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AGENCY IN EARTH SYSTEM GOVERNANCE

Edited by

MICHELE M. BETSILL
Colorado State University

TABITHA M. BENNEY
University of Utah

ANDREA K. GERLAK
University of Arizona

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14

How to Evaluate Agents and Agency

SANDER CHAN AND RONALD B. MITCHELL

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Chapter Highlights

- Earth System Governance (ESG)–Agency scholars have embraced the notion that agent influence is complex, contingent, and context dependent, with the success of environmental governance depending considerably on propitious environmental and social conditions.
- Scholars have shifted from an earlier focus on how agents influence behaviours and environmental quality in earth system governance to how they influence governance processes, with increasing focus on democracy, participation, legitimacy, transparency, and accountability.
- ESG–Agency scholars employ increasingly diverse methods to integrate insights from case studies, interviews, surveys, statistical analyses, and other approaches leading to deeper and more nuanced understanding of agency in earth system governance.
- Adopting more interdisciplinary, multidisciplinary, and transdisciplinary approaches to evaluating agency can foster future understandings of and contributions to earth system governance.

14.1 Introduction

Evaluating agents and their effectiveness has long been, and continues to be, an important topic for scholars of earth system governance. The growing number and types of actors engaged in environmental governance (see Chapter 2) provides new opportunities to understand how agency works in earth system governance while, simultaneously, making such assessments more complicated. For instance, the growing relevance of multiple agents not only raises the question of their individual

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governance contributions, but also whether and how interactions affect governance. The Earth System Governance (ESG) Project specifically engages questions of the evaluation and effectiveness of agency against a background of analytic problems, including accountability and legitimacy (Chapter 13); allocation and access (Chapter 11); and the design and adaptiveness of institutions (Chapters 8 and 12), all of which have prompted diverse scholarship over the last decade (Chapter 1).

This chapter reviews this literature, seeking to understand how ESG scholars have evaluated agents and the strategies that they adopt to promote and improve earth system governance. We assess how well ESG scholars have addressed knowledge gaps identified in the 2009 Science Plan (Biermann et al., 2009). We also identify remaining gaps in knowledge and research trends to suggest new research directions.

14.2 Scope of the Review

The 2009 ESG Science Plan encouraged scholars to use methods traditionally used to study institutions and political systems to evaluate the increasing diversity of agents and of strategies for exercising agency (see also Chapter 3). As the Science Plan notes, 'stable, adaptive, and inclusive earth system governance requires the consent and involvement of national governments, their bureaucracies, and the growing population of nonstate actors' (Biermann et al., 2009, p. 37). In any given realm of earth system governance, relevant actors express their agency as freestanding agents, within principal–agent relationships, and through their network relationships (Chapter 2). Evaluation of agency therefore requires examining the extent and nature of collaboration, the legitimacy of agents, and their 'performance' in generating and influencing outputs and outcomes.

Like others in this volume, we started with the 322 articles in the ESG–Agency Harvesting Database (see Chapter 1 and Appendix). Coders identified almost half of those articles (155 or 48%) as addressing the question of 'how to evaluate the significance of agents and agency?' We analysed those articles to identify major themes and how they addressed specific knowledge gaps noted in the Science Plan (Biermann, et al., 2009), including relevant types of agency, conceptual understandings of relevance and effectiveness, and assessment methodologies. We organize the chapter accordingly.

We first summarize knowledge gaps related to evaluation of agents and agency and then review trends in the observations and findings of this literature. We conclude by reflecting on remaining and emerging knowledge gaps that point towards new research directions.

