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Advantages of a Polycentric Approach to Climate Change Policy

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Lack of progress in global climate negotiations has led scholars to reconsider polycentric approaches to climate policy. Several examples of subglobal mechanisms to reduce greenhouse-gas emissions have been touted, but it remains unclear why they might achieve better climate outcomes than global negotiations alone. Decades of work conducted by researchers associated with the Vincent and Elinor Ostrom Workshop in Political Theory and Policy Analysis at Indiana University have emphasized two chief advantages of polycentric approaches over monocentric ones: they provide more opportunities for experimentation and learning to improve policies over time, and they increase communications and interactions — formal and informal, bilateral and multilateral — among parties to help build the mutual trust needed for increased cooperation. A wealth of theoretical, empirical and experimental evidence supports the polycentric approach.

The lack of progress in global climate change negotiations has spurred scholars to examine workable, subglobal policies to reduce anthropogenic emissions of greenhouse gases (GHGs). The late Elinor Ostrom led the way in a report she authored in 2009 for the World Bank, calling for a more 'polycentric' approach to climate governance[1]. Others soon followed suit[2–9]. Whether referring to 'polycentric approaches', 'building blocks', 'regime complexes' or 'bottom-up systems', these authors all agree about the need to pay more attention to existing and potential subglobal climate policies that might, alone or in some combination, substitute for or supplement the existing United Nations (UN) regime and/or provide new impetus to global negotiations. No one has yet offered a sufficient set of reasons for believing that a polycentric approach might produce a better climate outcome. This Perspective attempts to fill that gap.

Some scholars seem to have embraced polycentric solutions to climate change almost in desperation because of the lack of progress in global negotiations, but others have long preferred it as a matter of theory. Victor and Raustiala[10] argued in favour of "regime complexes" — defined as collective[s] of partially overlapping and non-hierarchical regimes — over monocentric international legal systems for plant genetic resources several years before Keohane and Victor[3] made similar arguments about climate policy. Abbott[11], citing Ostrom[12,13], specifically referenced the pre-existing literature on polycentric governance of common-pool resources.

The polycentric approach to policy

Ostrom's[1,13] own approach to climate governance was deeply rooted in the polycentric approach that was pioneered by her husband Vincent[14], and that became a central pillar of the 'Bloomington School' of political economy[15]. Ostrom *et al.*[14] based the polycentric approach on a principle of subsidiarity according to which government services are best provided at the lowest level of government consistent with their effective application. A polycentric system is characterized by "the concurrence of multiple opportunities by which participants can forge or dissolve links among different collective entities... [P]articipants must be able to pick and choose those producers and providers that are most appropriate to each specific issue at hand"[16]. Instead of a 'monocentric hierarchy', where governmental units at higher levels make all collective-choice decisions, and units at lower levels simply follow commands from above, "a polycentric system is one in which governmental units both compete and cooperate, interact and learn from one another, and responsibilities at different governmental levels are tailored to match the scale of the public services they provide"[1,4].

The 'Bloomington School' is associated with the Ostrom Workshop in Political Theory and Policy Analysis at Indiana University. Throughout its 45-year history, the Ostroms and their Workshop colleagues developed theories and conducted empirical tests of collective action for resolving social and combined social–ecological problems based in large part on the theory of polycentric governance. Years before she became famous as a scholar of 'the commons', Ostrom and her colleagues were designing and carrying out studies comparing 'small' (presumptively fragmented) and 'large' (consolidated and presumptively more efficient) police departments in Indianapolis and other cities. Those studies demonstrated that large-scale, consolidated police departments do not always benefit from economies of scale and often suffer performance deficiencies compared with smaller policing units in metropolitan areas. These police studies informed Ostrom's subsequent work on natural common-pool resources, ranging from small forests to large irrigation systems, where the polycentric approach was found to have substantial utility[1,12]. Although much of her work on common-pool resources focused on local resource-management problems, Keohane and Ostrom[17] explored how the polycentric approach to governance might also successfully operate at the international level.

