

7 Polycentric governance and climate change

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7.1 INTRODUCTION

More than 30 years ago, building on insights from the natural sciences, John Dryzek was one of the first social scientists to document the core features of modern environmental problems and to reflect on the implications (Dryzek, 1987, pp. 26–28). He suggested that there is an increasing realization that ecosystems interact with other ecosystems. Ecosystems also have emergent properties, which means that their behavior is not reducible to knowledge of their constituting parts. And ecosystems self-regulate on the basis of feedback loops within the system. As a result of these properties, environmental problems display a range of characteristics (Dryzek, 1987, pp. 29–33). They are *non-reducible*, which means that resolution cannot be guaranteed by resolving only a part of the problem. They are *highly variable* in a temporal and spatial sense, which means that the extent of the problem or the seriousness of it might not be the same in different places and at different points in time. They exhibit a *high degree of uncertainty*, which refers to the difficulty of knowing current and future conditions of ecosystems, but also of the effects of policy interventions. They are also *collective* in nature, meaning that ecosystems are often shared between human communities. Taken together, these characteristics render problem-solving a very *complex* task. With the term ‘complexity’, Dryzek referred to the existence of a wide variety of elements and interactions in the environment. The fact that purposeful components exist within ecosystems (this he terms ‘organized complexity’) implies that systematic and variable interactions between system elements take place, interactions that

cannot be captured by general laws or deduced from broad, statistical analysis (Dryzek, 1987, pp. 28–29).

Climate change is a prime example of the type of modern environmental problem that Dryzek had in mind, even if at the time he was writing, climate change was relatively unknown. Climate change cannot be reduced to one single parameter such as carbon dioxide emissions; it is deeply interlinked with many other environmental issues such as deforestation, air pollution and ocean acidification. In addition, the impacts of climate change will vary across time and space. Whereas the majority of impacts are negative, for some sectors in some regions they may be perceived to be beneficial, at least in the shorter term. Climate change is bedeviled by uncertainty: ‘the’ climate system has many moving parts – and their interactions are not yet fully understood and hard to predict. The relatively recent discovery that there is a relation between carbon dioxide emissions and acidification of the oceans is a good case in point. If one also factors in the complexity of the social systems that give rise to climate change (diverging norms, interests, etc.) then its full complexity starts to become obvious.

7.2 CRITERIA FOR GOVERNING

In this chapter we are concerned with the governance of climate change. Following Kooiman (2003) we see governing as social activities, involving government and nongovernment parties, that are aimed at (re)solving problems, or at least at reaping the opportunities that such problems create. Governance requires the creation of institutions – in other words new rules, organizations, and policies that give stability to these directed behaviors. Thus the term governance describes ‘the patterns that emerge from the governing activities of social, political and administrative actors’ (Kooiman, 2003, p. 2). It concerns ‘the ways and means in which the divergent preferences of citizens are translated into effective policy choices, about how the plurality of societal interests are transformed into unitary action and the compliance of social actors is achieved’ (Kohler-Koch, 1999, p. 14).

Dryzek (1987) approached governance from a functionalistic perspective; that is, he was keen to understand the fitness for purpose of various governing institutions. We will follow his approach here, taking his criteria for what he termed ‘ecologically rational decisions’ (Dryzek, 1987, pp. 45–54) and applying them to climate change governance. His first criterion is that governing institutions will function in an ecologically rational way in the presence of negative feedback. Negative feedback refers to the ‘deviation-counteracting input within a system’ and its presence is highly desirable, because it provides stability to systems (Dryzek, 1987, p. 47). Dryzek suggests that negative

feedback can take two forms: control mechanisms can be diffused throughout a system (which has ecological and social elements) and in that sense provide for 'automatic' corrections. But in addition he suggests that in a 'teleological system' (a system with some level of deliberate central control) monitoring of outputs can take place, and counteracting interventions can be issued. In Dryzek's terms: 'in ecological systems, there will be spontaneous homeostatic processes operating (...) to which any symbiotically rational system should be able to react as appropriate. (...) The maintenance of an anthropogenic subclimax requires continual intervention, and therefore continual information about and reaction to the results of intervention' (Dryzek, 1987, p. 47). In this chapter we only write about social systems, but we shall be referring to both forms of negative feedback in the sense that we look at self-organizing responses, and the way feedback about potential climate deviations to governors has been organized. Dryzek's second criterion – coordination – is that governance actors (from the public, private and civil realms) should align their behaviors so that their actions do not cancel each other out, whilst preventing free-riding. Coordination is also needed to make sure that solutions to one element of the climate problematique are not at the expense of creating new problems elsewhere. Third, institutions must be either robust or flexible, to cope with variability in ecosystems. Robustness means that institutions function well across a wide range of conditions. Flexibility is the ability of an institution to adjust as environmental conditions change. This means, for instance, that new technologies to understand novel environmental signals must sometimes be adopted, or new forms of coordination instigated as and when needed. And finally, institutions must have the capacity to steer social-ecological systems back to a preferred original state, a quality that Dryzek refers to as resilience.

