Deliberative Ecologies: Complexity and Social–Ecological Dynamics in International Environmental Negotiations

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Abstract

Theories of complex systems can yield valuable insights for understanding the increasingly intricate networks of actors, institutions, and discourses involved in international environmental negotiations. While analysis of regimes and regime complexes has shed light on macro-level structures and relationships in global environmental politics, systemic analysis has gained less traction in making sense of micro-level interactions—such as communicative exchanges among participants—that occur within the sites of negotiation and how those interactions shape (and are shaped by) the broader dynamics of governance systems. This article shows how the conceptual lens of "deliberative ecologies" can bridge these levels of analysis by integrating theories of deliberative systems with ideas from complexity theory and social–ecological systems analysis. Drawing on evidence from United Nations climate change and biodiversity conferences between 2009 and 2018, I show how methods such as discourse analysis and process tracing can help to apply a deliberative ecologies perspective and thereby advance understanding of how discourses and deliberative practices diffuse through negotiating sites and how deliberation interacts with the social–ecological dynamics of those sites.

Multilateral environmental conferences attract scholars of global environmental politics in much the same way as ecologists are drawn to mass congregations of migratory animals. Just as monarch butterflies travel by the millions each year to the Monarch Butterfly Biosphere Reserve in Mexico, delegates travel by the

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thousands to annual or biennial United Nations (UN) environmental conferences from Cancún to Kigali and Katowice. A daunting challenge facing researchers who observe these events is to make sense of the complex ways in which individuals interact with one another and to understand the broader systemic effects that those interactions produce. International environmental negotiations teem with delegates, discourses, texts, images, and performances, all of which interact with one another in manifold and often unpredictable ways (O'Neill et al. 2013). This unpredictability has arguably been amplified by the growing participation of nonstate actors in negotiations, the emergence of transnational environmental governance initiatives, a media landscape transformed by the explosion of online communication, and rising instability in the Earth system processes themselves that negotiations seek to address (Betsill et al. 2015; Dauvergne and Clapp 2016; Young 2017).

A substantial body of work has emerged that seeks to understand global environmental governance from the perspective of complex systems and to identify strategies for governing complexity in this area (for earlier examples, see Young 2002; Najam et al. 2004; Biermann 2007). Systemic analyses have yielded important insights on macro-level structures and dynamics, such as the formation of "regime complexes" (Keohane and Victor 2011), regime interplay (Oberthür and Stokke 2011), and regime fragmentation (Biermann et al. 2009). However, existing research in this vein has proved less adept at delivering finer-grained accounts of the dynamics of communication, power, and material flows occurring within negotiating sites, even though these sites remain central to understanding how broader systems for global environmental governance emerge and function (Okereke et al. 2009). At a micro-level, ethnographic studies of negotiating sites are vital for understanding the inner workings of agreement making (Campbell et al. 2014; Marion Suiseeya and Zanotti, this issue). However, analyses of this kind have drawn on a limited selection of theoretical frameworks to contextualize their findings, such as the politics of knowledge, scale, and translation (Campbell et al. 2014).

Complex systems perspectives can complement and enhance site-based analysis by helping to understand how micro-level interactions within negotiating sites shape—and are shaped by—the broader dynamics of global environmental politics. However, a key challenge is to navigate tensions between the structural orientation of macro-level approaches and the more agent-oriented emphasis of site-based approaches (Büscher 2014, 132).

One promising response is to harness recent research on deliberative democracy that views environmental negotiations as "deliberative systems," that is, systems whose components are interconnected by deliberation (or reasoned dialogue) and other forms of communication about a set of political concerns (Mansbridge et al. 2012). Importantly for the study of environmental agreement making, the deliberative systems approach can span site-based analysis of communicative interaction and macro-level evaluation across a diverse range of actors and institutions.

This article aims to show how the emergent concept of "deliberative ecologies" can enrich scholarly understanding of environmental negotiations by integrating concepts from complexity theory and ecology with analysis of deliberative systems. The idea of deliberative ecologies came to prominence in Mansbridge et al. (2012), which has been a touchstone for the expansion of research on deliberative systems. The authors argue,

> A deliberative systemic approach also suggests looking for "deliberative ecologies," in which different contexts facilitate some forms of deliberation and avenues for information while others facilitate different forms and avenues. (6)

The authors do not set out a conceptual framework for studying deliberative ecologies, nor has subsequent research sought to do so. Nevertheless, their tantalizing references to this idea suggest that a deliberative ecologies perspective can open up new theoretical vistas for the study of environmental agreement making in two ways. First, a deliberative ecologies perspective can tap into a rich vein of concepts from ecology—the study of relationships between living organisms and their environment—that can help researchers understand how participants in negotiations interact. Second, this perspective can bring to the fore the interconnected social and ecological ("social–ecological") systems in which negotiating sites operate and help us to understand the extent to which the course of negotiations is shaped by those systems. My aim is not so much to inaugurate a new field of "deliberative ecology" in the singular (alongside political or organizational ecology and the like) as it is to highlight the value of a plurality of ecological understandings of deliberative systems.

