



Local Environment

The International Journal of Justice and Sustainability

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/cloe20>

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To cite this article: Jarumi Kato-Huerta & Davide Geneletti (2023): Analysing the treatment of environmental justice and nature-based solutions in the Urban Climate Action Plans of Latin American metropolitan areas, *Local Environment*, DOI: [10.1080/13549839.2023.2221431](https://doi.org/10.1080/13549839.2023.2221431)

To link to this article: <https://doi.org/10.1080/13549839.2023.2221431>



Published online: 09 Jun 2023.



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Analysing the treatment of environmental justice and nature-based solutions in the Urban Climate Action Plans of Latin American metropolitan areas

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ABSTRACT

Urban Climate Action Plans are instruments increasingly being used by governments to identify vulnerabilities and propose technological, engineered and ecosystem-based actions for adapting to and mitigating climate change effects. However, as the outcomes of the climate response could asymmetrically affect marginalised communities already more impacted by climate-related hazards, researchers and practitioners have expressed concerns regarding the lack of attention given to the environmental justice (EJ) implications of climate action planning. In this context, this study uses content analysis to review the inclusion and framing of EJ concerns in Urban Climate Action Plans from 30 Latin American cities as a less studied and particularly vulnerable world region. Moreover, we investigate whether and how these documents translate justice concerns into concrete strategies, with particular emphasis given to the use of Nature-based solutions. We found that, through the years, the concerns related to EJ are more prominent but are rarely concretised into specific actions. When they are, these actions are less framed within systemic policy interventions and more into educational and capacity-building strategies. Finally, most planning documents frame Nature-based solutions for biodiversity conservation purposes, forgoing the opportunity to adopt the socially transformative potential of the term for enhancing sustainable and just futures.

ARTICLE HISTORY

Received 30 June 2022
Accepted 19 May 2023

KEYWORDS

Climate action;
environmental justice; Latin
America; urban planning;
nature-based solutions

1. Introduction

According to the Intergovernmental Panel on Climate Change (IPCC), in the next 20 years, global temperatures are expected to reach or exceed 1.5°C of warming, breaching the threshold set by governments in the 2015 Paris climate agreement, and representing one of the main threats for present and future generations (Pörtner et al. 2022). This climate crisis is expected to accelerate the ongoing ecosystem destruction that threatens food production, water availability, housing, and health as essential elements for living a dignified life. The people and communities that suffer most severely from climate-related impacts are the most vulnerable, including the world's poor, children, indigenous communities, people with disabilities, among others (Paavola and Adger 2006). Paradoxically, these population groups have contributed very little to the causes of climate change. This unequal distribution of risks and impacts has shaped the global call for climate and environmental justice (EJ) (Schlosberg 2013). As such, advocates and researchers in the field share several

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interrelated concerns, including the inequitable impact of fossil fuel production on vulnerable people, the historical responsibilities of climate-related threats, and the need to transition toward just climate actions with the capacity to reduce structural social and environmental injustices (Amorim-Maia et al. 2022; Schlosberg and Collins 2014).

Urban Climate Action Plans (UCAP) are strategic documents that outline actions to mitigate and adapt to climate change through technological, behavioural, engineered or ecosystem-based (EbA) approaches (UN Habitat 2015; Zölch et al. 2016). While adaptation actions are meant to help adjust in the face of current and expected hazards, those related to mitigation focus on decreasing greenhouse gas emissions (GHG) to transition towards low-carbon economies (Geneletti and Zardo 2016; Zhao et al. 2018).

EbA belong to the encompassing umbrella term of Nature-based solutions (NbS), which has gained importance as adaptation measures that can respond to pressing urban societal challenges (Reid et al. 2019; European Environment Agency 2021). These solutions provide important ecosystem services (ES) that can improve water retention and infiltration, reduce runoff, and alleviate the heat island effect (Byrne et al. 2016; Norton et al. 2015; Sahani et al. 2019). Regarding climate change mitigation, NbS can increase carbon sinks through the protection and sustainable management of urban green spaces and the restoration of peri-urban ecosystems (Girardin et al. 2021). As cities are highly complex systems where environmental injustices are exacerbated, NbS could also play a fundamental role in reducing the unequal distribution of green spaces by enhancing participatory processes that acknowledge communities' realities and needs (Kabisch, Frantzeskaki, and Hansen 2022).

From an EJ standpoint, UCAP can have diverse social implications, such as guaranteeing the inclusion of marginalised groups in decision-making and targeting actions in areas that positively influence the health and well-being of vulnerable communities (Swanson 2021). However, they can also consolidate or exacerbate existing vulnerabilities through maladaptation outcomes that occur when climate change policies increase vulnerabilities, shift existing vulnerabilities to external actors or erode mitigation efforts by increasing emissions (Magnan et al. 2016; Juhola et al. 2016). For example, NbS can cause land grabbing through the growing demand for climate and biodiversity offsets (Seddon et al. 2021). Moreover, their marketing could help to justify the displacement of vulnerable residents through a process that has been defined as climate gentrification (Cole et al. 2019; Anguelovski et al. 2019a).

Even if there are many ways to distinguish EJ, researchers have adopted three interlinked dimensions to analyse its inclusion in urban planning: the distribution of environmental benefits and harms, the recognition of vulnerable community's needs, values and perspectives, and the level of participation in environmental decision-making (Coggins et al. 2021). For example, researchers have analysed the inclusion of these different justice dimensions in sustainability, resilience and urban climate adaptation plans, mainly in the United States (Fitzgibbons and Mitchell 2019; Lambrou and Loukaitou-Sideris 2021; Rosan 2012; Pearsall and Pierce 2010; Le 2020; Schrock, Bassett, and Green 2015; Fiack et al. 2021). Consequently, this type of research has concentrated less on urban areas from the Global South such as Latin America (LATAM). This gap represents a critical setback for climate action because the unique characteristics of LATAM urban areas, such as income inequalities and high urbanisation rates, a prevalence of informal settlements, and a lack of state capacities, make this region particularly vulnerable to the harmful effects of climate change. Hence, it is fundamental to assess whether UCAP intertwine climate action with EJ to avoid perpetuating injustices such as social displacement and a lack of meaningful community engagement (Anguelovski, Irazábal-Zurita, and Connolly 2019b; Anguelovski et al. 2016). In turn, this information could be instrumental to normalising (creating a shared understanding) and operationalising (putting that understanding to work) EJ for responding to diverse climate threats in one of the world's most vulnerable regions.

Against this background, this paper aims to assess the extent to which UCAP in LATAM cities incorporate EJ concerns in their objectives and actions, particularly concerning NbS. Specifically, our research questions are:

1. How are EJ concerns incorporated in the different sections of the UCAP documents?
2. Do EJ concerns inform the specific actions proposed in the UCAP? If so, how?
3. Which EJ concerns are being addressed in concrete NbS proposals?

To address these questions, we applied a qualitative content analysis to the UCAP documents of a sample of large cities in LATAM.

The rest of this article is structured as follows: Section 2 presents a brief literature review on the EJ concerns that must be incorporated in UCAP for transitioning towards just climate action planning as described in the broader literature. Moreover, we present an overview of LATAM's urban vulnerability to climate change to contextualise the relevance of this research. Section 3 describes the selection process of UCAP and the content analysis framework to extract relevant information. Section 4 presents the content analysis findings, and Section 5 discusses them by considering the proposed research questions. Finally, conclusions are drawn in Section 6.