The work of Dryzek can in some ways be seen as a precursor to the work on resilience (Folke, 2006), on complex adaptive systems (Duit & Galaz, 2008), and the work on adaptive governance (Huitema et al., 2009) that followed somewhat later. We use Dryzek's framework because it focuses more strongly on governance than the literature on resilience generally does, and because it currently offers a more refined set of criteria than the literatures on complex adaptive systems or adaptive governance. Like Dryzek, we will use these criteria to assess the efficacy of polycentric climate governance, and we do so at two levels: 1. the conceptual level (do the theoretical advantages of polycentric governance fulfill the criteria that Dryzek proposed?); and 2. the empirical level (is the actual performance of polycentric governance really up to the mark?). These questions are highly relevant now that a polycentric approach to climate governance is increasingly seen as a way forward in the climate change debate (for an overview of the debate see Jordan et al., 2015, 2018). In addition, Dryzek's criteria are highly relevant here because they fit

with the nature of climate change problems, and can thus provide a sturdy test of polycentric governance ideas.

7.3 POLYCENTRIC GOVERNANCE: THEORETICAL PEDIGREE AND CORE PROPOSITIONS

The term ‘polycentric order’ was originally coined by Michael Polanyi in the 1950s, and refers to the outcomes and processes of mutual adjustment that go on between independent units (Polanyi, 1951). Vincent and Elinor Ostrom (e.g. Ostrom, Tiebout, & Warren, 1961) were the first to note the relevance of this insight for the practical challenge of governing, in their case the delivery of local services in cities in the United States. Their work appeared in an era of rapid expansion of the federal government and went against the spirit of the time by pleading for the self-governing capacity of (local) communities, and their capacity to learn from each other (without one dominating the other). Polycentricity is about the presence of

‘multiple governing authorities at different scales (...) Each unit within a polycentric system exercises considerable independence to make norms and rules within a specific domain (such as a family, a firm, a local government, a network of local governments, a state or province, a region, a national government, or an international regime)’ (Ostrom, 2010, p. 552).

Independence does not mean that units ignore each other. Indeed, Vincent Ostrom et al. argued that to: ‘the extent that [independent centers of decision-making] take each other into account in competitive relationships, enter into various contractual and cooperative undertakings or have recourse to central mechanisms to resolve conflicts, the various jurisdictions ... [polycentric governance] may be said to function as a “system”’ (1961, p. 831).

The logical opposite of polycentric governance is monocentric governance – as in a governing system controlled by a single unitary power. Whilst no governance system is fully mono- or poly-centric, they can be seen as the poles on a spectrum of governing types. It has been helpfully argued that polycentricity should not be understood as a binary variable (Galaz et al., 2012) i.e. it describes the degree of connectedness or structuring of a polycentric domain and/or system *vis-a-vis* other systems. The debate on how to establish or measure the level or degree of polycentricity within a system is far from resolved (Aligica & Tarko, 2012). And Jordan et al. (2018) maintain that a single, canonical summary of the essential features of polycentric systems, or a set of clearly articulated hypotheses, does not exist. This is problematic if one wants to use a polycentric governance lens as a framework for description

and analysis, let alone to derive policy prescriptions. But Jordan and colleagues do take one step in this direction by deriving a list of five propositions that aim to summarize the essential building blocks of polycentric thought. These are listed in Table 7.1.

Table 7.1 The propositions of polycentric governance thinking (adapted from Jordan et al. 2018)

Proposition	Short description
1. Local action	Governance initiatives self-organize.
2. Mutual adjustment	Governing units spontaneously collaborate.
3. Experimentation	Experimentation facilitates innovation and learning.
4. Trust	Trust builds up quicker when units self-organize.
5. Overarching rules	Local initiatives work best when there are overarching rules.

The first proposition – local action – revolves around the idea that governance initiatives are likely to take off at the lowest possible level (i.e. closest to the problem) through processes of self-organization (Jordan et al., 2018). The individual actors – including families, firms, local governments, networks of local governments, regional and national governments – plot their own actions, based on their preferences, and respond to external stimuli. Solutions can be delivered by different combinations of local actors self-organizing at different scales; other actors will choose accordingly (McGinnis & Ostrom, 2012, p. 16). Hence, the optimum scale of intervention is not necessarily the same for all measures – some may be better delivered at one level, others at another level. Instead of trying to remove overlapping jurisdictions by integrating governing units into larger bodies, polycentric thinkers try to identify how they coordinate themselves through less hierarchical arrangements (Aligica & Tarko, 2012, p. 242).

The second proposition – mutual adjustment – is about the way in which units in a polycentric system communicate with one another. The assumption here is that once the constituent units have emerged they will interact with one another (Jordan et al., 2018). Therefore, polycentric systems are often likened to complex adaptive systems – mutual adjustment is what allows them to adapt automatically to changing external conditions, their actions in turn feeding back on other actors (see for instance Tarko, 2017). Jordan et al. (2018) suggest that scholars of polycentric governance consider the diversity of approaches that are tried out an important advantage of a polycentric governance system. It implies that actors can and will try out their own locally tailored solutions, and that they will explicitly evaluate their outcomes. Thus,

the third proposition is that experimentation will take place. The expectation here is that, through the process of mutual adjustment, experiments in one setting will actively inform experiments in others, and that over time common methods for assessing costs and benefits will be established so that best practices can be shared.

The fourth proposition relates to trust: polycentric governance thinking assumes that trust is more likely to build up when units are able to self-organize. In addition, greater levels of trust will mean that collective ambitions can scale up over time. Because the emphasis is on local action, participating individuals know and trust each other. In turn, this makes further trust-building easier. When trust is more plentiful, scholars of polycentricity argue that the standard assumption within rational choice theory – that actors maximize their short-term interests – will not apply (Ostrom, 1998).