The analysis begins with a critical overview of literature that employs complexity theory and deliberative systems to understand global environmental governance. I then outline how a deliberative ecologies perspective could help to overcome key limitations of existing systemic approaches. Finally, I illustrate how two methods—discourse analysis and process tracing—could enhance empirical understanding of how deliberative ecologies operate. Throughout the article, I offer examples from multilateral biodiversity and climate governance, drawing on firsthand observations of conferences of the parties (COPs) to the United Nations Framework Convention on Climate Change (UNFCCC; 2009, 2010) and the UN Convention on Biological Diversity (CBD; 2016, 2018) as well as on media and scholarly accounts of COPs during the period 2009–2018.

Complex Systems Perspectives on Environmental Agreement Making

A core premise shared by ecologists, deliberative theorists, and observers of international environmental negotiations alike is that the systems they study are complex. To lay the groundwork for articulating what a deliberative ecologies perspective has to offer as an integrative concept spanning these fields, this

section clarifies what complex systems are, how negotiating sites can be understood as complex systems, and how research has grappled with complexity in global environmental governance.

Complex Systems: Characteristics and Properties

A system can be defined very broadly as "a set of things … interconnected in such a way that they produce their own pattern of behavior over time" (Meadows 2008, 2). While earlier phases of the sprawling transdisciplinary body of research on systems (or "systems thinking") were often marred by structural rigidity or notions of functionalism (Duit et al. 2010), more recent developments—often grouped under the banner of complexity theory—present a more nuanced and dynamic account of how agents interact to produce systemwide behavior (Mitchell 2009; Cairney 2012, 347).

In their analysis of how complexity theory can inform the study of international institutions, Orsini et al. (2019, 3) define complex systems as "open systems—that is, exchanging information with their environment—that include multiple elements (units) of various types intricately interconnected with one another and operating at various levels." Complexity results partly from the number of interacting elements in the system, although this property is insufficient to make a system complex (like an ecosystem) rather than merely complicated (like a jigsaw puzzle).

A common thread in systems thinking is the idea that systems demonstrate recurring properties across widely varying contexts, from ant colonies and rainforests to the human brain, political institutions, and the internet (see generally Meadows 2008; Mitchell 2009; Young 2017; Orsini et al. 2019). These properties include:

- *emergence*, where systemwide behavior emerges, often unpredictably, from the interactions among its elements;
- *self-organization*, where systems form and evolve in the absence of a central authority or externally imposed order;
- *path dependence*, or the sensitivity of a system's long-term behavior to its initial conditions;
- *nonlinear dynamics*, where a change of a given magnitude in one part of the system may produce a disproportionately large or small change elsewhere in the system, partly due to feedback effects within the system; and
- *adaptation, learning, and coevolution* as agents adjust their behavior in response to interactions with others in the system.

Although some applications of complexity theory run the risk of reductionism in their search for commonalities across heterogeneous systems, more nuanced approaches employ systems concepts with a greater appreciation of the contextual specificity and diversity of the systems they study (Meadows 2008, 35).

Environmental Negotiations as Nested Complex Systems

One virtue of complex systems perspectives is their ability to apply a common set of concepts to analyze multiple scales and cross-scale interactions. Perhaps the broadest unit commonly used in systemic analysis of global environmental politics is (1) the "international system" comprising nation-states (Waltz 1979). This system—like many other complex systems—contains other systems or subsystems nested within it (Figure 1). These include (2) broad thematic areas of global governance, such as the governance of the environment (Kim and Mackey 2014, 10), energy, or security, and within those areas (3) the governance of individual environmental concerns, whether in tightly integrated regimes or more loosely integrated "regime complexes," such as those for climate change (Keohane and Victor 2011) or biodiversity, comprising (4) one or more treaty bodies (such as the UNFCCC or CBD) or international organizations (IOs, such as the Global Environment Facility). Many of the innovative applications of complex systems ideas to global environmental politics in recent years—particularly those employing ideas of complex adaptive systems—deal with levels 2-4 (see, e.g., Hoffmann 2005; Kim and Mackey 2014; Orsini et al. 2019). Within each of these systems, there may be further subsystems associated with (5) organizational units such as the COP to a treaty or a subsidiary body