2. Background

2.1. *Situating EJ for climate action and urban planning*

EJ studies on climate change have focused on global responsibilities and the underlying reasons why particular communities bear a disproportionate vulnerability to the adverse effects of climate-related hazards (Cappelli, Costantini, and Consoli 2021; Paavola and Adger 2006; Ikeme 2003). Vulnerability has been defined as a function of the character, magnitude, and distribution of climatic variation to which a system is susceptible to harm, with key parameters being the system's exposure (pressures on people, structures, and assets), sensitivity (system response to change), and adaptive capacity (degree of adjustments to projected or actual changes) (Seddon et al. 2020; Inostroza, Palme, and Barrera 2016; Cutter, Boruff, and Shirley 2003).

From an urban planning perspective, social vulnerability to climate hazards is altered due to diverse planning decisions, such as reducing urban green spaces, favouring private transportation, and creating substandard housing (Loh and Kim 2020). Vulnerability is also determined by political and economic processes that are context-specific, such as gender inequities, discrimination based on ethnic, religious, or cultural factors, lack of financial capacities, and age or health conditions that lead to differential rates of adaptation and recovery (Lizarralde et al. 2021; Wilson, Hutson, and Mujahid 2008). Hence, recognising and understanding these differential vulnerabilities is critical for proposing means to generate environmentally just pathways for climate action.

As previously introduced, EJ theorists have articulated three dimensions of distribution, procedure, and recognition for understanding the relationship between climate change and justice. For example, the distributive perspective highlights the need to guarantee better access to adaptation and mitigation resources for urban citizens (Islam 2022). However, these distributive arguments focus more on the outcomes of climate actions than on the specific needs or realities of vulnerable communities, including how their identities and cultures are structured beyond spatially-related climate change concerns (Schlosberg 2012).

In contrast to the distributive perspective, procedural justice focuses on the discriminatory planning system and the unfair decision-making practices that exclude vulnerable residents or make them hold little influence (Deacon and Baxter 2013). Other researchers have pointed out that these exclusionary practices relate to recognitional injustices that result from a cultural domination where everything outside the mainstream interpretations of sustainability is rejected, including local and traditional knowledge (Martin et al. 2016; Chu and Michael 2019). Hence, UCAP should prioritise access to adaptation and mitigation actions based on meaningful community participation and a broader recognition of communities' social, environmental, and economic realities (Anguelovski et al. 2020; Yenneti and Day 2015).

Several authors have emphasised diverse ways to confront injustices in climate action planning by considering various EJ concerns. For example, environmentally just UCAP would encourage place-based and context-specific strategies that challenge the underlying drivers of injustice, including those rooted in gender, racial and socioeconomic inequalities (Virdee 2019; Bendlin 2014; Chakraborty et al. 2020; Amorim-Maia et al. 2022). Furthermore, they would prioritise spatially inclusive actions such as mixed land uses, affordable housing, and inclusive, accessible, and clean transportation modes (Ravi, Fields, and Dabelko-Schoeny 2021). UCAP would also include a widespread identification of vulnerable populations to propose concrete adaptation strategies for alleviating the effects of hazards expected to intensify due to climate change (Shrestha et al. 2016; Maragno, Fontana, and Musco 2020; Wilhelmi and Hayden 2014). They would clearly describe how funds and contracts are distributed and how public participation mechanisms could account for the realities of vulnerable communities to avoid exclusionary decision-making processes (Kosanic et al. 2022).

Regarding the link between EJ and NbS, it is crucial to acknowledge the concept's potential for achieving sustainable and climate-resilient urban pathways, but also their carrying risk in generating maladaptation outcomes that include the shifting of adaptation burdens to vulnerable populations or perpetuating mechanisms linked to existing injustices (Blythe et al. 2018; Kotsila et al. 2020; Kato-Huerta and Geneletti 2022). Hence, UCAP that promote NbS as climate actions should reinforce the needs and priorities of communities and, ideally, offer alternatives to avoid maladaptation risks (Shi 2019; Cousins 2021; Seddon et al. 2020). Finally, UCAP must integrate performance indicators to help local governments monitor and evaluate the degree to which climate actions can guarantee environmentally just conditions for all, but especially for the most vulnerable urban communities (Chang, Su, and Chen 2021).

2.2. Climate change and climate action in Latin American urban areas

LATAM urban areas are projected to suffer more intensely from the impacts of climate change (Bárcena et al. 2012; Intergovernmental Panel on Climate Change 2019). Moreover, heatwaves, floods, and droughts will further accentuate marginalised urban communities' social and economic struggles outweighed by existing poverty and inequality (Bárcena et al. 2020; Maurizio 2021). Interestingly, LATAM countries contribute less than 10% of the total GHG emission, demonstrating the asymmetry between polluting trends and extreme climate change vulnerability (Bárcena et al. 2018).

The most disadvantaged LATAM urban communities tend to live in informal settlements and lack essential services or access to emergency systems, making their vulnerability to climate-related hazards even more significant (Reyes 2021). Considering this problem, LATAM policymakers and planners face challenges in establishing UCAP in line with a development process that promotes socially and environmentally just economic growth (Rondón Toro et al. 2021). Hence, more information is needed on how local governments are developing climate action plans and whether they include EJ concerns to avoid the re-distribution or enforcement of systemic injustices.

3. Materials and methods

3.1. Selection of urban climate actions plans

We identified 215 cities in LATAM classified as "metropolis" using the 2020 UN-Habitat classification (UN Habitat 2020). From this sample, we focus on 74 urban areas with more than 1 million inhabitants. The rationale behind this selection is that the system of cities in the territory is structured based on territorial identities and functional economic dynamics (Suarez 2013). In this sense, these urban areas concentrate high population levels and represent the primary economic poles of the territory (Jordán, Rehner, and Samaniego 2010). Furthermore, cities with this characteristic are politically varied, intensely pressured by urbanisation, and experience challenging poverty and contextual injustices that profoundly affect their populations' health and well-being (Bilal et al.

2021). From the identified 74 urban areas with more than 1 million inhabitants, six have more than 10 million, three between 5 and 10 million, and 65 between 1 and 5 million.

The UCAP of these 74 cities were searched and, if available, collected from their official governments' websites in their local languages (Spanish or Portuguese). Only the most recent and updated plans were analysed if multiple options were identified. This search was conducted in February 2022 and led to the retrieval of 30 publicly available plans (Figure 1).

The UCAP identified were mainly from Mexico and Brazil. Regarding cities' characteristics, their diversity makes this sample useful to examine how diverse features (number of inhabitants, city type, size) may affect the operationalisation of EJ into concrete goals and policies related to climate action. For example, 33% of the identified UCAP (10 cities) are located in coastal areas, and 46% are urban agglomerations of more than 3 million inhabitants. The oldest identified UCAP was completed in 2012 (U.30, Montevideo), while 17 plans were completed between 2020 and 2021 (Table 1).

3.2. UCAP content analysis

The selected UCAP were assessed using qualitative content analysis. This method has been widely applied to examine the inclusion of diverse themes in urban planning documents, including some related to EJ (Geneletti and Zardo 2016; Cortinovis and Geneletti 2017; Schrock, Bassett, and Green 2015). The software MAXQDA Analytics Pro 2022 (Release 20.4.1) was used for coding and data analysis.

Using an iterative inductive and deductive process, a codebook was developed, and a pilot content analysis on a sample of five UCAP was conducted between the two principal investigators before transferring the coding framework into MAXQDA for the full analysis of the 30 UCAP.

