

The Empirical Realities of Polycentric Climate Governance: Introduction to the Special Issue

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Abstract

Scholars have undertaken much conceptual development of “polycentric” climate governance (PCG). Yet, there has been limited empirical examination of whether this descriptive, analytical, and normative concept can aid climate change mitigation; it may even undermine our efforts in certain contexts. Thus this special issue examines the empirical realities of PCG. Building from a shared definition of the concept, the constitutive articles analyze an exploratory range of systems, across policy styles, governance levels, and types of actors. Here we consolidate the findings of the articles by identifying five key themes that are drawn from across the special issue, for consideration in future research. These themes are operationalization of PCG systems; voluntary action; temporality; power; and, crucially, effectiveness in mitigating climate change. Our findings provide evidence from a wide range of contexts, from which we build to propose new research streams on this topic.

Keywords: climate change, governance, public policy, environmental politics, polycentric climate governance

One challenge of achieving effective climate change mitigation has been characterized concisely by Paterson (2021): “climate change is intrinsically political” (7). In response, we require effective governance systems that transform our relationship with greenhouse gases (GHGs). These systems must engage with multiple political dimensions such that considerations of power, inequality, justice, cooperation, responsibility, and accountability are at the heart of political responses. Articles within this journal have shone light onto this complex political problem, from characterizations of global climate governance as “fragmented,” with associated costs and benefits (Biermann et al. 2009), to the transnational initiatives that thread actors together within our planet’s patchwork quilt of climate action (Andonova et al. 2009). More broadly, scholars of global environmental politics tackle challenges around the coordination of actors, power

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dynamics, just transitions, “effective” policymaking, governance regimes, and long-term transformations, among others (e.g., Aklin and Mildemberger 2020; Graddy-Lovelace 2017; Paterson et al. 2022; van der Ven 2016), each of which we touch on in this special issue. We seek to contribute to these wider debates within the study of global environmental politics by focusing on one descriptive, normative, and analytical concept that has drawn scholarly attention since the early 2010s: polycentric climate governance (PCG).

Prior to the application of polycentric governance to climate change, the concept was employed as a means of analyzing a variety of policy issues, generating an extensive conceptual and empirical research base (Ostrom 1972; Ostrom and Ostrom 1965). In their influential study of local authorities’ public service provision in Chicago, which was focused on the relation between local democratic preferences and service levels, Ostrom et al. (1961) introduced four foundational elements of polycentric governance, namely, the presence of multiple decision centers, formally independent actors that possess overlapping authority, institutional diversity, and an overarching system of rules. These tenets have been built on over time but remain consistent features across articles on polycentric governance.

In the first decade of the twenty-first century, polycentric governance garnered scholarly attention as a possible response to the climate crisis (Cole 2011; Dorsch and Flachslund 2017; Jordan et al. 2015, 2018). The assumed advantages result from alignment with local preferences, experimentation through variation in policy approaches, and the existence of back-up options if/when one approach or actor fails to deliver (Cole 2015; Jordan et al. 2015). Ostrom (2010) suggested that “polycentric approaches facilitate achieving benefits at multiple scales as well as experimentation and learning from experience with diverse policies” (550). But do they do so when applied to climate change? How can effective policy responses be scaled (Young 2002)? And indeed, do they reduce emissions *sufficiently*? In certain scenarios, PCG may even *undermine* effective climate policymaking (Baldwin et al. 2024; Boasson 2018, 131; Heikkila 2019), necessitating context-specific research. Opportunities for experimentation may be captured by already dominant interests that wish to undermine climate action; alternatively, they may enable new actors that wish to avoid democratic scrutiny to be elevated into positions of authority (Vofß and Schroth 2018).

This special issue responds to the limited empirical research on PCG and climate *mitigation*: Kellner et al. (2024) identify just twenty-eight empirical studies of climate mitigation via PCG systems (regarding PCG and climate *adaptation*, see Vantaggiato and Lubell 2024). Yet, this relative paucity of research exists despite seedlings of PCG systems beginning to take root. In the United States, for example, we may be seeing initial developments toward PCG (Biedenkopf 2017; Selin and VanDeveer 2021). We need to determine in which contexts PCG approaches may be effective, or even detrimental, at reducing emissions by building from shared understandings and examining

complementary settings. The articles within this exploratory special issue provide critical examination of the empirical realities of PCG across a wide range of country contexts, governance levels, and types of actors. The articles analyze all of the existing scholarly literature on PCG and climate mitigation (Kellner et al. 2024), all 167 nationally determined contributions (NDCs; Castro et al. 2024), national and subnational action in both federal India (Marquardt et al. 2024) and unitary Sweden (Widerberg et al. 2024), transnational municipal networks (TMNs) featuring thousands of cities (Kern et al. 2024), almost 200 nongovernmental organizations (NGOs) from twenty-one Latin American countries (Tosun et al. 2024), and the climate commitments of more than 12,500 businesses (Tobin et al. 2024).