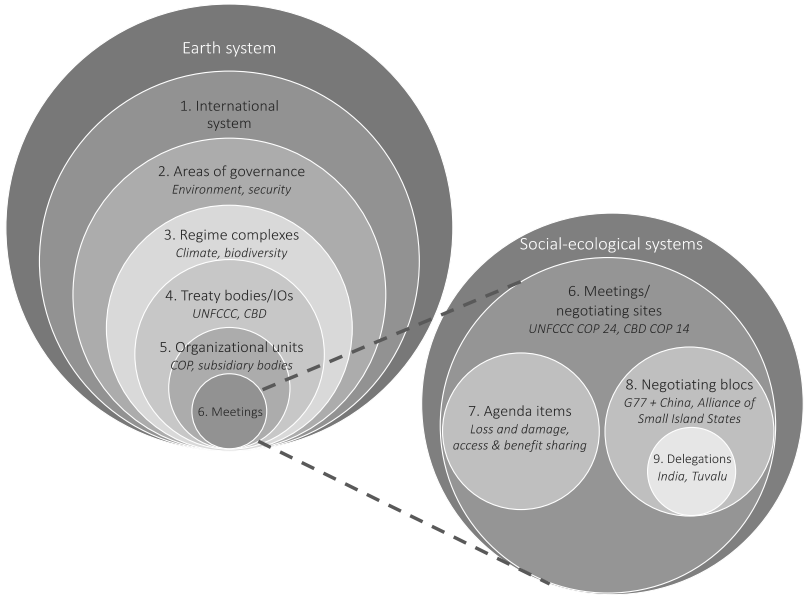

Figure 1
Nested Systems in Global Governance and International Environmental Negotiations

Note: text in italics shows examples of systems at each level.

under the COP.[1] Finally, systems could comprise (6) a meeting of one or more of these organizational units; and so on down to (7) negotiations on an individual agenda item, (8) a negotiating bloc, or (9) a single delegation.

As this nonexhaustive list shows, global environmental governance systems operate across widely varying scales, with corresponding implications for analysis of negotiating sites. As Figure 1 illustrates, these sites (a) constitute systems in their own right, (b) are nested within larger systems that form the "environment" within which the sites operate, and (c) have other systems nested within them. While some systems may be clearly bounded in time or space or by organizational or legal stipulation, in other cases, it may be hard to say unambiguously what lies inside or outside a system's boundaries. Moreover, as elaborated in later sections of this article, each of these systems is embedded within social-ecological systems at different scales.

The Microdynamics of Negotiating Sites

Thinking about a negotiating site as a system can sensitize site-based research to properties that are often studied at the macro-level (e.g., self-organization, emergence, or nonlinear change), which may help to explain sudden shifts, persistent blockages, or other dynamics that unfold during the course of a conference and subsequently produce broader ripple effects through environmental regimes. The next section (*Deliberative Ecologies in International Environmental Agreement Making*) gives several examples of how nonlinear dynamics may be evident in negotiating sites.

Applying a systemic perspective to negotiating sites need not involve a conceptual mismatch in the sense of using a fundamentally structure-oriented lens to understand agent-driven processes (Bousquet and Curtis 2011, 52; Cairney 2012). Individual actors—such as presidents or chairs of negotiations, executive secretaries of treaty secretariats, or heads of state—may have a prominent role in guiding environmental negotiations to their conclusion (Tallberg 2010). But this is consistent with the view that their role is both constrained and enabled by the negotiating structures and system characteristics within which they work, including rules of procedure, flows of information, and configurations of power among negotiating blocs (Büscher 2014).

Even if systemic perspectives can be scaled down and used to navigate tensions between structure and agency, there remains the challenge of showing how thinking about negotiating sites as complex systems can help to address important research questions in global environmental politics. I turn next to a promising example of such an approach.

1. Subsystems could also be defined around core governance functions of a regime such as goal-setting, review and financing (see, e.g., Pickering et al. 2017). These systems may span one or more treaty bodies or organizational units, and for simplicity they are not depicted separately in Figure 1.