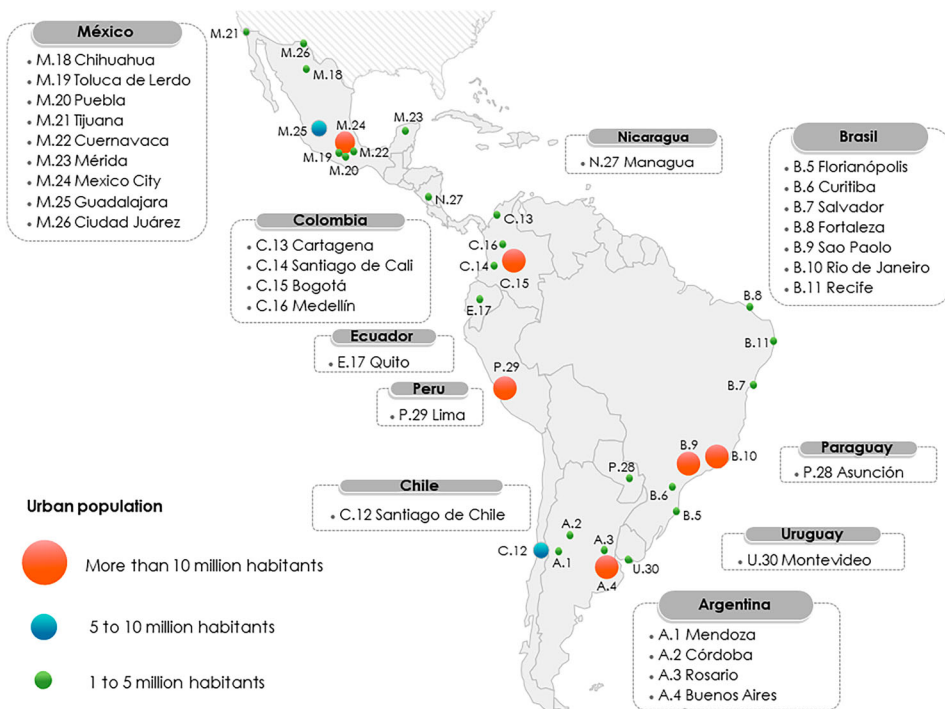


Figure 1. Location and population size of the different cities analysed in this study from which a UCAP was obtained. Note: Plan IDs are reported in Table 1.

Afterwards, one of the authors with previous experience with the use of the software proceeded with translating the coding into MAXQDA and applying it to the whole sample of plans. Results were recorded, and if discrepancies emerged on how the codes were applied, they were reconciled and converged through discussions between the two principal authors.

The initial inductive approach aimed to respond to the first research question on how diverse EJ concerns have been framed in UCAP sections. As described in Section 2.1, these concerns bring together the critical aspects that must be incorporated into climate action planning for generating environmentally just transitions. Hence, as a first step, the appearance of words such as “justice”, “environmental justice”, and related terms like “equity”, “inequality”, “equality”, and “equitable” in five main UCAP sections were coded. To individuate these sections, we followed classifications that have divided the contents of these documents into *information*, *vision and objectives*, *summary of climate risks and GHG inventories*, *climate actions*, and *monitoring indicators* (Andreanidou et al. 2018; Rondón Toro et al. 2021). When these justice-related words did not appear in the text, the mentions of vulnerable, disadvantaged, or marginalised groups were analysed to avoid excluding information that is not explicitly EJ-focused but that targets the improvement of social and environmental conditions.

The *information* section provides the cities’ background, including historical contexts and current social, economic, and environmental conditions. *Vision and objectives* describe the plan targets and long-term objectives. The *summary of climate risks* includes a description of the local context and population vulnerabilities, including the current and predicted climate hazards. The *inventory* section describes the contribution of different sectors and activities to GHG emissions. Both sections

Table 1. Sample of UCAP analysed.

ID	City	Inhabitants	Official language name	Year
A.1	Mendoza	1,173,000	Plan de Acción Municipio de Mendoza Sostenible	2018
A.2	Cordoba	1,572,000	Plan de Acción Local para la Resiliencia	2018
A.3	Rosario	1,532,000	Plan Local de Acción Climática Rosario 2030	2020
A.4	Buenos Aires	15,154,000	Plan de Acción Climática 2050 Ciudad de Buenos Aires	2020
B.5	Florianópolis	1,239,000	Plano de Ação Florianópolis Sustentável	2015
B.6	Curitiba	3,679,000	Plano Municipal de Mitigação e Adaptação às Mudanças Climáticas de Curitiba	2020
B.7	Salvador	3,839,000	Plano de Ação Climática da Salvador	2020
B.8	Fortaleza	4,073,000	Plano local de Ação Climática 2020 da cidade de Fortaleza	2020
B.9	Sao Paulo	22,043,000	Plano Climática do Município de São Paulo 2020–2050	2020
B.10	Rio de Janeiro	13,458,000	Plano de Desenvolvimento Sustentável e Ação Climática da Cidade do Rio de Janeiro	2021
B.11	Recife	4,127,000	Plano local de Ação Climática 2020 da cidade do Recife	2020
C.12	Santiago	6,767,000	Plan de Acción para el Clima y la Energía Sostenible, Comuna de Santiago	2020
C.13	Cartagena	1,063,000	Cartagena Competitiva y Compatible con el clima	2014
C.14	Cali	2,782,000	Plan Integral de Gestión del Cambio Climático de Santiago de Cali	2020
C.15	Bogotá	10,978,000	Plan de Acción Climática Bogotá 2020–2050	2021
C.16	Medellín	2,464,000	Plan de Acción Climática Municipio de Medellín	2021
E.17	Quito	1,874,000	Plan de Acción de Cambio Climático de Quito	2020
M.18	Chihuahua	1,055,000	Plan de Acción Climática Municipal de Chihuahua	2013
M.19	Toluca de Lerdo	2,467,000	Plan de Acción Climática Municipal de Toluca de Lerdo	2013
M.20	Puebla	3,195,000	Plan de Acción Climática Municipal de Puebla	2013
M.21	Tijuana	2,140,000	Plan de Acción Climática Municipal de Tijuana	2016
M.22	Cuernavaca	1,075,000	Plan de Acción Climática Municipal del H. Ayuntamiento de Cuernavaca	2018
M.23	Mérida	1,161,000	Plan de Acción Climática Ayuntamiento de Mérida	2018
M.24	Mexico City (agglomeration)	21,782,000	Plan de Acción Climática de la Ciudad de México Alineado con el Acuerdo de Paris	2018
M.25	Guadalajara	5,179,000	Plan de Acción Climática del Área Metropolitana de Guadalajara	2020
M.26	Ciudad Juárez	1,519,000	Plan de Acción Climática Municipal de Juárez	2021
N.27	Managua	1,052,000	Plan de Acción Managua Sostenible	2014
P.28	Asunción	3,337,000	Plan Local de Acción Climática Municipio de Asunción	2020
P.29	Lima	10,719,000	Plan Local de Cambio Climático de la Provincia de Lima 2021–2030	2021
U.30	Montevideo	1,752,000	Plan Climático de la Región Metropolitana de Uruguay	2012

Source: *Global Database of Metropolises* (UN-Habitat 2020). Cities in bold are located in coastal areas.

help to justify the mitigation and adaptation efforts that will be undertaken. *Climate actions* refer to the proposed means to promote adaptation and mitigation for achieving carbon neutrality. Finally, the *monitoring indicators* section presents the indicators for tracking progress towards the proposed objectives and targets.