To lay the foundations for the articles that follow, this introduction to the special issue is divided into four sections. First, we define PCG by building first from our understanding of “governance” (Kooiman 1993) before stating the shared definition of PCG (Ostrom 2010) on which every article in this collection builds. We distinguish PCG from related yet distinct conceptualizations, namely, fragmented, multilevel, and complex governance systems. Second, we summarize the findings of existing research on the potential impacts of PCG—positive and negative—and outline the *lack* of research in certain areas. Third, we explain our selection process for the seven empirical articles composing the special issue. Fourth, we identify five themes that emerge from the contributions, which regard operationalization; voluntary action; temporality; power; and, crucially, effectiveness. We explore how the articles encourage consideration of these themes by scholars researching PCG. Finally, we conclude and propose areas for future research that build on the findings of this special issue.

Defining PCG

Climate Change as a Problem for Global Environmental Governance

The Kyoto Protocol was a hopeful moment for those who believed that global institutions were needed for addressing climate change. The Protocol was agreed at a time—1997, before entering into force in 2005—when conflict between East and West was at its lowest and a belief in multilateral institutions was at its peak. Despite initial positive returns from global approaches to climate change, these have not transformed our relationship with GHGs. Resultantly, agreement at the global level is a starting point for subsequent negotiations and debates at the national and local levels—usually with ample opportunity for vested interests to oppose climate measures afresh (Paterson et al. 2022). Since the failure of the 2009 Copenhagen Conference of the Parties (COP), the onus has shifted: global goals continue to be discussed at COPs, but attempts to agree centrally how much, and how, states contribute toward achieving those goals have largely ceased. Instead, a “pledge-and-review” system has been introduced that leaves the initiative to set goals with nation-states but

offers mechanisms to review whether these commitments are being met (Castro et al. 2024; Tobin et al. 2024).

The pledge-and-review system pertains not only to nation-states but also to other actors, including companies, civil society parties, and local authorities, although these are voluntary in nature. Thus, amid worsening climate change scenarios and stronger calls for radical action, a “shift in governance” has taken place that spreads responsibility for addressing climate change more broadly. This shift is significant because it is common to suggest that climate issues present, not technical challenges per se, but rather *governance challenges*. Here we adopt Kooiman’s (1993) understanding of governance, whereby

governing refers to the totality of interactions, in which public as well as private actors participate, aimed at solving societal problems or creating societal opportunities; attending to the institutions as contexts for these governing actions; and establishing a normative foundation for all those activities. (4)

Governing is directed behavior, involving government and nongovernment parties, aimed at (re)solving a problem or at reaping the opportunities that a problem presents. Thus governance requires the creation of *institutions*, a term that refers to the foundation of new rules, organizations, and policies that give stability to these directed behaviors (we are directly building here on Jordan et al. 2010, 13–15). Indeed, in this special issue, Kern et al. (2024) offer further conceptual development of the study of governance with their contribution on three dimensions of TMN governance (namely, governance of networks, governance by networks, and governance with networks).

The Conceptual Foundations of PCG

Scholarship on polycentric governance developed around studies on local common pool resource issues, not climate change mitigation (Aligica and Tarko 2012), complicating its use for climate governance. Vincent and Elinor Ostrom built on the four foundations of polycentric governance espoused by Ostrom et al. (1961), emphasizing the *utility* rather than the pathology of overlapping actors when seeking to provide certain urban services (Ostrom 1972; Ostrom et al. 1961), explaining that these actors can be coordinated through “inter-organizational arrangements” (Ostrom and Ostrom 1965).

In this special issue, each article builds from a *shared definition* of PCG that has become widely used in the field, having already served as the opening definition in several analyses (e.g., Jordan et al. 2018; Schoenefeld 2023; Wurzel et al. 2021). This definition was provided by Elinor Ostrom (2010):

Polycentric systems are characterized by multiple governing authorities at different scales rather than a monocentric unit. Each unit within a polycentric system exercises considerable independence to make norms and rules within a specific domain. (552)

Let us clarify three aspects of this definition. First, one may argue that the specific reference to “authorities” implies state actors, but in this special issue, we consider a wide array of actor types. Second, van Asselt and Zelli (2018, 42) emphasize that there has never been a “monocentric” climate regime, while Jordan et al. (2018, 5) propose that the Kyoto Protocol–based approach of the 2000s was the “closest approximation” of monocentricity regarding climate governance at the global level. Hence, if everything is polycentric to some degree, how, then, do we know which systems are more or less polycentric? We return to this definitional quandary as one of our five themes in the overview section that follows. Third, Ostrom’s reference to “considerable independence” is contrary to the *interdependence* that has emerged as a central topic in subsequent research in this field. Hence this definition is intricate, with aspects that can be critiqued, but provides a shared starting point for the articles that follow.

