

# Success or Selection?

## An Economic Perspective on Fisheries Co-Management

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Working Paper EE 11-04  
April 2011

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This paper comments on a recent paper published in the journal *Nature* that claims that fisheries co-management causes successful outcomes in fisheries. We outline theoretical arguments in favor of and against co-management as an approach to solving fisheries-commons problems. We argue that the principal claims of the authors are not supported by their data and analysis. Spurious inference about effectiveness of co-management runs the risk of undermining rather than advancing the policy process.

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## **Success or Selection? An economic perspective on fisheries co-management**

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## Success or Selection? An economic perspective on fisheries co-management

**Abstract:** This paper comments on a recent paper published in the journal *Nature* that claims that fisheries co-management causes successful outcomes in fisheries. We outline theoretical arguments in favor of and against co-management as an approach to solving fisheries-commons problems. We argue that the principal claims of the authors are not supported by their data and analysis. Spurious inference about effectiveness of co-management runs the risk of undermining rather than advancing the policy process.

**Keywords:** program evaluation, co-management

One of the first articles published in the *American Economic Review* focused on the economics of managing a common-pool resource [1]. After 100 years, managing the commons continues to engage economists, and the fishery has become the canonical case of a common-pool resource [2]. Being environmental economists focused on regulatory analysis and fisheries, we read with great interest the recent article in *Nature* by Gutiérrez, Hilborn, and Defeo (hereafter GHD) [3] that described co-management as "the only realistic solution for the majority of the world's fisheries." In an accompanying press release, the lead author characterized co-management as "an effective way to sustain aquatic resources and the livelihoods of communities depending on them." This note provides an economic perspective on their analysis and on evaluation of co-management more generally.

Any regulatory system is composed of four broad components: (1) target (2) regulator, (3) command(s), and (4) consequences ([4, 5]). The economic literature on fisheries management has largely focused on designing and evaluating commands (and to some extent consequences) that overcome the open access problem and lead to improved fisheries outcomes [6-14]. A dominant focus in this literature concerns market-based policy instruments such as individual transferable quotas (ITQs), which are now often called *catch shares* in policy circles [7-10].

Co-management is not a set of commands and consequences that could be compared to ITQs along economic, social or political dimensions. Rather, co-management is a particular definition of the regulator; it is "the sharing of power and responsibility between the government and local resource users" [15]. Co-management is a hybrid between centralized state control of policymaking and community-based management [16]. It differs from simply involving stakeholders in the regulatory process because stakeholders have explicit power and not just a voice in the process.

The theoretical arguments in favor of co-management stem largely from the pioneering work of Nobel laureate Elinor Ostrom [17, 18]. In collective action problems agents are more likely to

abide by rules that they were involved in making and that were not imposed on them externally[16, 18]. Co-management may also harness local knowledge to augment independent scientific information[15, 16]. Beyond theory, proponents of co-management frequently invoke an argument of expediency; top-down controls are not possible in many parts of the world with central governments that are weak or simply lack resources to regulate effectively[3].

Theoretical arguments against co-management suggest that it facilitates various forms of regulatory capture [16, 19]. In co-management, fishermen ultimately will be able to influence the total allowable catch (TAC) and may be able to shape it more than in a top-down management regime. This potential should be worrisome for proponents of co-management. In Clark's classic papers on economics of overexploitation[20, 21], he argued that privatization of fishery resources as a solution to the commons is problematic because an individual firm's private discount rate may exceed the biological growth rate of a species and lead the private firm to drive the species to extinction. The same could be true for a community group exploiting a fishery. Clark's caution was not against the use of market-based instruments (indeed the idea of ITQs was only beginning to emerge at the time[8]). Instead, the implication of Clark's analysis was that it is essential to maintain a separate role for government in deciding how much of a resource to harvest. In a more contemporary context, there are non-market values of the stock of a species that cannot be fully appropriated by those exploiting it. Public goods dimensions of fishery resources co-exist with their traditional common-pool features [22]. This mixed good nature provides reason to doubt that the devolution of regulatory control to fishing stakeholders will lead to socially optimal outcomes.

Readers familiar with the literature on regulatory processes and regulatory instruments for pollution control will no doubt find striking parallels between the theoretical models of co-management and theoretical models of both self-regulation and negotiated rulemakings. Both self-regulation and negotiated rulemaking have been promoted on the theory that they can capitalize on regulated entities' information about pollution reduction possibilities to lower compliance costs and decrease regulatory litigation [23-26]. Theoretical work in this area has shown that there are limited circumstances under which voluntary agreements can achieve the level of pollution control that is socially efficient either under threat of command-and-control or with the promise of subsidies [27-30]. The problems of regulatory capture and adverse selection have been raised in the pollution control context as well and are thought to be easiest to overcome when regulatory failures have systemic impacts on all regulated entities. In other words, self-regulation is most likely to succeed when parties have an interest in protecting the "reputational commons" [24]. Members of the American Medical Association, for instance, have a strong stake in the reputation of the medical profession.