Deliberative Systems in Global Environmental Governance

Deliberative systems approaches offer a valuable way to make sense of how varying degrees of democratic legitimacy emerge from the complex interactions among different modes and sites of political communication, which range from parliamentary debates and town hall meetings to talkback radio and social media. An important insight emerging from this work is that the democratic legitimacy of the system as a whole is not reducible to the deliberative quality of each individual part (Mansbridge et al. 2012). Systemic legitimacy may not demand that every part of the system satisfy all criteria of good deliberation at once, for example, that all affected parties be included and that participants provide publicly justifiable reasons for their arguments (Goodin 2008). Instead, one can envisage a division of deliberative labor where different components perform different functions and compensate for one another's limitations, or at least have the potential to do so.

Stevenson and Dryzek's (2014) *Democratizing Global Climate Governance* remains the high-water mark for deliberative systems analysis of global environmental politics. Although their book focuses on climate change, its approach is equally applicable to agreement making on other issues. Drawing on participant observation as well as document analysis and interviews, Stevenson and Dryzek investigate how environmental discourses feature in "public space" (civil society) and "empowered space" (governmental or private authority) within the deliberative system for global climate governance and how those discourses are transmitted from the former to the latter. Through analysis of four civil society and business summits that took place around the UN climate conference in Copenhagen in 2009, they identify a range of discourses in public space surrounding the UNFCCC negotiations but find that this diversity is not fully reflected in negotiated outcomes. They find an even narrower range of discourses embedded in networked climate governance (studied through three transnational initiatives on climate finance, mitigation technologies, and carbon offset certification) as well as a less active public space seeking to transmit its concerns.

Stevenson and Dryzek's book valuably illuminates how multiple sites interact to produce a deliberative system that struggles to achieve meaningful inclusion of affected groups or a reflexive capacity to learn from prior experience. Nevertheless, its scope of analysis is limited in several respects, which highlight opportunities for future analysis and new perspectives on deliberative systems.

First, while the authors offer many examples of key moments in deliberative processes or accounts of how a decision was reached, they rarely present a detailed textual analysis of the communicative interactions among actors. Second, while their analysis occasionally points to the physical features of negotiating sites—for example, the distance between negotiating rooms and venues for side events or protests where civil society is more actively involved (Stevenson and Dryzek 2014, 123, 144)—the "spaces" they map are largely discursive rather than physical. The authors do not engage closely with how the broader social and

ecological settings of those sites shape deliberation. Third, as with much other research on deliberative systems, the book draws on a limited number of systems concepts (e.g., functional differentiation), with much less emphasis on other concepts in the broader repertoire of systems thinking (e.g., nonlinear dynamics). Finally, the book says little about how the UNFCCC interacts with a broader constellation of negotiating sites, including those at the science–policy interface, such as the Intergovernmental Panel on Climate Change. In the next section, I show how a deliberative ecologies perspective can help to address the first three of these limitations (for strategies to address the fourth, see Hughes and Vadrot, this issue).

Deliberative Ecologies in Environmental Agreement Making

As outlined in the introduction, the deliberative ecologies perspective can help to illuminate environmental agreement making in two important ways: it expands the *conceptual repertoire* of deliberative systems thinking by adapting ideas from the field of ecology and complexity theory on how systems operate, and it draws attention to the *material and communicative interactions* between deliberative practices and the social–ecological systems in which they are embedded. This section explores each of these aspects in turn.

Harnessing Ecological Concepts to Understand Negotiating Sites

The field of ecology employs many ideas from complexity theory to explain how ecosystems emerge, function, change, and collapse (see, e.g., Holling 1973; Dyball and Newell 2014). Nevertheless, a deep convergence of ideas from complexity theory and ecology is rarely found in research on global environmental politics. Research on political ecology has yielded valuable insights into relationships between global environmental institutions and local experiences of environmental change, particularly in the Global South (Adger et al. 2001; Newell and Bumpus 2012). However, it is less common for work in political ecology to explore the ecological settings of negotiating sites themselves or to draw on the broader array of ecological concepts to understand governance dynamics (Walker 2005). Here I turn to three areas which have generated valuable insights in international relations—organizational ecology, nonlinear dynamics, and evolutionary theories of norm diffusion—areas that a deliberative ecologies perspective could harness and adapt to understand how negotiating sites function.

The first set of concepts applies ideas from organizational ecology, particularly the notion that the availability of resources and the organizational density in a given environment affect the capacity of organizational populations to flourish within it (Abbott et al. 2016). The authors apply these ideas creatively to global climate governance to explain why private transnational regulatory organizations have expanded more rapidly in recent years than intergovernmental

organizations. Taking organizational populations as the unit of analysis may work well at a macro-level but becomes harder to apply to individual negotiating sites. Moreover, as Abbott et al. (2016, 250) acknowledge, theirs is primarily a structural theory that needs to be complemented by agent-oriented perspectives.

