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Editorial

Looking beyond the fisheries crisis: Cumulative learning from small-scale fisheries through diagnostic approaches

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ABSTRACT

The common scientific and media narrative in fisheries is one of failure: poor governance, collapsed stocks, and vanishing livelihoods. Yet, there are successful fisheries – instances where governments and/or communities have maintained or rebuilt stocks, where fishers have robust livelihoods, and where institutions are strong. Scientists and managers alike are becoming increasingly interested in moving beyond the doom-and-gloom stories of fisheries failures toward cumulative knowledge for making fisheries governance more successful. Recent literature has attempted to determine what separates the successes from the failures and better understand how lessons learned for effective fisheries governance can be cumulatively compiled. In this special issue, we present a range of fisheries studies from around the world – Latin America, The Pacific, and East Africa. The studies look at varying fisheries outcomes, including sustainability, cooperation, self-governance, and sustaining livelihoods. The contributions in this special issue all tackle the challenge of exploring, testing, and refining the Diagnostic Framework for Analyzing Social-Ecological Systems developed by Elinor Ostrom as a way to cumulate knowledge on the potential conditions that could be causing a problem or creating a benefit in the governance of small-scale marine fisheries. These articles successfully explore the applicability and contributions of the framework while providing important theoretical refinements for small-scale fisheries.

1. Introduction

For many decades, fisheries management focused on achieving maximum sustainable yield through top-down management. These top-down policies were often prescribed without consideration of local social or political contexts, often resulting in unsustainable fisheries. Considerable contemporary fisheries literature is focused on documenting how equilibrium-based policies caused widespread changes to marine ecosystems and the coastal societies that depend on them. A common narrative is that fisheries have failed, overfishing is rampant, and people are generally unable to overcome the 'tragedy of the commons' (Mora and Sale, 2011; Worm et al., 2006). However, there is increasing recognition among researchers of the different processes that allow fisheries to modify their own governance landscapes and overcome tragedies of the commons (e.g., Cinner et al., 2012a; Gelcich et al., 2010; Hilborn et al., 2003). As a result, there is increasing awareness of the diversity of governance arrangements – which include the structures and decision-making processes by which people in societies shape outcomes about fisheries – that can bring about positive outcomes. Thus, we are experiencing a revival in recognition of the role of existing common property institutions, decentralized management, and increased empowerment of local authorities and fishers to pursue key social goals such as wellbeing and equity. Additionally, there has been increasing integration of fish stock management and wider environmental governance such as habitat management and restoration, rare species conservation, and incorporation of non-consumptive uses of aquatic biodiversity. Thus, some fisheries are better suited toward social and/or ecological sustainability, paving the way for a more nuanced understanding of how to achieve desirable fisheries outcomes (McClanahan et al., 2009).

Despite real gains in understanding the drivers of sustainability, drawing common lessons among fisheries successes and failures has been difficult. The tendency for high profile journals and the media to focus on disaster narratives have made it difficult for scientists to get traction with success stories, creating strong incentives to report on global declines rather than successes. The 10 most cited fisheries papers of the past 20 years have almost all focused on decline (ISI Web of Knowledge search using the keyword "fisheries"). In addition, disciplinary silos, lack of a common language, and a scarcity of integrated methodology have created fundamental limitations in how science has been able to learn by combining information from case and comparative studies generated at different spatial and temporal scales.

In 2007, Elinor Ostrom, published "*A Diagnostic Approach for Going beyond Panaceas*," a framework for making inferences from comparative social-ecological studies (Ostrom, 2007). This diagnostic framework drew from a series of carefully controlled laboratory experiments of appropriation dilemmas, targeted

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empirical case studies, previous frameworks and meta-analyses from the published literature, which altogether signaled the basic attributes critical for the emergence and sustainability of common pool resource management. The ultimate goal was to initiate the process of establishing comparable databases to enhance the gathering of research findings about processes affecting the sustainability of common pool resources around the world (Ostrom, 2009). As Ostrom (2009) points out "*Research across disciplines and questions will thus cumulate more rapidly and increase the knowledge needed to enhance the sustainability of complex social ecological systems*". Articles in this special issue embrace the challenge of knowledge accumulation by using the framework to link fisheries studies in a comparable way. Indeed, this special issue, which attempts to advance the use of the diagnostic framework for analyzing social-ecological systems, is dedicated to the memory of the late Elinor Ostrom. The interdisciplinary nature of this special issue is in recognition of the profound contributions she has made to the hearts and minds of researchers such as ourselves in fields as diverse as ecology, economics, political science, and geography.

In this special issue, we present a range of case studies and comparative analyses detailing the institutional and contextual conditions determining small-scale fishery social and ecological outcomes at a range of spatial and temporal scales. We use Ostrom's diagnostic framework to conceptually organize and unify the papers (Ostrom, 2007, 2009). The framework provides a common language to describe our methods and understand our results. It acts as a lens through which to view a compilation of fisheries determinants of specific outcomes and move beyond case studies, beyond disciplinary viewpoints, and beyond one-size-fits-all panaceas and toward cumulative knowledge. The special issue can also be understood as a portfolio of examples of different analytical approaches with which Ostrom's diagnostic framework can be engaged to study the determinants of social and ecological sustainability.