When Ostrom later turned her attention to the problem of climate change[1,13], she summarized the findings of her earlier applications of the polycentric approach to problems of providing public goods (for example, police services) and conserving common-pool resources. A key factor running through several of those findings was that the polycentric approach provides "greater opportunity for experimentation, choice, and learning" across levels of social organization[4]. She also referenced its tendency to "enhance innovation, learning, adaptation, trustworthiness, levels of cooperation of participants, and the achievement of more effective, equitable, and sustainable outcomes

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at multiple scales…"[13]. These conclusions are well established in the 'Bloomington School' literature, but Ostrom's explanation was incomplete. She never fully explained how the polycentric approach could improve climate outcomes by (1) creating more opportunities for experiments and learning, and (2) building the mutual trust necessary for improved climate outcomes. Because much already has been written about experimentation and learning in climate policy[1,13,18], the emphasis here is on the widely neglected issue of trust-building.

Experimentation and learning in climate policy

No one believes that the UN's global climate policy has been successful. Yet it seems remarkably resistant to change, let alone replacement. But it has never been "the only game in town"[19]. Several authors point to numerous climate policies that have been, and are being, implemented at local, state, regional and national governments, and even among private business associations[1,2,4]. These polycentric policies multiply opportunities for communication, trust-building, policy experimentation and learning.

Local-level governments have been experimenting with GHG mitigation policies for many years now, and paying close attention to what others have been doing. Ostrom[13] writes about a 2005 conference in London attended by representatives of 18 large cities. They compared notes on urban mitigation policies and reviewed the congestion tax introduced by the City of London in 2003. Non-exempt motor vehicles entering London's 'Congestion Charge Zone' must pay £11.50 each working day. The primary purpose of the tax is to reduce city traffic and raise funds for London's public transportation system. To the extent that the congestion charge moves more commuters from private to public transport, it also reduces carbon emissions. Virtually all major cities have been watching London's experiment, and several, including Stockholm[20] and Milan[21], have already replicated it. In 2007, when Mayor Michael Bloomberg proposed a congestion charge for New York City, it was blocked in the state legislature despite widespread support[22].

Elinor Ostrom[1] observed that "all policies adopted at any scale can generate errors, but that without trial and error, learning cannot occur." If the Kyoto Protocol were in fact 'the only game in town', the extent of learning, and prospects for improving policies, would be quite narrow. A polycentric system of climate policies necessarily entails a greater number of discrete policy experiments from which policymakers at various levels of governance might learn valuable lessons, including about designing monitoring systems to ensure policy compliance[1]. The growing literature on experimentalist governance, including at the global level, supports Ostrom's arguments[18,23,24].

Relatedly, Ostrom[1] observed that efforts "to improve levels of collective action to overcome social dilemmas must enhance the level of trust of participants that others are complying with the policy or else many will seek ways of avoiding compliance." And she noted that "[i]f the *only* policy related to climate change was adopted at the global scale, it would be particularly difficult to increase the trust that citizens and firms need to have that other citizens and firms located halfway around the globe"[1] are reciprocating.

Building mutual trust through a polycentric approach

Trust has been absent in the global-level climate negotiations, which Scott Barrett[25] has aptly described as a "free-rider game". Formal and highly structured meetings involving thousands of individuals—the United Kingdom's official delegation to the most recent meeting of the parties in Warsaw reportedly[26] numbered 45—may not always provide the best fora for facilitating communications that lead to trust-building and cooperation. Trust is not the same as blind faith, where parties simply sit down and 'do the right things' according to someone's moral compass. Rather, trust is earned by mutual commitments that are not overly costly to monitor[27]. Thus, Ronald Reagan's famous admonition to "trust, but verify" is redundant. Verifiability is part and parcel of trust.

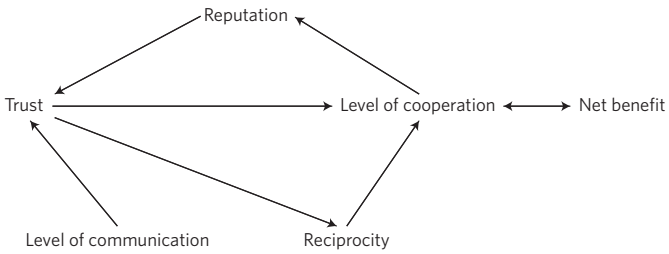

Figure 1 | Core relations in repeated social dilemmas. Adapted from Ostrom[34,35].

