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Editorial: Institutional adaptation and transformation for climate resilience

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Editorial on the Research Topic

[Institutional adaptation and transformation for climate resilience](#)

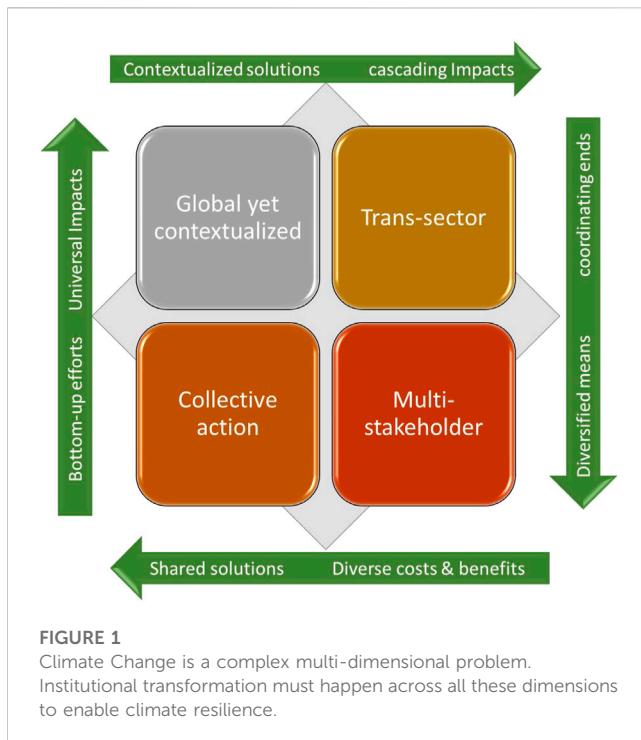
The global climate change has drastically increased the intensity and frequency of floods, droughts, heatwaves and other natural hazards. These result in increasing hazards to humans and societies, including infrastructure damage and displacement of civilians. Thus, significant transformations must take place to make society more resilient to these hazards. In addition to technological and behavioural changes, governance of social systems also requires substantial transformation (Patterson and Huitema, 2019; Owen, 2020; Seddon et al., 2020).

An improved governance of natural resources and the reduction of climate-related hazards heavily rely upon a better scientific understanding of the social dimensions of climate change, including people's behaviour and the dynamics of institutions (i.e., formal and informal rules). Recognizing the crucial role of human actors and the institutional structures that affect their behaviours triggers a paradigm shift in how societies are governed on various scales, from local communities to national governments and international entities (Andrijevic et al., 2020).

This search topic focuses on institutional adaptations and transformations that can make societies become more resilient towards climate change. The articles published on this topic address how institutions must adapt or transform into entirely new ones to better accommodate incremental and abrupt changes to our society that result from climate change and climate disasters. These institutions can be formal, taking the form of policies, regulations and laws devised by various levels of governance, from the UN to local councils. They can also be unwritten and informal agreements among people, leading to collective behaviour that may pass a tipping point and significantly impact the course of climate change and our capacity for adaptation (Ostrom, 2005). Studying the role of formal and informal institutions in combination with environmental, behavioural, and technological factors involves a broader transdisciplinary perspective able to improve our capacity for climate mitigation and adaptation, for instance through adaptive governance (Susskind and Kim, 2022), bottom-up collective initiatives and polycentricity (Jordan et al., 2015), (Poteete et al., 2010).

The study of institutions for climate change governance is especially important because (Figure 1):

1. Climate change is a global yet contextualized problem implying that a diversity of institutions (with different rules, regulations, and norms) are possibly needed to cope with its consequences (Bushnell et al., 2008; Ostrom, 2017). Therefore, there are no one-size-



- fits-all solutions for this “shared problem” as it is heavily contextualized and should be governed as such.
- Climate change is a collective action problem (Ostrom, 2017). While the problem is shared, the impacts are distributional, and the stakeholders have different interests and capacity to adapt to its consequences. Such diversity leads to collective action problems such as free-riding on climate action of other stakeholders or green-washing rather than effective climate actions that could actually lead to a significant reduction of greenhouse-gas emissions. These problems lead to various forms of inequality across the globe.
 - Climate change governance is a multi-stakeholder problem (Pérez-Soba et al., 2018), involving individuals, companies, and (sub) national governments and international entities. The current decisions will have long-term consequences and affect future generations as well. These stakeholders interact at various levels, creating an incredibly complex institutional environment that heavily influences climate mitigation and adaptation strategies.
 - Climate change is a trans-sector problem rather than a multi-sector (Pérez-Soba et al., 2018) one as it transcends the traditional boundaries between sectors. While many hazards relate to infrastructure, food, water and energy, these sectors are heavily interrelated with cascading impacts. Therefore, institutions should be adapted or transformed in ways to take into account and learn to cope with the cascading impact of climate change (Lawrence et al., 2020).

The articles in this collection point to these four attributes of the climate change problem: First, they cover various parts of the globe with different environmental, political, economic and societal backgrounds: China, Iran, the US and Chile. The research on Colorado groundwater (Loos et al.), in particular, addresses the context specificity of institutional design and the substantial changes that are needed at the institutional level to cope with the challenges posed by a warmer climate. Likewise, another

research (Graham and Brungard) on EVs in the US, learns from European policies to propose localized policies for the context of US to make the adaption of Electric Vehicles more successful in this country. The article on Industrial Community energy systems (Eslamizadeh et al.) varies cultural and economic attributes in an agent-based model to show how the success of different policies for promoting renewable energy among industries varies depending on the country that those policies are being implemented in.

Second, two of the articles in this collection take a collective action perspective on localized cases, one addressing the energy (Eslamizadeh et al.), the other looking at water governance among groundwater users in four different cases (Loos et al.). Both articles address how stakeholders self-organize and build institutions to govern their renewable yet scarce resources.

Third, all articles in this special section have a multi-stakeholder approach and address various climate change challenges that arise among stakeholders and influence their interactions. In particular, the paper on haze pollution in China (Lv et al.) addresses the importance of alignment between different levels of government (local and national) to manage haze pollution in China. The multi-stakeholder and path-dependent nature of the climate crisis is also highlighted in a research (Ocampo-Melgar et al.) conducted on Aculeio Lak Basin regarding water scarcity in Chile.

Fourth, the articles in this collection address various sectors: water, energy and infrastructure. Yet, only one article (Ocampo-Melgar et al.) partially addressed the cascading effect of climate change across sectors. This hints that the cascading effect of climate change requires further attention, especially in terms of institutional research.

A final point to make is that institutional adaptation to climate change calls for a transdisciplinary and multi-method approach (Poteete et al., 2010). Qualitative research goes hand-in-hand with quantitative models to design better empirically-driven models able to sketch future path-ways under current circumstances and possible trajectories in terms of environment, economics, politics and society (Terzi et al., 2019; Haer et al., 2020; Simpson et al., 2021).

The articles in this collection, although all addressing governance aspects of climate change, are spread across disciplines ranging from environmental sciences, to economics and management, to technological studies and make use of a range of qualitative and quantitative methods. Despite their diversity, they all point out to the need of management practices, better able to integrate different stakeholders and all the relevant levels of decision making and able to take into account the long-term consequences of the decisions taken today (Pérez-Soba et al., 2018).

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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