Distinguishing Polycentric Systems from Fragmentated, Multilevel, and Complex Systems

Before examining the empirical realities of PCG, it is prudent to distinguish the concept from fragmented, multilevel, and complex systems.¹ First, “fragmentation” of global governance architectures was explored in this journal as a means of conceptualizing the “overarching system of public and private institutions, principles, norms, regulations, decision-making procedures and organizations” that pertain to a given issue area within world politics (Biermann et al. 2009, 14). Biermann et al. developed a typology of manifestations, namely, synergistic, cooperative, and conflictive fragmentation, but with emphasis in the literature being placed on the negative sides of fragmentation (Kim 2020). Authors working in the tradition of polycentric governance accentuate the net positives that can be gleaned from diverse independent actors’ activities regarding a shared topic. Hence Pahl-Wostl and Knieper (2014) state that fragmentation is rather different than polycentric governance, as discussions about fragmentation are often written with one particular viewpoint, one particular level of governance, or one particular goal in mind, while subordinating other aspects, whereas debates about polycentric governance embrace diversity, initiative from lower levels, and more spontaneous interactions, which are, for instance, assumed to lead to a diffusion of approaches for problem solving.²

Second, we acknowledge that multilevel and polycentric systems share many similarities, such as multiple centers of decision-making and a focus on governance rather than top-down government, but they are distinct (Heinen et al. 2022; Morrison et al. 2017, 3–4; Wurzel et al. 2021, 12–14). Multilevel

1. Kim (2020) provides graphical illustrations that make the distinctions between these concepts clear.
2. Relevant comparisons could be made here between PCG and the literatures on norm and policy diffusion (e.g., Gilardi 2012).

systems “involve a nested structure with a central predominant government authority whose decision-making is based on constituent interests (e.g., lower-level authorities)” (Morrison et al. 2017, 3). Hence studies employing a Multi-Level Governance perspective tend to assume a stronger role of, or focus on, state actors than PCG scholars. PCG studies allocate an expectation of greater independence to nonstate actors, such as NGOs and businesses, while emphasizing self-organization of actors within functionally defined governance systems (Kim 2020; Wurzel et al. 2021).

Finally, scholars have characterized systems as being *both* complex and polycentric (Berardo and Lubell 2016; Galaz 2019; Huitema et al. 2019). Scholars’ thinking on polycentric governance shares some notions with complex systems approaches, such as the emphasis on emergence and the desire to understand interactions at the systems level. Indeed, many polycentric governance thinkers are concerned with whether polycentric governance regimes in the end will behave as a *system* (where collaboration, learning, and diffusion take place) or as just a random set of elements (more akin to a fragmented system). Nevertheless, the differences are clear, because, as Kim (2020) explains, scholars of complex systems emphasize a different set of system-level properties that do not figure in polycentric governance thought, particularly nonlinear and adaptive characteristics.

In sum, differences exist between polycentric, fragmented, multilevel, and complex systems analyses of governance, with scholars increasingly speaking to these concepts in concert (Galaz 2019; Hale 2020; Heinen et al. 2022; Kim 2020; Pahl-Wostl and Knieper 2014). We focus on polycentric governance in this special issue because of its normatively positive framing yet contested effectiveness in different contexts. At the same time, as Hale (2020) summarizes, although polycentric governance “accurately describes the reality of climate governance today, it does not necessarily mean that such an approach will become an effective response to climate change” (211). Jordan et al. (2018) concur and add that PCG still needs development as an analytical framework, whereas it is already succeeding as a descriptive and normative framework.

Potential Positive and Negative Impacts of PCG

Let us turn to the potential impacts of PCG, both positive and negative (referred to as “promises” and “pitfalls” by Marquardt et al. 2024). On one hand, polycentric governance has garnered attention from scholars because of myriad possible beneficial features potentially provided by such approaches. Polycentric systems are associated with building resilience and improved institutional fit for natural resource systems (Carlisle and Gruby 2019). Such risk mitigation is achieved if one actor fails to engage with a policy problem but others act as a “safety net” by continuing to address the issue (Carlisle and Gruby 2019; Ostrom 2012). This benefit is strengthened by the diversity of actors present within the system (Low et al. 2003).

Decision-making centers employing a wide diversity of institutions are discussed as enabling conditions for a functional polycentric system by Carlisle and Gruby (2019). Institutional diversity is “a variety of written and unwritten rules, norms, and strategies in a particular domain” (Carlisle and Gruby 2019, 228) and can be advantageous, as it provides backups in situations where employment of one single institution proves inadequate or ineffective (Ostrom 1999). Institutional diversity is also a logical outcome in a polycentric governance system with a diversity of semiautonomous governance actors. Such flexibility may afford actors the opportunity to employ the most relevant policy approaches for their context, informed by the actions of other, often different, actors. But it should be noted that there is nothing intrinsic to polycentric governance systems that “prevent[s] decision-making centers from coalescing around a common policy or approach” (Carlisle and Gruby 2019, 937). Indeed, Ostrom (2010) argued that diversity might offer a quasi-experimental situation but that evidence garnered this way should eventually lead to an idea of what are best-practice approaches. More unpacking is needed here. Kellner et al. (2024) argue that polycentric governance thinking needs to be developed further when it comes to the mechanisms that influence coalescence.