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14.3 Relevance and Roles of Different Types of Agents and Agency

Over the past decade, ESG scholars have expanded their investigation of agency beyond the study of international treaties, regimes, institutions, and policies that dominated earlier environmental governance scholarship. Scholars continue to assess the effectiveness of intergovernmental environmental institutions, particularly those related to climate change and within the context of the European Union (EU) (Underdal et al., 2012; Gehring et al., 2013; Kluvánková-Oravská et al., 2013; Leventon, 2015). In the EU case, scholars now recognize the dynamic development and adaptation of the EU to an increasingly polycentric governance environment (Rayner and Jordan, 2013). However, scholars also increasingly recognize that accurately assessing state- and nonstate actors (including firms) requires examining their influence in ways that move past the binary of adoption/compliance versus non-adoption/non-compliance. For instance, Chappin et al. (2009) highlight that agent influence often reflects cumulative policy interventions and innovation that emerges through intra-firm interaction. Many scholars also have replaced a focus on a single level of governance to polycentric and multilevel governance (see Chapters 6 and 9).

Multinational corporations, political groups, civil society sectors, and other stakeholders have influenced environmental governance outcomes for decades and, over the past decade, scholars have begun to recognize that the who, how, and when of stakeholder participation fosters accurate identification and parsing of the influence of all agents involved. Private sector agents – individually, in partnerships, and through collective private governance – now garner scholarly attention (van der Heijden, 2010). Stakeholders and private sector actors now garner a focus that rivals that on epistemic communities in the 1990s (though see Spruijt et al., 2014; van Kerkhoff and Lebel, 2015). Scholars are paying particular attention to the involvement of stakeholders in knowledge production and to less powerful groups (Hage et al., 2010; Auld et al., 2015; see also Chapters 5 and 7). More broadly, scholars increasingly use participation and accountability as criteria for evaluating agents and institutions (see Chapter 13).

This wider view of relevant stakeholders dovetails with an increasing recognition that influence flows from networks and relations as much as from single actors, echoing scholarship from the 2000s on networks, institutional interplay, and overlap (Taplin and McGee, 2010; Benecke, 2011). Faced with ‘complex, contextual and multi-faceted issues’ (Larson et al., 2013, p. 4425), effective governance and adaptive capacity have been found to emerge out of complex interactions among social factors and social networks of actors at and across governance levels as well as formal institutions (Gupta et al., 2010; Grothmann et al., 2013; Chapters 8, 9, and 12).

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Researchers increasingly find that earth system governance becomes more effective when synergies emerge among organizations and institutions working across scales rather than independently (see Chapter 9). Joint efforts among economic, political, social, and environmental actors at the local level 'generate better social and environmental outcomes' (Kuzdas et al., 2014; Brisbois and de Loë, 2016, p. 22). One study, for instance, found that the effectiveness of health governance in Guangzhou, China depended on understanding interactions across myriad actors at the micro-level, including patients and their social networks, paying institutions, social organizations, and civil society (Bork et al., 2011). In addition, coordination and learning among agents fosters effective city-level cooperation (Seitzinger et al., 2012; Chapter 7). Such linkages among organizations and people also span scales (Chapter 9). Scholars have shown the contribution that linkages between international organizations and nonstate actors can make toward low-carbon emissions pathways (Chan et al., 2016; Widerberg and Stripple, 2016). Similarly, scholars have found that integrating stakeholder participation into intergovernmental cooperation has improved governance to protect the Great Barrier Reef, large marine areas, and fisheries resources (Olsson et al., 2008; van Tatenhove et al., 2014; Defeo et al., 2016).

At times, the political and social contingency of one agent's actions on those of others can be a constraint as well as a resource, limiting network authority and agent influence. ESG scholars have shown the costs to effective governance of mismatches between scales (Paloniemi et al., 2012), obstacles to partnership building (Thaler and Priest, 2014), competition between networks (Chan and Pattberg, 2008), and limited governance capacities of subnational actors (Gordon, 2016b).

14.4 Conceptual Understandings of Relevance and Effectiveness

The last decade has seen more nuanced views of agents in earth system governance emerging. In reviewing the large body of research emerging from the ESG project, we have found it valuable to see agent influence as conditioned by three sets of factors: (1) broad (above the agent) institutional norms, rules, and processes that structure interactions among agents; (2) the characteristics and resources of the specific agent in question; and (3) political, economic, and social contexts.