Here, we first outline Ostrom's diagnostic framework, discussing its strengths and weaknesses. Next, we discuss the individual lessons drawn from each of the studies in this special issue. Finally, we integrate results across studies to understand the broad and contextual conditions that lead to fisheries success and failure, making recommendations for applying this research across the broader seascape.

2. A diagnostic framework for analyzing Social-Ecological Systems

There is widespread recognition that human activities are generating dramatic ecological change (Jackson et al., 2001; Rockström et al., 2009), with increasing recognition among scientists and managers that social, economic, and cultural drivers often interact with ecological processes as linked Social-Ecological Systems (Berkes et al., 2003; Berkes and Folke, 1998). The need to understand social-ecological processes is particularly acute among common-pool resources such as shared grazing areas, groundwater basins, irrigation systems, forests, and fisheries, due to their importance as resources and for livelihoods.

Common pool resources have two defining characteristics: they have limited excludability and high subtractability (Ostrom and Ostrom, 1977). Limited excludability means it is costly to keep individuals from harvesting the resources. High subtractability means that when one resource user harvests a resource unit, that resource unit is not available for others to harvest. These two characteristics make common pool resources particularly susceptible to situations that encourage users to overexploit, sometimes to the point of ecological collapse. Prominent examples include ocean fisheries during the late 20th century (Hilborn et al., 2003), which collapsed due to factors such as a lack of appropriate institutions or enforcement (Ostrom, 2008) and the life history characteristics of the species harvested (Myers and Worm, 2003).

Despite the potential for resource overexploitation, many small-scale fisher groups among other local groups have developed norms and rules that enable them to successfully manage common pool resources (see the Digital Library of the Commons http://dlc.dlib.indiana.edu/dlc/). Such successes have occurred particularly among common pool resource users with local knowledge of the dynamics of the resource and autonomy to design a diverse range of mechanisms to overcome commons dilemmas. Studies of these interactions have led to a rich case study literature that has greatly informed our understanding of social and institutional mechanisms that can enable successful governance of common pool resources (e.g., Basurto, 2005; see the Digital Library of the Commons http://dlc.dlib.indiana.edu/dlc/, Gelcich et al., 2006). A distinct yet complementary series of comparative studies have also identified common principles that lead to successful or failed governance of common pool resources (Cinner et al., 2012b; Cox et al., 2010; Gutierrez et al., 2011; McClanahan et al., 2006).

A large body of theoretical, case study, and comparative research has uncovered a set of potential variables, operating at multiple scales, that relate to common pool resource governance outcomes. A coherent way to navigate this maze of potential relationships is through development of a conceptual, ontological framework that helps to organize relationships among the many concepts or variables; posit how they are causally related across and among scales; define how and where these variables are embedded within the system; and discern how sub-systems are linked to still larger systems. Such an ontological system also addresses the problem of infinite regress, where a linguistic construction such as a concept is composed of sub-concepts, which are in turn composed of sub-concepts, and further sub-concepts.

Here, we draw on the multitier framework for analyzing social-ecological systems presented in *Proceedings of the National Academy of Sciences* on "A Diagnostic Approach for Going beyond Panaceas" (Ostrom, 2007) and Ostrom (Ostrom, 2007) (Fig. 1). The framework starts with a first tier of variables that those studying common pool resources can use in any particular focal system, ranging in scale from a small inshore fishery to the global commons. These first-tier core subsystems include: the social, economic, and political setting (S); resource system (RS); governance system (GS); resource units (RU); actors (A); interactions (I); and outcomes (O), as well as related ecosystems (ECO) (Ostrom, 2009). To apply the framework, a researcher would first identify the Resource System (RS) and Resource Units (RU) relevant for answering a particular question and use these as the focal system for analysis. The diagnostic framework represents each of these broad components as a unified ontological system, providing physical bounds and a critical point of departure for the analysis process.

To diagnose the causal patterns that affect specific outcomes, such as successful formation of self-organization to control access to fishing grounds, one needs to incorporate a set of "second-tier" variables (Table 1) that are contained within the broadest tiers identified in Fig. 1. The list of second-tier variables in Table 1 constitutes an initial effort to help group and classify important variables into a tiered ontology specific to the theoretical puzzles related to common pool resource problems such as the one posited above. Although comprehensive, the framework itself isn't final at any point; rather it forms a sound basis from which further concepts and ideas can be integrated and tested. Progress in the development of this tiered ontology leads to better understanding of how concepts are embedded and related with each other, opening space for third, fourth, and fifth tiers to be further elucidated (Basurto et al., 2013).