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Exploring the contours of climate governance: An interdisciplinary systematic literature review from a southern perspective

Rodolfo Sapiains | Cecilia Ibarra | Guadalupe Jiménez | Raúl O'Ryan | Gustavo Blanco | Pilar Moraga | Maisa Rojas

Center for Climate and Resilience Research, (CR)2, Santiago de Chile, Chile

Correspondence
Rodolfo Sapiains, Center for Climate and Resilience Research, Capitan Ignacio Carrera Pinto 1045, Ñuñoa, Santiago de Chile 7750000, Chile.
Email: rodolfo.sapiains@gmail.com

Abstract

Dealing with climate change is one of this century's most difficult challenges demanding new strategies to steer societies towards common transformational goals. A growing literature involving "climate governance" is evolving and should advance the discussion on transformations and the involvement of different actors in climate action. However, it is unclear that the Global South's particularities are being integrated. This study has a three-fold goal: (a) identify the different approaches to climate governance found in the mainstream literature, (b) explore the degree of integration of the Global South in those approaches, and (c) contribute to the ongoing discussion on this issue from a southern perspective. A systematic literature review on "climate governance" was conducted, distinguishing different approaches and their significance for the Global South. Results clustered in six groups use the characterizations: multi-level, global, adaptive, transnational, polycentric, and experimental/transformative. These terms account for different levels of decision-making, emerging values, and the importance of non-State and sub-national actors. Approaches vary, in relation to change and participation, from an incremental improvement focus to a more transformative perspective and from the promotion of community influence to processes based on traditional institutions. In the Global South, multi-level, multi-actor climate governance occurs in a context of deep inequality and asymmetric power relations, rising environmental conflicts, and a lack of adequate mechanisms for community participation. Addressing climate change here will require, acknowledging the State alone cannot solve the issue, that different views must be considered and that contextualized perspectives from the Global South must be integrated.

KEYWORDS

climate change, climate governance, Global South, interdisciplinary, literature review

1 | INTRODUCTION

Humans have become a new force in nature altering natural systems on an unprecedented scale (Foster, Royer, & Lunt, 2017; Rockström et al., 2009). This phenomenon has been conceptualized as the Anthropocene (Crutzen & Stoermer, 2000; Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015), an epoch in which anthropogenic climate change is one salient expression of human activities' massive

impact on Earth. In such a context, Franchini, Viola, and Barros-Platiau (2017) observe that addressing climate change requires levels of cooperation never before achieved by the international community. However, despite the evidence and scientific consensus on both the causes of the problem (Cook et al., 2013; Cook et al., 2016) and the need for profound transformations in society to deal with climate change, ideological conflicts associated with strong dependence on fossil fuels and the need for industry regulations to mitigate greenhouse gas emissions have made it difficult to act at the pace demanded by the magnitude of the problem. Criticism has consequently mounted on the capacity of a multilateral approach to address climate change. In fact, achieving the ambitious goal of the Paris Agreement limiting warming to 1.5°C above pre-industrial levels, although feasible, would require transformative changes, challenging the capacity of the current global climate governance system (de Coninck et al., 2018; Masson-Delmotte et al., 2018). In this scenario, climate change has been depicted as a wicked problem characterized by ambiguous or uncertain settings in which unstructured, multi-causal interdependencies dynamically evolve, where various social actors perceive, interpret, and assess the problem differently and very often have different interest in coping with it (Morner & Misgeld, 2014). Furthermore, Lazarus (2009) describes climate change as a super wicked problem, adding additional features: the longer it takes to address it, the costlier it will be to do so; there are ideological differences relating to the responsibilities of addressing it; and it is systemic in nature, whereby it requires a coordinated global response. This type of problem does not have "a" solution but rather must be coped with. Given these complexities, Gupta (2016) states dealing with climate change demands more significant participation from multiple stakeholders at different levels of society. Consistently, the last decade's growing literature on climate governance shows trends towards displacing the traditional top-down institutionally driven climate governance for more polycentric bottom-up and locally implemented strategies (Aykut, 2016). These latter increasingly focus on the role of non-State and sub-national actors and their associated networks, which may help to partially overcome the limitations of the dominant approaches and be more adequate to the need to integrate climate governance into the complex process of achieving sustainable development and overcoming poverty and inequality in developing countries.

However, to what extent this literature can adequately include the particularities of what is called the Global South is not clear. The Global South term is a polisemic and debated one, but for heuristic purpose of this literature review, we will refer to it following the complementarity of the first two out of three meanings proposed by Mahler (2017). The author defines Global South as "economically disadvantaged nation-states and as a post–Cold War alternative to "Third World.". However, within a variety of fields, and often within literary and cultural studies, the Global South has been employed in a postnational sense to address spaces and peoples negatively impacted by contemporary capitalist globalization. Considering this, a general review of mainstream climate-change literature suggests most academic studies, including those that advocate more horizontal, decentralized, and participatory governance, come from rich, industrialized, and developed countries. If that is the case, this might reproduce the colonial production of knowledge and subsequent generalization of findings to the rest of the world (Connell, 2014) still common in many academic institutions. In this context, a southern perspective (Kane & Boulle, 2018) that highlights the importance of developing situated knowledge built upon particular places and contexts (de Sousa Santos, 2009; Watson, 2016) can be useful and necessary to better understand and ultimately develop new climate governance approaches. All the more so, considering no strong evidence suggests there is one solution to govern climate change or that the traditional climate governance approach should be replaced with a more polycentric one (van Asselt & Zelli, 2014).

Even though current definitions of climate governance are broad, the usual uses of the concept are not. Overall, governance can be defined as the process to steer social organizations and economic activities through collective action according to common objectives (Torfing, Peters, Pierre, & Sorensen, 2012), or the interactive processes through which society and the economy are steered toward collectively negotiated goals (Ansell & Torfing, 2016). Climate governance focuses on the complex decision-making process associated with climate change and its ramifications at multiple levels of society. It considers the particularities of adaptation, defined as the process of adjustment to actual or expected climate and its effects (Glossary, IPCC, 2014), and is hence generally more locally oriented (Termeer, Dewulf, Karlsson-Vinkhuyzen, Vink, & van Vliet, 2016), and mitigation, defined as a human intervention to reduce emissions or enhance the sinks of greenhouse gasses (Glossary, IPCC, 2014), which tend to emphasize global action and global objectives through local initiatives.

To our knowledge, the multiple approaches to climate governance have not been systematically reviewed in the literature. This gap can have practical implications considering multiple stakeholders, including many international organizations, financial institutions (i.e., the World Bank), NGOs, corporations, and governments with different political ideologies refer to climate governance implicitly assuming a consensus on its meaning, its goals, and its implementation. This creates conflicting expectations regarding the role and influence of different actors, producing confusion about the goals of governance, jeopardizing necessary negotiations, and finally emptying the concept of its meaning, something that has been observed, for example, with the notion of participation (Cornwall, 2008).