One hypothesis of the polycentric approach to climate policy is that social–ecological problems can be successfully resolved, whether those problems are conceived as iterated Prisoners' Dilemmas[28,29] or Assurance games[30–32], only if mutual trust among resource users can be cultivated over time through communication and cooperation across a range of issues. This hypothesis is consistent with Keohane's[33] observation that "Intergovernmental relationships… characterized by ongoing communication among working-level officials, 'unauthorized' as well as authorized, are inherently more conducive to information-exchange and agreements than are traditional relationships between internally coherent bureaucracies that effectively control their communications with the external world."

The diagram in Fig. 1, adapted from Ostrom[34,35], describes relations between communication, trust and cooperation in repeated social dilemmas. Similar to Sen's[30] Assurance games, she locates "the core of a behavioural explanation" for mutual cooperation on social dilemmas in the trust individuals place in others, the investment those others make in developing and maintaining reputations for trustworthiness, and the probability that participants adopt norms of reciprocity (such as tit-for-tat strategies)[35]. If initial levels of cooperation are sufficiently high, then individuals learn to trust one another, developing new, or reinforcing existing, norms of reciprocity and establishing reputations for trustworthiness that may lead to higher levels of cooperation in future interactions. This dynamic, reinforcing aspect of the cycle is not entirely clear in Ostrom's original depiction of these 'core relationships'. My own contribution is to make manifest the dynamic process of trust-reinforcement by (1) directly incorporating communication as a variable affecting trust, (2) describing a direct feedback from the level of cooperation to reputation, and (3) describing another direct feedback from 'net benefit' to the 'level of cooperation'. The chief point of the figure is altered only slightly: levels of communication can affect trust levels, which substantially determine levels of cooperation. Positive outcomes of cooperation include enhanced reputations for cooperators, which can lead to increased trust and reciprocity, and subsequently even higher levels of cooperation.

The goal of communicating and developing a reputation for trustworthiness is to build 'relationship capital', as it is known in the literature on international business alliances[36], which can alter a game's expected payoffs by raising the subjectively perceived probabilities of mutual cooperation. Communication does not inevitably lead to higher levels of trust, of course. But simple communication has too often been denigrated as 'cheap talk'[35], which, ironically, can prove extremely valuable for improving cooperation.

The hypothesis about communication, trust and cooperation is further supported by a substantial body of research. In a variety of experimental settings, Ostrom, Gardner and Walker found "communication … to be a very effective mechanism for increasing the frequency with which players choose joint income-maximizing strategies, even when individual incentives conflict with the cooperative strategies"[27]. Their experiments confirmed, more generally, "the power of face-to-face communication in a repeated common-pool

resource dilemma where decisions are made privately"[27], particularly where costs of communication are low. More recently, a field experiment conducted by Cardenas *et al.*[37] revealed that repeated communications help to establish the identities of 'conditional cooperators' in a group, "who can then develop common knowledge that they will play the cooperative equilibrium in a repeated game." Extraction rates from common pools fell significantly as a direct consequence of the repeated communications.

Although the existing empirical and experimental literatures do not provide much insight into relations between the scale or scope of communications and cooperative outcomes, especially in the context of international negotiations, several discrete studies provide some indication that the scale, scope, duration and context of communications can matter. Aumann and Hart[38], for example, show that 'long cheap talk' (that is, communications over a longer period of time) helps to promote cooperation better than 'short cheap talk'. Barrett[25] suggests that quieter and more confidential conversations might be advantageous, observing that the recent trend toward greater democracy and transparency in international negotiations has not necessarily promoted cooperation. Compromise, he notes, is not so easy when it must be done in full public view. Such assessments warrant the hypothesis that formal or informal, one-on-one, or small-group communications might have a significant positive impact on climate negotiations.