Factors in these three sets promote certain outcomes and inhibit others and any specific agents influence in promoting a particular outcome. Scholars have 'zoomed out' to get a broader view that captures both proximate influences on outcomes that can be attributed to particular agents and intermediate and deeper forces that foster or impair an agent's influence. This approach supports more nuanced, refined, complex, and contingent understandings of agent influence and

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effectiveness. Similarly, the criteria against which we evaluate agents and agency influence have evolved and multiplied. Whereas earlier work focused on changes in environmental policies and behaviours, scholars are now equally interested in the influence of agents on the traits and processes of other institutions.

14.4.1 Norms, Rules, and Processes

One major focus of research has been when, whether, and how agents prompt institutions to become more participatory, democratic, transparent, accountable, and legitimate (see Chapters 10 and 13). Many scholars have assessed the democratic legitimacy of the agents pushing for policy change and the governance institutions they seek to influence (Fuchs et al., 2011; Bernauer and Betzold, 2012; Bäckstrand and Kylsater, 2014; Widerberg and Stripple, 2016). Some scholars see legitimacy as an evaluative criterion distinct from effectiveness, evaluating the legitimacy of particular agents and the factors that promote or inhibit that processual (as opposed to outcome) trait (Karlsson-Vinkhuyzen and Vihma, 2009; Bernstein, 2011; Schouten and Glasbergen, 2012; Mees et al., 2014). Others see legitimacy as a mediating variable that underpins greater environmental effort or promotes better outcomes (Karlsson-Vinkhuyzen and McGee, 2013).

Closely related to legitimacy are issues of transparency and accountability, both as contributors to agent influence and as traits of agents and their decision-making processes (Bäckstrand, 2008; Chan and Pattberg, 2008; Newell, 2008a; Sofronova et al., 2014; Jedd and Bixler, 2015; Gordon, 2016b; Kramarz and Park, 2016). Scholars also increasingly assess how participatory agents are, both as an end in itself and as a contributor to effectiveness. Duyck (2015), for instance, assesses the influence of the Aarhus Convention's participation provisions on the climate regime. Sanz et al. (2016, p. 963) shows that participatory approaches work best when combined with 'supportive capacity building and command-and-control policies'. Young et al. (2013) show that those who participate are more likely to perceive biodiversity management efforts as effective. However, scholars also have raised cautions, noting that participation may 'increase the costs of the policy making process' (van Tatenhove et al., 2014, p. 364) and that 'many non-governmental organizations themselves lack democratic legitimacy' (Bernauer and Betzold, 2012, p. 62).

14.4.2 Characteristics and Resources of Specific Agents

Although scholars continue to see effectiveness as dependent on resources or capacities (e.g., Bastakoti et al., 2014), they increasingly appreciate the highly contingent, complex, and dynamic nature of agent influence. Increasingly, the

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connectedness among actors itself becomes a trait that shapes effectiveness and outcomes (Bodin and Osterblom, 2013; Wallbott, 2014). Bernstein and Cashore (2012) argue for assessing effectiveness in complex governance environments in light of the ability of actors to influence policies, norms, and discourses domestically, internationally, and through market interventions. Similarly, polycentric governance has become a common thread in assessments of agent influence. For instance, Reducing Emissions from Deforestation and forest Degradation (REDD+) projects operate as transactions within a complex polycentric system involving 'transnational development governance, including private aid, public-private sustainable development projects, and transnational polycentric governance initiative' (Gallemore and Jespersen, 2016, p. 1). Polycentric governance highlights cross-scale interactions, institutional linkages, authority, networks, and markets in ways that help communities realize 'local benefits, while increasing adaptive capacity to deal with complex social-ecological challenges' (Bixler, 2014, p. 155; see Chapter 9).