This article presents a systematic literature review on climate governance with a three-fold goal: (a) identify the different approaches to climate governance found in the mainstream literature, considering guiding principles, actors, levels and their interactions, as well as the role of science and the interplay of different forms of knowledge underlying the diverse and sometimes opposed ways climate governance is used, (b) explore the degree of integration of the Global South in those approaches, and (c) contribute to the ongoing discussion on this issue from a southern perspective, not to establish a new governance approach but to discuss key aspects that, to our understanding, should be addressed in future research and debates. To do this, we conducted a systematic literature review of mainstream

databases, which allowed us to empirically analyze the dominant approaches to climate governance. Then, we reflect on critical issues related to the North–South differences in knowledge production and power issues in practical dimensions. We hope this article can contribute to address the challenges of climate change especially in the Global South where this analysis of climate governance should resonate.

2 | CONTEXTUALIZING THIS REVIEW: THE ONGOING MULTILATERALISM CRISIS

International negotiations on climate change have shed light on the difficulties in moving towards a greater commitment by States within the framework of multilateralism, also reflecting the different interests, values, and needs between developed and developing countries. This has brought about governance under the aegis of the international community, limited to setting common objectives and a minimum framework of rules and procedures to carry these out: States define their commitments individually, while together aim to achieve global goals. This has translated into a greater distribution of responsibilities between developed and developing countries, as well as an opportunity for the emergence of other actors involved in fulfilling common objectives.

The United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP) established common but differentiated responsibilities between developed (Annex I) and developing countries. In this sense, all parties of KP have reporting obligations, but only Annex I parties have mitigation targets. Both instruments were signed based on the logic of multilateralism, marked by decisions sovereignly adopted by the States, which they are obliged to later implement. However, at the 15th Conference of the Parties (2009) the mitigation goal failed, this is "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels" (article 2a) PA), opening up the possibility for States to assume individual commitments. This situation was perceived by some as a negative scenario and indicative of a weakening of multilateralism (Bodansky & Diringer, 2010; Rajamani & Werksman, 2018), while others viewed it as a possibility for strengthening the participation of non-State and sub-national actors (Peel, Godden, & Keenan, 2012).

At the same time, a differentiated system has been developed that recognizes developing and least developed countries' situations and limitations with respect to assuming commitments that could compromise their development opportunities. The rulebook defined in COP 24 in Poland (2018) establishes whoever wishes to benefit from the flexibility provided in the Paris Agreement (PA) with respect to developing and least developed countries must prove their condition as such (UNFCCC, 2018). The PA marks a new paradigm in international relations by setting the framework of rules, procedures, mechanisms, and a common objective in the Agreement itself, leaving the States to establish the sovereign definition of their commitments set out in their respective Nationally Determined Contributions (NDC). In turn, article 4 of the PA specifies that developing countries are "encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances" (UNFCCC, 2015). For that, PA refers to financial aspects, technology transfer, and the creation of capacities, respectively.

However, even if the commitments assumed in the NDCs submitted in 2015 are met, we will exceed the 3° increase in global temperature compared to the pre-industrial period, far from the "well-below 2°C" agreed in the PA and the desired 1.5°C (Masson-Delmotte et al., 2018). The agreed flexibility afforded to developing and least developed countries is founded on terms defined in the "rulebook" and is applied on a case-by-case basis. Again, this category of countries would not just have an international regime adapted to their own realities, as they must also prove their condition to fall under such a category. In consequence, while the KP distinguished two categories of nations – Annex I parties (developed countries) and non-Annex I parties (developing countries) – prior to the PA, the international community started to build a new regime focused on "the universal participation through a system of contributions, where each nation is to do its part in some capacity" (Boran, 2017), in an attempt to fairly distribute the global effort to achieve the ultimate objective of the agreement outlined in Article 2 holding temperatures below 2°C. It is worth noticing that during the discussion towards a new regime, non-Annex I parties opposed universal participation arguing it overlooks the enormous debt of developed countries (Annex 1 parties) given their historical emissions that far outweigh that of non-Annex 1 countries.

The literature is unclear regarding how even the current insufficient pledges will be implemented, especially in developing contexts with low institutional capacities and pressing development needs. In fact, more precise analysis concerning developing countries and climate action implementation would need local/national knowledge to identify capabilities and weaknesses in terms of climate. Additionally, the goals of such governance and how they contribute to each country's development strategy must be part of the process and in synergy with other strategic objectives such us ending hunger and reducing inequality. Consequently, exploring modes of climate governance at the international level may expand the possibilities of climate change action in addition to or beyond multilateralism, but for that it will be necessary to involve different perspectives that represent northern and southern values and interests.

3 | METHODS

The phases used in our systematic literature review (Figure 1) were inspired by the work of Spruijt et al. (2014). We used an interdisciplinary approach, based on the research backgrounds of the authors (Law, Economics, Psychology, Sociology, Physics, Engineering, History, and International Relations). Firstly, we conducted a search in two databases, Web of Science and Scopus, with two preliminary criteria: scientific articles written in English and published between 2009 and 2017. Two reviewers tried several combinations of keywords prior to