The fifth and final proposition concerns the overarching rules (Jordan et al., 2018). Such rules – sometimes referred to as ‘the rule of law’ – are assumed to provide a means to settle disputes and aid conflict resolution. In doing so, they protect diversity and facilitate mutual adjustment. One question that has sometimes be asked is whether they emanate from the local level or from an external authority such as a federal government. The answer to this is not fully clear in the literature.

The notion of polycentric governance was first connected to the issue of climate change by Elinor Ostrom in a World Bank working paper (Ostrom, 2009, 2010). Her remarks should be seen in light of the prevailing HDH dissatisfaction with the development and performance of international climate regime established by the United Nations Framework Convention on Climate Change (UNFCCC). Since its founding in 1988, the political complexities noted in Section 7.2 have made the process of reaching global agreement very hard. The 2009 Conference of the Parties to the UNFCCC held in Copenhagen was widely regarded as having been a particular failure for not reaching a sufficiently ambitious global agreement. As a consequence, many parties started looking at more polycentric approaches than the 1997 Kyoto Protocol, which was relatively monocentric (van Asselt, Huitema, & Jordan, 2018; van Asselt & Zelli, 2018). Some practitioners and academics started focusing on the potential roles of cities or regional governments such as regional governments, whereas others suggested a greater role for private companies, investors, civil society, etc. The failure of Copenhagen provided a window of opportunity for such ideas to be pushed with greater force and vigor. Importantly, Elinor Ostrom posited that the ‘new’ and more dynamic forms of governing that were appearing around, below and to the side of the UNFCCC, were not a minor accompaniment to the UNFCCC but part of an entirely different approach to address climate change at the international level.

7.4 CAN POLYCENTRIC GOVERNANCE CONTRIBUTE TO THE RESOLUTION OF MODERN ENVIRONMENTAL PROBLEMS?

In this section we will discuss whether polycentric governance, at least in theory, fulfills the criteria that Dryzek formulated. In short, these criteria relate to arrangements for negative feedback, coordination, robustness and flexibility, and resilience. The test we perform is one of logic and reasoning, drawing on the existing literatures on polycentric governance where relevant. Table 7.2 below summarizes our observations, and we follow up with explanations, drawing on Jordan et al. (2018, 2015).

The notion of local action as embedded in polycentric governance thought clearly speaks to the idea that social systems ‘automatically’ correct themselves and thus provide for negative feedback in the social system. These actors are expected to take measures on the basis of the fact that they seek to avoid damage, or because they seek to reap co-benefits from climate change measures. Information about the deviations that are occurring within a system (and that can help kick-start negative feedback processes) can come in various forms, some visible to the plain eye at local levels, some requiring extensive scientific equipment. Ostrom (2009) pointed out that local actors can ignore information about deviations such as climate change even when they are in plain sight, and observed how governments and international organizations can do so as well (2009, p. 23). In essence, Ostrom argued that those who produce information about feedbacks should communicate their findings not only to global decision makers, but to governors at multiple levels – in the hope that at least some of these levels will not ignore them. And because local actors experience the effects of climate change directly (they have local knowledge of it so to speak), they might actually be less inclined to ignore information about feedbacks than those at higher jurisdictional levels. But one under-explored dimension here is the way signals are produced and interpreted in the first place, especially signals that are not in plain sight but that can only be perceived by scientific techniques such as satellite observation. Nation states and international organizations, amongst others, have the resources to help organize and finance capabilities in this respect, but why they actually would organize such capabilities is less clear from Ostrom’s analysis.

Information about feedbacks can also pertain to the actions (measures, policies) that actors take vis-à-vis climate change and their effectiveness. The question then becomes one of how the evaluation of these measures should be organized. Ostrom was hopeful that action would come from multiple scales at the same time, and that policy makers would not reply on one single scale: ‘devising policies related to complex environmental processes is a grand challenge and that reliance on one scale to solve these problems is naïve (...)’;

Table 7.2 Does polycentric governance meet the criteria?

Criterion	Considered in the literature on polycentric governance?	Critical issues	Will PG meet the criterion?
Negative feedback	Yes, in the sense that local actors (companies, communities, etc.) are assumed to self-organize on the basis of climate signals. It is assumed that scientific expertise will organize as demand grows.	Will collective action dilemmas arise, and will signals lead to collective action? Does the technical ability to receive and interpret signals exist at all levels?	Supposedly – local action will “automatically” take place. Actors might also ignore feedback however. Connecting global insights on deviations in the climate system to local needs and situations is challenging however.
Coordination	Yes, through mutual adjustment, ability to form collaborations at appropriate scale.	How considerate are local actors of other actors? Are co-benefits of climate action a sufficient incentive?	Somewhat - climate change measures tend to have co-benefits, but this will help only so much. Coordination will be less likely with actors further away.
Robustness/ flexibility	Yes, through experimentation and learning, by the ability to form collaborations at the perceived appropriate scale, and by having variability in approaches.	How will local learning be organized, how will upscaling take place? What about persistent inactivity by some groups of local actors?	Robustness: not so much, there is no belief in one-size fits all solutions. Flexibility: yes, when openness and trust dominate; otherwise not.
Resilience	Not much, although trust building could create solidarity between local actors.	Recovery from extreme weather events that overpower local problem-solving capacities.	Unlikely, unless risk pooling and collaboration between local actors can take place.