14.4.3 Political, Economic, and Social Contexts

By emphasizing complexity, connectedness, and polycentricity, ESG scholarship increasingly emphasizes the context dependency of agency, encouraging scholars to unpack the influence of contextual factors rather than accepting it as an undifferentiated assemblage of exogenous factors. For instance, scholars increasingly call attention to the ways in which contexts create constraints and opportunities that shape actor influence (see Chapters 6, 8, 9, and 13). For instance, in some countries, 'the informal nature and historical embeddedness of decision making' plays a major role in actors' positions and 'how they make decisions' (Naess et al., 2015 p. 534). Even well-designed earth system governance efforts, such as environmental impact assessment programs and community-based natural resources management, may fail to realize their potential because of constraining policy contexts (Kolhoff et al., 2013; Leventon et al., 2014). Although context is a major theme in agency assessment and evaluation research, ESG scholars assess non-human agency only rarely (Chapters 2 and 15). Some have found that climate change shapes discourses, networks, and policy approaches in the conservation realm (Hagerman et al., 2012) and alters migration decisions in communities dependent on vulnerable ecosystems (Renaud et al., 2011). Work on ecosystem services highlights the role that 'biotic agents' play in the availability of carbon sinks and the sustainability of fisheries (Lee et al., 2014). Rozema et al. (2015) argues that 'place,' conceptualized as an assemblage rather than in dualistic terms, reconfigured British protests against high-speed rail developments. Gellers (2016) shows that new technologies that made 'crowdsourcing' possible, in turn, fostered

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participatory decision-making. Generally, however, the ESG community has yet to embrace the Science Plan's invitation to investigate non-human agency (Biermann et al., 2009, p. 41).

14.5 Methods for Assessing Agents and Their Influence

Shifts in conceptual understandings necessitate the rethinking of methods to assess agents and their influence (see also Chapter 3). The past decade of research on agents, agency, and their influence in earth system governance has seen scholars using increasingly diverse methods, reflecting their disciplinary backgrounds, their research questions, and the interdisciplinary nature of the field. Here, we review the dominant methods used and identify opportunities to expand both the methods and interdisciplinarity of the ESG community. Of the 155 articles in the ESG–Agency Harvesting Database identified as related to evaluating agency (see Section 14.2), abstracts show the use of interviews in 25, case studies in 20, surveys in 8, qualitative methods in 11, and quantitative methods in 7. Discourse analysis, Q methodology, fuzzy set analysis, and meta-analyses of prior research were used in only one or two articles despite being increasingly common in many fields (Breitmeier et al., 2011; Hobson and Niemeyer, 2011; Mukhtarov and Gerlak, 2013; Brockhaus, et al., 2014; Spruijt et al., 2014; van Laerhoven, 2014; van der Heijden, 2015; Simpson et al., 2016). Here we highlight some examples of each.

Single case studies continue to dominate ESG scholarship on agents and agency. This seems to be consistent with the growing need to understand how agency in specific cases is contingent on context. For instance, case studies have situated social learning in forest management in a historical context (Mulyani and Jepson, 2015), improved our understanding of governance by examining floodplain management in the Tisza river (Werners et al., 2009), and developed hypotheses regarding adaptive capacity in collaborative governance (Cheng et al., 2015). Surveys and interviews have clarified why some stakeholders see the World Bank as a 'legitimate knowledge actor' while others 'contest that authority' (Kramarz and Momani, 2013, p. 409). Indeed, interviews of stakeholders, experts, or community members have become central to case study research (Apostolopoulou and Pantis, 2009; van der Heijden, 2010; Gerhardinger et al., 2011; Gerlak and Heikkila, 2011; Apostolopoulou et al., 2012; Bergsma et al., 2012; Hurlbert, 2014; Kuzdas et al., 2014; Bowen et al., 2015; Milkoreit, 2015a). Scholars are using case studies not only to identify 'good practices' and 'early adopters' but also to explain governance failure as in Orsini's (2012) exploration of the failure of private biosafety initiatives. Case studies permit time-consuming methods that are essential to understanding complex, multifaceted phenomena and the processes that drive them. For instance, scholars have developed detailed

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reconstructions of the drivers of Philadelphia's (USA) approach to climate adaptation (Uittenbroek et al., 2016) and in-depth ethnographies to identify the moments of influence of indigenous people and local communities on the Convention on Biological Diversity negotiations (Witter et al., 2015).