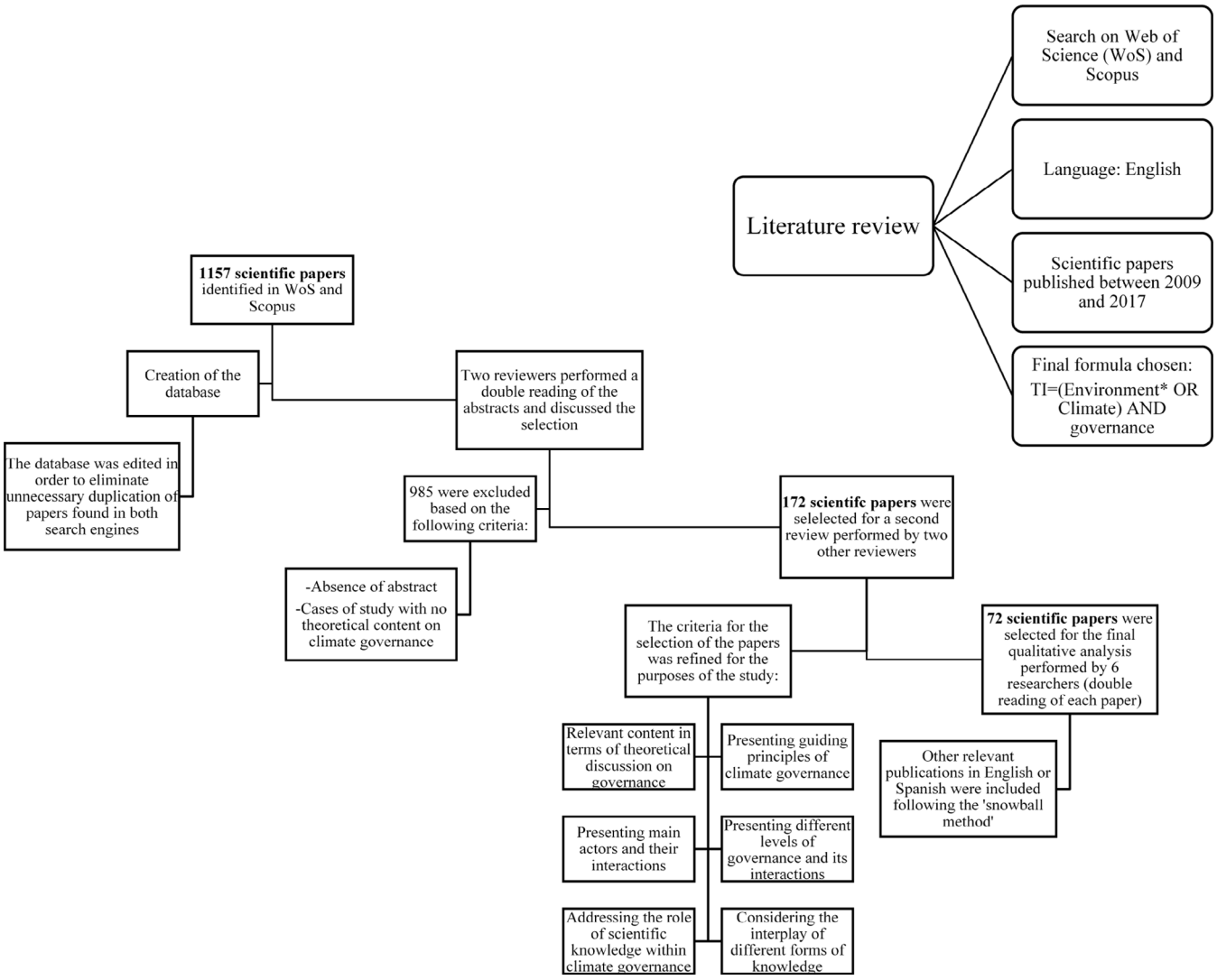

FIGURE 1 Structure of the phases of the systematic literature review

determining the final formula (TI = [Environment* OR Climate] AND governance) that brought a fairly consistent number of articles (1157) from both databases. Secondly, a database was created to filter the articles (e.g., suppress duplicated papers), and two of the authors carried out a double reading of the titles and abstracts, followed by a discussion on their content. Then, 985 articles were excluded on the basis of two criteria: absence of abstract and/or articles addressing case studies with no theoretical discussion on climate governance. As a result, 172 papers were selected and reviewed by two new authors, widening the range of specific content of interest for our literature review. The four reviewers agreed upon new evaluation criteria: in addition to theoretical content on climate governance, they focused on articles that discussed guiding principles, actors, and levels and their interactions. Thirdly, a representative sample of 72 articles was qualitatively analyzed by six co-authors, again performing a double in-depth reading of each paper. For the purposes of our work, we then included 11 relevant publications on climate governance not necessarily included in peer-reviewed journals (the snowball method), such as books, handbooks, or seminal articles from major authors often referred to within the literature, to avoid neglecting major contributions to the topic from such sources.

Finally, it must be noted that "climate governance" has to some extent replaced and is used as equivalent to the concept of "global environmental governance" and to a lesser extent to "environmental governance." We do not find "climate governance" in the earlier literature covered by this review; however, our reading suggests that "environmental governance" referred to issues focusing on different environmental problems and progressively began to frame climate-related ones. The use of "governance" distinguishes this literature from the "environmental policy" literature, calling attention to the participation of different actors apart from the State. "Global environmental governance" emphasizes the supra and transnational perspective observed in the literature, as does the concept of "climate governance."

4 | RESULTS

The literature on climate governance in the last decade is broad, with many apparently different approaches to the understanding of the concept. For Okereke, Bulkeley, and Schroeder (2009), "governance refers to the numerous activities which are significant both in establishing international rules and in shaping policy through 'on the ground' implementation even when some activities originate from actors that, technically speaking, are not endowed with formal authority" (p. 60). Others define governance "as the interactions between public and/or private actors ultimately aimed at addressing collective issues" (Termeer et al., 2016, p. 12) or "the institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their legal obligations, and mediate their differences. Fundamental components of governance are laws, regulations, and policies of government" (Hurlbert & Gupta, 2016, p. 339).

From these definitions, we identify some shared components: actors and their interactions, rules, and institutions. Ultimately, as the debate on the definition of "governance" dates back to the late 1970s, "governance emerges as a concept that acknowledges the public sector is not the only controlling actor when it comes to the solution of societal problems" (Driessen, Dieperink, van Laerhoven, Runhaar, & Vermeulen, 2012, p. 144). The latter (minimal) definition is revealing in terms of the content of most of the papers: even though the characterization of climate governance is far from unambiguous, the literature agrees on the emergence of new actors other than the State (e.g., city networks, multinational companies, and sub-State entities), new instruments and levels (such as the bottom-up approach, soft law instruments, or transnational dynamics), and new guiding principles and values (fairness, transparency, and co-participation).

The literature included around 30 types of climate and/or environmental governance with a focus on climate change. The qualitative analysis proved that despite their disparities they could be grouped into categories based on similar conceptions and key features: multi-level, global, transnational, polycentric, adaptive, and experimental/transformative. Thus, for reasons of clarity, the articles were classified into six clusters (Table 1). However, as several papers present more than a single approach, they can be found in more than one cluster. This categorization allowed us to explore the relevance of trends over time.