subsequently '[d]ealing with the complexity of environmental problems can lead to 'negative learning' by scientists and policy makers at all scales (...)' (Ostrom, 2009, p. 23). But she is less clear on the way in which local actors (especially citizens, families, companies, and communities) evaluate their actions and those of other actors. And what about the politics of evaluation – for instance the fact that local actors might simply want to suppress feedback information? Polycentric governance theorists have remained silent on these matters, even when they expect eventually a selection of best practices to emerge from such evaluations – a process Elinor refers to as certification. Here she has faith in the private sector: 'there is a need for skilled personnel to certify that a project does indeed reduce ambient CO₂ by some specified amount over a defined time period. A very active new industry of "global consultants" has emerged' (Ostrom, 2009, pp. 30–31). At the same time, citing others she notes that 'while many consultants do have good scientific training, the greatly increased need for certification has generated opportunities for at least some contractors lacking appropriate skills to earn money in the new "certification game"' (Ostrom, 2009, pp. 30–31). Sovacool and Brown (Sovacool & Brown, 2009, p. 14) report on one study that evaluated 93 randomly chosen Clean Development Mechanism projects and found that 'in a majority of cases the consultants hired to validate CERs did not possess the requisite knowledge needed to approve projects, were overworked, did not follow instructions, and spent only a few hours evaluating each case' (Ostrom, 2009, pp. 30–31). How systematic evaluation by this 'new industry' is then, is a question of concern.

The second criterion – coordination – is elaborated in various ways, but the key operational term is mutual adjustment. The first publications on polycentric governance were concerned with service delivery by local governments (see Ostrom et al., 1961). This work suggested that coordination between local actors (in this case at the municipal level) is about finding a balance between a certain level of services and local tax levels, with inhabitants 'voting with their feet'. In keeping with these origins, much of the writings of Elinor Ostrom (see Ostrom, 2005) emphasize democratic decision-making by local actors like municipalities, and above all the development of solutions that fit with local political preferences. The more troubling question is of course what to do if and when those political preferences imply that nothing should be done. Elinor Ostrom is relatively certain that this is an unlikely outcome, because climate change measures tend to have co-benefits (for human health, for air quality, etc.). But the question is whether co-benefits will 'do the trick' in all cases (think of local cattle ranchers in the Amazon) and, if so, whether it leads to the right type of activity. Coordination between local actors is another issue of interest. Polycentric governance theorists assume that local actors will create linkages and collaborations that allow them to address problems at the right scale whilst avoiding problem displacement. This means

that communication channels must exist between all local actors, and that through these communication channels they can come to some form of collective understanding about the relevant scale of the problem. Mutual adjustment is meant to prevent free-riding in the sense that local actors who do not keep their promises, will be punished by the other local actors, for instance by being excluded from future beneficial collaborations.

However, a number of unanswered questions emerge also in this case. For instance: to what extent will local actors resist the urge to simply displace their problems towards others, especially when local social bonds are strong, and include shared world-views and preferences? What if those affected by their actions are not close to them, but to be found elsewhere in the world? What if all local actors contribute to the problem to some extent, and requests to change behavior are met by counterclaims to do the same? And what if the political preferences of local actors differ strongly – how can they agree on the best way forward? Coordination has thus been identified as an important topic in polycentric governance thinking, but the details of how it actually works have not been fully elaborated.

The third criterion – robustness or flexibility – is important from the perspective of coping with the central theme of this book – problem complexity. As indicated, robustness means that institutions function well across a wide range of (environmental) conditions. This issue does not attract attention from academics working on polycentric governance – where a more prominent main concern is the fit between the political preferences of local actors and governance approaches. Some theorists assume that local diversity implies that back-ups and alternatives for existing institutions are always available (Perrow, 1984). This indicates that the mechanism for robustness builds on the replacement of institutions rather than on institutional performance under various conditions. Replacing institutions does require flexibility of course. As stated, flexibility is the ability of an institution to adjust to the demands placed on them by changing environmental conditions. Polycentric theorists elaborate on this through an emphasis on experimentation and learning (Ostrom, 2005). Their core idea is that polycentricity offers space for natural experiments, because a variety of approaches can be trialed at the same time in real life. Through continuous discussion, the best approaches are gradually identified, which can subsequently be scaled up to multiple settings (see Huitema et al., 2018).

However, some important questions linger. One issue relates to the connection between diversity and upscaling of identified effective approaches. If and when the local actor preference is not to take any action against climate change, the idea that they might seek to adopt ‘best practices’ from elsewhere becomes problematic, because evidence about what works is simply uninteresting. Similarly, local actors who are willing to do something about climate

change might radically differ in how they view the problem, and which solutions they prefer. As noted in Section 7.2, some local actors may see climate change mainly as a problem of mitigation, whereas others may be forced to focus on adaptation. Within those realms, local actors might favor collective solutions, or individual solutions, and they might prefer hierarchical modes of governance, or market-based solutions. All this makes upscaling of best practices more tenuous as there is no normative agreement and thus no agreement on what the term 'best' really means.

