the understanding of each question and concepts used across the survey. Third, and finally, the researchers conducted a focused group study in three different regions across the country.

Measuring the Dependent Variables

We measure the outcome variable of interest by asking respondents how important it is for them to have the following: (1) public participation in environmental decision-making, (2) protecting vulnerable citizens from the harms of climate change, and (3) basic compensation for victims of climate change. The response options provided were “not important at all,” “slightly important,” “moderately important,” “very important” and “extremely important.” We recoded the response levels from 1 (not important at all) to 5 (extremely important). We use the survey responses to create three dimensions of climate justice: (1) **Procedural** for public participation in environmental decision-making, (2) **Recognition** for protecting vulnerable citizens, and (3) **Distributive** for compensation for victims of climate change (see Figure 1). We then added the three variables to form a single **Climate Justice** index. Appendix A details each variable, including survey questions, values, and coding decisions.

Measuring the Independent Variables

Our national public opinion survey allows us to explore a wide range of "climate bads" connected to experiences with climate-related extreme weather events – both personally or vicariously – including perceptions about the frequency of floods and droughts, economic losses associated with various extreme weather events, and finally, the destruction of homes, including the temporary relocation of households because of damaged homes. Our survey questionnaire goes beyond standard questions of personal experiences with extreme weather events, which focus mostly on their frequency (Spektor et al., 2023).

We draw on multiple survey questions to capture "climate bads." First, we asked respondents two questions about the frequency of **Floods** and **Droughts** to assess their exposure to these climate-related events over the past five years. Based on the overall sample, which includes the flood and drought oversamples, about 27 percent and 39 percent of respondents indicated that the levels of floods and droughts, respectively, were more and much more during this period. In the flood and drought oversamples, these responses were 59 percent and 52 percent, respectively.[9]

Second, we use two binary questions concerning property destruction due to climate-related extreme weather events. First, we asked respondents if their house has suffered damage due to climate-related events (**Home damage**). Next, we asked if they had to leave their house temporarily due to climate-related events (**Home relocation**). About 25 percent and 17 percents of respondents reported home damage and relocation, respectively.

Third, we asked if respondents knew anyone who has experienced economic losses due to any climate-related events in the last five years because of: (1) rise in level of ocean/river/lake, (2) drought, (3) hurricanes, (4) floods and/or landslides due to rains, and (5) extreme heat. We added the five variables to create an **Economic Loss** index ranging from 0 to 5, where 0 and 5 capture opposite extremes of economic losses due to extreme weather events.

Our national public opinion survey included several questions about climate change perception. Almost 82 percent of respondents, for instance, indicated that they have heard of climate change. About 56 percent of respondents rated climate change as very important, and 49 percent of respondents indicated that they were extremely concerned about climate change. To grasp the level of climate change concern, we draw on a question asking respondents if climate change represents a serious threat to them or their families. Approximately 75 percent of respondents indicated that they agree (27 percent) or strongly agree (48 percent) with climate change being a serious threat to them of their families.

To delineate the role of institutional climate actions, we asked respondents two sets of questions. First, we ask respondents if they believed the government of Guatemala has the resources to: (1) resolve emergencies caused by extreme bad weather or climate, (2) mitigate the effects of climate change, and (3) adapt to the effects of climate change. These actions have different temporal

[9] These responses may reflect some recency bias, whereby respondents give greater importance to the most recent events vis-à-vis older ones.

scales, yet they were highly correlated.[10] Hence, we added these three binary questions to create a **Government Preparedness** index, which ranges from 0 to 3, where 0 and 3 represent opposite extremes of government preparation. Second, we ask respondents is they have heard anything about the government's plans to: (1) minimize the damage from future extreme weather events, and (2) combat climate change.[11] We combined these binary questions into a **Government Planning** index, which range from 0 to 2, where 0 and 2 represent opposite extremes of government planning.

Turning to non-institutional climate actions, we considered two questions related to civic engagement. We first asked respondents to rate the trustworthiness of their community members with responses ranging from 0 (not at all trustworthy) to 4 (very trustworthy) (**Interpersonal Trust**). About half of survey respondents regarded their community members as very trustworthy (27 percent) and somewhat trustworthy (25 percent). We then asked respondents to rate on a scale of 1 (not at all) to 7 (a lot) how much they trust the following groups: (1) community organizations and COCODE[12], (2) national environmental organizations, such as the Defenders of Nature Foundation, (3) community leaders, and (4) indigenous leaders. We aggregated these four ordered categorical variables to create a **Trust in Social Organizations** additive index.[13]

We control for the respondent's gender (binary variable coded 1 for **Female**), their level of **Income** (ordered categories on a scale of 1 to 7), **Education** (ordered categories on a scale of 1 to 4), as well as a binary variable for the supply of drinking water in their homes (**Drinking Water**).