4.1 | Multi-level governance

Cluster 1 presents articles referring to the "multi-level" nature of climate governance. A significant number of papers assume, implicitly or explicitly, that current forms of governance are multi-level (Dannevig & Aall, 2015; Driessen et al., 2012; Fraundorfer, 2017; Galaz et al., 2012; Laakso et al., 2017; Lee & Koski, 2015; Marquardt, 2017; Pattberg, 2010; Pattberg & Widerberg, 2015; Peel et al., 2012; Sattler et al., 2016; Sun et al., 2010; Termeer et al., 2016), even though their authors commit to different approaches to climate governance. In this context, multi-level governance encompasses different components (scale, actors, and interactions) of governance articulating within a broader scheme. This approach is common among international (Peel et al., 2012) and/or transnational

TABLE 1 Cluster analysis of climate governance

Defining Variables	Climate Governance Approaches Found in the Literature
Cluster 1: Multi-level	Sun, Wennersten, & Brandt, 2010; Driessen et al., 2012; Galaz, Crona, Osterblom, Olsson, & Folke, 2012; Peel et al., 2012; Dannevig & Aall, 2015; Lee & Koski, 2015; Pattberg & Widerberg, 2015; Sattler et al., 2016; Termeer et al., 2016; Fraundorfer, 2017; Laakso, Berg, & Annala, 2017; Marquardt, 2017
Cluster 2: Global	Okereke et al., 2009; Pattberg, 2010; Termeer et al., 2011; Koetz, Farrell, & Bridgewater, 2012; Peel et al., 2012; Hoppe, Wesselink, & Cairns, 2013; Vink, Dewulf, & Termeer, 2013; Beck et al., 2014; Biesbroek, Termeer, Klostermann, & Kabat, 2014; van Asselt & Zelli, 2014; Dannevig & Aall, 2015; Keohane & Victor, 2015; Pattberg & Widerberg, 2015; Visseren-Hamakers, 2015; McGee, 2016; Gupta, 2016; Chan et al., 2016; Termeer et al., 2016; Van Bommel et al., 2016; Dorsch & Flachsland, 2017; Franchini et al., 2017; Marquardt, 2017; Patt, 2017; Turner, 2017
Cluster 3: Transnational	Bailey & Maresh, 2009; Pattberg, 2010; Rice, 2014; Leventon, Dyer, & Van Alstine, 2015; Gupta & Mason, 2016; Paavola, 2016; Andonova, Hale, & Rogers, 2017; Ciplet & Roberts, 2017; Kahler, 2017; Wilshusen & Macdonald, 2017.
Cluster 4: Polycentric	Holley, 2010; Newig, Günther, & Pahl-Wostl, 2010; Pattberg, 2010; Sun et al., 2010; Cole, 2011; Sovacool, 2011; Peel et al., 2012; Galaz et al., 2012; Barton, 2013; Aykut, 2016; Gupta, 2016; Sattler et al., 2016; Dorsch & Flachsland, 2017; Lervik & Sutherland, 2017; Tosun & Schoenefeld, 2017; Fraundorfer, 2017
Cluster 5: Adaptive	de Faria, Bessa, & Tonet, 2009; Barton, 2013; Heinrichs, Krellenberg, & Fragkias, 2013; Schroeder, Burch, & Rayner, 2013; Rice, 2014; Chaffin et al., 2016; Da Silva & Buendia, 2016; Hurlbert & Gupta, 2016; Mah & Hills, 2016; Nursey-Bray, 2017; Armstrong & Kamieniecki, 2017; Berkes, 2017; Corral & Monagas, 2017; Craig et al., 2017; DeCaro, Chaffin, Schlager, Garmestani, & Ruhl, 2017; Kirschke & Newig, 2017; Lervik & Sutherland, 2017
Cluster 6: Experimental and transformative	Delgado & Strand, 2010; Leal, 2010; Urperlainen, 2013; Kivimaa, Hildén, Huitema, Jordan, & Newig, 2017; Laakso et al., 2017; Kaisa et al., 2017; Boyd, 2010; Leino & Peltomaa, 2012; Van Kerkhoff & Pilbeam, 2017; Allan, 2017a, 2017b

(Fraundorfer, 2017) climate law scholars as well as in international relations and/or political science literature (Marquardt, 2017) or environmental management (Sattler et al., 2016). As Peel et al. (2012) recalls, this multi-level governance literature has its source in EU-studies scholarship and emphasizes the imperative of decentralization as "decision-making taking place at a range of territorial levels or scales" (p. 251). The emergent role of new actors other than governments or the State and "cooperating not only within the same level" (Sattler et al., 2016, p. 24) would be necessary to tackle a wicked problem such as climate change. Overall, Cluster 1 presents a recurrent trend within the literature dating back to the 1980s – in particular within the International Relations scholarship – as a descriptive analytical tool to approach the nature of climate governance.

4.2 | Global governance

Cluster 2 includes articles referring to a "global" approach, representing the largest part of the climate governance literature within the last decade. The main criteria for grouping this heterogeneous selection of papers are the importance they devote to understanding the most recent dynamics of the international or global climate governance from a perspective in which the State and international institutions still play a central role. Indeed, apart from those papers presenting a literature analysis of the state of the art in terms of governance (Vink et al., 2013; Visseren-Hamakers, 2015), three main currents should be distinguished: global climate governance, global mitigation and adaptation governance, and Earth system governance.

International relations or international law scholars have traditionally focused on the dynamics of the "international regime" of climate change. The literature on "the regime complex" (Keohane & Victor, 2011) shows this to be the dominant approach to global climate governance, and its core element is the imperative of "effectiveness" within the fragmented regime of climate change. "The regime-complex perspective builds on neo-liberal institutionalism and is a continuation of regime theory in International Relations scholarship, which has dominated global environmental governance studies over the past 30 years and borrows from it analytical concepts such as interests and functions" (Pattberg & Widerberg, 2015, pp. 694–695). In consequence, from 2009 onwards there have been claims to "conceptualize governance beyond the regime" (Okereke et al., 2009; Peel et al., 2012) to enrich the debate, insisting on the importance of values. Symptomatically, Keohane and Victor (2015), the theorists of the regime complex, have recently proposed moving towards more "experimental governance" schemes within global climate governance.

Similarly, the evolution of this literature reflects the change of focus from mitigation to adaptation in international negotiations. The "mitigation and adaptation divide" discourse still has relevance (Termeer et al., 2016). However, the new architecture of global climate governance under the Paris Agreement and recent developments under the UNFCCC reveal a greater emphasis on developing comprehensive adaptation strategies in which the role of evidence provided by epistemic communities of scientists (Beck et al., 2014; Hoppe et al., 2013; Koetz et al., 2012; Van Bommel, Blackmore, Foster, & de Vries, 2016) would become increasingly important. This has progressively led to a distinctive and more locally centered approach catalyzed by the adaptive governance production. In this sense, we also observe growing interest in interdisciplinary work within the research on climate governance, in particular developed by the scholars of the so-called Earth system governance (Biermann & Pattberg, 2012; Galaz et al., 2012; Pattberg & Widerberg, 2015; Turner, 2017). Although this was first conceived as a research project, aiming at rethinking global environmental governance, it has gained salience among researchers, which allows us to consider it as a new paradigm in conceptualizing climate governance. This approach seeks more holistic perspectives on global climate governance to obtain a more comprehensive understanding of the implications of the social-ecological systems in the context of the Anthropocene, without neglecting implicit power dynamics. In sum, even though this literature observes new actors gaining relevance in the context of global climate governance, its intergovernmental nature remains central.