Given the theoretical ambiguity, whether co-management is an effective regulatory process is an important empirical question. In the case of pollution control, there is little empirical evidence to suggest that self-regulation or negotiated rulemakings have systematically resulted in improvements in environmental performance [31, 32] or reductions in rulemaking time and litigation [23], although some success stories can be found [32]. As GHD correctly stated in their introduction, there have been “no comprehensive evaluations to support the hypothesis that co-management improves fisheries governance systems and performance indicators,” which is precisely what makes their paper potentially so significant.

GHD stated that their paper “tested whether co-management improves fisheries’ social, economic and ecological success, identified relevant attributes generated by isolated study cases in diverse disciplines ..., and evaluated the relative merits of different co-management attributes across fisheries.” There are two different research questions embedded in this statement. First, does co-management lead to successful fisheries outcomes? Second, within the set of co-managed fisheries, what are the sets of institutions (commands and consequences) that are most strongly associated with success? In their press release they make strong claims about the policy implications of their analyses and findings: “A study considering new evidence suggests that most global fisheries including small-scale ones could be harvested sustainably through community-based co-management.”

Before turning to their analysis, let us consider what it would mean in the abstract to answer their first research question, namely “test[ing] whether co-management improves fisheries’ social, economic and ecological success.” One possibility is that co-management improves outcomes, *ceteris paribus*. In this context, *ceteris paribus* implies that the set of commands and consequences are the same and the only difference is the regulatory process by which these commands and consequences were determined. In the case of fisheries management, it is difficult to imagine testing this hypothesis as it would require comparisons among top-down, co-managed, and community-managed fisheries with the exact same set of policy instruments. A more relevant hypothesis is whether co-management leads to better outcomes than other forms of management regardless of the type of commands and consequences. We suspect this is the hypothesis that GHD intended to test. Does co-management, through collaboration with regulated entities, result in a set of commands and consequences that result in improved outcomes relative to those that would have resulted from a top-down or community-managed approach?

Testing the hypothesis that co-management improves fisheries governance systems and performance indicators requires a comparison between fisheries that are co-managed and not co-managed, yet GHD analyzed data only for co-managed fisheries. Hence, they cannot make comparisons across regulatory processes. GHD began with 218 co-managed fisheries where

“co-management” is defined broadly to include formal consultation to self-governance. From this set of 218 cases, they examined peer-reviewed and gray literature to ascertain whether the co-management regime was “successful” where measures of success included measures of fish abundance, catch, prices, etc. They discarded cases where documents revealed too little or contradictory information and cases in which co-management was in the pre-implementation phase. They assembled data on the remaining 130 fisheries covering 19 attributes of the fisheries regime including type of co-management, type of fishery (resource system), type of governance (including types of commands and consequences), nature of the user systems (e.g., social cohesion, importance of fisheries in local economy). They then used regression tree analysis (a data mining technique) to explore correlations between the attributes of co-management programs and qualitative measures of fishery outcomes. The data and analysis in GHD were constructed to identify attributes of co-management regimes and establish correlations between these attributes and aggregate measures of fisheries success. They found that co-managed fisheries in high-income countries are more successful than ones in low-income countries. And co-managed industrial and off-shore fisheries are more successful than co-managed small-scale and in-shore fisheries. The higher the governance attribute score for a co-managed fishery the more likely it was to be successful. In multivariate analysis, the most important features were strong leadership, community cohesion, and incentives such as catch shares and enforcement mechanisms.

GDH analysis fails to answer both of the research questions on co-management. First, GDH failed to test the hypothesis that co-management has a positive causal impact on fisheries governance systems and performance indicators because their data includes only fisheries that are co-managed. The fisheries that did well under co-management, might have done equally well or, perhaps better, under top-down or community-based management.

Second, they fail to isolate features of co-management that are most correlated with success. Many of the features of co-management that are correlated with success are actually features of the set of commands or consequences rather than features of the regulatory process, per se. Economists are not likely to find surprising their result that fisheries with well-defined property rights in the form of quotas and with established enforcement mechanisms are more successful. But these commands (quotas) and consequences (enforcement mechanisms) could have led to fisheries success through a top-down management regime as well. Arguing that there is something about quotas and enforcement that leads to success specifically in a co-management context requires some comparison to regimes that are not co-managed.

GHD acknowledged that causal inference is challenging because policy interventions are non-random. The vast majority of environmental policies are not randomly assigned. Nonetheless there is a detailed literature in policy analysis on the use of quasi-experimental or observational

methods for causal inference [33, 34]. These methods statistically construct a counterfactual for what would have happened in the absence of the policy (or in the presence of a different policy) [35-38] and have started to be applied to fisheries policy evaluation [9, 39].

It is possible that co-management will cause fishery outcomes to improve as many have argued, but GHD failed to provide causal evidence. Many of the cases analyzed in GHD come from developed countries such as the U.S., Japan, and New Zealand, in which alternatives to co-management not only exist but constitute the majority of management regimes. Spurious inferences about co-management could stimulate more adoption of co-management and undermine existing regimes that are successful or at least failing less than a co-managed regime would. Claiming a particular regulatory process for fishery management is successful without careful causal analysis does not advance the policy process.

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