Empirical Results

We present two sets of results. Table 1 focuses on the three-pillared expressions of justice: **Procedural** (Model 1), **Recognition** (Model 2), and **Distributive** (Model 3). In Model 4, we consider the additive index **Climate Justice**. Because these dependent variables are categorial, we estimate ordered logit regressions. As a robustness check, Table 2 returns to the **Climate Justice** index testing separately the different groups of variables and alternating to linear regression models.

*** Table 1 about here ***

[10] The percentage of survey respondents who said "yes" to these three questions were 82 percent, 66 percent, and 68 percent, respectively. The correlation scores were 0.53 for 'emergencies' and 'mitigation,' 0.51 for 'emergencies' and 'adaptation,' and finally, 0.61 for 'mitigation' and 'adaptation.'

[11] 73 percent of respondents indicated knowledge of the government's plan to minimize the damage from extreme weather events, but only 22 percent of respondents said so for combating climate change.

[12] COCODE is a citizen advisory group that works with municipal officials across local government agencies.

[13] These two variables focus on trust, which is widely seen as a byproduct of participation in organizations (Putnam, 1993). Unfortunately, the survey questionnaire did not provide a suitable measure of participation in organizations.

An initial comparison of the three climate justices (Models 1, 2 and 3 of Table 1) suggests some congruence regarding two explanatory variables. Specifically, individuals who viewed climate change as a serious threat to them or their families (H2) as well as those who reported greater government preparedness (H3) were more likely to support the three pillars of justice. By contrast, the theorized roles of climate bads (H1) and non-institutional climate actions (H4) are inconsistent across the three dimensions of climate justice, suggesting that the factors supporting each of the pillars of justice are indeed dissimilar.

For instance, while we considered a wide range of "climate bads," only economic losses were statistically significant and only for distributive justice (Model 3). The survey responses related to economic losses could be read as lived experiences with extreme weather events, and as such, it appears that distributive climate justice is closer to the severity and/or intensity of climate-related threats. By contrast, the mere recollection of the intensity of floods or droughts, which could reflect some recency bias, appears insufficient to move individuals closer to any of the dimensions of climate justice. Similarly, interpersonal trust, which we use as a proxy for civic engagement, is statistically correlated with recognition and distributive justices, but not procedural. These findings are somewhat counterintuitive as procedural justice is centered on public participation. Overall, the evidence for the weight of non-institutional climate action centered on civic engagement (H4) is mixed across the three climate justices.

Turning to the additive index **Climate Justice** (Model 4 of Table 1), two patterns immediately stand out. First, the results present a clearer picture for the theorized mutuality of institutional and non-institutional climate actions. Respondents who rated government preparedness higher, as well as those with greater trust in social organizations ($p < 0.10$) and interpersonal trust were significantly more likely to support climate justice. Second, the results of **Climate Justice** (Model 4) tread closely to those of **Distributive Justice** (Model 3) – economic losses, for instance, remain positive and statistically significant. As in the study of perceptions of climate justice in emitter countries (Gregersen et al., 2025), it appears that when Guatemalans are thinking about climate justice, they, too, are essentially considering distributive expressions, and not the others.

*** Table 2 about here ***

As a robustness check, Table 2 disaggregates the groups of variables correlating with **Climate Justice** and considers linear regression models. All the models control for the socio-demographic characteristics of gender, income, education and drinking water. These separate models suggest that the results supporting the importance of economic losses, climate threats, government preparedness, trust in social organizations and interpersonal trust are not driven by inclusion or exclusion of other variables. The theorized role of climate bads (H1), climate threats (H2), institutional (H3) and non-institutional climate actions (H4) is shown more distinctly with **Climate Justice** compared to its pillars, save **Distributive Justice** (Models 1 thru 3 of Table 1).[14]

[14] The results reported here include a national sample of adult respondents (N = 950) and two oversamples representing drought (N = 201) and flood (N = 199) prone regions (N = 1,350). When we re-estimate the analysis for **Climate Justice** without the oversamples, the statistical significance of **Economic Loss** drops.

In addition, we run ordered logit models disaggregating the **Government Preparedness** index. Each of the three variables related to emergencies, mitigation and adaptation were positive and statistically significant when we estimated separate models for each, and the results reported here stayed the same. We also considered other variables related to civic engagement, such as the presence of community support groups and NGOs providing relief assistance after climate-related events (a binary variable coded as 1 if present, and 0 otherwise), and another variable asking respondents if they believe they can influence their community's response to climate-related events (an ordinal variable ranging from 1 for strongly disagree to 5 for strongly agree). These variables were not significantly correlated with **Climate Justice,** and our main findings remained the same.

Finally, Figure 2 displays the average marginal effects of support for **Climate Justice** (Model 9 of Table 2) based on a change in the values of the independent variables. The use of average marginal effects, as opposed to discrete value changes, means we estimated the changes in mean predicted probabilities considering the observed values of our control variables. Our approach for estimating marginal effects in average predicted probabilities does not hold constant control variables at their means or other values but, rather, considers the full variation of the data.[15] One noticeable difference is the variable trust in social organizations. While it was statistically significant, its effect is a lot smaller compared to interpersonal trust.

