



Climate justice in future cities: Geographical perspectives for inclusive urban resilience and adaptation

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Cities and urban areas will be even more affected than other areas by the local impacts of climate change. The increase in intensity and frequency of extreme meteorological events, such as heat waves, droughts, intense rainfall, and floods, highlight the urgent need for urban systems to more actively tackle the threats of climate change to safeguard economic, environmental, and social resources (IPCC, 2022). Indeed, as home to more than 70 % of the global population in 2050, cities are considered the areas most vulnerable to climate risks.

Against this backdrop, most cities worldwide are increasingly developing climate-resilient adaptation plans to handle climate change impacts in complex urban territories. Among the most common strategies included in these plans are i) embracing green and blue infrastructures, along with nature-based solutions (Depietri & McPhearson, 2017; Fitzgibbons & Mitchell, 2019); ii) adopting new technologies to reduce urban vulnerability to climate-related hazards (Nordgren et al., 2016); and iii) incorporating adaptive land uses, such as safeguarding urban spaces from natural disasters, implementing land management to temporarily address climate hazards, or relocating people to safer areas within cities (Doberstein et al., 2019; Larsen, 2015; Scott et al., 2020).

However, the issue of climate change has mostly been leveraged by local policymakers as a strategic economic opportunity for cities to attract new investment and entrepreneurialism (Shokry et al., 2020). As a consequence, even if adaptive actions should accrue different benefits to cities to mitigate various climate change impacts, at the same time, they also create unequal outcomes by prioritizing capital-driven development, real estate, and affluent groups (Anguelovski et al., 2019; Garcia-Lamarca et al., 2019; Tan et al., 2015). In various cases, climate adaptation plans have been drivers of green gentrification processes resulting in the physical displacement of weak actors affected by pre-existing social injustice and social exclusion within urban territories (Anguelovski et al., 2022).

By framing these critical elements, existing scholarship has highlighted the urgent need for climate action plans and strategies to take

into account and introduce principles of equity and justice in urban policies and interventions (Fitzgerald, 2022) by drafting the concept of “urban climate justice.”

First and foremost, it is necessary to highlight that the overall concept of “climate justice” has been gaining recognition in the last decade, mainly in an international context, by bringing to light how climate change occurs unequally and unevenly among places and geographical regions, while the responsibilities and causes of climate crisis differ among countries (Sultana, 2022). In general, the main focus of climate justice is the “between-nation” context, which is strictly related to the idea that states are the main actors and play a pivotal role in historical and actual responsibility for climate change; as a consequence, the “within-nation” dynamics of inequality are, in most cases, overlooked (Bulkeley et al., 2014). Indeed, climate justice is framed and approached in terms of historical or actual responsibility for the greenhouse gas emissions of states or international energy policies to combat global climate change. Thus, the within-nation dynamics currently remain poorly investigated in terms of climate-related issues that represent impacts in local and urban contexts (Islam & Winkel, 2017).

Prioritizing the concepts of “urban climate justice” focuses the lens of analysis on injustice and inequities related to climate change more locally (e.g., in cities and urban areas). In particular, as suggested by Bulkeley (2010) and Hughes (2013), the perspective moves to climate change adaptation with the aim of ensuring that climate change adaptation planning and outcomes are equitable and that the implementation of climate policies does not reinforce or exacerbate existing vulnerabilities in cities.

It is therefore crucial to highlight that at present, adaptation plans are mainly focused only on the physical environment of cities, with little or no regard for the unequal spatial distribution of both climate change impacts and adaptation measures within urban territories (Swanson, 2021). Moreover, little is known about how the implementation of climate adaptation plans might directly or indirectly affect the

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vulnerabilities of disadvantaged and low-income populations and whether these strategies might themselves exacerbate, maintain, or ignore present and future inequalities by creating injustice and unequal interventions (Anguelovski et al., 2016; Barnett, 2006).

By considering the spread of climate adaptation plans worldwide and the urgent need to consider and include elements of justice, the Jean Monnet Centre of Excellence on Climate Justice (University of Padua) launched and supported the present special issue by connecting eight groups of researchers. The articles include applied and theoretical research from six different countries from the “global north” to the “global south”: Italy, Denmark, China, Ecuador, Canada, and Spain (Table 1). Hence, in the present special issue, different paradigmatic case studies, as well as innovative methodologies to explore urban climate justice, are investigated and critically analyzed. The *fil rouge* linking these studies located in different geographic and socio-economic contexts, together with an interdisciplinary perspective, will allow for a comprehensive and profound understanding of how climate justice is shaping our cities and urban areas, including those located in remote contexts, and how to deal with this as we develop sustainable, just, and future cities.