In a literature review of public good and common-pool resource experiments, Ostrom[35] explored six potential reasons that communication increases cooperation. It:

(1) facilitates the development of socially optimal strategies;
(2) allows for exchanges of promises;
(3) "increases mutual trust and thus affects expectations of others' behaviour";
(4) adds value to payoffs;
(5) reinforces norms; and
(6) promotes development of 'group identity'.

Ostrom found "building trust… to be a key link in the communication–cooperation connection", and that "the efficacy of communication is related to the capability to talk on a face-to-face basis."

The US–China Climate Change Working Group

But can increasing the frequency and types of interactions among parties increase levels of mutual trust and cooperation in the climate change context? Despite more than two decades of formal meetings under the auspices of the UNFCCC, most major emitting countries including China and the United States have remained (generally speaking) non-cooperators on GHG mitigation. In April 2013, however, those two climate belligerents established a joint US–China Climate Change Working Group with the explicit goal of fostering cooperation and facilitating bilateral and multilateral negotiations[39]. How many people outside the climate policy community have even heard about this group, let alone follow its ongoing negotiations?

The Working Group's first official report[40] enunciated three main goals, the second of which relates directly to the thesis of this Perspective: "both sides appreciate that advancing concrete action on climate change can serve as a pillar of our bilateral relationship, build mutual trust and respect, and pave the way for a stronger overall collaboration." In June 2013, the Working Group picked some low-hanging fruit by agreeing to a 'phase-down' of emissions of hydrofluorocarbons — potent GHGs, but not of great importance to either the United States or the Chinese economy, especially after the European Union prohibited its member states from funding hydrofluorocarbon-based Clean Development Mechanism projects in China, which had been a major source of fraud[4].

No one realistically expected the US–China Climate Change Working Group to yield significant climate-policy benefits in a matter of a few months or even years. But already the regular meetings seem to be paying dividends. On 11 November 2014, US President Obama and Chinese President Xi signed a climate-change agreement, "worked out quietly" over the course of nine months[41]. Pursuant to that agreement, the United States set a new target of reducing its carbon emissions by 26–28% from 2005 levels by 2025, and China committed to peak its carbon dioxide emissions by 2030 (or earlier), while increasing use of non-fossil fuels to 20% of its total energy portfolio[42]. These are, of course, only pledges of future reductions; it remains to be seen whether the pledges will be fulfilled. Future governmental action is especially difficult to guarantee in democratic republics such as the United States, where presidential elections can lead to policy reversals.

An explicit motivating factor for both the United States and China was to "galvanize efforts to negotiate a new global agreement by 2015"[41]. At the very least, the agreement puts more pressure on other non-cooperating countries, including India and Canada. That the world's two largest emitters of carbon, and two of the existing global climate regime's greatest belligerents, entered into a bilateral agreement with the aim of improving global negotiations amounts to an implicit endorsement of the polycentric approach to climate governance, regardless of the ultimate outcome of the global negotiations. And, interestingly, although the deal was done behind closed doors, in complete secrecy, no one seems to be complaining about a 'democracy deficit'.

The US–China climate agreement was not hammered out in the course of a couple of days by the two principals. It was worked out over many months by their agents, lower-level government officials. Unfortunately, trust and cooperation between negotiators does not always translate into trust and cooperation among their principals, the individuals who sign agreements and ratify treaties. Moving trust from the negotiators (that is, agents) to the principals depends on processes of 'intra-organizational bargaining'[43]. But whatever the difficulties of such processes, it remains clear that if trust does not first develop between negotiators, its development among the principals is unlikely. Principal-agent problems are, at least at some level, unavoidable for any proposed solution to a given collective-action problem. The key empirical question is whether principal-agent difficulties are so serious as to undermine any negotiated solutions, whether local, national or global.