Scholars have used comparative case studies to identify patterns and draw more generalised conclusions. For instance, Termeer et al. (2012) compare the effectiveness of four European states' national adaptation strategies and derive six qualities of governance institutions that promoted their effectiveness. Some studies assess a few cases, employing interview and documentary analysis (Mees et al., 2014; Scolobig et al., 2014). Small-n comparative case studies, like single case studies, serve exploratory purposes such as demonstrating the usefulness of an analytic framework for effectiveness (Kolhoff et al., 2013). Comparative studies can reveal how contexts and socio-economic factors shape the success and failure of policy approaches (Defeo et al., 2016) and how an actor's influence or a policy innovation functions in different political systems or contexts (Dryzek and Tucker, 2008; Gehring et al., 2013). A few scholars, seeking generalizable lessons, have undertaken larger comparative studies. Van der Heijden (2015) compared 30 Voluntary Environmental Programmes to establish how such programs perform on average, independent of individual program design, to better inform choices of such programs over alternative strategies in other settings. Scholars also compare cases to identify outliers, as in Urpelainen and Van de Graaf's (2015) contrasting of the International Renewable Energy Agency's (IRENA) unique origin story and unusually focused mandate to other international organizations.

Looking forward, the abundance of single and comparative case studies offers opportunities for meta-analyses that could assess how well specific conclusions hold up across multiple studies (Chapter 15). Meta-analyses have been rare in the ESG community. Exceptions include Breitmeier et al.'s (2011) meta-analytic comparison of quantitative evaluations of regime effectiveness and Widerberg and Stripple's (2016) review of five databases of cooperative initiatives for decarbonization. More large-n studies and meta-analyses could help make research on the effectiveness of agents and agency in earth system governance a field that reflects both in-depth, contingent stories about particular cases and large-N studies that show how well particular claims hold up in various contexts. The latter offers greater confidence to those looking for strategies that might improve the governance efforts of particular agents (see Persha et al., 2011; Hultman et al., 2012; Schultz et al., 2015).

The last decade has seen more ESG scholars using statistical techniques and developing large datasets to investigate the influence of various types of agents (Breitmeier et al., 2011; Widerberg and Stripple 2016). Using mixed methods, scholars seek to reap the advantages of quantitative and qualitative methods while

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mitigating their weaknesses, e.g., by establishing correlations with the former and strengthening claims of causality with the latter (Orsini, 2013; Mert, 2014; Davidson and de Loë, 2016). Scholars increasingly apply statistical models to data from their own surveys and interviews (Vasileiadou et al., 2014; Gallemore et al., 2015), to documentary data from web searches (Gallemore and Jespersen, 2016), or to large databases of expert-coded data (Böhmelt and Betzold, 2013). Van Laerhoven (2014) investigates the determinants of participatory local environmental governance in Brazil, using regression models that take account of the existence and form of local government, private sector actors, and civil society. Böhmelt and Betzold (2013) investigate the influence of non-governmental organizations (NGOs) on international environmental negotiations by analysing 23 different environmental regimes. Most such modelling focuses on social indicators in the evaluation of agency. For instance, Gallemore et al. (2015) use Exponential Random Graph Modelling (ERGM) to analyse how transaction costs in social networks shape power differentials among transnational and local actors in Indonesian forest governance (see also, Kim, 2013). Modelling that analyses correlations among biophysical and social data remains less common, though there are exceptions. Wang et al. (2013) undertook a multilevel statistical analysis of household and biophysical data to investigate adaptation strategies of Mongolian herders. Similarly, Persha et al. (2011) assessed the relative contributions of forest size, economic dependency on forests, and stakeholder participation to biodiversity conservation and sustainable livelihoods. Despite growing recognition of earth system governance as complex and of 'context' and scope conditions as endogenous to governance outcomes, the limited integration of biophysical and social data in statistical models to date suggests that scholars still struggle to 'unpack' complexity and complex interlinkages in ways that can show how social, environmental, and economic systems interact.