We also face gaps in knowledge around the contexts in which PGC may be most effective, and where we may face negative impacts. While the literature on polycentric governance is extensive in some policy areas, such as water governance (Kellner et al. 2019), and vital conceptualization of PCG has been undertaken in recent years (Jordan et al. 2018), there is a dearth of studies on its possible pitfalls. Empirical research on the polycentric governance of climate change mitigation is lacking regarding the Global South (Kaiser 2022; Marquardt et al. 2023) and different types of actors; where it does exist, it can find uninspiring results. As van der Heijden (2018) argues regarding cities, “the evidence base to support claims about the opportunities and constraints of (polycentric) urban climate governance is thin at best—and at worse may be imbued with a great deal of wishful thinking” (93). Indeed, Ostrom (2010) admitted that any GHG emission reductions within polycentric systems would be only “slowly cumulating” (553). More troubling still, despite widespread academic support for polycentric models, it may transpire that such governance systems instead enable individuals who wish to *weaken* climate policy ambition to gain a stronger foothold (Boasson 2018; Heikkila 2019).

Facilitation of actors who wish to weaken climate action is especially disconcerting considering the resource and power inequalities inherent within climate politics, such as the influence wielded by the fossil fuel industry and industrial farming sector. Morrison et al. (2017, 2) suggest that researchers favoring polycentric systems have neglected different types of power, their distribution, and their impact on governance and environmental outcomes (see also Morrison et al. 2019; Singleton 2017, 1000). Thus Kellner et al. (2024) use a systematic analysis of empirical texts to unearth further insights from empirical studies of PCG, which confirm the importance of various forms of power,

including design power (the authority to design international agreements or treaties).

Selection of Articles in This Special Issue

The existing literature on PCG and climate mitigation is small in volume (Kellner et al. 2024). Indeed, Morrison et al. (2023) note that

research on polycentric governance remains mostly comprised of normative concepts or descriptive single case studies at one point in time and assessing the functional quality of a polycentric system is still a black box. (6)

We seek to mitigate these gaps in knowledge by examining the empirical realities of PCG across a wide range of contexts and by applying a range of methods. Following an October 2022 open call for papers on the empirical realities of PCG, we received twenty-two abstracts that described potential articles to be considered for this special issue. To choose between these abstracts, we favored an exploratory case selection process (Seawright and Gerring 2008), emphasizing a diversity of institutional contexts, levels of governance, and types of actors, while prioritizing papers with an explicit conceptual framework and systematic approach to empirical data gathering. We summarize the author team, institutional context, level of governance, type of actor, and data source for each article in Table 1.

Let us summarize the contributions. First, Kellner et al. (2024) emphasize the importance of states within PCG systems, while providing insights into how local initiatives share and transfer knowledge, including via transnational networks. Second, Castro et al. (2024) use regression analysis to discern that greater engagement in PCG is associated with stronger domestic mitigation policies, but not with more ambitious NDCs. Third, Marquardt et al. (2024) demonstrate the importance of state governments for implementing solar power development in India but caution about the challenges of institutionalizing and scaling up these activities. Fourth, Widerberg et al. (2024) also offer a cautionary tale, finding that PCG systems have mobilized key industries and cities for greater action, but warn that even within this pioneer country, emission reductions appear inadequate. Fifth, Kern et al. (2024) introduce a new tripartite framework for examining governance *of*, *by*, and *with* networks, before examining how three TMNs have become more, and less, polycentric over time. Sixth, Tosun et al. (2024) employ network analysis and regression analysis in their study of Latin American NGOs, finding that NGOs create networks with a diverse range of actor types, before identifying factors that explain the governance level at which NGOs' partners operate. Finally, Tobin et al. (2024) explore the use of large-*N* data sets for examining PCG systems, using Python computer programming language and regression analyses to find that transnational initiatives can elevate Organisation for Economic Co-operation and Development (OECD) businesses' emission reductions but also that businesses can miss their self-selected targets' deadlines.