After the initial inductive coding, a focused coding followed for each UCAP section to assess the extent to which the different EJ concerns are included (Table 2). Hence, using a scoring system from 0 to 3, each UCAP section was rated to identify the inclusion and prominence of these concerns. For example, 0 points were awarded if the concern was not mentioned. They were rewarded with 1 point if discussed superficially and with no specificity or an in-depth discussion regarding the local context. Two points were awarded if the concern was discussed more prominently or critically but with little contextual specificity or if it lacked a connection to specific local strategies. Finally, 3 points were assigned if they were entirely acknowledged in the plan, that is, if they were prominent and examined with high specificity regarding the local context, including through an explicit description of how they were translated into climate actions.

To answer how the different EJ concerns inform specific actions, we first coded and categorised all the identified climate actions based on the classification from the Fifth IPCC Assessment and supplemented this classification with potential actions to avoid maladaptation as identified from previous literature on the topic (Magnan et al. 2016; Oscilowicz et al. 2021; Bulkeley and Betsill 2005; Noble et al. 2015) (Table 3). Once this coding was undertaken, the identified actions were assessed for their links to the identified EJ concerns.

Finally, to answer the last research question, all the identified EbA were analysed to select those that fit the NbS definition proposed by the International Union for Conservation of Nature as “actions to protect, sustainably manage and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature” (Cohen-Shacham et al. 2016). As such, EbA actions were categorised as NbS if these were explicitly mentioned as such or if the plan linked EbA implementation to urban societal challenges (e.g. disaster risk reduction, food and water security, ecosystem degradation, economic and social development, among others) that can be alleviated through the provision of ES. For example, UCAP A.3 (Rosario) proposed the implementation of pocket parks for transforming vacant or disused land into public green spaces and provide recreation as a relevant cultural ES (p. 145). Moreover, the plan explicitly highlights their positive impact in improving quality of life, alleviating stress, strengthening social bonds for coexistence, and improving participation of neighbourhood associations. In contrast, UCAP M.19 (Toluca de Lerdo) proposed a general increment in green spaces without an explicit link to any societal challenge or ES (p. 121). When EbA actions were categorised as NbS their framings were assessed to explore whether they were expected to respond to local EJ concerns.

4. Results

4.1. Environmental justice concerns across UCAP sections

From the initial sample of 74 cities, only 40% (30 cities) have published a UCAP. From this sample, 30% (17 plans) have been formulated or updated since 2020 as a particularly critical time to underscore the importance of climate adaptation and mitigation.

The content analysis showed that UCAP in LATAM have focused on EJ with diverse levels of attention. Even if more than 90% of the plans (28) had at least some discussion related to EJ, mainly in the *information* and the *vision and objectives* sections, 43% have analysed the concept with in-depth detail and by analysing contextual injustices that their populations have endured. Hence, as shown in Figure 2, the overall inclusion of EJ concerns across the various UCAP sections is mixed, with 13 plans scoring above 2.25 points from the 0–4.5 average. These scores were obtained by summing the normalised scores of each UCAP section.

Table 2. Scoring systems and examples of coded content from the UCAP. Coded examples are taken from the documents and translated by the authors.

UCAP section	EJ concerns (3 points each)	Examples of ratings and coded samples
Information (6 points)	<p>The plan shows an in-depth application of EJ or implicitly links the concept to the realities of vulnerable populations</p> <p>The plan intends to recognise and respond to past, present, and future injustices and how these are perpetuated (e.g. uneven distribution of economic resources, discriminatory planning practices, lack of recognition of needs and vulnerabilities, etc.)</p>	<p>1 point "This UCAP addresses equitable access to socioeconomic opportunities while reducing greenhouse gas emissions, thus increasing climate resilience. (Source: A.3)"</p> <p>2 points "... 10% of the world's population generates more than 50% of global emissions, while large proportions of the urban population lack access to essential services and are highly prone to climate risks. It is clear that tackling climate change without tackling inequality in this context is impossible. Climate actions will provide collateral benefits of a social, economic, and environmental nature, such as improved air quality, low-cost renewable energy, employment opportunities, and others." (Source: M.24)</p> <p>3 points "Quito promotes equality, offering all its inhabitants the same opportunities and rights. Consistent with these principles, social justice and climate justice are a priority. The city's goal is to promote climate change policies with more significant impact, which go beyond isolated, sectoral, assistance and short-term visions; instead, actions are necessary to encourage the development of the population with equity, equality, universality, responding to diversity in the city" (Source, E.17)</p>
Climate risk/GHG inventory (9 points)	<p>The plan identifies and details current and projected climate hazards</p> <p>The plan includes an explicit identification of the most disadvantaged and vulnerable communities</p> <p>The plan mentions the need to protect vulnerable or underserved areas</p>	<p>1 point "Tierrabomba and La Boquilla are considered highly vulnerable areas due to the limited coverage of public services in some areas of the neighbourhoods. The type of housing adds to the vulnerability effects of coastal erosion and flooding." (Source, C.16)</p> <p>2 points "Concerning the city of Mérida, there are high and very high danger zones in the south, mainly within the Cuxtal Reserve and the northern areas of the urban outskirts. These areas are determined by the degree of marginalisation and the behaviour of maximum temperatures from 1960-2016 ... The vulnerable population includes age groups younger than three years and more than sixty." (Source M.23)</p> <p>3 points "The poorest population of CDMX lives in areas of high climatic risk, with a lack of services and precarious housing. In addition, there is a homeless population not registered and even more vulnerable to extreme hydrometeorological events. The most disadvantaged population concentrates around 42% of the Mexico City Metropolitan Area population. The most susceptible housing group encompass 30% of its total population and is located in areas to the south and south-west of CDMX and conurbation municipalities of the State of Mexico to the west, while those found in the southeast and the east are located in areas susceptible to flooding, where actions need to be prioritised" (Source M.24)</p>
Vision and objectives (9 points)	<p>The plan recognises social markers of disadvantage (in the form of race, gender, disability, economic capacity etc.) and devises specific ways to respond to them</p> <p>The plan mentions that communities' preferences, traditions, or local and indigenous</p>	<p>1 point "To be a city capable of visualising and implementing the forecast of natural contingencies resulting from climate change, through the development and implementation of strategies and public policies" (Source M.21)</p> <p>2 point "Santiago, a sustainable and innovative</p>

(Continued)

Table 2. Continued.