One promising way forward is to adapt the idea of the ecological "niche," which both Abbott et al. (2016) and Mansbridge et al. (2012, 6) employ. In ecology, a niche is commonly understood as "the range of environmental conditions that allow a population to persist in some location" (Schoener 2009, 2). In a deliberative ecology, the conditions that enable a discourse or practice to persist may include factors such as support from powerful actors or embeddedness in legal institutions or cultural traditions. Mansbridge et al. use the idea to argue that mechanisms that are nondeliberative or poorly deliberative—such as political partisanship and the use of cognitive shortcuts in making decisions—can nevertheless serve useful functions in a deliberative system. The term could also be extended beyond mechanisms to the actors that inhabit a deliberative system. The idea of a niche is sometimes invoked in studies of diplomacy to describe how nondominant actors, such as middle powers or nongovernmental organizations (NGOs), carve out a role for themselves (Princen 1994; Betsill and Corell 2001). At a micro-level, the niche idea could help to explain the spatial configuration of negotiating sites—as different actors compete for space to deliberate or promote themselves—or the strategies used by marginal or obstructive parties to colonize agenda items that give them a foothold for advancing their objectives (as Saudi Arabia has done in using the UNFCCC's "response measures" item to obstruct collective progress on climate change mitigation; Depledge 2008).

A second set of concepts involves nonlinear dynamics driven by feedback effects. While interest in these dynamics is characteristic of complexity theory more generally, it is also a core concept in ecology (Dyball and Newell 2014). Reinforcing or positive feedback loops enable initially small changes to produce much larger effects, sometimes rapidly and unexpectedly. In contrast, balancing or negative feedback loops help to preserve equilibrium in systems, meaning that a large change in one part of a system may nevertheless fail to produce a correspondingly large change in the overall system. Much existing research on nonlinear dynamics in global environmental governance operates at a macro-level (where states are the individual units) and over longer temporal scales (years or months). For example, iterative processes of reviewing implementation and renewing commitments—as with cycles of Nationally Determined Contributions under the Paris Agreement—aim to promote a virtuous circle (a type of positive feedback loop) where progress engenders more progress (Falkner 2016). Much less attention has been devoted to micro-level negotiating dynamics that may occur among individuals over hours, minutes, or seconds, such as crowding behavior or the formation of "huddles" in the late stages of negotiations. For example, positive feedback effects that initially increase the numbers of people present in a venue may eventually trigger negative feedback

mechanisms, as where the organizers of the Copenhagen climate conference in 2009 drastically reduced civil society access in the late stages of the conference in response to unprecedented levels of civil society attendance (Stevenson and Dryzek 2014, 144; see also Neeff 2013, 159, for a related analogy between COP participation levels and bacteria populations).

To take another example, one reason posited for why multilateral meetings often stall or run over time is the norm that "nothing is agreed until everything is agreed," meaning that the resolution of key issues is often backloaded and conferences frequently run hours or days over their deadlines (Chasek et al. 2015). This norm results in a threshold effect or tipping point, where a conference may transition rapidly from large amounts of bracketed (yet-to-be-agreed) text to a fully agreed outcome. The sequencing of decisions has important implications for power relations and the quality of decision-making, but much remains to be understood about how this dynamic operates in large negotiations and how it could function more effectively.

A third set of concepts involves the use of ideas from evolutionary biology to explain how international norms diffuse (see, e.g., Florini 1996; Finnemore and Sikkink 1998). These accounts often trace the evolution of norms over longer time periods, given that international legal norms may take decades to gain wide acceptance. However, other inputs and outputs of deliberation may travel more quickly—from concepts, discourses, and buzzwords to scientific findings, interpretations, rumors, and snippets of negotiating text—and shape the course of negotiations during a single conference. A deliberative ecologies perspective could draw on and adapt theories of norm diffusion to investigate how these elements of deliberation diffuse through negotiating sites.

Social–Ecological Interactions

A second vista that a deliberative ecologies perspective could open up concerns the social–ecological relations in which negotiations are embedded. In a review of findings and future questions in global environmental governance, Pattberg and Widerberg (2015, 701) argue that "systems thinking could yield new knowledge on how humans interact with the environment by identifying drivers, impacts and feedback loops between the two systems." Social–ecological systems (SESs) comprise ecosystems and social systems that are linked together into a larger hybrid entity (Young 2017, 4–5). As with deliberative systems analysis, a strength of SES approaches is their ability to span multiple scales and thereby place individual sites in a broader context. The scale of SESs may range from local (e.g., a wetland or forest) to global (including the Earth system itself). While much early work on SESs concentrated on local levels, researchers have subsequently extended SES analysis to multilevel governance, for example, through studying global climate governance as a polycentric set of systems (see, e.g., Ostrom 2010). Negotiating sites are embedded within both the SESs they purport to address (e.g., the global climate) and the local SESs surrounding

the site itself (e.g., the reclaimed wetlands surrounding UN climate and biodiversity summits in the resort city of Cancún; Vidal 2010).