Table 1

Author Team, Institutional Context/Location, Level of Governance, Type of Actor, and Data Sources for Each Article Within the Special Issue

<i>Author Team</i>	<i>Institutional Context/Location</i>	<i>Level of Governance</i>	<i>Type of Actor</i>	<i>Data Sources</i>
Kellner et al. (2024)	Asia, Australia, North America, South America, multinational, transnational	Multinational, transnational, national, subnational, local	Various	Existing empirical literature
Castro et al. (2024)	All countries that have created NDCs	National	Countries	Climate Change Laws of the World data set; assessment of equity in global mitigation by Robiou du Pont et al. (2017); UNEP Climate Initiatives Platform; GCAP
Marquardt et al. (2024)	Federal, global; south country of India	Subnational	State and nonstate actors in three federal states	29 interviews with national- and state-level experts; media sources and government documents relating to the three states' solar energy development
Widerberg et al. (2024)	Unitary, global, north country of Sweden	Subnational	Subnational and government	Online survey, document analysis, in-depth interviews, GHG emission trends
Kern et al. (2024)	Municipalities and their networks (Europe, global)	Local	TMNs	Document analysis, participant observation, interviews with key actors in each

Table 1*(Continued)*

<i>Author Team</i>	<i>Institutional Context/Location</i>	<i>Level of Governance</i>	<i>Type of Actor</i>	<i>Data Sources</i>
Tosun et al. (2024)	18 unitary and 4 federal, Global South countries in Latin America	Transnational and nonstate actor	NGOs	network, previous studies Original interview data and NGO websites regarding partner organization types and level of governance
Tobin et al. (2024)	38 OECD states	Transnational and nonstate actor	Businesses	GCAP

GCAP = Global Climate Action Portal. GHG = greenhouse gas. NDC = nationally determined contribution. NGO = nongovernmental organization. OECD = Organisation for Economic Co-operation and Development. TMN = transnational municipal network. UNEP = United Nations Environment Programme.

Overview of the Articles in This Special Issue

We consolidate the seven articles by identifying five themes that arose during our research on PCG and climate mitigation, which pertain to operationalization; voluntary action; temporality; power; and, crucially, effectiveness. In each section, we introduce existing understandings from the global environmental politics literature, synergize our studies' findings, and briefly suggest further reflections on these themes.

Operationalizing PCG Within Empirical Studies

Much of the appeal of engaging with PCG derives from its apparently established status for characterizing contemporary global climate governance. As Stephan (2024) suggests, "polycentric governance is possibly the only viable way to understand climate change governance" (60). However, because of the breadth of institutional contexts, levels of governance, and actor types within PCG systems, *operationalization* of PCG systems as a delimited system of interactions can be challenging in practice. Much ink has been spilled in collating a concrete set of criteria, or propositions, for identifying and understanding empirical instances of PCG (Cole 2011; Dorsch and Flachsland 2017; Heinen et al. 2022; Jordan et al. 2018; Kellner et al. 2024; Ostrom 2010; Wurzel et al. 2021). Yet, each of those pieces emphasizes slightly different components for

operationalizing PCG. Resultantly, we face a dilemma: to meaningfully assess PCG in a wide range of contexts, we need to adapt the broad principles of polycentric governance to match the issues and dynamics encountered in climate mitigation. Studies of polycentric governance in other areas do likewise. For example, in their discussion of applying Ostromian design principles to cities, Foster and Iaione (2019) state that Ostrom's framework "needs to be adapted to the reality of urban environments" (238), while McGinnis (2018) speaks of "translating" (298) Ostrom's writing to enable analysis of health policy. But in making context- and policy area-specific "translations," are we in danger of everything and nothing being an instance of PCG? Such an operationalization could veer close to the "conceptual stretching" of which Sartori (1970) warned decades ago, in which vague and amorphous conceptualizations undermine analytical articulation.

As editors of this special issue, we have been mindful of this challenge of maximizing the diversity of situations and settings under examination while avoiding conceptual stretching. To assume an exploratory approach, we have deliberately assumed a broad operationalization of PCG for the pieces in this collection. Thus our contributing scholars have needed to align the characteristics of PCG with previously unexplored empirical terrain. For instance, Tosun et al. (2024) investigate PCG using concepts and theories from the literature on NGO behavior. Meanwhile, Castro et al. (2024) operationalize engagement in PCG by drawing on two levels: the number of state-level memberships within transnational climate initiatives (TCIs) that focus on mitigation and the involvement of a state's sub- and nonstate actors within such initiatives. This breadth of operationalization brings new dynamics into the nature of interactions, away from those encountered in local policy regimes, but also raises questions around whether empirical manifestations that could be considered instances of PCG *are* indeed such manifestations.

In the pursuit of future research that can speak in conjunction, we note the utility of Heinen et al.'s (2022) framework for empirical governance on PCG, Jordan et al.'s (2018) five core propositions of PCG, and Morrison et al.'s (2023) "building blocks" of polycentric governance, upon each of which scholars in this special issue draw. Drawing from a shared set of assumptions is a fruitful foundation for conducting research on context-specific governance systems, particularly via comparative collections of studies that examine PCG across different contexts and/or over time.

The Voluntary Nature of PCG

PCG systems rely on voluntary participation, as McGinnis and Ostrom (2012, 15) noted. Units within such systems are formally independent of one another, "choosing to act in ways that take account of others ... through processes of cooperation, competition, conflict, and conflict resolution" (Ostrom 1991, 225). The empirical studies contained within this special issue provide insights

into the nature of voluntary participation in practice that in turn contribute to ongoing discussions in global environmental politics around participation in voluntary climate schemes (Andonova and Sun 2019).