Finally, regarding the criterion of resilience, which refers to performance under conditions of continuous change, surprise and non-linear behavior. The term is not mentioned once in Ostrom (2009)⁶, although she does pay attention to the durability of institutions in her earlier work. Indeed, in her work it has often been the main dependent variable. But because the focus of that work was very much been on local institutions that were durable under stable conditions, it has strong limitations when it comes to the possibilities for making statements about resilience. Ecological circumstances (and changes therein) do play a role in her thinking on polycentric governance, and there are explicit statements that some problems can be handled very locally, whereas others require the involvement of actors located in higher institutional scales. There is no attempt by Ostrom to sort environmental issues and connect them to appropriate scales. In fact quite the opposite is common in the literature about polycentric governance. This body of work suggests that local actors will notice problems when they become too big for them to handle, and subsequently start collaborating to address them at higher levels. The key question then becomes how local actors (citizens/families/communities/companies, etc.) are about the nature of ecological processes and changes therein, as they relate to climate change. Certainly, for long-standing community institutions that have reached a certain equilibrium (in the sense of avoiding overexploitation of natural resources, etc.), changes in what might have been a relatively stable climate thus far might be problematic. Extreme weather events are expected to occur more frequently under climate change, creating previously unknown conditions, which may pose unique challenges to particular local actors and institutions. One classic prescription in the disaster management literature is to centralize responsibilities (Wolbers, Boersma, & Groenewegen, 2018) when extreme events strike, but in practice this may be at odds with the emphasis on decentralized responsibilities in polycentric thought. The effectiveness of polycentric governance institutions then depends on timely cooperation between local actors, and the wisdom to create such collaborations and higher order institutions before disaster strikes (for instance by pooling risks). Historical studies on water management and floods show that finding the right balance between centralization and decentralization is often a matter of trial-and-error learning (TeBrake, 2002). This suggests that for every durable local

institution, there may be many more examples of failed institutions that do not survive long enough to be studied by scholars.

In sum, it would appear that the notion of polycentric governance has some potential to address a wicked problem such as climate change. The main recurrent issue is how one combines the emphasis on democracy within local levels (such as communities or municipalities) with the need for oversight and assistance from higher jurisdictional levels. Within nation states, the answer to that question is often found in one or another form of sorting, with some issues determined to be suitable for local resolution, and others deemed to require regional and national control (federal and unitary states both engage in such sorting), but it is clear that polycentric governance scholars do not favor constitutional engineering from the top as has often happened within states, but rather assume that scale-sensitive solutions will emerge through self-organization from the bottom up. Whether this happens in practice (with or without the occurrence of crisis or disasters to trigger it) remains to be seen.

7.5 WHITHER POLYCENTRIC CLIMATE GOVERNANCE? A CONFRONTATION WITH EMPIRICAL INSIGHTS

In this section we discuss whether – and how – polycentric climate governance meets Dryzek’s criteria; not in theory, but in practice. We base this on the outcomes of a four-year project on Innovations in Climate Governance (INOGOV), as reported in Jordan et al. (2015) and Jordan et al. (2018). Our analysis here will focus on *mechanisms* – here defined as unobservable but empirically traceable processes that act as a cause in generating outcomes and which, in principle, do not need further elaboration as they are self-evident and self-explanatory (Biesbroek, Dupuis, & Wellstead, 2017). We look at the current global climate governance regime for clues as to whether certain expected mechanisms are in place (Table 7.2) that could help or hinder performance in light of the criteria.

The first issue concerns the way *negative feedback* occurs in polycentric climate governance, and one question to ask here is whether local actors (be they cities, companies, communities) have self-organized to act on climate change and why. The activities of local and regional governments have drawn considerable attention in the climate governance literature (see e.g. Bulkeley, 2013). Many local actors (cities, municipalities, states and provinces) address climate issues, sometimes in the context of an unwilling nation state, thus providing an alternative of sorts to inaction at the national level. Van der Heijden (2018) synthesizes the literature and suggests that they do so for four reasons: 1. cities are both a serious source and a victim of climate change; 2. cities have

much low-hanging fruit in climate action, making them places where much emission reduction can be reached at low cost; 3. thinking of green growth and ecological modernization is rising in cities; and 4. finally national political support helps urban climate action. The latter motive is contradictory to the notion of self-organization that is embedded in polycentric governance thought. Van der Heijden does not explicitly address which motivations are most dominant in practice, but he does indicate that the interactions between cities and other (government actors) must not be overlooked – citing the impact of Local Agenda 21 and national climate policies in Australia, which have both stimulated and required cities and regional governments to act. What do cities do according to him? He suggests that cities can be seen as experimental and innovative, since new processes and instruments are tried out. In addition, networks of cities have performed that function as a platform for exchange and learning, but also seek to influence international climate negotiations. Van der Heijden sees much to like, but also suggests that the writings about the roles of cities have initially been too positive. He writes that

[i]t is troublesome, however, that polycentric urban climate governance has been studied only in a relatively small number of cities, that we have a limited knowledge base about whether it really delivers on its promises, and that we have a very poor understanding of what this approach to governing means in areas with the very highest levels of urbanization, namely those in the global South, and particularly Asia and Africa' (van der Heijden, 2018, p. 93).

On the initiatives by companies, a good source of information is Green (2013). She sees lots of potential for initiatives from the private sector as a tool to reduce emissions. Specifically she studies private regulation, which is at stake, for instance, when companies oblige their suppliers by contract to reduce emissions. She shows how various large international companies are already making major contributions this way. Whilst she did not explicitly study the interactions between private and public regulation, she does suggest that private regulation should not only be regarded as a way of purely implementing public regulation. Private regulation can precede and pave the way for public regulation. However, she also demonstrates how power asymmetries affect these interactions – suppliers to major companies sometimes have no choice but to agree to its climate standards or face financial pressures. In settings like this, Green argues that what might be presented (or indeed appear) as a voluntary collaboration could in reality be accomplished by the exercise of power, which raises question about the way the rule of law is upheld under this form of polycentric governance.