*** Figure 2 about here ***

Conclusion

There is substantial conceptual richness surrounding the interpretative frame of climate justice and its three pillars. The theorized mainstreaming of institutional and non-institutional climate actions also figures prominently in various contributions about the climate crisis. However, when we set to explore the factors that move individuals to consider supporting climate justice, these variables appear to be a good fit when it comes to one dimension of justice – distributive justice – but less so for the other two dimensions – procedural and recognition. Moreover, our results show that the correlates of distributive justice are in congruence with those of climate justice, implying that Guatemalans may be thinking about climate justice largely through the lens of distributive climate justice.

Two broad conclusions with implications for the underpinnings of the separate expressions of climate justice can be drawn from our study. First, while our results did not provide a clear picture of the correlates of procedural and recognition justices, save perceptions of climate change as threats to livelihoods and government preparedness, civic engagement and other forms of non-institutional climate actions remain pivotal to close policy implementation gaps and hold existing

We conclude that the inclusion of individuals from climate-vulnerable areas makes "climate bads" more relevant.

[15] We use the margins command in Stata with the default specification.

government climate action and adaptive capacity accountable. As in numerous policy examples, it is rarely the case that civic engagement alone makes the difference as an explanation of policy outcomes. Rather, it is the embeddedness of civil society actors within government institutions, akin to revolving doors, that yields better and more sustainable policy changes. Procedural and recognition climate justices remain a pathway to better climate action.

Second, and returning to the three-pillared justices, climate justice scholars make recognition justice the starting point of the other pillars of justice, preceding discussions of meaningful involvement (procedural) and fair benefit sharing (distributive), yet our survey results do not support this conceptualization. Instead, individuals are equating climate justice with distributive expressions, and we can offer some tentative explanations. For one thing, distributive climate justice is centered on economic considerations – who gets what and how much they get – and as such it is likely to eschew the importance of the other dimensions of justice if the allocation of costs and benefits of adaptive interventions is viewed as fair or equitable. Moreover, distributive justice is closer to climate threats – as in economic losses due to climate-related events – vis-à-vis the other justices. On these grounds, distributive justice could be read as 'threat justice,' and procedural and recognition justices as 'opportunity justice.' If this division of justices holds true, then again, threats and losses are a more powerful driver of collective action compared to opportunities or gains. By extension, climate bads are a more powerful source of support for climate justice than climate goods.

Indeed, it may be that, as with other empirical manifestations of the abstract concept of climate justice, survey respondents – and citizens more broadly – can more readily perceive fairness in distribution (which is, after all, observable), as opposed to procedures and recognitions. We observed earlier that the procedural and recognition expressions of climate justice are not explained very well by the factors often associated with climate justice, and, furthermore, that some studies tend to subsume the procedural and recognition "faces" of climate justice within the more readily perceived distributive component. If our Guatemala data offers any indication, then perhaps the fairness of decision-making (procedural justice) and the underrepresentation of vulnerable groups (recognition justice) are manifest more evidently – at least to citizens navigating climate adaptation – as empirical manifestations of the "downstream" component of distributive justice, which seems to capture the earlier two inequities in what may be a temporally later outcome.