We see similar obstacles to integrating socio-economic and biophysical data among researchers that investigate stakeholder agency through surveys coupled with statistical analysis. Studies that look for agent influence on environmental outcomes are rare (see Pattberg and Widerberg, 2015). Instead, most statistical studies by ESG scholars focus on the relationships among agents and stakeholders, rather than those between biophysical and socio-economic systems. For instance, Davidson and de Loë (2016) combined surveys and social network analysis to study NGO entrepreneurship in water governance. Other scholars have used similar techniques to investigate accountability in transboundary collaborations, the roles of nonstate stakeholders in climate governance, and actor perceptions of governance quality (Cadman and Maraseni, 2013; Jedd and Bixler, 2015; Nasiritousi et al., 2016b). Bodin and Österblom (2013) regressed survey responses to assess how the resources and activities of actors in a fisheries regime influenced

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perceptions of those actors' importance. Burch et al. (2013) used surveys to assess perceptions of social enterprises and the ways that regional authorities enabled actions in a Canadian climate initiative. Gerlak and Heikkila (2011) developed a theory of learning by combining surveys and interviews of those involved in collaborative ecosystem restoration. Yengoh et al. (2016) combined survey and focus group data to identify the factors that make communities in Sierra Leone vulnerable to unequal engagement in large-scale land acquisitions.

Environmental conditions have begun to appear in research on earth system governance in efforts to address the complexity of human systems, environmental systems, and the coupled human and natural systems that join them (Liu et al., 2007). Vasileiadou and Safarzńska (2010) argue that the complexity that emerges due to the heterogeneity and plurality of agency should not be taken as a given but should be subject to critical reflection. ESG scholars also have shown with increasing nuance that both agents' goals and the success of their influence reflect complex relationships. For instance, the success of desalination efforts in the Arabian Gulf was found to depend on 29 separate cause-and-effect relationships and nine intervention strategies (Barau and Al Hosani, 2015). Variation across outcomes in biodiversity and forest conservation revealed 'both positive and negative relationships, leading to joint wins, losses, and trade-offs depending on specific contextual factors' (Persha et al., 2011, p. 1606). Designations of marine protected areas improve biodiversity outcomes only if agents' strategies take an array of contextual factors into account (Gerhardinger et al., 2011). Similarly, implementation of clean production rules improves when participatory approaches account for socio-economic constraints, blend capacity-building with command-and-control policies, and account for regulatory realities such as zoning regulations (Sanz et al., 2016).

Two under-realized aims of the ESG initiative have been to promote methodological diversity and to improve communication and understanding between the natural and social sciences (Biermann et al., 2009; Pattberg and Widerberg, 2015). First, as noted, ESG scholarship on agents and their effectiveness depends excessively on a limited range of methods (Chapter 3). Numerous opportunities exist to apply new methods to achieve deeper insights and to increase our confidence in those insights. Such methods could include applying agent-based modelling, forecasting techniques, cross-correlations in time-series analysis, scenario analysis, and integrated biophysical and socio-economic models. ESG scholars could learn from the examples taken outside the ESG network, for instance, integrating social science and econometric modelling to understand the role of state and nonstate actors in emissions reduction scenarios (Hsu et al., 2018).