An abiding critique of SES analysis is that it tends to assume that social systems operate much like ecosystems do, leading proponents to conflate properties observed in ecosystems—such as resilience or redundancy—with desirable features of social systems (Challies et al. 2014). Despite these concerns, SES analysis could yield fruitful results if it were more deeply informed by social scientific concepts and methods and judiciously adapted to a global scale (Duit et al. 2010, 364; Dryzek and Pickering 2019).

A deliberative ecologies perspective could assist in this regard by critically interrogating the ways in which social and ecological systems are "coupled" with one another in practice (Hill et al. 2015, 27; Young 2017). For example, this perspective could yield insights on how the political representation of nonhuman nature in deliberation could help to couple negotiating sites with ecosystems in more productive ways (Eckersley 2004; Dryzek and Pickering 2019). A major impediment for environmental deliberation is that ecosystems and species at risk cannot speak for themselves. Recent CBD COPs have displayed creative strategies to represent nature in negotiating spaces, ranging from a Speak for Species campaign launched in 2016 by the Global Youth Biodiversity Network—which called on delegates to adopt a species or ecosystem and raise awareness about it during the conference—to a plenary segment at the 2018 COP featuring an eco-acoustic performance of the sounds of equatorial rainforests (IISD 2018).

Methods for Applying a Deliberative Ecologies Perspective to Environmental Agreement Making

Quantitative methods, such as game-theoretic and agent-based models (Lempert et al. 2009; O'Neill et al. 2013) and social network analysis (Kim 2013; Paterson, this issue), have become increasingly popular for understanding complex governance systems and ecosystems alike. Qualitative methods or mixed-methods approaches (see, e.g., Hoffmann 2011; Paterson et al. 2014) are particularly valuable for studying phenomena where multiple causes interact in a nonlinear fashion (Jervis 1997; Bennett and Elman 2006, 262), yet they remain underused in analyses of complex systems. This section presents two primarily qualitative methods—discourse analysis and process tracing—that could be employed either separately or in tandem to explore the two dimensions of deliberative ecologies identified in the previous section. The examples presented here do not amount to fully fledged case studies but offer a "proof of concept" to demonstrate potential for future research.

Analyzing the Ecology of Discourses in Negotiating Sites

Discourses, along with actors and communicative exchanges, are among the basic components of deliberative ecologies. Discourses—defined here as shared

ways of apprehending the world (Dryzek 2013, 9)—help actors to coordinate and interpret their interactions with one another. Although some discursive shifts may only be observable over long time periods, others may be apparent during the course of a single conference, such as the proliferation of calls for a "new deal for nature" at the CBD COP in 2018 (CBD 2018). Discourse analysis offers a particularly promising method for studying individual exchanges as well as broader discourses. While this method is solidly established in the study of deliberative systems (Stevenson and Dryzek 2014; Ercan et al. 2017) and environmental negotiations (Adger et al. 2001; Marion Suiseeya 2014), a deliberative ecologies perspective reveals new opportunities to use it to understand processes of change and to evaluate practices of agreement making.

Diffusion and Evolution of Discourses and Deliberative Practices

The first strategy involves using discourse analysis to understand how discourses and deliberative practices emerge, diffuse, and evolve. Such an approach could build on existing work that combines discourse analysis with collaborative event ethnography (CEE; see Marion Suiseeya and Zanotti, this issue) to assess opportunities and barriers for discursive change. Marion Suiseeya (2014), for example, investigates whether the CBD COP 10 (held in Nagoya in 2010) enabled contestation over meanings of justice associated with accessing genetic resources and sharing the benefits from their use. She finds that deliberation focused largely on how to implement existing—and predominantly neoliberal—principles of justice rather than on contesting the meaning of those principles in ways that could advance the interests of Indigenous peoples and local communities. Marion Suiseeya (2014, 120) finds that, paradoxically, "even as the deliberative space expands to include more actors, the space for introducing and contesting norms, ideas, and meanings remains constrained." To account for this paradox, a deliberative ecologies perspective could enlist concepts from organizational ecology outlined earlier. It may be the case, for example, that in a more inclusive deliberative space, nonstate actors find themselves competing for a static level of attentional resources from government negotiators. They may therefore focus their efforts on instrumental strategies to achieve predetermined goals rather than on opening up principles of justice for debate, which would require substantial attention from government negotiators but may produce fewer short-term gains. Ecological analysis could also illuminate factors that enable "weighted concepts" (see Hughes and Vadrot, this issue) to incubate and diffuse across negotiating sites. Similarly, discourse analysis could be combined with social network analysis to show how discourses cluster across deliberative settings (see Paterson, this issue).