On the one hand, the main objective of this special issue is to collect relevant scientific studies that adopt multi- and interdisciplinary approaches to investigate the territorial implications related to climate change impacts and adaptation measures or policies; on the other hand, sustainable scenarios and pathways to pursue more climate-resilient and inclusive urban development and management are presented. Hence, this special issue responds to the need to bring the issues of climate justice into the scientific debate on sustainable and climate-resilient cities by fostering dialogue among academics, policymakers, and stakeholders.

Specific objectives of the articles include i) exploring the urban geography of climate justice in different contexts, from the “global north” to the “global south”; ii) identifying possible strategies and pathways to include different urban actors in decision-making processes; iii) analyzing who might be affected or marginalized by climate change impacts, adaptation plans, and interventions; iv) investigating best practices and walkable pathways toward more inclusive and just cities; and v) investigating various topics related to climate change to test climate justice issues at a local scale.

As widely reported, both climate change impacts and adaptation strategies have been explored in different scientific fields through diverse approaches—from engineering to urban planning and from economics to the social and political sciences. Therefore, the contributions of the present special issue will deal with a variety of intertwined topics (from fossil fuel extraction to the right to urban green spaces and from extreme weather events to urban public health) by maintaining a comprehensive interdisciplinary *fil rouge* to enable the analysis and representation of the territorial dimension of climate justice.

Nielsen et al. (2023) explore the concept of vulnerability in affluent urban societies by presenting as a case study the metropolitan municipality of Frederiksberg (Copenhagen). Indeed, despite affluent societies possessing better socioeconomic resources to adapt to climate change impacts, vulnerabilities are still present—and they might be underestimated. In this context, the article adopts an intersectional and dynamic approach to vulnerability by also including its (hidden) nuances. Hence, the complex interdependencies between the social, spatial, and temporal aspects of climate change impacts, which also affect affluent groups, are analyzed.

Mohtat and Khirfan (2023) shift the focus to the city of Toronto (Canada), and specifically, to the Thorncliffe Park neighborhood, characterized by a low-income immigrant population, which is an urban sector at high risk for extreme meteorological events, such as flooding. Their objectives are to delve into local experiential knowledge around floods and the climate-adaptive green infrastructure of the local population and to explore how this knowledge is affected by structural vulnerabilities. Moreover, the article investigates the past causes of

Table 1

Articles in this special issue “Climate justice in future cities: Geographical perspectives for inclusive urban resilience and adaptation,” Landscape and Urban Planning (2024); guest editors Francesca Peroni and Salvatore Eugenio Pappalardo.

Authors	Title	DOI	Case study
A. B. Nielsen, S. Bonati, & N. Blom Andersen	Discover the dynamics: An intersectional analysis of overt and hidden vulnerabilities to flood risk in urban Denmark	https://doi.org/10.1016/j.landurbplan.2023.104799	Copenhagen (Denmark)
N. Mohtat, & L. Khirfan	Epistemic justice in flood-adaptive green infrastructure planning: The recognition of local experiential knowledge in Thorncliffe Park, Toronto	https://doi.org/10.1016/j.landurbplan.2023.104834	Toronto (Canada)
B. He	Cause-related injustice, process-related injustice, effect-related injustice and regional heat action planning priorities: An empirical study in Yangtze River Delta and Chengdu-Chongqing urban agglomerations	https://doi.org/10.1016/j.landurbplan.2023.104800	Yangtze River Delta and Chengdu-Chongqing Economic Circle regions (China)
A. T. Amorim-Maia, I. Anguelovski, J. Connolly, & E. Chu	Seeking refuge? The potential of urban climate shelters to address intersecting vulnerabilities	https://doi.org/10.1016/j.landurbplan.2023.104836	Barcelona (Spain)
S. E. Pappalardo, C. Zanetti, & V. Todeschi	Mapping urban heat islands and heat-related risk during heat waves from a climate justice perspective: A case study in the municipality of Padua (Italy) for inclusive adaptation policies	https://doi.org/10.1016/j.landurbplan.2023.104831	Padua (Italy)
D. Codato D., F. Peroni F., & M. De Marchi	The multiple injustice of fossil fuel territories in the Ecuadorian Amazon: Oil development, urban growth, and climate justice perspectives	https://doi.org/10.1016/j.landurbplan.2023.104899	Amazon region (Ecuador)
F. Facchinelli et al.	The Apaguen los Mecheros campaign: Supporting climate justice in the Amazonian cities of Ecuador by estimating the health risks of gas flaring	https://doi.org/10.1016/j.landurbplan.2023.104898	Amazon region (Ecuador)
M. Bayón Jiménez, & M. Moreano Venegas	A climate justice approach to urbanisation processes in the South: Oil axis in Ecuador	https://doi.org/10.1016/j.landurbplan.2023.104845	Ecuadorian Amazon (Ecuador)