In their article for this special issue, Paula Castro, Marlene Kammerer, and Axel Michaelowa (2024) emphasize that the content of NDCs of countries is self-determined and that their fulfillment is voluntary. Countries' voluntary mitigation pledges in NDCs are likely to be influenced by political considerations at both national and international levels. Examination of how differing degrees of PCG within countries affect the development of attendant NDCs would be a rich avenue for future research to explore. Relatedly, in their article, Oscar Widerberg, Karin Bäckstrand, Eva Lövbrand, Jens Marquardt, and Naghmeh Nasiritousi (2024) examine the capacity of the Swedish state to steer toward decarbonization by coordinating and facilitating voluntary decarbonization initiatives through climate target setting, regulation, monitoring, and enforcement. The results show that the emphasis of the Swedish state on voluntary action, self-regulation, collaboration, legitimation, and consensus making has struggled to bring national emissions down to reach national and international climate goals. The authors conclude that voluntary initiatives can create new opportunities but are not sufficient to fulfill climate goals. Next, Elke Kellner, Daniel Petrovics, and Dave Huitema (2024), in their systematic analysis, look for evidence of how local action diffuses from one community to others. They find that three main factors are implied in the way local initiatives diffuse and replicate their actions and grow their initiatives: knowledge sharing, who transfers the knowledge, and participating in transnational networks. These findings engage with the literature on transnational climate governance (Bulkeley et al. 2014; Hale 2020) and connect with Paul Tobin, Andreas Duit, Niall Kelly, and Ciara Kelly (2024), who find that three-quarters of OECD businesses within the Global Climate Action Portal (GCAP) do not track their climate commitments, undermining the effectiveness of voluntary pledge-and-review strategies.

Articles in this special issue find that voluntary initiatives and commitments as part of a polycentric governance system can support new opportunities but that this voluntarism can lead to gaps in performance, as expected by the literature on polycentric governance. These findings are especially noteworthy considering the reliance on pledge-and-review measures within current global climate governance. Consideration of variations in different direct and indirect incentives, reputational rewards, and motivations for participation that shape actors' behaviors within PCG systems are likely to provide additional analytical insights for scholars undertaking future research (see Dorsch and Flachsland 2017).

Considering Temporality Within PCG

Considering the inherently long-term nature of climate change, myriad debates center around how to secure multidecadal action (Hale 2024). For example,

Paterson et al. (2022) highlight an ongoing antagonism in the climate governance literature between the pursuits of policy stability and of re/politicization. PCG systems may provide some means of navigating this antagonism, aided by their emphasis on integrating types of actors and levels of governance. Such insights are especially warranted considering the reality that climate policy can be dismantled: policymaking can go backward as well as forward, especially at times of crisis and/or in the event of exogenous shock (Burns et al. 2020). Yet, despite repeated calls for more insights into how polycentric systems vary over time, particularly regarding coordination of actors (Morrison et al. 2023), and how polycentric governance evolves through feedback pathways and adjustment mechanisms (Baldwin et al. 2024; Kellner et al. 2024), the literature still lacks insights on temporality in PCG.

The challenge of including temporal considerations within studies of PCG systems is mirrored in this special issue, in which only one article traces the evolution of such a system. Kristine Kern, Peter Eckersley, Elisa Kochskämper, and Wolfgang Haupt (2024) examine three TMNs over time, starting at different positions within the polycentric–monocentric spectrum, finding that networks can become both more and less polycentric over time. One of the reasons for the lack of exploration of temporality within PCG is the nascence of such systems regarding climate change. The governance shift following the Paris Agreement means that PCG systems are now entering into maturity, providing new means for empirically examining polycentric governance as a response to climate change.

Where do we encourage scholarship of PCG systems to head over the coming decade? The steady increase in accessible data will enable temporal analyses to be undertaken that can map the change in degree of polycentric governance, the factors behind such changes, and the impact of these changes on emission trajectories. For example, Castro et al. (2024) and Tobin et al. (2024) analyze data curated from the GCAP, which contains more than 34,000 actors (as of June 2024). While that public database does not easily enable the collection of data across time periods, as the dates of pledges are not captured in the portal, scholars can begin to collect data now, and update these regularly, to build data sets with temporal characteristics. Likewise, Castro et al. (2024) call for new research on PCG that uses panel data, which would enable changes in polycentric governance to be analyzed alongside variations in policy ambition and accomplishment. One topic worthy of study is whether climate governance systems with higher levels of polycentric governance withstand changes in political climate (e.g., the rise of populism) better than regimes with lower levels of polycentric governance. Self-organized, emergent climate measures might be a harder target for populist or emerging right-wing governments than imposed measures. Such an analysis could consider multiple jurisdictional levels: currently the most explored scenario is one in which local or regional government carries on with climate measures while the national government ceases to lead. However, other scenarios can be imagined, including situations in which local

or regional government wishes to abolish measures that national governments want to continue.