4.3 | Transnational, polycentric, and adaptive governance

In this section, we include three clusters. Cluster 3 includes the subset of articles addressing "transnational" climate governance. These papers could be analyzed with those of Cluster 4 ("Polycentric"); however, their focus differs. Cluster 3 focusses on the role of private actors in climate governance, with a significant role of political economy. For example, emerging public–private partnerships (Pattberg, 2010; Tosun & Schoenefeld, 2017) or more informal law-making (Kahler, 2017) are common features. This corpus addresses the challenges related to the sustainability over time of different transnational initiatives (Pattberg, 2010) and presents concrete examples (Wilshusen & Macdonald, 2017) but agrees that the State remains a central actor within transnational governance (Andonova et al., 2017; Aykut, 2016; Kahler, 2017). However, questions of the authority and legitimacy of these new actors (Okereke et al., 2009) are often neglected with an enthusiastic narrative on transnational initiatives, namely marketization, privatization, technocratization (Gupta & Mason, 2016), financialization (Wilshusen & Macdonald, 2017), market-based mechanisms such as trading schemes (Bailey & Maresh, 2009), commodification of the commons (Rice, 2014), among others. Overall, "an intellectual hegemony of neo-liberal theorizing about environmental problem-solving" (Pattberg & Widerberg, 2015, p. 704) has influenced international climate agenda-setting (Ciplet & Roberts, 2017) and allowed the rise of economistic paradigms under the sponsorship of international organizations to have broad success (e.g., the sustainable development paradigm in the 1987 Brundtland Report, the Rio + 20 Earth summit's Green Economy paradigm (2012) and onwards). In sum, there have been "approximately three decades of economization of environmental governance in which the language and practices of economics have become integrated with nature protection and social reform" (Wilshusen & Macdonald, 2017, p. 1827).

The "transnational" governance cluster somewhat resembles the approach of ecological modernization whose proponents believe that most environmental problems, including climate change, may have technological fixes emerging from the right combination of policies and market incentives.

Unlike Cluster 3, however, Cluster 4 includes papers insisting on the emerging role of new actors and giving greater importance to variables such as participation of local communities and city networks. Although some articles on transnational governance take these initiatives into account, the relevant number of papers addressing climate governance (implicitly or explicitly) through the lens of the Ostromian polycentric ideal (Aykut, 2016; Fraundorfer, 2017; Ostrom, 2010; Pattberg, 2010) allows us to consider this subset of articles as a cluster per se. The distinctive features of this polycentric order include orchestration (Aykut, 2016), new instruments of transnational law (Fraundorfer, 2017), non-State and sub-State actor agency (Andonova et al., 2017), networked governance (Lervik & Sutherland, 2017), global city networks (da Silva & Buendia, 2016; Kahler, 2017), or "loops of learning" (Gupta, 2016; Newig et al., 2010). Some authors even suggest that polycentric and multi-level governance can be understood as synonymous (Peel et al., 2012).

Similarly, polycentricity has constituted the theoretical basis for recent literature on "adaptive" governance from environmental and sustainability studies, and the resilience literature of the ecological sciences (Vella et al. in Armstrong & Kamieniecki, 2017). Adaptive governance literature, grouped as Cluster 5, proliferated around 2010, where adaptation-based initiatives under the Cancun Adaptation Framework gained prominence within the UNFCCC. As highlighted by some authors, adaptation "was very much backstage for almost twenty years" (Termeer et al., 2016, p. 12). The growing importance of adaptation was confirmed in the 2015 Paris Agreement, in particular in article 7 devoted to adaptation action (UNFCCC, 2015). A significant corpus has focused on local experiences, using case studies on "local" or "urban" governance (da Silva & Buendia, 2016; de Faria et al., 2009; Heinrichs et al., 2013; Lervik & Sutherland, 2017; Mah & Hills, 2016; Rice, 2014; Schroeder et al., 2013) or focusing on the management of natural resources, for example, water governance (Barton, 2013). Key concepts such as panarchy,[1] scale, resilience, adaptation, tipping points, the Anthropocene, social-ecological systems, interdisciplinarity, and the already mentioned polycentricity (Armstrong & Kamieniecki, 2017; Barton, 2013; Berkes, 2017; Chaffin et al., 2016; Craig et al., 2017; Heinrichs et al., 2013; Hurlbert & Gupta, 2016; Kirschke & Newig, 2017; Nursey-Bray, 2017; Termeer et al., 2016) are central to this approach.

4.4 | Experimental and transformative governance

Finally, the "experimental and transformative" approach (Cluster 6) seeks to overcome the recurrent problems of climate governance with "learning by doing" mechanisms or developing strategies or "experiments" on a more local scale. This literature draws from the sustainability transitions theory (Kivimaa et al., 2017) and is more recent. It aims at a dynamic (Urperlainen, 2013) transformation (Kaisa et al., 2017) by "profoundly changing attitudes, norms, and framings" (Laakso et al., 2017, p. 10) within climate governance. This literature focuses on the normative aspects in climate governance, closely linked to the content of "good governance". Indeed, the notion of good governance "tends to refer to the endeavor of international organizations such as the United Nations and the World Bank to assess and measure the quality of governing institutions in developing countries" (Ansell & Torfing, 2016, p. 2). "Good governance" is still present in the debate in the form of positive values such as transparency, co-production of knowledge, fairness, inclusiveness, accountability, participation, deliberation, equity, mutual learning, legitimacy, and trust-building (Craig et al., 2017; de Faria et al., 2009; Delgado & Strand, 2010; Dorsch & Flachsland, 2017; Gupta, 2016; Laakso et al., 2017; Leal, 2010; Mah & Hills, 2016). In this respect, we find recent articles that suggest "good governance values" are the answer to the dilemma between flexibility and stability in adaptive governance (Craig et al., 2017), and a number of articles on urban, local, or transformative experimental climate governance committed to this approach (da Silva & Buendia, 2016; de Faria et al., 2009; Kaisa et al., 2017; Mah & Hills, 2016). Some have a less normative approach to the super wicked problem of climate change, proposing experimental and transformative solutions as alternatives. The literature inspired by the Science and Technology Studies on the role of scientific or lay expertise or/and co-production of (situated) knowledge (Allan, 2017a; Allan, 2017b; Boyd, 2010; Leino & Peltomaa, 2012; Van Kerkhoff & Pilbeam, 2017) requires visionary thinking to engage all the actors involved in climate governance and suggests knowledge is a dimension within the study of climate governance that cannot be neglected and should be mobilized to shape and imagine possible futures.