injustice in adaptive green infrastructure interventions as well as whether future strategies will entrench structural vulnerabilities.

Amorim-Maia et al. (2023) focus on the so-called “climate shelters” in Barcelona, where residents can take refuge during extreme

meteorological events, such as heat waves. They analyze, from an intersectional climate justice perspective, how the social vulnerabilities of marginalized populations could remain poorly addressed and might be exacerbated due to scarce inclusive adaptation strategies and infrastructures.

Two articles investigate the emerging issue of the impacts of heat waves and heat islands combined within urban areas by proposing different methodologies of territorial analysis to support heat action planning strategies in practice. The study by He (2023) divides heat injustice into cause-related, process-related, and effect-related injustice by empirically testing these components in two urban agglomerations in China: the Yangtze River Delta and Chengdu-Chongqing Economic Circle regions. The methodology adopted in this case study is based on a questionnaire survey. In the second article, Pappalardo et al. (2023) focus on the city of Padua (Italy) for a pilot study to assess the effects of urban heat waves and heat islands combined by framing the unequal spatial distribution of socially vulnerable groups, such as the elderly, children, migrants, and low-income households. In this research article, the integrated methodology for mapping climate risk is implemented in a completely open-source and open-access GIS environment by modeling satellite images from Landsat missions and territorial data.

Finally, three articles investigate the dimension of climate justice in the tropical contexts of the Ecuadorian Amazon region. As discussed by Jiménez and Venegas (2023), who analyze the extractive axis of these territories, this region represents an extended urbanization characterized by unequal development models. In particular, the article develops a dialogue with Latin American dependency theory as a framework for decolonizing urban studies.

Codato et al. (2024) investigate how these Amazonian territories (also defined as “urban jungles”) are peripheries of fossil fuel extraction and national benefits and, at the same time, entangled with the socio-environmental impacts caused and increased by oil activities. From this perspective, they critically analyze multiple dimensions of injustice: on the one hand, these communities are integrated into a “fossil territory” for oil extraction and production but are not direct beneficiaries of the income; on the other, the impacts of oil extraction afflict these very same territories with deleterious environmental and social impacts.

Finally, Facchinelli et al. (2023) investigate the impact of gas flaring activities on Amazonian settlements in the Ecuadorian Amazon Region. The study aims to support the implementation of the “Protective Action” initiative, approved by the Court of Nueva Loja, which banned oil-related gas flaring activities “near populated centers.” The results of this study show how participatory processes can support indigenous movements by taking action to shape just and inclusive futures.

In conclusion, interdisciplinary approaches from geography and geographic information science (GIScience) at present offer a promising holistic and systemic framework to analyze, by combining qualitative and quantitative research, the diverse dynamics of climate-related urban ecosystems to assess alternative resilient scenarios to facilitate decision-making processes and conflict negotiation among various urban actors. The *fil rouge* linking these varied case studies located in different geographic and socio-economic contexts, together with an interdisciplinary perspective, facilitates a comprehensive and profound understanding of how climate justice is shaping our cities.

This special issue is one of the outputs of the Climate Justice Jean Monnet Centre of Excellence of the University of Padova (Italy). The Centre of Excellence, supported by the European Commission from 2020 to 2023, works as a hub that generates, exchanges, and gathers scientific knowledge, practices, and expertise on EU climate justice policies and strategies at different levels, from the international to the local scale. The main objective of the Centre of Excellence is to bring the issue of climate justice, recognized in the EU Green Deal framework, into the dialogue among the academic world, civil society, institutions, and policymakers.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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