Currently the source for most information on deviations in the climate system is a global institution, the Intergovernmental Panel on Climate Change

(IPCC). This institution synthesizes scientific information pertaining to global emissions and impacts, but it does not directly inform most local actors (citizens/families/firms/communities, etc.) about the consequences of climate change or pinpoint intervention options for them directly. In fact, it has long been argued that there is a disconnect between the global picture painted by the IPCC (see Pielke & Wilby, 2012), and the information needs of various local actors. A firmer connection requires ‘downscaling’ of such information, which is considered scientifically very challenging (see for instance Edwards, 2010) and which still remains an elusive goal for most countries, let alone regions, cities or communities. This does not, however, hamper too much the impact of the messages emanating from the IPCC’s work, because almost every one of its reports is received as a wakeup call and a call to action. The IPCC is able to make statements about climate change developments at the global and regional scales and at the level of climate zones, which is sufficient for actors to receive meaningful feedback. Information from the IPCC is often supported by observations from national scientific communities, and by local knowledge, which allow local actors to add detail to the general picture that IPCC provides, but also to take actions that they deem appropriate. Naess (2013) suggests that climate change observations from local actors correspond well with meteorological observations, and shows that such local knowledge helps reduce biophysical and social exposure to climate change, as well as helps reduce sensitivity to change and variability, and supports adaptive capacity. One of his conclusions is that external knowledge and national policies are viewed by local actors ‘in light of their own knowledge as well as what they can afford (...)’ (Naess, 2013, p. 104). He concludes, hopefully, that ‘local knowledge and social institutions are dynamic and changeable. Local knowledge and capacity are changing due to external and internal change processes (...)’. But he also finds that local communities can be ‘unruly’ in the sense that national policies can be ignored and that local institutions ‘are not necessarily socially just or leading to desired adaptation outcomes’ (Naess, 2013, p. 104).

Statements such as this point to the need for thorough *evaluation of measures and policies*, a theme elaborated by Schoenefeld and colleagues (2018) in their work on policy evaluation in polycentric settings. Their work focuses on the way member states of the European Union (EU) monitor and report on climate policies to the European Commission, which is in some ways a precursor to the more bottom-up process of governance ushered in by the Paris Agreement. EU member states have relatively strong policy evaluation capabilities, and yet even under these favorable circumstance, evaluation and reporting is plagued by ‘political concerns over reporting burdens and costs, but also struggles over who determines the nature of climate policy monitoring, the perceived usefulness of reporting information, and the political control

that policy knowledge inevitably generates' (Schoenefeld et al., 2018, p. 118). These are not the collaborative dynamics assumed by polycentric governance thinkers. Even though the literature acknowledges that local actors often compete, and thus might have motives not to share experience and evaluations, it does assume that, eventually, a veritable system of communication emerges.

At first glance, the different governance units in global climate governance, seem well *coordinated*. It is remarkable that, even given the dearth of data downscaled to the local level, so many local actors have organized around the theme. At the international level, treaties are the outcome of agreements between sovereign nation states. Here, the emphasis is largely on voluntary promises, but these promises tend to form the basis for further discussions, thus providing direction and anchoring for further state action (Kyoto Protocol, Paris Agreement). Whilst the resulting global arrangements are often depicted as top-down instruments (creating a 'global government'), the dynamic has always been relatively polycentric as states essentially self-impose emission targets after complex negotiations about responsibilities and burden sharing. The Kyoto protocol was more ambitious than the Paris agreement in its attempts to create a globally coordinated approach to task allocations to nation states, but the essential features of the two major agreements were not as fundamentally different as is often assumed (see van Asselt et al., 2018; van Asselt & Zelli, 2018). This means that nation states have always been able to step out of international treaties, and that enforcement is problematic (Biesenbender & Tosun, 2014). Unfortunately, this has led to frequent in-compliance and inaction, even by signatory states. Here, too, it would seem that polycentricity – now within nation states – comes to the aid. Setzer and Nachmany (2018) discuss how environmental non-governmental organizations are increasingly successfully going to the courts – part of the polycentric fabric of the state – to force states to fulfill their commitments.

Many local authorities are seeking collaborations with like-minded counterparts, creating collaborations and exchanges around the world (Bansard, Pattberg, & Widerberg, 2017). Collaboration between cities is influenced by shared challenges around issues such as service delivery, relationship to citizenry, and sustainability aspirations, including on climate change. Geographical distance hardly seems to be a determining factor when it comes to collaboration among cities. The search for partners in lesson-learning happens bilaterally but also in specialized networks such as the C40 Cities Climate Leadership Group, which opens up many new opportunities for cities to collaborate to find solutions globally. Much of this coordination is meant to exchange ideas on policy responses and solutions, with some cities and other subnational actors playing the role of 'hub' for others who seek to learn from them. Unfortunately, cities from the developing world are often heavily under-represented in formal transnational city networks (van der Heijden, 2018),

as are small and medium sized cities which may often lack the resources and political clout to convene on the same level as major cities. In that sense it may not be surprising that cities who adopt the ideas from other cities tend to copy ideas rather than develop their own approaches (van der Heijden, 2018).