Power in PCG

The breadth of contexts analyzed in this special issue enables us to offer consolidated reflections on the nature of *power dynamics*. Understanding “what is power” is a dilemma at the heart of studies on global climate governance (van der Ven 2016). Torney (2019) has previously offered insights into how to conceptualize the relationship between leaders and followers in PCG. Furthermore, such reflections on power inequalities call to attention the ongoing pursuits for a “just transition” within climate and environmental governance more broadly, alongside parallel questions around “justice for whom?” (Brown and Spiegel 2019; Graddy-Lovelace 2017). The normative underpinnings of PCG scholarship seek to facilitate answers to such questions.

The articles in this collection examine power and PCG in different ways. Kellner et al. (2024) and Jale Tosun, Emiliano Levario Saad, and Denise Gutiérrez (2024) build on the categorization by Morrison et al. (2019) of power into design, pragmatic, and framing forms. Kellner et al. (2024) analyze power as one of their four key issues within PCG as part of their systematic analysis of empirical studies. They suggest that with “overarching rules” being a core proposition of PCG (Jordan et al. 2018), whoever “designs” these rules of law is placed within a “significant position of power.” Tosun et al. (2024) capture power within PCG through measurements of regional authority and participation in public consultation, showing that opportunities for participation create opportunity structures that in turn shape South American NGOs’ behavior. Jens Marquardt, Shyamasree Dasgupta, Chris Höhne, Markus Lederer, and Pooja Sankhyayan (2024) examine energy politics in India *because of* the varied power relations between national and state-level governments. In their three subnational cases, Gujarat, Kerala, and Himachal Pradesh, the levels of coordination, sources of funding, and inclusion of actors vary markedly due to diversity of shared responsibilities, with implications for resultant energy and climate governance. For Sweden, a member of the European Union, Widerberg et al. (2024) note that the state relinquished some power on topics of shared competency, such as climate change, and hence holds limited influence for the design of climate policies from “above,” for example, the Emissions Trading System. Moreover, Widerberg et al. (2024) find that better-resourced actors participated to a greater extent within PCG systems than other actors, again highlighting a power differential, resulting in their call for greater analysis of justice issues within PCG. Finally, Kern et al. (2024) find that TMNs that possess secretariats with limited powers would be closer to the polycentric end of the monocentric–polycentric spectrum.

Drawing together these findings on power relations, we suggest that power continues to represent somewhat of a black box within studies of PCG (Morrison et al. 2019). Nevertheless, we note that even if power is diffused

across actors, the rules of the game in which PCG actors operate still require a “designer,” or orchestrator, which in turn brings its own inequalities of power into the governance system. We note, too, that what it means to be a PCG system may vary according to the institutional context of a given country under examination, which in turn may hinder comparative study of PCG systems between states that differ fundamentally in their institutional structures.

The Effectiveness of PCG Systems

This theme is necessarily the longest, due to the primacy of assessing the effectiveness of PCG for climate mitigation. But what is “effective” PCG? This special issue focuses on PCG and climate mitigation, yet, as we noted earlier, PCG systems may proffer benefits alongside potential emission reductions alone. Also, we heed the cautions of scholars noting that greater polycentricity may create new opportunities for weakening climate action (Baldwin et al. 2024; Boasson 2018, 131; Heikkila 2019). Thus we emphasize the approach of Marquardt et al. (2024), who highlight the “promises and pitfalls” of PCG as encountered in India. Here we reflect on the findings of the articles, focusing on emission reductions but also noting other impacts.

In assuming an exploratory case selection rationale for this special issue, we expected that PCG would be found to be more effective in facilitating GHG emission reductions in some studies than in others (Kellner et al. 2024). This expectation has been supported; each article has provided evidence, with caveats, of the effectiveness of climate governance as a means of *starting the process* of reducing GHG emissions, as Ostrom (2010, 553) cautiously warned would be their likely utility. While Tobin et al. (2024) suggest that the accomplishment of businesses’ climate commitments increased with more numerous memberships in TCIs, they also find that one-third of businesses’ commitments were not accomplished by their deadlines. Castro et al. (2024) examine the same dependent variables as Tobin et al. (2024)—the accomplishments of climate commitments—but regarding countries rather than businesses. Castro et al. (2024) find that “engagement in polycentric climate governance is associated with mitigation policy effort, but not with the level of ambition of countries’ NDC targets.” Underscoring the importance of national context for shaping PCG, Castro et al. (2024) find that this positive association with policy effort is particularly important for countries that are economically developing (former non-Annex I). Future scholarship would benefit from engaging directly in researching how countries and businesses decide the degree of ambition within their respective climate policy targets. This research can build on the exploration of Marquardt et al. (2024) of the promises but also pitfalls of PCG, such as lack of authority, coordination, or finance, concerns over which may direct policymakers’ policy preferences away from—or toward—pursuing PCG systems.