UCAP section	EJ concerns (3 points each)	Examples of ratings and coded samples
	<p>knowledge will be recognised and meaningfully accounted for</p> <p>The plan supports vulnerable residents' participation through deep involvement and community outreach</p>	<p>capital, focuses on its adequate climate management aims to reduce its GHG emissions through mitigation and adaptation to respond to the unavoidable effects of climate change and provide a better quality of life for its citizens and users with an emphasis on education" (Source C.15)</p> <p>3 points "The vision of the future of Recife that was established for the UCAP aims to guide the actions developed during the plan period strategically. Recife is a resilient, sustainable, and carbon-neutral city, inclusive of all, prioritising vulnerable communities and historic and disproportionately impacted communities by environmental injustices, respecting the knowledge and traditions materialised in its strong cultural heritage. The identity of the people from Recife is embedded in the vision of the city, reinforcing the collective construction due to its unique culture of participation, perpetuating ways of life, knowledge, and ritual" (Source B.10)</p>
Climate Actions (15 points)	<p>Actions related to public participation offer clear written descriptions of how such processes will be undertaken</p> <p>Through the proposed actions, the plan intends to repair the inequitable access and distribution to adaptation and mitigation sources</p> <p>The proposed actions include clear funding descriptions, details on budgets, and responsible bodies</p> <p>The plan acknowledges potential maladaptation risks that can be created with some of the proposed actions</p> <p>The plan proposes strategies for avoiding/repairing eventual <i>ex-post</i> maladaptation effects</p>	<p>1 point "Implement actions for the recovery, maintenance, conservation, preservation and expansion of the city's green areas, aiming at increasing carbon stock and ecosystem-based adaptation" (Source B.6)</p> <p>2 points "Comprehensive pilot interventions in some vulnerable neighbourhoods of Lima for enhancing their adaptation to climate change, which includes the implementing of a battery of strategies including green bus stops, green corridors, green micro-solutions at the housing level, road lining, drainage systems (if applicable), creation of shaded areas, wastewater recycling system, eco-efficient neighbourhood equipment and bioclimatic designs." (Source, P.29)</p> <p>3 points "The generation of energy from renewable sources, centralised and equitably distributed, represents affordable and non-polluting sources ... however, informal communities may have few incentives to carry out energy efficiency improvements due to land tenure insecurity, while low-income households may not be able to finance the initial costs of such programmes ... To minimise these impacts, recommendations include creating tiered building codes where stringency increases with income and development levels, and setting targets for new public and affordable housing that incorporate energy-efficient measures and practices through collaboration agreements with public and private funding agencies" (Source M. 25)</p>
Monitoring indicators (6 points)	<p>The plan includes an explicit EJ indicator framework</p> <p>The plan does not include an explicit EJ indicator category, but concerns are well defined and framed in other categories</p>	<p>1 point "Urban green space per Inhabitant" (Source C.15)</p> <p>2 points "% reduction of deaths and population affected by climate-related events" (Source C.12)</p> <p>3 points "Reduction of emissions (CO₂, PM_{2.5}, NO₂) in key areas of the city (for example, around hospitals, schools, care centres or low-income neighbourhoods)" (Source, M. 25)</p>

Note: Plan IDs are reported in Table 1.

From this sample of UCAP, social markers of environmental injustice were identified as living under poverty conditions (64%), gender and age-related inequities (50%), and housing and job informality (42%). The *climate risks/GHG inventory* sections received the highest score (0.78),

Table 3. Typology of climate actions coded in the different UCAP.

Category	Typology of action	Examples
Structural and Physical	Engineering and built	Seawalls and coastal protection, culverts, artificial water storage, sewage, and artificial drainage systems, building codes, road infrastructure, power plants and energy grids, artificial shelters, transport, and road infrastructure adaptation
	Technological	Genetic techniques for crop production, water-saving technologies (rainwater harvesting), <i>hazard mapping and monitoring</i> , building insulation, mechanical or passive cooling, renewable energies, biofuels
	Ecosystem-based	Environmental conservation and protection (protected areas, reserves, etc.), regeneration and restoration (reforestation, revegetation, phytoremediation, etc.), and creation of new green/blue spaces (parks, gardens, corridors, infiltration basins, green wall systems, etc.)
	Services	Social protection, public health and emergency services, water and sanitation, waste management
Institutional	Public policies and programmes	Regulation plans (formulation, regulation, actualisation), municipal ordinances for urban agriculture, <i>housing coops</i> , <i>public rent control</i>
	Laws and regulations	Property rights and land tenures, protected area declaration, energy efficiency standards, building efficiency standards, social relocation, and territorialisation, <i>eco-district zoning</i> , <i>inclusionary zoning</i> , <i>compact and mixed-used development</i>
Social	Economic	Payment for ecosystem services, green bonuses, green jobs, insurance and funding systems, emission taxes, <i>property tax payment for homeowners</i> , <i>housing credits</i> , <i>rent subsidies</i> , <i>foreign house taxes</i> , <i>green bonds</i>
	Behavioural	Sustainable practices (agriculture, transportation, etc.), evacuation mechanisms, livelihood diversification
	Educational and participatory	<i>Community involvement in adaptation projects</i> , collaboration, and environmental education, awareness raising, creation of participatory grounds (in-person workshops, surveys, focus groups, public consultation etc.) capacity building, scientific dissemination, stakeholder mapping, scenario development,
	Information	Environmental forecast, monitoring and remote sensing, alert systems, <i>hazard and vulnerability mapping</i>

Source: Adapted from *Adaptation Needs and Option*, IPCC Fifth Assessment Report (Noble et al. 2015). Actions in italics could be implemented to avoid maladaptation and are adapted from Oscilowicz et al. (2021), Magnan et al. (2016) and Bulkeley and Betsill (2005)

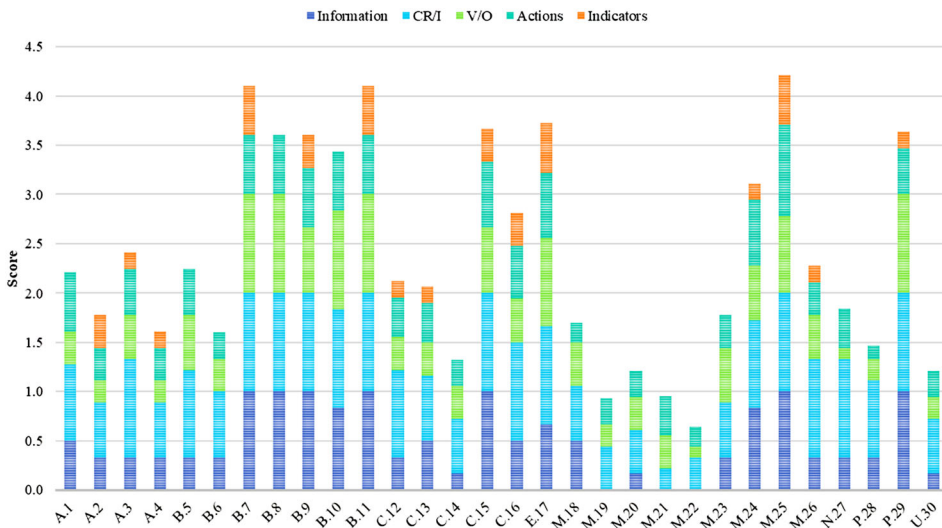


Figure 2. Inclusion of EJ concerns as the sum of the normalised scores from the five UCAP sections analysed. Note: Plan IDs are reported in Table 1. CR/I stands for UCAP section *Climate Risks/GHG Inventory* and V/O for *Vision and Objectives*

showing that UCAP from LATAM have broadly identified environmental hazards and the distribution of vulnerable communities in overburdened areas. The *information* and the *vision and objectives* sections scored above 0.50 across all the plans. The lower scores were identified for the *climate actions* (0.44) and the *indicators* sections (0.14), pointing out a disconnection between how the different EJ concerns are transferred in concrete strategies and monitoring systems for achieving carbon neutrality and vulnerability reduction.

There is also evidence that cities in LATAM are making EJ concerns a growing priority. In plans completed before 2018, only one made EJ a prominent topic. In contrast, from the UCAP completed since 2020, 14 out of 17 emphasised EJ and scored highly regarding the inclusion of the analysed concerns. This result was also tested by calculating the Pearson correlation of the normalised sections and their total scores with two city characteristics: the year of UCAP publication and the total population. As shown in [Table 4](#), there is a strong positive correlation between the year of UCAP publication and the inclusion of EJ concerns. Interestingly, a moderate positive correlation was also found between cities' population and the inclusion of these concerns, as six out of the eight cities with more than five million inhabitants (Mexico City, Guadalajara, Sao Paulo, Rio de Janeiro, Bogotá, and Lima) scored higher than average.