Obviously, the role of a city as a hub in an international network requires the possession of an innovative potential, and a certain level of standing amongst peers. Interestingly, this dynamic does not lead to a universal agreement on 'best practices'. In fact, Matisoff and Edwards (2014) find that federal states in the United States operate in blocks that share a cultural and political outlook on the world. These blocks all have a leader (Texas is one, New York and California are too) but they innovate in diverging directions, in line with their political preferences. This suggests that there will be learning and optimizing in multiple trajectories because, even if all blocks do decide to work on climate governance, they will develop different approaches. The propensity to adopt such approaches is certainly not exclusively an effect of intrinsic motivation or co-benefits, the motivation is sometimes derived from 'outside' pressure, such as a policy from the national government. Local and regional governments sometimes wish to avoid national orders by developing their own approaches. For instance, in the context of the American discussion on emissions trading, several states (including California and Texas) worked on their own version of such a system in anticipation of a pending decision by the federal government to introduce such a system nationally. By the time this 'threat' disappeared, Texas had withdrawn its plans (which were apparently inspired more by external motivations), whereas California pushed its plans through (because of internal motivations) (Biedenkopf & Wettestad, 2018). In this sense local actors can clearly 'game' a polycentric system.

With respect to *robustness* and *flexibility*, the current patterns of climate governance provide some clues about the functioning of polycentric systems. Robustness is related to the ability to perform under a large range of future conditions. Political conditions are particularly salient here. The initial approach to climate governance was aimed at the construction of a truly global regime (multilateralism), an approach that held promise around the early 1990s. While progress was made along these lines (notably the adoption of the Kyoto Protocol in 1997), the multilateral approach has turned out to be susceptible to changes in the political climate in various countries, such as the United States, Australia and Canada. It is clear that a more polycentric system, in which many local jurisdictions are working on climate change measures, has advantages since a 'coalition of the willing' could continue to drive ambitious climate action. The advantage of polycentricity is that progress continues to be made – although this progress is obviously bounded by the authority that these governments have. In this sense, performance is still not as good as it could be if the full force of a nation state is not behind it.

In terms of *flexibility*, polycentric climate governance systems obviously allow for more initiative from the ground-level up, as self-organization will be hindered less by higher authorities. In the field of climate engineering (or 'geo-engineering'), for instance (Reynolds, 2018), the absence or weakness of rules in certain domains (e.g. the high seas), has led some wealthy entrepreneurs to deploy small-scale experiments on the basis of their own ideas about potential solutions (such as the injection of iron into the ocean to reduce acidification). At the moment it is unclear whether this flexibility will remain in place as more and more jurisdictions start coordinating with each other on this topic. One question is, of course, whether this type of flexibility is even desirable.

Finally (and as suggested above), the notion of resilience falls within a blind spot of polycentric governance thinking. The full effects of climate change are yet to manifest themselves. The empirical evidence that is available on the slower and more fundamental changes in our climate is not very reassuring. Take the example of coral reefs, specifically the Great Barrier Reef in Australia. The governance regime there is considered quite polycentric as every level of government is involved, alongside quite a few civil society and private sector actors (Morrison et al., 2017). The regime is known for handling certain local challenges such as the negative consequences from fisheries and tourism, but climate change and the associated recurring peaks in water temperature have causes at the global level, which are beyond the control of the local actors (local to the problem), creating what could be called a scale mismatch (Galaz et al., 2008). This could be addressed to some degree if the Australian government was taking emission reduction measures itself and pushing for more stringent measure internationally. The Australian government is, however, not willing to act as a global leader on this issue, and instead prefers to implement patchwork solutions, such as pumping up cooling water from elsewhere in the ocean, something that coral reef experts consider ineffective. In regards to extreme weather events, much of the work that addresses the performance of governance regimes focuses on relative abstract assessments, based on indicators that are conceptually aligned with resilience, such as 'adaptive capacity'. Many models for adaptive capacity are offered and concomitant capacity assessments are made, but empirical work on the actual recovery from extreme weather events is still somewhat limited. An exception is provided by Hill (2012). Based on a study of extreme weather events in mountain areas in Chile and Switzerland, she finds that the Swiss do a better job in both recovering from such events, and in learning from them. The key explanation for the difference is located in the existence of informal networks with high levels of trust so that causes can be openly discussed and insights on solutions shared. This suggests that trust within social networks plays a big role in explaining resilience at multiple levels. A summary of this section is presented in Table 7.3.

Table 7.3 *The performance of polycentric climate governance*

Criterion	Performance against the criteria
Negative feedback	<p>Cities do act in response to climate change, for various reasons, and seek to create networks. However many cities remain inactive and impacts of city actions are largely unknown.</p> <p>Private companies and sectors have started setting goals and regulating. Power asymmetries affect these processes.</p> <p>Insights provided by IPCC, sufficient to spur action, despite low detail level at local levels.</p> <p>Local knowledge tends to match with global projections, but also provides a filter for global information, which means that feedback is interpreted in a selective way.</p> <p>Evaluation of policies and measures meets with many political concerns, which hampers the ability to provide negative feedback.</p>
Coordination	<p>Coordination at the global level is matter of voluntary collaboration between nation states. Enforcement is problematic, although at the national level courts are forcing states to honor their commitments.</p> <p>Coordination between local actors (as in local and regional governments) occurs even when they are spatially dispersed. Representation in global networks is unbalanced. Coordination focuses on the adoption of policy models (emulation), and to a lesser extent on critical evaluation and learning.</p> <p>Motives for collaboration are multiple, sometimes intrinsic, sometimes to do with co-benefits, but sometimes also arise from external pressure. Local actors (local and regional governments) act strategically vis-à-vis the nation state – they sometimes act to fill a void, sometimes pretend to act to prevent the nation state from acting (i.e. they ‘game’ the system).</p> <p>Coordination occurs amongst jurisdictions that have a shared affinity and in groups of leaders and followers.</p>
Robustness/ flexibility	<p>International and national political conditions have made somewhat higher levels of polycentricity a necessity, in turn allowing a certain level of robustness progress even when key nation states do not wish to commit.</p> <p>Polycentric governance may lead to technological divergence, possibly hindering upscaling.</p> <p>More bottom up initiative is possible (due to natural experimentation), but this flexibility may also lead to less desirable initiatives (private initiatives with geo-engineering).</p>
Resilience	<p>Local actors (including national governments) face challenges in addressing the local consequences of climate change, when the root causes are not acknowledged, and there is an unwillingness to lobby for an international approach.</p> <p>Trust in governance systems is a key factor in the ability to recover from extreme weather events, enhancing lesson drawing and longer-term learning.</p>