Figure 1. Three Pillars of Climate Justice

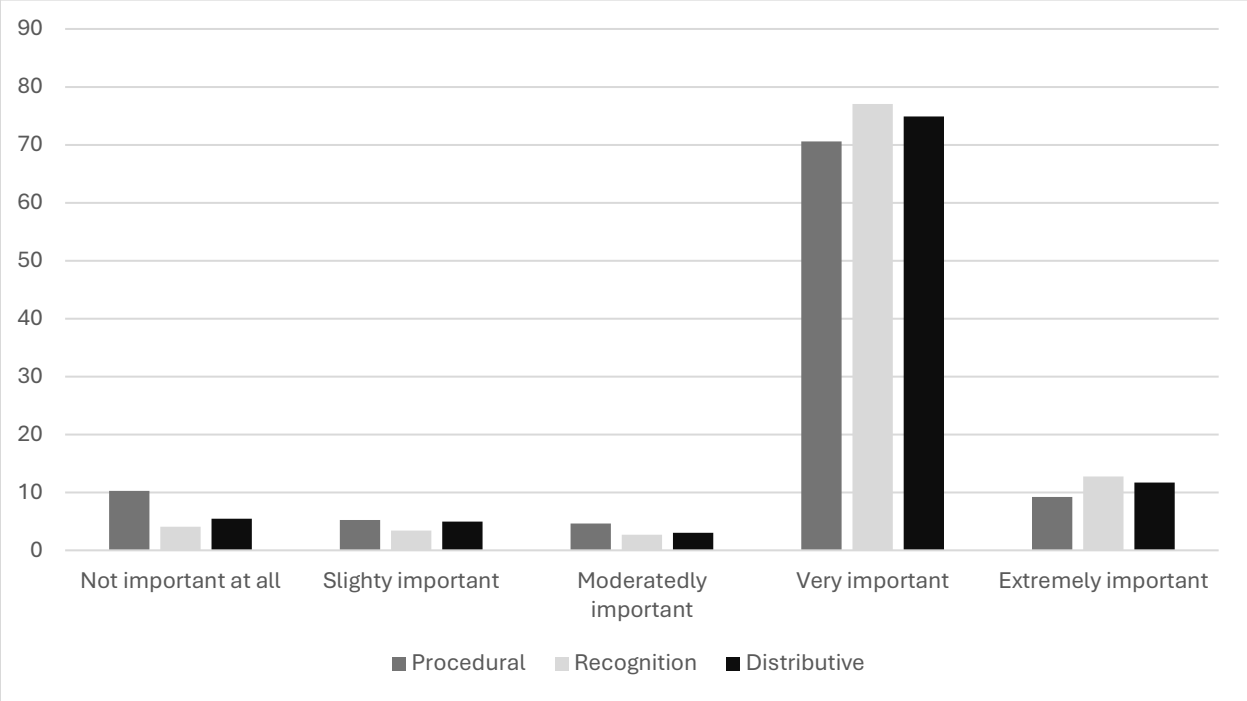


Table 1. Correlates of Climate Justice

	Procedural Justice Model 1	Recognition Justice Model 2	Distributive Justice Model 3	Climate Justice Model 4
Floods	-0.02	0.0129	-0.00541	-0.0336
	-0.0651	-0.0704	-0.0683	-0.0576
Droughts	0.0786	-0.000279	-0.102	-0.00557
	-0.0651	-0.0703	-0.0686	-0.0575
Home damage	0.303	-0.215	0.00156	0.0947
	-0.209	-0.222	-0.213	-0.181
Home relocation	-0.0741	-0.198	-0.224	-0.103
	-0.231	-0.248	-0.239	-0.2
Economic loss	0.0593	0.0512	0.147***	0.0871**
	-0.0474	-0.0517	-0.0502	-0.042
Climate threat	0.361***	0.180**	0.305***	0.310***
	-0.0728	-0.0798	-0.0767	-0.0647
Govt. preparedness	0.162**	0.127*	0.124*	0.195***
	-0.064	-0.0704	-0.0684	-0.0571
Govt. planning	0.00749	-0.146	0.0798	-0.00579
	-0.0995	-0.109	-0.104	-0.0862
Trust in social organizations	0.0126	0.00703	0.0147	0.0168*
	-0.0116	-0.0126	-0.0122	-0.0102
Interpersonal trust	0.106	0.186**	0.137*	0.149**
	-0.0772	-0.0836	-0.0811	-0.0679
Female	-0.156	0.0857	0.166	0.0179
	-0.147	-0.159	-0.155	-0.13
Income	-0.0178	0.112*	0.1	0.0165
	-0.0608	-0.063	-0.0629	-0.0526
Education	0.432***	0.276**	0.184	0.364***
	-0.114	-0.122	-0.117	-0.099
Drinking water	0.257	0.178	0.193	0.178
	-0.22	-0.234	-0.229	-0.19

/cut1	1.062**	-0.933	-0.46	-1.195**
	-0.526	-0.578	-0.557	-0.542
/cut2	1.662***	-0.106	0.372	-1.023*
	-0.526	-0.564	-0.547	-0.53
/cut3	2.046***	0.251	0.731	-0.809
	-0.527	-0.56	-0.545	-0.516
/cut4	5.906***	4.527***	4.830***	0.0665
	-0.571	-0.594	-0.581	-0.483
/cut5				0.277
				-0.478
/cut6				0.746
				-0.472
/cut7				1.398***
				-0.469
/cut8				1.903***
				-0.47
/cut9				2.256***
				-0.471
/cut10				4.905***
				-0.494
/cut11				5.876***
				-0.505
/cut12				6.671***
				-0.521
Observations	906	910	908	906