4.2. Identification and analysis of climate actions

Considering the UCAP sample, we recorded 1,578 potential climate actions. From this number, 310 belong to the category of *educational actions*, followed by those classified as *engineered and built* (235) and *EbA* (214). 178 actions from the *educational* category explicitly reflect the EJ concerns from [Table 2](#). For example, A.3 (Rosario) prioritises the dissemination of knowledge related to the rational use of non-renewable energy through environmental education programmes in schools and vulnerable homes. Other types of highly prioritised actions from different climate action categories and their links to the diverse EJ concerns are shown in [Table 5](#). This table also shows examples of how higher-scored plans have framed specific climate actions from an EJ perspective.

Regarding the type of actions that could be prioritised to avoid maladaptation even if not explicitly framed for such purpose, three strategies were identified i) inclusionary zoning policies, ii) housing tax credit programmes for affordable housing schemes, and iii) differentiated taxation schemes. Inclusionary zoning focused on planning ordinances to establish mixed land uses and promote housing developments that integrate communities with diverse socioeconomic profiles, as in N.27 (Managua, p. 82). In contrast, low-income housing tax credit programmes, as proposed in E.17 (Quito, p. 112), aim to generate low-cost and eco-efficiency strategies to create social interest housing schemes by promoting technical expertise, microcredits, and shared inversion between the public and private sectors. Finally, differentiated taxation refers to variations in existing paying prices according to emission levels, resource uses, or the socioeconomic conditions of the population. For example, M.24 (Mexico City) proposes payment programmes according to water consumption patterns and income levels (p. 93).

Table 4. Pearson correlation matrix calculated on the normalised scores of the five UCAP sections and two characteristics of the plans: publication year and city population. *P* values are significant at 0.05.

Variables	Year	Population	Information	CR/I	V/O	Actions	Indicators	Total score
UCAP Year	1							
Population	0.350	1						
Information	0.579*	0.470*	1					
CR/I	0.615*	0.280	0.764*	1				
V/O	0.518*	0.289	0.857*	0.645	1			
Actions	0.504*	0.334	0.780*	0.705*	0.740*	1		
Indicators	0.501*	0.297	0.528	0.475	0.442	0.516*	1	
Total score	0.637*	0.399**	0.952*	0.851*	0.897*	0.868*	0.645	1

Note: CR/I stand for UCAP section *Climate Risks/GHG Inventory* and V/O for *Vision and Objectives*

Table 5. Classification of the highest prioritised climate actions and their relationship with EJ concerns with specific examples from high-scored UCAP.

Category of actions	Prioritised actions	Relation with EJ concerns	Example from high-scored UCAP
<i>Ecosystem-based</i>	Creation of new green spaces	Pilot programmes of green space implementation in neighbourhoods under higher climate change risks	Comprehensive interventions in vulnerable areas of Lima for climate change adaptation, including green walls, green corridors, micro green solutions at the house level, road linings, drainage systems, creation of shaded areas, wastewater recycling systems, and bioclimatic designs (P.29, p.197)
<i>Engineered and built</i>	Integration of diverse and low-emission public transportation systems	Discourage private transport and enhance access for vulnerable groups	The <i>Fortaleza Municipal Walkability Plan</i> will requalify the road space for commuting pedestrians and people with reduced mobility, increase the attractiveness of pedestrian movement, and promote accessible and safe public spaces (B.8, p.45)
<i>Information</i>	Monitoring and alert systems	Consolidate early warning systems in vulnerable communities	Establish surveillance, early warning systems and prompt attention mechanisms using an effective system of direct and indirect monitoring and communication with the population while considering their vulnerability conditions (M.25, p.33)
<i>Behavioural</i>	Promote sustainable practices	Promote livelihood diversification and sustainable practices such as waste separation and recycling, tree planting, walking and bike use, ecotourism, and sustainable agriculture	Engage, identify, and train existing collectives of the city for the promotion of planting actions in urban afforestation programmes while strengthening the cooperative character in the face of epidemics and pandemics (B.10, p. 136)
<i>Laws and regulations</i>	Inclusive eco-zoning and planning regulations	Use zoning instruments to bring alternate collective housing and public spaces by considering the characteristics and needs of populations. The formulation or revision of existing urban planning instruments will support such actions	Procurement of public works and zoning ordinances for the construction of low-income housing that focus on the use of sustainable materials, eco-efficiency, and Nature-based solutions (B.11, p.46)
<i>Technology</i>	Use of renewable energy systems (e.g. solar, wind)	Extend the use of renewable sources in homes, companies, and institutions for economic savings in energy consumption	Ensure that scattered homes located in non-interconnected areas or areas with difficult access to electrical networks are able to implement energy self-generation systems using non-conventional sources (C.15, p.99)
<i>Services</i>	Low-emission waste management systems	Include informal recyclers in the city's recycling programmes so that they can securely develop this practice and obtain economic gains	Implement an inclusive recycling programme that includes grassroots recyclers. This programme aims at promoting formalisation, association, and training of recyclers so that they develop this practice as an inclusive peasant business (E.17, p.118)
<i>Public policies and programmes</i>	Municipal ordinances of urban agriculture	Increase food security and boost agriculture in the urban cores and areas not habilitated for other uses.	Create a food security programme by attracting resources and funding from federative or external entities, to promote the socio-nutritional well-being of vulnerable groups, for example, through the expansion of community gardens, community restaurants and Food Banks. (B.7, p, 116)

(Continued)

Table 5. Continued.

Category of actions	Prioritised actions	Relation with EJ concerns	Example from high-scored UCAP
<i>Economic</i>	Insurance and funding schemes	Promote funding schemes and secure the maintenance of incentives in social and ecologically vulnerable areas.	To increase climate resilience, the contracting of individual or collective insurance should be promoted, and economic incentives offered for implementing risk reduction measures in small and medium-sized enterprises. (M.24, p.101)

Note: Plan IDs are reported in Table 1.

4.3. Nature-based solutions and environmental justice

From the 214 actions categorised as EbA, we coded 148 that fit the IUCN's NbS definition. In terms of the prioritised societal challenges that these actions aimed to address, 33% focus on avoiding biodiversity loss and enhancing ecological integrity, followed by mitigating the urban heat island (12%), improving social cohesion (11%), GHG sequestration (10%), and flood risk reduction/increase water quality (8% each). The remaining 26% of the identified challenges include coastal resilience, protection of mental health, enhancing public mobility, establishing a transition towards greener economies, and preserving cultural heritage.

Of the 148 actions coded as NbS, only 32 (21%) were explicitly linked to the diverse EJ concerns analysed in this study, mainly in distributive justice terms (Table 6). For example, NbS were meant to reduce the adverse outcomes of climate change for marginalised groups by providing diverse ES such as heat and flood risk mitigation, enhancement of air quality, and soil erosion control. Eight plans have also addressed the need to co-create these strategies with communities to generate a sense of belonging. Only four plans have emphasised the importance of vulnerable community participation in creating and managing diverse NbS.

5. Discussion

As previously discussed, LATAM is particularly vulnerable to the impacts of climate change. Hence, its countries and city governments have been taking important steps towards adapting and mitigating these impacts, including through the development of UCAP that promote the implementation of climate-resilient infrastructure projects and sustainable land use practices. However, it is striking that 44 cities from the original sample of 74 lack a comprehensive UCAP. Moreover, of the available 30 plans, only 30% have recently been formulated or updated. This lack of availability and update of UCAP in LATAM highlights the need to promote the development of capacities and resources for the establishment of information systems and data infrastructure to design, implement, and monitor UCAP at the city scale (Aguilar María Gracia et al. 2019).