4.5 | Climate governance matrix

The clusters are organized into a matrix to better understand the aims and approaches of each (Figure 2). The horizontal axis indicates the ultimate goal of the governance clusters from a more conservative approach aimed at incremental socio-technical improvements within the social system, to a more radical and critical perspective aimed at socio-technical transformations. The vertical axis shows the degree of community influence allowed or encouraged within each cluster, as opposed to institution-based approaches to governance. The resulting four quadrants summarize the salient attributes of governance modes when they are implemented.

Most global governance practices are located in quadrant I (hierarchical), with aims more related to changes within the current socio-economic and institutional setup, reinforcing a hierarchical approach with a clear top-down perspective led by global institutions, such as the United Nations and its bodies, and nation States. At the other extreme, in quadrant IV (self-organized), polycentric governance is characterized by early inclusion of local actors with the aim of transformative socio-technical changes. Quadrant II (co-dependent) allows a high degree of local participation but with conservative goals.

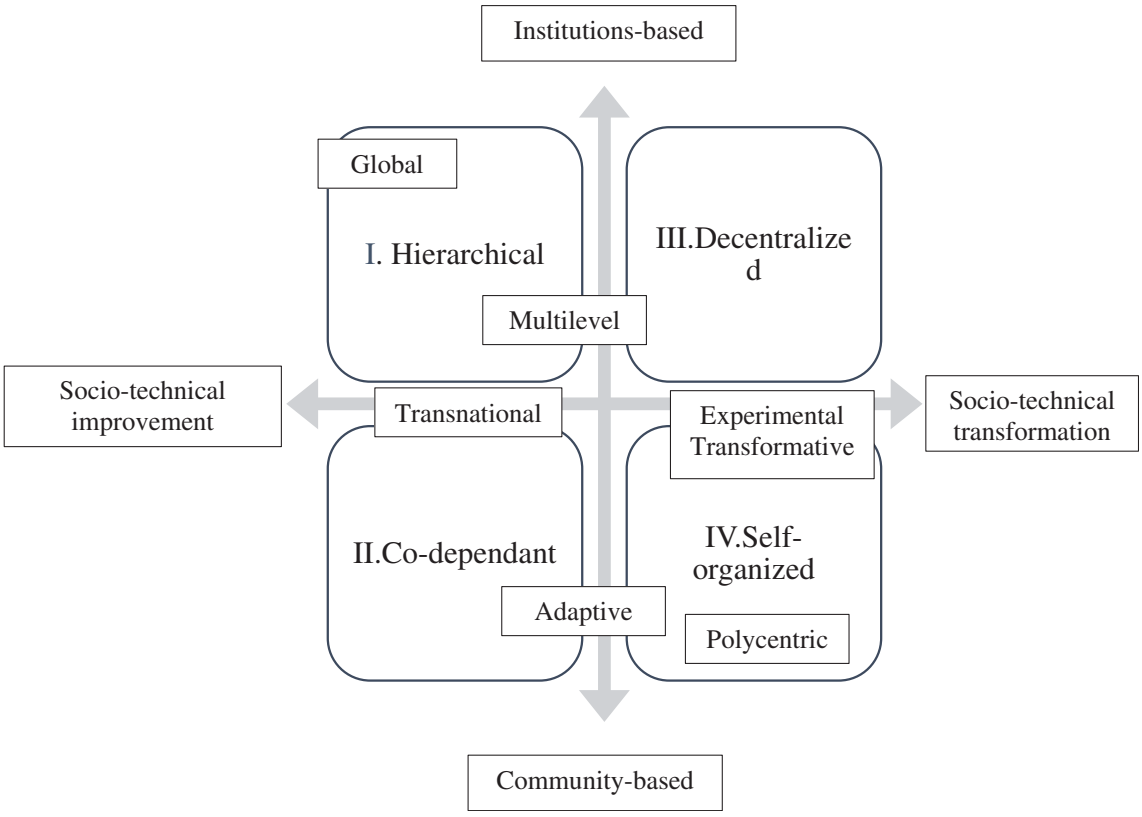

FIGURE 2 A climate governance matrix to classify the clusters proposed in this review. The *x*-axis shows the ultimate goal of the governance modes from socio-technical improvement to socio-technical transformation. The *y*-axis shows the tension between community-based and institutions-based approaches to governance. The resulting four quadrants summarize the salient attribute of these governance modes when they are implemented

Quadrant III (decentralized) approaches target socio-technical transformations guided and designed by institutions but including local actors at least in the implementation.

4.6 | The southern perspective in climate governance

As mentioned in Section 1, the Global South is an elusive concept and therefore hard to operationalize. However, to conduct this analysis we decided to follow the definition of Annex 1 and non-Annex 1 countries used in the KP considering that the former includes rich, industrialized countries usually associated with the Global North (plus Australia, New Zealand, and Japan) and the latter refers to developing countries, in particular from Latin America, Africa, and Asia. Following this, results showed that the first author of 82% of the initial 1,157 papers was affiliated to an institution in the European Union, the United States, Japan, Australia, or New Zealand (first affiliation as shown in the paper). In the 72 articles considered for the cluster analysis, we found authors affiliated to: European Union´ countries (42), United States (16), Australia (5), Brazil (3), Canada (1), South Africa (1), Korea (1), Chile (1), Singapore (1), and China (1). A breakdown by cluster, considering that some papers belong to more than one, shows that from the 12 papers of the multi-level governance group only one was led by a South Korean author with a co-author from the United States. The 24 papers in the Global Governance cluster include one article with all three authors from Brazil. In the case of Transnational Governance, there are 10 articles, and none of the authors is affiliated to the South. The Polycentric cluster includes 16 papers, from which 3 were written by authors affiliated to Singapore (single author paper), Chile (single author paper), and South Africa (both co-authors). Adaptive governance included a total of 17 papers from which one was led by a Brazilian author with a co-author from Spain and four papers with authors from Chile, South Africa (two co-authors), Brazil (three co-authors), and China (two co-authors). Experimental and Transformative Governance, with a total of 11 papers, includes one article written by authors from Finland (main author) with a co-author from Indonesia. None of the papers offered Southern perspectives and they did not use references related to decolonial studies, southern epistemologies, indigenous and rural knowledge, Latin-American psychology of communities, political ecology, among others.