7.6 CONCLUSIONS

Climate change is an immensely complex environmental problem, and on this basis we identified a set of theoretical criteria to assess the performance of governance responses to it. We then interrogated polycentric governance as a distinct type of governing which its advocates claim satisfies many of these criteria. In this chapter, we have offered our own conceptual assessment of its performance, illustrated with empirical examples of those that have emerged in the 2010s.

Our analysis points to several conclusions. The first is that the criteria Dryzek developed in 1987 are still salient today. Even if climate change was not such a big political priority when he developed them, it does represent, and maybe even embodies, precisely the kind of problems that he had in mind. Having said that, interpreting theoretical criteria in the light of empirical evidence is seldom straightforward. For example, where Dryzek spoke about complexity in ecological systems, and saw human institutions as potential vehicles for addressing it, academic debates have since shifted to an understanding that ecology and society are in many ways deeply interwoven ('social-ecological systems'). Consequently, the complexity of societal systems themselves has come into focus far more sharply, and one should no longer look at the way social systems respond to ecological complexity, one should also regard how such systems contribute to this complexity (Galaz et al., 2012). If anything, this makes the challenge of satisfying Dryzek's criteria even more daunting.

Second, we have observed that the concept of polycentric governance, although perhaps counterintuitive in breaking away from a solely global focus, can be quite relevant to a complex issue such as climate change. Polycentric governance thinking scores well against some – but certainly not all – of Dryzek's criteria. The advantage of polycentric thinking is that it challenges several established simplifications, including the idea that a 'global problem' always requires 'global solutions'. The idea that local actors can and do coordinate and scale up approaches as the need arises, challenges assumptions that have held sway in climate governance circles for decades.

Third, Jordan et al. (2018) suggest that polycentric governance thinking has descriptive, normative and analytical implications. In terms of *description*, it is interesting to explore if, and indeed how, global climate governance has become more polycentric than it once was. Several of the features of climate governance do exhibit features of polycentricity – the networking between communities; the de-emphasizing of the nation state; the proliferation of local experiments, and others. *Normatively*, polycentric thinking emphasizes local action and a particular, consensual style of decision-making, a preference also shared by Dryzek (1987). Polycentric governance thinking has often been

wrongly interpreted as being anti-statist (as per Setzer & Nachmany, 2018). This is puzzling because at least V. Ostrom's version of polycentric governance is very strongly focused on intergovernmental dynamics. What's more, at least one core proposition – relating to the rule of law – is directly associated with the nation state and its legal manifestations. Elinor Ostrom (2005) is quite clear that nation states are and should be seen as an integral part of polycentric governance systems. Her idea is not that there should be no role for the state, but that it should stay as small as possible to perform the necessary tasks (a variation of the subsidiarity principle). However, one wonders whether it is really possible to combine such a strong emphasis on the local community whilst reserving certain decision powers for the state. The idea that the state will scale up local innovations, is one of the points in polycentric theory where this inherent normative tension expresses itself with particular clarity. These are not merely technical issues (of 'what works best') – they are deeply political and philosophical as they relate to choices, contestations across multiple levels. Finally, Jordan et al. (2018) suggest that polycentric thinking has some way to go in terms of exerting analytical power. The five propositions provide a useful building block, but a fully-fledged conceptual framework with testable hypotheses still seems a long way off. As a tool of analysis, let alone prediction, polycentric governance thinking is still a veritable work in progress.

Where should climate governance research go next? First, our analysis suggests that polycentric governance thinking has relevance to the governance of complex issues such as climate change. It is very well suited to offering a comprehensive description of ongoing events in global climate governance. This is no small feat because accurate description is far from simple yet should always precede explanation. Polycentric thinking forces academics to transcend traditional academic boundaries, for instance between those who analyze governance at the local level (public administration, law) and those who do so at the international and global levels (European studies, international relations). Future analyses of climate governance need to consider the relationships between these levels, and between the units at these levels.

But to offer sharper analysis, polycentric governance thinking has to change. Jordan et al. (2018) show how it has the potential to develop into a fully-fledged theory, initially as a meso-level concept around which other concepts and theories can be brought into a more productive dialogue with one another. This will of course take time, but unfortunately time is of the essence when it comes to addressing climate change. While polycentric governance might involve a lot of natural experimentation, the most effective approaches are in the end often *not* scaled up. Understanding how local experiments can instigate a society-wide transformation is an important challenge not only for polycentric governance thinkers, but decision makers the world over (see for instance Bernstein & Hoffmann, 2018).

NOTES

- 1 Apart from the title of one of the references.

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