Our results also show that EJ concerns are being increasingly incorporated into LATAM climate action planning. Nonetheless, from the 30 UCAP analysed in this study, it can be reported that specific climate actions do not usually derive from EJ concerns, which is a finding also identified for other world regions (Loh and Kim 2020; Lioubimtseva and da Cunha 2020; Fiack et al. 2021). This result is supported by the disparity of discussions concerning EJ as the plans shift from the non-technical UCAP sections (e.g. *information* and *vision and objectives*) to proposing specific actions. In addition, 15 plans did not present monitoring indicator frameworks, which undermines their possibility to track how spatially distributed climate actions could change, improve, or worsen the socioenvironmental standings of already vulnerable populations.

We found that less populated cities with UCAP published before 2020 are less engaged with EJ concerns, while cities' plans of more than five million inhabitants scored higher. To give two contrasting examples, M.25 (Guadalajara) achieved the highest score (4.2 out of 4.5) for integrating concerns

Table 6. Link between NbS and EJ concerns as identified in the diverse UCAP.

ID	Link with EJ concerns	EJ dimension
A.1	Consolidate a system of green spaces by considering the ecological value of the Mendoza foothills to increment the recreational opportunities for the most vulnerable.	Distributive
A.2	Through their transformation into small parks, vacant lots or land that remains in disuse will have added value. These parks can further strengthen social bonds and the participation of neighbourhood associations.	Distributive and procedural
B.10	Develop social training and income generation programmes for community members who perform services for managing and maintaining green and protected areas, with priority given to disadvantaged groups.	Distributive
B.10	Promote a better distribution of NbS, such as urban parks, create appropriate designs according to the social realities of communities, and promote public participation in their management to enhance place attachment.	Distributive, procedural and recognition
B.11	Expand the knowledge of regional native flora for use in urban afforestation and environmental recovery programmes so that these can represent an economic opportunity for vulnerable groups.	Distributive
B.11	Promote social participation in the management of urban parks to create a sense of belonging and legitimise the actions developed.	Distributive and procedural
B.11	Engage and train existing vulnerable collectives in the city, especially for promoting planting actions in urban afforestation programmes and strengthening the cooperative character of the population in the face of epidemics and pandemics.	Distributive and procedural
B.11	Recover and requalify existing squares and parks in the city while promoting improved accessibility for communities.	Distributive and recognition
B.5	Implement street trees to generate a suitable microclimate, alleviate the effects of very hot periods, and positively impact people's well-being by reducing dehydration risks for children and older adults.	Distributive
B.7	Create new parks, conservation units and green spaces in vulnerable areas. These create zones of freshness in cities and allow rainwater absorption.	Distributive
B.7	Create tree planting programmes in public spaces to create shade and reduce the impact of heat waves. The action aims to guide public tree planting projects in places with greater risk of heat islands and fewer green areas.	Distributive
B.7	The Urban Gardens and Orchards programme aims to create these spaces with communities and schools to encourage and raise awareness about organic food systems and agroecological production.	Distributive and recognition
B.8	Implementation of NbS in high-demand areas to enhance soil permeability, especially in zones prone to flooding risks.	Distributive
B.8	Promote ecological connection and strengthen the relationship between society and urban green space by implementing a Green Connector pilot project, expanding the city's green area from 17.33 m ² /inhabitant in 2017–20 m ² /inhabitant by 2030 and 26.48 m ² by 2040.	Distributive
B.9	Ensure that urbanisation actions for precarious settlements adopt proposals for increasing soil permeability by implementing green areas capable of reducing flooding risks.	Distributive
C.13	By including local knowledge, generate interventions for reducing fluvial risks, rainfall floods, mass movements, and torrential avenues.	Distributive and recognition
C.14	Design and implement community gardens to strengthen aspects of food security in prioritised and poor areas	Distributive
C.14	Implement programmes and projects with species of wild fauna and flora that may be affected by climate change so that these can serve as an additional income generation for vulnerable communities.	Distributive
C.14	Implement actions to prevent the informal occupation of areas by developing urban forests and gardens, which stimulate public appropriation and accessible, endowed, and safe public spaces.	Distributive and recognition
C.16	Restore, maintain, and enhance the city's ecological structure through actions for recovering marine and coastal ecosystems to improve livelihoods, reduce disasters, and conserve biodiversity.	Distributive
E.17	Generate greenway systems to spatially link urban areas and natural green and blue spaces (e.g. live streams and rivers) and revitalise disadvantaged districts' natural landscapes.	Distributive
E.17	Implement NbS as actions for sustainable and inclusive urban regeneration. It contemplates the joint implementation of such solutions with citizens to regenerate spaces functional to the local reality. The active participation of the	Distributive, procedural and recognition

(Continued)

Table 6. Continued.

ID	Link with EJ concerns	EJ dimension
	different social and vulnerable groups will guarantee that the prioritised create a high sense of belonging.	
M.18	Carry out productive reconversion measures towards forest uses and agroforestry to support economies and food production in highly biodiverse areas where vulnerable communities reside.	Distributive
M.19	Implement a Water Bodies Recovery Programme to increase the drinking water supply in disadvantaged areas.	Distributive
M.19	Conservation and use of flora and fauna through the creation of Management Units for the Conservation of Wildlife and the Development of Biological Corridors, which can be a source of income for vulnerable communities	Distributive
M.23	Promote fruit trees in marginalised areas to provide food for self-consumption.	Distributive
M.24	Help the environmental regeneration of the Xochimilco area with actions focusing on preventing or reducing human settlements while improving water management and restoring productive agricultural uses.	Distributive
M.25	Promote urban gardens in vulnerable areas to reduce anxiety and depression.	Distributive
M.25	Implement urban trees in streets and avenues to improve access to jobs and services for populations that use alternative means of transportation.	Distributive
M.25	Define and delimit the areas that must be protected, conserved, and recovered for their environmental value and reduce the risks associated with heat waves or floods in vulnerable communities.	Distributive
M.26	Create a resilient park in response to the problem parks deficit in Juárez. This space will integrate urban agriculture and endemic vegetation to develop artistic, cultural, recreational and sports activities that promote the integration of communities and people near these places.	Distributive and recognition
N.27	Create a linear park in the city to produce a point of social interaction and recompose the fragmentation between traditional city centre neighbourhoods. This park will further play an essential role as a green lung to reduce GHG emissions.	Distributive and recognition

Note: Plan IDs are reported in [Table 1](#).

with deeper analysis and context specificity. Its UCAP outlines social goals for energy efficiency, sustainable mobility and disaster risk reduction and indorses urban renovation as an opportunity to promote inclusive development for all communities, but especially those in need (p. 23). It was also one of two plans (the other being C.16, Medellín) that explicitly recognised the potential maladaptation effects of the proposed actions, including climate gentrification and energy-efficient housing unaffordability for poor communities due to their limited resources or lack of inclusion in renovation programmes (p. 24). In contrast, UCAP U.30 (Montevideo), published in 2012, received one of the lowest scores (1.2 out of 4.5) due to the lack of connection to context-specific EJ concerns, thus pointing out to the need to strengthen the existing plan. Hence, and in line with other findings, this result shows that larger cities could have more ambitious climate actions in relation to EJ concerns due to having more institutional capacities and resources, but more research on how UCAP are being developed in smaller urban areas is still needed (Otto et al. 2021; Häußler and Haupt 2021)