Private actors in polycentric governance

The polycentric approach is not solely concerned with cooperation between public agents at different levels of government. It is about governance, not governments, and encompasses private as well as public actors. Those private agents include GHG emitters, non-governmental organizations, small groups of concerned citizens, even families who might decide, for example, to install solar systems at their homes and take other steps to minimize their carbon footprints[1]. It is easy enough to point to private-sector actors that have taken significant actions to reduce GHG emissions. The World Business Council for Sustainable Development (WBCSD) was founded in 1992, just before the Earth Summit in Rio, by a Swiss entrepreneur who "believed that business had an inescapable role to play in sustainable development" (http://www.wbcsd.org/about.aspx). Today, the WBCSD represents the CEOs of more than 200 companies globally. Its Executive Committee includes CEOs from multinational corporations such as Unilever, Toyota, Infosys, Royal Dutch Shell and China Petrochemical. Recently, the WBCSD partnered with scientists from the Stockholm Resilience Centre and policy analysts at the World Resources Institute to establish ACTION2020, a programme designed to develop 'business solutions' that will ensure global mean temperatures do not increase by more than 2 °C by 2050. According to its Action2020 Overview (http://go.nature.com/2VmDLt), those solutions will be measurable, scalable, replicable, beyond business as usual and, ultimately, good

for business. On other matters relating to sustainable development, it has partnered with the World Wildlife Fund, the International Union for the Conservation of Nature, and the Earthwatch Institute, among many others.

The WBCSD's activities should not be dismissed blithely as 'greenwash', but should be understood, as Najam[44] has argued, as a serious offer from the private sector to participate in finding effective solutions to problems such as climate change. At the very least, by taking climate science seriously and recognizing a need for private-sector cooperation with regulators and non-governmental organizations on climate solutions, the WBCSD makes it more difficult for other firms and business associations to deny or downplay the climate change problem. In addition, member CEOs of the WBCSD who claim to take the climate change problem seriously and promise to participate in solutions implicitly open themselves and their firms to public and media criticism, should they fail to live up to their promises. Finally, the WBCSD reminds us that no matter who imposes what climate change regulations, the vast majority of actual GHG emission reductions will ultimately come from private actors (at least in countries where most major emitting firms are privately owned). Thus, the role of private actors in the process, whether it is a comprehensive global treaty-making process or some set of polycentric processes, should not be underestimated. Improving levels of trust and cooperation among the individuals who are decision-makers within private enterprises, with both policy advocates and those who establish and implement government policy, would be advantageous for climate policy. To that end, the WBCSD's positive interactions with climate scientists and various environmental groups provide a useful and replicable working model.

Conclusion

If any realistic policy solution (or set of policy solutions) to the climate change problem requires the development of higher levels of mutual trust among the relatively small number of major emitting parties, then how quickly can that happen? The honest answer is probably not quickly enough to avert the need for fairly high levels of adaptation and/or geoengineering. Ostrom[45] observes that mutual trust is "an asset that individuals build over time by engaging in mutually beneficial transactions that cannot be consummated in an immediate quid pro quo exchange." Certainly, the evidence of more than 20 years of UN climate meetings is that little mutual trust has developed so far. Indeed, a review of contemporaneous accounts from recent global climate meetings indicates continuing high levels of distrust, represented not only by lack of progress on mitigation but also by well-publicized conflicts among parties. A headline from the meeting in Warsaw (November 2013) makes the point well: "Bitter recriminations highlight climate-summit rift"[46].

That subglobal negotiations and agreements might not reduce GHG emissions rapidly enough to forestall the need for adaptation and/or geoengineering is no reason to maintain an exclusive focus on global policies that have failed and global negotiations that remain stalled. To the contrary, a polycentric approach to climate governance might provide the best chance we have of accelerating progress toward global climate stabilization by providing more frequent and varied opportunities for major emitting parties to engage in face-to-face communications in bilateral and multilateral fora, including some outside the intense glare of the public spotlight. Those interactions, some of which the UN might even facilitate, could inculcate the kind of mutual trust that seems necessary for greater cooperation at the global level. Thus, a broader focus on bilateral and smaller-scale multilateral negotiations might be not only desirable; it could be a necessary condition for more successful negotiations in the global, UN-based process. As Prins and Rayner[47] have observed, no silver bullet exists to solve the climate change problem, but a 'silver buckshot approach' might work.

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Additional information

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The author declares no competing financial interests.