5 | DISCUSSION

Overall, our results highlight common governance features through all clusters. The role of the State, although central, is questioned in its

exclusivity with new interpretations of the State's role as orchestrator of diverse actors as a growing number of types of actors in climate-related decisions emerge. There is acknowledgment of the greater complexity of interactions and power relations (Marquardt, 2017; Vink et al., 2013) between local and central government, local communities and local governments, and local communities and the private sector. Furthermore, most studies share the view that "things must be done differently." Most importantly for our purposes, we can now examine from the perspective of what is currently being done, how – in the context of this multi-actor, multi-level web of interactions that constitutes climate governance – things could be done differently to accommodate the Southern perspective.

5.1 | Climate governance and the Global South

This review shows that most articles on climate governance in mainstream literature are largely produced by authors from the Global North, which highlights the marginal place of the Global South in that literature. This might reflect the low academic production on this topic from the Global South or that a southern view on climate governance is more prevalent in other types of academic sources (e.g., other databases, books, reports, etc.). It might also be explained by the formula used, although the research focus was on exploring the mainstream literature and keywords were selected to cover this topic's fundamental components. In any case, scarce references to alternative theoretical lenses to account for southern realities were found within the climate governance literature, which disregards, for example, the important corpus of decolonization studies, political ecology, or the so called "Southern theory" (Connell in Kane & Boulle, 2018, p. 1183). This is symptomatic of the state of the art on this matter, which neglects the importance of theorizing from the situated realities in the South, beyond being simply the source of data, empirical work, or case studies (Kane & Boulle, 2018, p. 1180).

This is important because alternative theoretical approaches "challenge the orthodoxy of global knowledge production" (Connell in Kane & Boulle, 2018, p. 1183). Ultimately, if "in the human state of being in the world, knowing and acting are one: to know is to act; to act is to know" (Hulme, 2018, p. 333), climate action in southern countries can be strongly diminished by local knowledge production underrepresented in mainstream literature, with little visibility and influence of results accounting for local challenges and aiming at proposing adequate solutions to their context-related situations in terms of national development policies and climate change measures (Kane & Boulle, 2018). Indeed, as Haraway (1988) notes, it is relevant to "seek (...) partial sight and limited voice – not partiality for its own sake but, rather, for the sake of the connections and unexpected openings situated knowledges make possible" (p. 590). Those attributes highlighted by the Southern theory, such as "non-prescriptive" and "non-colonial" approaches, south–south knowledge sharing and learning and "communities of practice" (Kane & Boulle, 2018), then, appear essential for climate governance theory and practice.

5.2 | Climate governance rationales

Promising approaches from a Southern perspective that consider local experiences and local governance include the experimental approaches and polycentricity, which constitutes the basis for adaptive governance. These two approaches share two characteristics: the role that knowledge plays in the matrix of change and the local scale on which these processes can be registered. The recognition of knowledge interfaces and the situatedness of actions seem to be key elements in legitimizing governance innovations prior to their articulation in broader networks or up-scaling strategies (Leino & Peltomaa, 2012; Van Kerkhoff & Pilbeam, 2017). One problematic aspect of adaptive governance, though, is the strong link to climate multilateralism. The adaptive capacity and its attributes of flexibility and self-organization are central elements for creating open-ended modes of governance capable of responding to situations of change and stress. However, its use by organizations that carry out climate change adaptation strategies – international organizations, national climate change agencies, academia, and NGOs – has instrumentalized the concept within governance practices that do not question the production and consumption modes in which these practices are embedded. Furthermore, they focus on preparedness for situations of stress and change instead of proposing incremental or radical changes in lifestyles and modes of social organization (Blanco, 2016; Pelling, 2010).

Moreover, although it sounds "appealing," the polycentric approach to governance, based on the idea of solving the "tragedy of the commons," may not so easily be implemented in Latin America where authoritarian, individualistic, and top-down policies and intitutions have historically prevailed and, to an extent, are part of the dominant local culture along with social movements pushing for more participation and direct democracy (Cuevas, 2014; Fabricant, 2010; Moulian, 1997; Ruiz, 2019; Sapiains, Ugarte, & Aldunce, 2018; Svampa, 2008). Some authors (Aykut, 2016; Marquardt, 2017; Okereke et al., 2009) show that governance modes are strongly influenced by the differential opportunities to participate in decision-making for different stakeholders considering resource disparities (human and financial), cultural issues, political positions, and institutional arrangements favoring or not a greater influence of non-State and sub-national actors on climate change policies. In societies that have experienced long periods of authoritarian and military governments and form part of the Global South, like Latin America, community participation can be limited culturally (e.g., hierarchical mindsets), institutionally (e.g., non-binding participation systems), socially (e.g., long working hours), and psychologically (e.g., diminished sense of empowerment), affecting the interaction between stakeholders, the levels of trust among them, and ultimately the motivation and possibility to get involved in such activities. The interactions between different stakeholders and diverse types of knowledge and the associated power relations constitute an area of research that should be of growing importance in climate governance, considering, for example, that rural and indigenous communities in the Global South are at the forefront of climate change impacts and women, especially of low-income, are considered among the most vulnerable.

On the other hand, experimental governance approaches commonly embrace radical lifestyle changes, challenge dominant values, and allow new actors to enter (Kivimaa et al., 2017; Laakso et al., 2017), while recognizing these changes can be partial, fragmented, or localized. They are actions that can generate "small wins" and still contribute to a "big dream" (Urperlainen, 2013). The difference between radicalism and the incrementalism that experimentation can bring represents an important ideological contrast, but in general the available literature seems to focus on the degree of effectiveness of these experiments on practical transformations that can be up-scaled, when it comes to bottom-up proposals, or down-scaled when the experimental arrangements are top-down (Kaisa et al., 2017; Laakso et al., 2017). An important part of this literature seems more pragmatically oriented to facilitate processes of transitions towards sustainability, with an emphasis on "learning and processes" not to ensure success, but rather to explore forms of organization that facilitate transitions towards sustainability (Kivimaa et al., 2017; Laakso et al., 2017).

The affinities of adaptive and experimental climate governance are in their theoretical origins: both emphasize the importance of situated knowledge, flexibility, and the capacity for self-organization of the actors and systems from which they emerge or to which they give rise. However, they differ in their adherence to the principles of transformation of these systems, through radical or incremental possibilities. Adaptive governance does not actively promote deliberate transformations (O'Brien, 2012), nor challenge central aspects of production and consumption regimes, something necessary following Gupta's definition of climate change as a super wicked problem (Gupta, 2016). This is particularly clear when adaptive governance focuses on accommodating climate risks rather than tackling root causes (Pelling, 2010), but it can be effective in leading social groups to be prepared for situations of stress and change. Experimental climate governance must prove its value in the long term, since only in retrospect can we assess the transformative capacity of certain actions, artifacts, or forms of organization in response to the challenges of climate change.