*** p<0.01, ** p<0.05, * p<0.1
Standard errors in parentheses

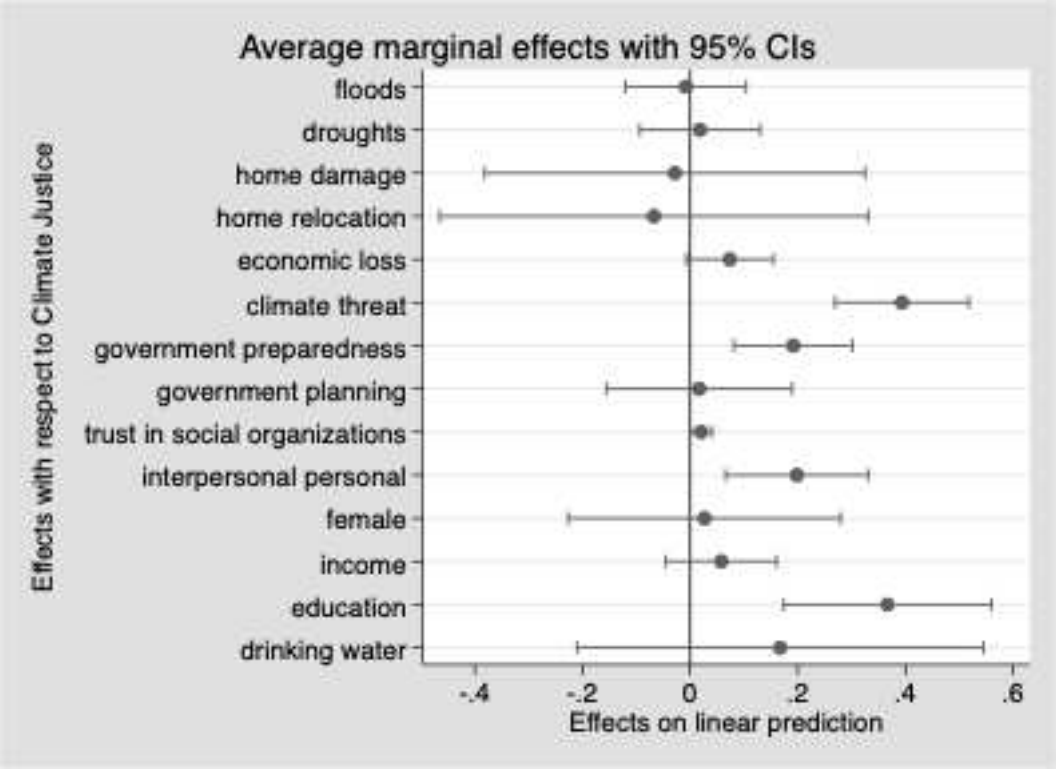
Table 2. Correlates of Climate Justice

	Model 5	Model 6	Model 7	Model 8	Model 9
Floods	-0.0165				-0.00787
	-0.057				-0.0571
Droughts	0.00957				0.0185
	-0.0571				-0.0571
Home damage	9.81E-06				-0.0282
	-0.179				-0.18
Home relocation	-0.0387				-0.0672
	-0.203				-0.203
Economic loss	0.0922**				0.0738*
	-0.0414				-0.0414
Climate threat		0.400***			0.394***
		-0.0596			-0.0634
Govt. preparedness			0.173***		0.192***
			-0.0541		-0.0562
Govt. planning			0.0449		0.017
			-0.0801		-0.0878
Trust in social organizations				0.0212**	0.0207**
				-0.00966	-0.0102
Interpersonal trust				0.201***	0.198***
				-0.0639	-0.0674
Female	-0.0497	0.00247	0.0258	0.0322	0.0267
	-0.129	-0.12	-0.123	-0.123	-0.129
Income	0.0828	0.0778	0.0911*	0.0936*	0.0579
	-0.0531	-0.0495	-0.0504	-0.0502	-0.0524
Education	0.371***	0.333***	0.399***	0.374***	0.367***
	-0.0971	-0.09	-0.0929	-0.0916	-0.0982
Drinking water	0.0799	0.0231	0.0146	0.0623	0.167
	-0.193	-0.174	-0.178	-0.179	-0.192
Constant	10.12***	9.135***	9.817***	9.358***	7.563***
	-0.331	-0.318	-0.305	-0.348	-0.458

Observations	956	1,077	1,064	1,055	906
R-squared	0.032	0.066	0.038	0.044	0.104

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 2. Support for Climate Justice



Appendix A: Summary Statistics and Survey Questions

Variable	N	Mean	Std. Dev.	Min	Max
Climate Justice	906	11.51104	2.00066	3	15
Floods	906	1.836645	1.259581	0	4
Droughts	906	2.165563	1.210984	0	4
Home damage	906	.2505519	.4335702	0	1
Home relocation	906	.1821192	.3861559	0	1
Economic loss	906	1.931567	1.809049	0	5
Climate threat	906	3.197572	1.016784	1	4
Govt. responsiveness	906	2.096026	1.138306	0	3
Govt. planning	906	.4690949	.7562883	0	2
Trust in social organizations	906	15.79029	6.420457	4	28
Interpersonal trust	906	2.665563	.964374	1	1
Female	906	.4933775	.5002323	0	1
Income	906	1.939294	1.32033	1	7
Education	906	2.743929	.7149482	1	4
Drinking water	906	.8587196	.3485029	0	1