Second, the ESG Science Plan (Biermann et al., 2009) encouraged research on earth system governance to become a joint natural and social science enterprise but

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that integration has remained elusive. The last decade reveals only limited progress in expanding the disciplines reflected in ESG scholarship. Such interdisciplinarity as occurs usually involves a few social sciences (e.g., political science and economics) or, less often, humanities and social sciences. As Pattberg and Widerberg note (2015), scholars too often focus on the 'human component' of global environmental governance, despite opportunities for ESG scholars to deepen their insights by also addressing environmental, demographic, and energy systems. Opportunities exist to link ESG scholars and their expertise on governance into the broader communities' turn toward integrated modelling while seeking to develop interdisciplinary collaborations that bring natural and social scientists together (Ledford, 2015).

14.6 Conclusions

Over the past decade, scholars have broadened and deepened our understanding of agents and their influence in earth system governance. Most significantly, scholars have vastly expanded our understanding of who shapes global environmental governance and how they shape it. Single and comparative case studies and quantitative techniques have documented the array of actors beyond international institutions, governments, and high-visibility NGOs that shape earth system governance. Scholars have also highlighted how participation by community members and by political, social, and economic stakeholders and networks among them alter the policies that emerge, the processes of implementation, and the degree to which behaviours change and environmental quality improves.

Our review of a decade of scholarship in the ESG project has resulted in the following key findings.

First, ESG scholars have embraced the notion that agent influence is complex, contingent, and context dependent. The success of environmental governance efforts depends considerably on propitious contextual conditions, both environmental and social. Success usually reflects interactions and networking among actors rather than independent efforts of a single agent. And, increasingly, the focus on social networks, multiple stakeholders, networks, and polycentricity has rendered 'context' as endogenous, rather than as an assemblage of exogenous factors.

Second, ESG scholars have expanded how they define and assess agent influence. They have shifted from an earlier focus on how agents influence behaviours and environmental quality to how they influence governance processes. Democracy, participation, legitimacy, transparency, and accountability increasingly appear in ESG research on agents as criteria for evaluating agents, as traits of agents that deserve explanation, and as capacities of agents that enhance their influence in the more traditional, behavioural or environmental, sense.

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Third, ESG research on agency has become more diverse with respect to methods. However, deep analyses of one or a few well-chosen cases continue to dominate and offer nuanced understandings of the processes and complexities of agency influence rather than the reductive, single-variable understandings of much of the early regime effectiveness literature. Interviews and surveys now shed light on how influence actually works, comes to be shaped by stakeholder perceptions, and depends on complex interactions among agent characteristics and capacities, contextual factors, and social processes. While still limited, some ESG scholars are applying novel quantitative methods, meta-analytic approaches, network analysis, Q methodology, and fuzzy set techniques.

Overall, recent research on agents and agency in earth system governance has deepened our understanding of which actors and agents operate in a given policy space, their multiple interactions in that space, the processes by which they wield influence, and the range of factors that shape and condition their influence. Our review, however, also identifies opportunities for growth in research on agency. We believe benefits would accrue by coupling the increased attention to participation, legitimacy, democracy, accountability, and networks to more traditional assessments of agent influence in terms of improving environmental quality and reducing behaviours that threaten it (Chapter 15). We also urge ESG scholars to continue bridging the social/natural science divide. Interdisciplinary, multidisciplinary, and transdisciplinary research remains undersupplied but critical to the success of our collective desire to understand and improve earth system governance. In this regard, the new Earth System Governance Science and Implementation Plan (Earth System Governance Project, 2018a) should be welcomed, as it seeks to extend disciplinary and interdisciplinary collaborations to transdisciplinary efforts that recognize a plurality of perspectives on problems and solutions. Obstacles to progress towards inter- and transdisciplinarity arise from a scholarly context that rewards disciplinary depth and punishes, excludes, and ignores interdisciplinary and transdisciplinary work. We can overcome those obstacles, however, by designing projects to understand coupled human and natural systems, by building collegial relationships that foster understanding and respect, and by encouraging a new openness of editors and reviewers to such research.

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