Our research also shows that when EJ concerns inform climate actions, these are mainly framed as educational strategies, but this finding raises some concerns. For example, if strategies such as capacity-building or educational workshops do not consider underlying power dynamics and the lack of access for particularly vulnerable communities, they risk becoming only a procedural requirement (Brockhaus et al. 2021). In this line, recent research has also found that if participatory actions are not framed from societal needs and different knowledge systems from the beginning, they could have minimal influence on the community or add legitimacy concerns (Sandover, Moseley, and Devine-Wright 2021; Satyal et al. 2020). Still, there are notable exceptions. UCAP C.15 (Bogotá) seeks to strengthen decision-making in the ordering and planning of the city through deliberative knowledge transfer processes that facilitate the inclusion of climate action for all communities, but especially for women and racially excluded groups (p. 247 and 248)

As previously mentioned, the explicit acknowledgement of maladaptation outcomes, such as climate gentrification, was only explicitly discussed in two UCAP. Hence, the analysed plans tend

to state targets without recognising potential negative consequences or means for avoiding them. As this misrecognition could obscure broader structural problems that limit the positive effects of climate actions, a major scientific and political challenge is first to acknowledge the possibility of failure and avoid defining success only from the perspective of dominant and powerful agendas that have historically ignored the interests of the vulnerable. This also means that climate action goals should address the underlying drivers of vulnerability to avoid unsustainable and unjust change (Magnan et al. 2016; Lin et al. 2021; Johnson, Parsons, and Fisher 2021).

Our results also demonstrate the increased prioritisation given to EbA and NbS as climate actions for biodiversity conservation, but without an explicit link to broader EJ concerns. Other authors have already discussed that EJ is a relatively new but fundamental topic for NbS planning and that their lack of connection with topics such as environmental and social justice could result from an association of green with “good” (Dick et al. 2020; van der Jagt et al. 2021; Haase et al. 2017). Hence, while the use of concepts such as ES and NbS areconsistently permeating climate action planning, it is essential to establish ways in which they could respond to existing local constraints related to human health and well-being, cultural recognition and economic growth as challenges that were less discussed in the analysed UCAP (Kotsila et al. 2020; Loos et al. 2023).

One notable example of a more comprehensive connection between NbS and EJ was found in UCAP B.11 (Rio de Janeiro), which addressed the need to better distribute these solutions for improving green space access (p. 223). Moreover, this plan promotes broader community participation to legitimise the proposed NbS, including through the development of differentiated designs according to communities’ needs (p. 496). This UCAP also highlights potential synergies of NbS implementation with other climate action sectors, including affordable housing and clean and equitable mobility. Consequently, broader attention could be given to creating synergies between NbS and other climate actions to minimise the risk of maladaptation.

Considering the results obtained from the higher-scored UCAP and the identified voids for effective integration of EJ concerns, climate action planning in LATAM could approach some best practices to meet community needs and recognise the everyday struggles of vulnerable communities. Hence, the following bullet points provide ideas to better link EJ and climate action in LATAM while recognising the need to adapt these practices to specific local contexts and the unique socio-economic and environmental characteristics of each city in the region.

- Regarding the inclusion of EJ concerns in diverse sections of UCAP, higher-scored plans have created comprehensive visions and objectives that recognise different vulnerabilities. This means that carbon-neutral pathways should be inclusive for all, but, as stated in UCAP B.9 (Fortaleza, p. 15), priority should be given to the most vulnerable and those that have been historically more impacted by respecting their knowledge and traditions.
- In terms of the identification of climate hazards and risks, UCAP from LATAM are comprehensively analysing current and predicted impacts (e.g. through susceptibility maps and scenario analysis, as in P.29, Lima) and should stress how to expand opportunities for positive climate action in areas under pressing signs of social vulnerability, which tend to be context specific. For example, UCAP B.10 (Rio de Janeiro) widely addresses informal housing because this issue results in poor communities occupying spaces prone to landslides and floods as hazards expected to intensify due to climate change.
- Quantitative and qualitative process, result, and impact indicators, as those identified in E. 17 (Quito), allow for better understanding the outcome of the diverse actions proposed, including their suitability and effectiveness. These indicators need to be associated with the goals of each sector and be formulated in accordance with the general objectives of the UCAP, including those related to EJ and inclusive climate action.
- Regarding specific climate action strategies, the examples identified in Table 5 demonstrate that it is possible to link them with local EJ concerns. For example, educational strategies should define targeted communities and focus on broader and inclusive community participation that favours

social training and capacity building to promote income generation for disadvantaged communities (as in B.11, Recife, p. 60). These actions should be complemented with multisectoral investments that maximise adaptation for community members and community assets while maintaining affordability and accessibility (as in C.16, Medellín, p. 98).

- Finally, with regards to the link between NbS and the EJ concerns identified in Table 6, it is imperative that all the processes surrounding their development overcome existing challenges related to LATAM contexts, but particularly those related to procedural and recognitional issues that derive in distributional injustices such as participation barriers, lack of community governance, threatening the rights and land tenures of indigenous communities, and climate gentrification (Anguelovski, Irazábal-Zurita, and Connolly 2019b). Addressing these issues requires meaningful engagement, transparent communication, land and resource rights recognition, and equitable benefit-sharing arrangements. Finally, adopting an inclusive co-creation approach that considers local knowledge, values, and preferences (as seen in C.15, Bogotá), is crucial to ensure that NbS interventions align with community needs to further overcome opposition and foster acceptance.

6. Conclusion

This paper offered relevant insights on how EJ is conceptualised and translated into climate actions in LATAM. As cities are areas of significant social and spatial constraints, climate change impacts are asymmetrical and intensify injustices for people already under disadvantaged conditions, especially in less advantageous world territories.

Our analysis shows that many governments in LATAM are incorporating EJ concerns as part of their climate action planning, but how and whether these are translated into climate mitigation and adaptation strategies is less clear. Hence, planners and decision-makers must create more straightforward connections between climate change response and EJ to avoid perpetuating the injustices that have historically afflicted the region.

Regarding how EJ concerns are translated into climate actions, LATAM tends to focus on educational strategies that could outweigh other options that yield more tangible benefits for vulnerable groups. Moreover, if climate action does not first address inequitable power structures, uneven distribution of climate action benefits, and unmeaningful environmental decision-making, these strategies could obscure the fact that climate change is a systemic issue that requires complex transformations not only from the civil society, but particularly from governments, industries, and the economic elite. A similar problem was identified for the type of NbS prioritised as the analysed plans failed to connect their role as conservation and biodiversity repositories and their capacity to respond to existing local needs. However, the described thriving framings and actions identified could inspire more cities to build UCAP that account for the diverse concerns analysed. In this regard, it is important to consider that the capacity to reach broader EJ goals will hinge primarily on government capacities, which tend to be dissimilar across LATAM cities.

While these results represent meaningful insights into the missing links between EJ, climate action and NbS planning, it is essential to highlight some limitations. The first one is that the study did not extend to explain how UCAP were produced or their rationale for including EJ language or policies, mainly because the selected city sample did not universally offer the same information about their formulation process. Moreover, this analysis did not directly investigate the outcomes of some of the proposed strategies. Hence, future research needs to empirically assess the effects of the evaluated UCAP to see if they have upheld their goals of generating an environmentally just present and future.

Disclosure statement

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

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