Dependent Variables	Survey Question	Coding, recoding
Procedural Climate Justice	How important is it for you to have the following? Public participation in environmental decision-making	1 = Not important at all 2 = Slightly important 3 = Moderately important 4 = Very important 5= Extremely important
Recognition Climate Justice	Protecting vulnerable citizens from the harms of climate change	1 = Not important at all 2 = Slightly important 3 = Moderately important 4 = Very important 5= Extremely important
Distributional Climate Justice	Basic compensation for victims of climate change	1 = Not important at all 2 = Slightly important 3 = Moderately important 4 = Very important 5= Extremely important
Climate Justice	The sum of procedural, recognition and distributional justice	
Independent Variables		
Floods	Where you live, has the level of floods in the past five years been much less, less, the same, more, or much more?	1 = much less 2 = less 3 = the same 4 = more 5 = much more 6 = no floods Recoding 1 = much less; 2 = less; 3 = more; 4 = much more; 0 = otherwise

Droughts	Where you live, has the level of drought in the past five years been much less, less, the same, more, or much more?	1 = much less 2 = less 3 = the same 4 = more 5 = much more 6 = no droughts Recoding 1 = much less; 2 = less; 3 = more; 4 = much more; 0 = otherwise
Home Damage	(1) Has your home suffered damage due to one or more of the events mentioned above? For example, hurricanes, floods, etc., within the last 5 years.	1 = Yes 0 = No
Home Relocation	(2) Have you had to leave your home temporarily due to one or more of the natural events mentioned above? For example, floods, droughts, etc., within the last 5 years?	1 = Yes 0 = No
Economic Loss	Do you know someone who has experienced financial loss due to any of the following natural disasters in the last five years? (1) rise in level of ocean/river/lake (2) drought (3) hurricanes (4) floods and/or landslides due to rains, and (5) extreme heat	1 = Yes 0 = No Recoding as an additive index
Climate Threat	Please tell me if you strongly agree / somewhat agree / somewhat disagree / strongly disagree with the following statements about climate change: It represents a serious threat to you and your family.	1 = Strongly disagree 2 = Somewhat disagree 3 = Neither agree nor disagree 4 = Somewhat agree 5 = Strongly agree
Government Preparedness	In general, do you believe that the Guatemalan government has the resources to solve the following problems? (1) The Guatemalan government has the resources to resolve emergencies caused by extreme bad weather or climate. (2) The Guatemalan government has the resources to mitigate the effects of climate change. (3) The Guatemalan government has the resources to adapt to the effects of climate change.	1 = Yes 0 = No Recoding as an additive index
Government Planning	(1) Have you heard anything about the government's plans to minimize the damage from future extreme weather events? (2) Have you heard anything about the government's plans to combat climate change?	1 = Yes 0 = No Recoding as an additive index
Trust in social organizations and leaders	How much do you trust each of the following institutions/groups? I will ask you to answer the following questions using a number on a scale ranging from 1 to 7, where 1 means nothing and 7 means a lot. If your opinion is between not at all and a lot, you would choose the middle score: (1) Community organizations and COCODE (2) National environmental organizations in general, such as the Defenders of Nature Foundation, and others (3) Community leaders (4) Indigenous authorities	1 = Nothing 7 = A lot Recoding as an additive index
Interpersonal Trust	Now, speaking of the people here, would you say the people in your community are very trustworthy, somewhat trustworthy, not very trustworthy, or not at all trustworthy?	1 = Very trustworthy 2 = Somewhat trustworthy 3 = Not very trustworthy 4 = Not at all trustworthy

		Recoding 1 = very and somewhat trustworthy, 0 = otherwise
Female	Respondent's reported gender	0 = Male 1= Female
Income	Adding up your salaries and other income, approximately how much does your family receive per month?	1 = Less than 1,600 quetzales 2 = 1,600 to 3,200 quetzales 3 = 3,200 to 4,800 quetzales 4 = 4,800 to 5,400 quetzales 5 = 5,400 to 7,000 quetzales 6 = 7,000 to 10,500 quetzales 7 = More than 10,500 quetzales
Education	What is the highest level of education you have?	1 = No formal education 2 = Incomplete primary education 3 = Complete primary education 4 = Incomplete secondary education 5 = Complete secondary education 6 = Incomplete university 7 = Complete university 8 = Postgraduate – Master's, PhD 9 = Technical/vocational Recoding 1 = No formal education; 2 = incomplete and complete primary education; 3 = incomplete and complete secondary education; 4 = incomplete or complete university, postgraduate or technical/vocational
Drinking Water	Do you have a supply of drinking water in your house?	1 = Yes 0 = No

References

Alcañiz, I. & Gutiérrez, R. A. *The Distributive Politics of Environmental Protection in Latin America and the Caribbean*. (Cambridge University Press, 2022).

Almeida, P. in *Wiley-Blackwell Companion to Social Movements* (eds Snow, D., Soule, S. & Kriesi, H.) 43–62 (Wiley-Blackwell, 2018).