Furthermore, the two single-country context articles in this special issue, by Widerberg et al. (2024) on Sweden, and by Marquardt et al. (2024) on India, complement the article by Castro et al. (2024). Combined, the two articles explore countries with a unitary and a federal government and an economically developed and developing country, respectively. Both articles find weakly positive results regarding PCG, but we note that PCG may manifest differently in such different localities. Widerberg et al. (2024) offer a “cautionary tale,” as Sweden has committed to rapid and deep decarbonization but is struggling to bring down GHG emissions at a sufficient rate to meet its goals. This case highlights the difficulties of disentangling policy arrangements that include multiple actors—such as the European Union, national government, and local governance—both for scholars and policymakers (Green 2014). Similarly, regarding India, and writing on the development of solar power in three different states, Marquardt et al. (2024) suggest that “while polycentric governance can foster experiments and innovations, going beyond these initial efforts is crucial for institutionalization,” which in turn is needed to scale up emission reductions. Hence, for Marquardt et al. (2024) PCG is but one step in a wider governance process—an argument that reiterates Ostrom’s (2010, 553) proposal that PCG systems may simply start the process of reducing GHG emissions. Conceptualization of where next to head within this process, and how such steps can be secured, merits consideration.

In sum, PCG is a *normative* as well as a descriptive and analytical concept, whereby, as Jordan et al. (2018, 6) note, duplication and overlaps within governance arrangements are not signs of inefficiency but rather opportunities to learn. Hence reducing the definition of PCG effectiveness simply to emission reductions is likely to obscure outcomes achieved by more polycentric systems. Yet, we also note Scruggs’ (1999) argument that reductions in GHG emissions are the primary rationale for climate governance. We encourage ongoing consideration of what it means for PCG systems to be “effective,” with emission reductions likely a necessary but insufficient characteristic for many scholars conducting analyses.

Conclusions and Proposals for Future Research

Mitigation of climate change requires urgent and transformative action. Selection of appropriate policy responses that maximize emission reductions while considering myriad other dimensions—from economic cost to accountability to justice—is fraught with complexity (Aklin and Mildenerger 2020; Paterson et al. 2022; van der Ven 2016). Other environmental policy issues—such as biodiversity loss, waste management, and water allocation—are affected by our actions on climate change, all of which are in turn orchestrated across distinct political systems, levels of governance, and types of actors (Graddy-Lovelace 2017). In traversing this landscape, scholarship on PCG has offered us shared propositions, understandings, and proposed courses of action. Thus the characterization of the global climate architecture as being polycentric has become

widespread, while PCG has been viewed optimistically by many scholars as a response to the climate emergency we are facing (Hale 2020). But what are the empirical realities of such systems? This exploratory special issue has sought to provide answers to that question by drawing from a wide range of contexts.

Here we complement the proposed four avenues for future research that Kellner et al. (2024) identified by combining them with insights from our other contributing articles. First, Kellner et al. (2024) call for greater clarity on the role of the state within PCG, especially with an awareness of how national, subnational, and nonstate actors collaborate and coordinate their actions. Future research on this topic would benefit from considering the calls by Marquardt et al. (2024) to examine the institutionalization of climate activities, beyond initial experiments, and the means for scaling up experiments, especially across multilevel governance arrangements, such as those within federal regimes. Second, Kellner et al. (2024) call for insights on the diffusion of local action, which is refined by the work of Tosun et al. (2024) who highlight the interactions between national policy styles and nonstate activities, as mediated by trans-/subnational networks, while Marquardt et al. (2024) reflect on the importance of scaling up. More research on the dynamics of diffusion in polycentric governance systems will be pertinent considering a long-standing debate on the notion of scale, where some have argued against the possibility of adopting local solutions at the global level (Young 2002), while PCG thinking assumes that local solutions can diffuse and thereby become globally relevant. Third, Kellner et al. (2024) propose that the lack of clarity regarding how governance processes—especially regarding democratic decision-making—can be improved. There the new tridimensional framework created by Kern et al. (2024), regarding governance *of*, *by*, and *with* networks, provides a new means of generating insights, whereby comparative approaches, and considerations of the interactions between these forms of governance are especially welcome. Finally, Kellner et al. (2024) extend the calls by Morrison et al. (2023) to scrutinize the roles of power dynamics within PCG. We echo the proposal from Widerberg et al. (2024) that global environmental politics will continue to benefit from examining justice and just transitions as integral parts of future studies on PCG systems.

In sum, the articles in this special issue provide rich empirical data regarding the realities of PCG systems across every continent, multiple levels of governance, and a wide variety of actor types. They identify important interaction dynamics that engage with myriad ongoing debates within the study of global environmental politics. In so doing, we hope that these insights may stimulate new and ongoing research into the difficulties—but also the opportunities—of coordinating, and self-organizing, responses to global environmental challenges and the conditions that determine the resultant outcomes.

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