Finally, discourse analysis could help to understand how deliberative practices—and the associated discourses in which they are embedded—spread through negotiating sites. Of particular interest here is the UNFCCC's embrace of two forms of deliberation inspired by different cultural traditions. At the

Durban COP in 2011 parties gathered for a series of "indabas" informed by Zulu and Xhosa traditions that were "motivated by the spirit of the common good" and aimed to resolve intractable issues (Redmond 2011). Then, in 2017, the Fijian COP presidency launched the Talanoa Dialogue (Lesniewska and Siegele 2018), based on the Pacific tradition of Talanoa, which aims for an "inclusive, participatory and transparent dialogue" that enables participants to "share stories, build empathy and trust" (UNFCCC 2018, Annex II). Drawing on evolutionary and niche concepts outlined in the previous section, a deliberative ecologies perspective could help to explain how these innovations took hold. One such account could begin by pointing to parties' widespread dissatisfaction with the UNFCCC's existing negotiating practices, particularly after many were excluded from the drafting of the Copenhagen Accord. This discontent may have freed up political resources that could be used to enable alternative deliberative practices to occupy a niche within the system. The COP presidencies of South Africa and Fiji, respectively, provided the resources for these practices to take root in the conferences they hosted. Given competition from prevailing negotiating formats, there was a strong risk that these practices would wither once the presidency passed on to another country. Nevertheless, after maintaining a lower profile in the intervening years, the indaba once again came to prominence in the closing days of the Paris COP in 2015, when the COP president, Laurent Fabius, initiated an "indaba of solutions" in what was ultimately a successful effort to break deadlocks over the text of the Paris Agreement (Bate 2015). This example suggests that there would be value in exploring further how cultivating and sustaining diverse negotiating practices could bolster healthy deliberative ecologies. This work could build on findings about the value of diversity in complex systems (Page 2010).

Evaluating Discursive Quality

A second strategy involves using techniques developed in research on deliberative democracy to evaluate micro-level deliberative interactions in order to build up a picture of the overall deliberative quality of the negotiating site, or the health of the deliberative ecology.

Perhaps the best-known tool of this kind is the Discourse Quality Index (DQI) developed by Steenbergen et al. (2003) and updated by Gerber et al. (2018). The DQI sets out a framework for coding deliberative statements across a range of criteria, such as the extent to which actors participate in debate, justify their own claims, and respect the claims of others. Micro-level findings on discourse quality can inform macro-level assessments of the deliberative capacity or democratic legitimacy of broader polities or governance areas (Dryzek 2010; Stevenson and Dryzek 2014). Pedrini (2014) shows how the DQI can be used to reveal a division of labor across different sites within a national deliberative system. Similarly, in environmental agreement making, plenaries may be better at securing the inclusion of all parties than fostering a meaningful exchange of

views, while the converse may hold for smaller (often closed) forums for deliberation, such as contact groups or Friends of the Chair meetings (Eckersley 2012). The DQI could also be used to investigate whether innovative practices like indabas or the Talanoa Dialogue display higher deliberative quality than conventional negotiating formats and whether enhanced quality within these settings flows through to other parts of the system.

Challenges to implementing the DQI include the laborious nature of coding individual statements and the difficulty of obtaining access to deliberation that takes place behind closed doors (Stevenson and Dryzek 2014, 65–66). However, neither of these challenges is unique to environmental agreement making or to discourse analysis. Coupling DQI analysis with CEE could help to address these challenges, as the latter method typically generates a wealth of data on deliberative encounters, and the team-based approach of CEE makes DQI coding more workable.

Process Tracing the Social–Ecological Dynamics of Negotiating Sites

Long-term environmental problems may coevolve with regimes to address those problems, but typically, long-range studies are required to understand how this kind of social–ecological interaction unfolds (Vanhala 2017, 98). Other social–ecological interactions occurring over shorter time frames and at smaller scales may be more amenable to site-based analysis, but there remains the important question whether these interactions exert more than a trivial causal influence on the overall dynamics of deliberation.