Almeida, P., Fonsah, E. & González, L. R. The role of environmental threat in motivating climate action. In *The Oxford Handbook of Climate Action* (ed. Almeida, P.) (Oxford University Press, 2025).

Almeida, P., González Márquez, L. R. & Fonsah, E. The forms of climate action. *Sociol. Compass* 18, e13177 (2024). https://doi.org/10.1111/soc4.13177

Barnett, J. & O'Neill, S. J. Maladaptation. Global Environmental Change 20, 211–213 (2010).

Benjaminsen, T. A., Svarstad, H. & Shaw of Tordarroch, I. Recognising recognition in climate justice. *IDS Bull.* 53, (2022). https://doi.org/10.19088/1968-2022.136

Boulding, C. & Holzner, C. A. *Voice and Inequality: Poverty and Political Participation in Latin American Democracies*. (Oxford University Press, 2021).

Bulkeley, H., Edwards, G. A. & Fuller, S. Contesting climate justice in the city: Examining politics and practice in urban climate change experiments. *Glob. Environ. Change* **25**, 31–40 (2014). https://doi.org/10.1016/j.gloenvcha.2014.01.009

Bullard, R. D. *Dumping in Dixie: Race, Class, and Environmental Quality*. 3rd edn (Routledge, New York, 2000). https://doi.org/10.4324/9780429495274

Chu, E. & Michael, K. Recognition in urban climate justice: Marginality and exclusion of migrants in Indian cities. *Environ. Urbanization* 31, 139–156 (2019). https://doi.org/10.1177/0956247818814449

Desmond, M. *National preparedness to adapt to climate change: Analysis of state of play*. (Environmental Protection Agency, 2018).

Dolšak, N. & Prakash, A. Three faces of climate justice. *Annu. Rev. Polit. Sci.* 25, 283–301 (2022). https://doi.org/10.1146/annurev-polisci-051120-125514

Fraser, N. *Scales of Justice: Reimagining Political Space in a Globalizing World*. (Columbia University Press, 2009).

Gould, K. A. & Lewis, T. L. in *The Oxford Handbook of Climate Action* (ed. Almeida, P.) (Oxford University Press, 2025).

Gregersen, T., Helliesen, M. S. & Jagers, S. C. "The Poor Are Hit the Hardest"—Norwegians' Perceptions of Climate (In)Justice. *Scand. Polit. Stud.* 48, e70002 (2025). https://doi.org/10.1111/1467-9477.70002

Heidrich, O., Dawson, R. J., Reckien, D. & Walsh, C. L. Assessment of the climate preparedness of 30 urban areas in the UK. *Clim. Change* 120, 771–784 (2013). https://doi.org/10.1007/s10584-013-0846-9

Herrera, V. *Slow Harms and Citizen Action: Environmental Degradation and Policy Change in Latin American Cities*. (Oxford University Press, 2024).

Hürlimann, A. C. *et al.* Climate change preparedness across sectors of the built environment – A review of literature. *Environ. Sci. Policy* 128, 277–289 (2022). https://doi.org/10.1016/j.envsci.2021.11.021

Intergovernmental Panel on Climate Change (IPCC). *Climate Change 2001: Impacts, Adaptation, and Vulnerability. Summary for Policymakers*. (Cambridge University Press, 2001).

Intergovernmental Panel on Climate Change (IPCC). *The Concept of Risk in the IPCC Sixth Assessment Report: A Summary of Cross-Working Group Discussions*. (IPCC, Geneva, 2020).

Jaskoski, M. Participatory institutions as a focal point for mobilizing: Prior consultation and indigenous conflict in Colombia's extractive industries. *Comp. Polit.* **52**, 537–556 (2020). https://doi.org/10.5129/001041520X15757670821639

Jenkins, K. Setting energy justice apart from the crowd: Lessons from environmental and climate justice. *Energy Res. Soc. Sci.* **39**, 117–121 (2018). https://doi.org/10.1016/j.erss.2017.11.015

Koubi, V., Spilker, G., Schaffer, L. & Böhmelt, T. The role of environmental perceptions in migration decision-making: evidence from both migrants and non-migrants in five developing countries. *Popul. Environ.* 38, 134–163 (2016). https://link.springer.com/article/10.1007/s11111-016-0258-7

Leiserowitz, A. Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Clim. Change* 77, 45–72 (2006). https://link.springer.com/article/10.1007/s10584-006-9059-9

Maboudi, M. *et al.* Climate change, vulnerability, and the propensity for climate migration: Evidence from Guatemala. *Glob. Environ. Polit.* **25**, 55–85 (2025). https://doi.org/10.1162/glep_a_00780

Madariaga, A., Maillet, A. & Tapia, D. in *The Oxford Handbook of Climate Action* (ed. Almeida, P.) (Oxford University Press, 2025).