5.3 | Scientific evidence and climate governance

Among the key aspects of climate governance presented in this review, issues related to participation and the role of science are critical for the implementation of any governance approach that considers a Southern perspective. The literature review, however, shows that participation in the production of scientific evidence for climate governance remains largely confined to selected groups of scientists and experts, mainly from the Global North. Despite efforts to include diverse disciplines, geographical representation, and topics, the type of knowledge involved in climate governance is predominantly formal science, produced in universities and research centers in Europe, the United States, and Australia. The literature acknowledges the Intergovernmental Panel on Climate Change (IPCC) as the most influential organization in climate governance and its creation demonstrates recognition of the importance of scientific evidence in climate-related policy processes and, also, the political involvement of science in climate change. Most IPCC authors, however, can be traced to OECD or Annex 1 countries, revealing a particular "geography of climate science" (Mahony & Hulme, 2016).

Yet, although scientific knowledge and scientists are recognized as relevant to climate governance, the literature shows a widespread perception of limited influence in decision-making towards solving climate challenges. The scientific community in the Global North shares a sense of frustration because scientific findings have not resulted in major policy changes. Resolving this tension has become a research motivation in itself (Hoppe et al., 2013; Koetz et al., 2012; Van Bommel et al., 2016; Van Kerkhoff & Pilbeam, 2017). Only a few articles in the review reflected on the role of scientists in framing the climate problem (Allan, 2017a; Boyd, 2010), in participating through transnational organizations such as the IPCC, or on exploring the power relations involved in science involvement in climate governance (Vink et al., 2013). None of the articles refers to the particularities of the relations between science and climate governance in contexts with small local scientific research communities. The latter along with less institutionalized science advisors in governments in southern countries defines another important difference with the North. For example, a place for formal academic science is acknowledged in the Climate Change Law proposal of the present Chilean government. However, as in most of the Global South, the country's funding for scientific research is limited, allocated mainly through competitive funding and explicit demands for usable science. Therefore, despite the recognition of science in climate governance, the financial limitations to developing a strong research community restrict these efforts. Any new governance approach should redefine the importance of local science and increase allocation of resources for research.

5.4 | Climate governance challenges for the Global South

Our results do show growing acknowledgment of the role of power relations in understanding the challenges and limitations not only of traditional top-down approaches to climate governance but also of bottom-up ones. The inherent dynamics of power both within the international system and at sub-national levels can be seen even in policy writing, where power relationships are generally neglected, assuming a shared belief in collective action for common good in the common interest (Biermann & Pattberg, 2012). In this scenario, some authors (Okereke et al., 2009) understand power as a relational phenomenon constituted in and through social relations, rather than something that some privileged groups or people own, to observe how international and sub-national interactions are defined and can be used as an alternative pathway to modify them. From this perspective, a governance system should guarantee or at least levels the existent power inequalities between stakeholders that exists at both the international level and within each country, especially in the Global South.

Although this review suggests a certain degree of optimism about the potential of initiatives to overcome or at least lessen the impacts of the ongoing crisis of multilateralism and to increase the role of the Global South, the pertinence and viability of these new approaches in many developing countries is still unclear. As Gupta (2016) observes, diversifying participation including more stakeholders in climate governance, along with a central role of science, is necessary considering the lack of consensus, the current unstructured characteristic of the problem, and the super wicked features of climate change. However, the shapes climate governance can take from a Southern perspective are still blurred. The Global South must certainly move away from just implementing and evaluating northern formulas. This does not mean rejecting everything that comes from the North, but rather establishing dialogue between situated knowledge and dominant theories, allowing room for experimentation, social learning, and transformation, and recognizing the importance of cultural, social, and psychological differences. The South must start to act based on innovation, (situated) problem-solving, and being at the forefront of climate action globally (Honty & Gudynas, 2014). Concomitantly, the Global South should oppose climate change geopolitics that imagines a universal being under the "zero carbon citizen" umbrella and defines specific ways of knowledge production and decision-making (while excluding others) so as to generate a counter representation of climate change from multiple perspective. These perspectives should include women and indigenous and rural communities in its approaches, redefining how developing countries can tackle this problem considering the ongoing global scenario (Ulloa, 2017). Finally, reshaping climate governance towards a more participatory and inclusive framework provides an opportunity to rethink the way democracy is understood in most of the Global South and experimenting new situated ways to organize society.

6 | CONCLUSIONS

This literature review has identified and characterized six distinct governance clusters in the mainstream literature on climate governance: global, multi-level, adaptive, transnational, experimental/transformative, and polycentric. The first three reflect how participation occurs, whereas the last three focus on whether improvements or significant transformations are urged. Distinguishing between these approaches is needed to advance towards a different – more desirable – state of affairs when confronting wicked or complex problems like climate change. The literature shows addressing climate change demands an approach in which the State does not act alone. Different disciplines and perspectives must be integrated, a wider and greater participation of diverse stakeholders must be promoted, and policy making must reflect inclusion of new actors. Our review suggests that insights and practices for better governance are moving into the mainstream in many parts of the world. Important advances include considering the interests of more actors, pushing towards more significant participation, better coordination among different levels of decision-making, more and better scientific and informal evidence, and developing strategies to deal with imbalances in power relations and legitimacy.

Although there is much to learn from mainstream literature on governance, we observed an absence of perspectives from the Global South. Dedicated efforts are needed to build a Southern perspective on climate governance. This implies not only producing more knowledge from situated experiences in these regions but also unpacking current notions and practices of climate governance through the critical lenses of theories already existing in the Global South: decolonial studies, political ecology and political ontology, among the most relevant. As our review showed, this literature is underrepresented in mainstream databases when climate governance keywords are the search criteria. A review of different academic sources should also be included in next steps to explore the state of the art on this matter in the Global South, expand our toolbox, and better define the shape of our region's response to this super wicked problem.

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ORCID

Rodolfo Sapiains https://orcid.org/0000-0003-0366-5553
Cecilia Ibarra https://orcid.org/0000-0003-1290-9281
Guadalupe Jiménez https://orcid.org/0000-0001-5946-9645
Raúl O'Ryan https://orcid.org/0000-0002-6148-5473
Gustavo Blanco https://orcid.org/0000-0002-4980-3424
Pilar Moraga https://orcid.org/0000-0001-8847-8559
Maisa Rojas https://orcid.org/0000-0002-5985-1905

ENDNOTE

[1] Panarchy assumes the idea of nested sets of adaptive cycles (cf. Craig et al., 2017) or embedded scales (pan-archies) (cf. Berkes, 2017).

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