Process tracing offers a promising method for testing this question. Process tracing involves identifying causal mechanisms that link the causes of particular events or phenomena to their outcomes, drawing on a wide range of sources of evidence associated with an individual case or a small number of cases (Waldner 2012). This method is valuable for addressing complex causal relationships where dynamics like feedback effects—which often confound standard quantitative methods such as regression analysis—are at play (Kay and Baker 2015). Vanhala (2017, 94–95) highlights the potential for process tracing to discover interactions between social and ecological systems. Here I highlight two such types of interaction.[2]

The first type involves the capacity of sudden environmental shocks or disasters to shape the tenor of negotiations. Two recent studies use process tracing to understand how the UNFCCC came to grapple with the issue of loss and damage resulting from climate change (Vanhala and Hestbaek 2016; Allan and Hadden 2017). While neither of these studies seeks to offer primarily ecological explanations for institutional change, both yield suggestive evidence on how

2. A third type of interaction, not discussed here because of space limitations, involves the ecological impacts of multilateral meetings on the problems that they aim to solve, for example, the carbon footprint of UN climate conferences.

environmental shocks can catalyze discursive shifts in negotiations. Vanhala and Hestbaek (2016, 118–119) observe that the destruction wrought by Typhoon Haiyan in the Philippines shortly before the UN climate conference in 2013 helped to make loss and damage "a critical and high-profile issue." Allan and Hadden (2017, 609–610) attribute "a major frame transformation" in the loss and damage campaign to an episode at the Warsaw COP where Philippine climate negotiator Yeb Saño went on a hunger strike in response to the typhoon, and some NGO participants joined him in solidarity.

A second type of interaction involves how negotiating sites are physically embedded in SESs. Deliberative ecologies analysis could build on other spatially oriented approaches to analyzing negotiating sites (e.g., the "micro-geographies" of UN climate summits; Weisser and Müller-Mahn 2017) while placing these in a broader explanatory context. Given that environmental negotiations are typically held in generic meeting rooms in large convention centers, delegates are largely cocooned from their immediate surroundings. Even so, there is scope to explore how negotiating sites may be chosen strategically to strengthen local social–ecological couplings or to disrupt the generic backdrop of negotiating venues. Situating the International Union for Conservation of Nature (IUCN) 2016 World Conservation Congress in Hawai'i, for example, underscored the event's focus on ocean conservation, as well as helping the US government showcase its expansion of the Papahānaumokuākea Marine National Monument, which became the world's largest marine reserve (Wilson Center 2016).

Conversely, one could investigate the discursive effects of hosting UN climate change conferences in fossil fuel–dependent countries like Poland and Qatar. At COP 24, held in the Polish coal-mining city of Katowice in 2018, the presence of coal was unmissable:

> Delegates arriving at the talks were met by the taste of coal in the air and high levels of smog, as well as an accolade from the Polish Coal Miners Band. It was very quickly noted that the Katowice pavilion inside the COP venue featured walls, floors, soap and even earrings all made from coal. (Carbon Brief 2018)

These settings in turn provide discursive resources that participants can employ to interpret and shape negotiations, as with efforts at COP 24 to ensure a "just transition" of workers in fossil fuel industries as economies shift to cleaner sources of energy. Similarly, a reporter attending the CBD COP 14 in Sharm El-Sheikh, Egypt, in 2018 noted, "Highlighting the low priority that even the host government put on nature, a shop near the conference centre was openly selling an illegal lion hide" (Watts 2018).

Conclusions

In this article, I have shown how a deliberative ecologies perspective can weave together a range of innovations in the study of deliberative systems, complex

systems, and ecology to yield new insights on questions such as how discourses and deliberative practices diffuse through negotiating sites, how negotiations interact with their social–ecological context, and how both of these processes can shape broader systems for global environmental governance. I have shown how methods such as discourse analysis and process tracing can be employed to gain empirical traction on these questions. In these ways, a deliberative ecologies perspective can strike a balance between structure- and agent-oriented modes of studying agreement making while building analytical bridges between communicative exchanges among negotiators and the larger-scale dynamics of global environmental politics. More generally, this perspective offers a set of tools that can be used in multiple configurations to render the complexity of negotiating sites more legible.

While much of the article has focused on the descriptive and explanatory potential of deliberative ecologies, I have briefly illustrated their potential for normative analysis, for example, through generating ideas on how to couple negotiations more closely with the ecological interests they seek to address. The challenge remains for future research to build a stronger evidence base for how deliberative ecologies function so that we are in a better position to understand how they can flourish.

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