Martínez-Alier, J. in *The Oxford Handbook of Climate Action* (ed. Almeida, P.) (Oxford University Press, 2025).

Méndez, M. *Climate Change from the Streets: How Conflict and Collaboration Strengthen the Environmental Justice Movement*. (Yale University Press, 2020).

Mohai, P., Pellow, D. & Roberts, J. T. Environmental justice. *Annu. Rev. Environ. Resour.* **34**, 405–430 (2009). https://doi.org/10.1146/annurev-environ-082508-094348

Mohtat, N. & Khirfan, L. The climate justice pillars vis-à-vis urban form adaptation to climate change: A review. *Urban Clim.* 39, 100951 (2021). https://doi.org/10.1016/j.uclim.2021.100951

O'Brien, K. *et al.* Mapping vulnerability to multiple stressors: Climate change and globalization in India. *Glob. Environ. Chang.* 14, 303–313 (2004). https://doi.org/10.1016/j.gloenvcha.2004.01.001

Ogunbode, C. A. *et al.* Climate justice beliefs related to climate action and policy support around the world. *Nat. Clim. Chang.* 14, 1144–1150 (2024). https://doi.org/10.1038/s41558-024-02168-y

Piroli, D. Climate justice, recognition, pluralism. *Braz. Political Sci. Rev.* 19, e0003 (2025). https://doi.org/10.1590/1981-3821202500010003

Putnam, R. D. *Making Democracy Work: Civic Traditions in Italy*. (Princeton University Press, 1993).

Ribot, J. C. Vulnerability does not just fall from the sky: Toward multi-scale pro-poor climate policy. In *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World* (eds Mearns, R. & Norton, A.) (The World Bank, Washington, DC, 2010).

Ribot, J. C. Vulnerability before adaptation: Toward transformative climate action. *Glob. Environ. Change* **21**, 1160–1162 (2011). https://doi.org/10.1016/j.gloenvcha.2011.07.008

Schlosberg, D. Reconceiving environmental justice: Global movements and political theories. *Environ. Polit.* **13**, 517–540 (2004). https://doi.org/10.1080/0964401042000229025

Schmidtke, R. & Ober, K. *Two years after Eta and Iota: displaced and forgotten in Guatemala*. (Refugees International, 2023). https://www.refugeesinternational.org/reports-briefs/two-years-after-eta-and-iota-displaced-and-forgotten-in-guatemala/

Slovic, P. *The Perception of Risk*. (Earthscan, 2000).

Spalding, R. J. The politics of implementation: Social movements and mining policy implementation in Guatemala. *Extr. Ind. Soc.* 13, 101216 (2023). https://doi.org/10.1016/j.exis.2023.101216

Spektor, M., Fasolin, G. N. & Camargo, J. Climate change beliefs and their correlates in Latin America. *Nat. Commun.* 14, 7241 (2023). https://www.nature.com/articles/s41467-023-42729-x

Torres-Wong, M. *The Indigenous Right to Self-Determination in Extractivist Economies*. (Cambridge University Press, Cambridge, 2023).

University of Notre Dame. *Notre Dame Global Adaptation Initiative (ND-GAIN)*. (2025). https://gain.nd.edu/

US Environmental Protection Agency (EPA). *Environmental justice timeline*. (2017). https://19january2021snapshot.epa.gov/environmentaljustice/environmental-justice-timeline_.html

van der Linden, S. The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *J. Environ. Psychol.* 41, 112–124 (2015).

Williams, R. W. Environmental injustice in America and its politics of scale. *Polit. Geogr.* **18**, 49–73 (1999). https://www.sciencedirect.com/science/article/abs/pii/S0962629898000766

World Bank. *Climate Change Knowledge Portal: Guatemala*. (2024). https://climateknowledgeportal.worldbank.org/country/guatemala

Xiloj, L. in *The Prior Consultation of Indigenous Peoples in Latin America: Inside the Implementation Gap* (ed., Wright, C. & Tomaselli, A.) (Routledge, 2019).

Yang, Y. & Lo, K. Just climate experimentation: Distributive, procedural, and recognition justice in two low-carbon pilots in China. *Political Geogr.* 121, 103384 (2025). https://www.sciencedirect.com/science/article/pii/S0962629825001167

Yazar, M. & York, A. Disentangling justice as recognition through public support for local climate adaptation policies: Insights from the Southwest US. *Urban Clim.* 41, 101079 (2022). https://doi.org/10.1016/j.uclim.2021.101079

Young, I. M. & Nussbaum, M. *Responsibility for Justice*. (Oxford University Press, 2011). https://doi.org/10.1093/acprof:oso/9780195392388.001.0001

Ethics Declaration

Ethical approval for this study was granted by American University Institutional Review Board Office of Research Integrity (ref. IRB-2022-228). All participants provided informed consent before completing the study.

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Data availability

The authors will provide the data supporting the findings of the study upon reasonable request.