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Analysis

# An institutional framework for designing and monitoring ecosystem-based fisheries management policy experiments

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## Abstract

Indicator systems are seen as central tools for ecosystem-based fisheries management, helping to steer fisheries towards sustainability by providing timely and useful information to decision-makers. Without testing hypotheses about the links between policies and outcomes, however, indicator systems may do little more than promote ad hoc policies, possibly even prolonging the transition to sustainable fisheries. The Institutional Analysis and Development (IAD) framework is a robust framework that has been used extensively to design policy experiments and empirically test theories and models linking ecological–economic systems, institutions and the sustainability of common pool resource systems. A modified IAD framework is developed that transparently encompasses both process-oriented pressure-state-response (PSR) and structurally oriented sustainable livelihood indicator frameworks, thus providing a platform for ecosystem-based fisheries management policy experiment design and monitoring. An institutional approach to fisheries management facilitates critical examination of important cross-cutting issues, including assumptions regarding what comprises sustainability and how market, government and civil society organizations use strategic investments in capital assets and institutions to achieve sustainability objectives. The emphasis on capital assets keeps attention on the relative merits of alternative investment options in policy experiments.

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## 1. Introduction

According to the American Fisheries Society, “sustainability of fisheries and other aquatic resources is a state in which these resources, and the ecosystems that support them, are managed in such a way that their long-term viability and productivity are maintained for the benefit of future generations”

(Knuth et al., 1999). Achieving sustainability has proven elusive to date, but it is internationally recognized as a primary goal of fisheries management (FAO, 1995; NMFS, 1999; NRC, 1999; Garcia, 2000; Garcia and Staples, 2000).

There is a growing consensus that an ecosystem-based fisheries management paradigm is needed for achieving fisheries sustainability (Costanza et al., 1998; NRC, 1999; Gislason et al., 2000). Under ecosystem-based fisheries management, experiments are needed to build further understanding about complex fishery system processes (Walters, 1997).

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This goes beyond just implementing ad hoc ‘adaptive’ responses to unexpected ecological or economic crises, replacing trial and error learning with a directed process of active policy selection. Policy selection is driven by societal objectives that are ultimately a reflection of the values, preferences and behaviors of individuals and organizations within that society.

Institutions, the human-crafted rules and norms that infuse social order, shape human incentives and behavior (Ostrom, 1990, 1999) and a variety of institutions (means) can be crafted to achieve any particular objectives (ends) envisioned under ecosystem-based fisheries management. Even small-scale, self-governing fisheries use a plethora of rules to govern when and how resources are harvested and used by particular users (Ostrom et al., 1994) and, in more complicated fisheries, the rule set may become very complex (Sinclair et al., 1999). Furthermore, the array of options may vary greatly in costs, making it necessary to design and monitor policy experiments that strategically test the cost-effectiveness of policy bundles that can help achieve diverse societal objectives under ecosystem-based fisheries management (Rudd et al., 2003).

A variety of indicator frameworks have been proposed to monitor fisheries sustainability (Garcia and Staples, 2000; Garcia et al., 2000; Sutinen, 2000; Charles, 2001; Olsen, 2003), the sustainability of other common pool resources (Prabhu et al., 1999; Campbell et al., 2001) and for broader assessment purposes (Hammond et al., 1994; Ashley and Carney, 1999; Bossel, 1999; OECD, 2000; UN, 2001; World Bank, 2001; Segnestam, 2002; NRTREE, 2003). The OECD pressure-state-response (PSR) framework (OECD, 2000) and variants are process-oriented frameworks that are gaining exposure in the fisheries field (Garcia and Staples, 2000; Bowen and Riley, 2003). Exogenous driving forces and endogenous anthropogenic impacts exert pressure on the state of the environment; societies respond by attempting to mitigate the pressures. An alternative structurally oriented framework, the sustainable livelihoods model (Ashley and Carney, 1999; Bebbington, 1999), is popular in the forestry and agricultural development fields (Prabhu et al., 1999; Campbell et al., 2001). An emphasis in the sustainable livelihoods framework is on the role of capital assets (natural, produced or

physical, human, social and financial) on sustainability and human welfare.

The emphasis in both PSR and sustainable livelihoods frameworks has been largely on using indicator systems to communicate useful information to decision-makers (Ashley and Carney, 1999; Garcia and Staples, 2000; Garcia et al., 2000; Segnestam, 2002); relatively little explicit emphasis has been placed on the role of frameworks in developing policy experiments. Without testing hypotheses about the links between policies and outcomes, however, indicator systems may do little more than promote ad hoc policy responses, possibly even prolonging the transition to fisheries sustainability. There is, therefore, a need to use a framework that can be used for both the design and monitoring of fisheries policy experiments.

The Institutional Analysis and Development (IAD) framework (Ostrom, 1990, 1999) is a robust framework that has been used extensively to design policy experiments and empirically test theories and models linking institutions and the sustainability of common pool resource systems (Ostrom et al., 1994). The strength of the IAD framework is derived from its systematic theoretical focus on the impact of rules and norms on individual incentives in complex ecological-economic systems, its empirically oriented focus on outcomes (including the transaction costs of management) and by its accounting for dynamic system interactions at multiple tiers of analysis (Ostrom, 1999). To date, however, the IAD framework has not been used to organize indicators of sustainability.

In this paper, I present a modified IAD framework that transparently encompasses both the PSR and sustainable livelihoods frameworks, thus providing a platform for designing, monitoring and communicating the results of ecosystem-based fisheries management policy experiments. The framework encourages analysts to organize indicators to take full account of the ecological, social and institutional variables that influence and shape the incentives and behavior of individuals and organizations. Further, there is a clear differentiation between aggregate patterns of behavior (e.g., fishing effort), the impacts those behaviors have on capital assets (e.g., species depletion, rent capture) and the threats that those impacts pose to capital assets (based on societal goals and fishery management objectives). Finally, societal responses to threats to capital assets are clearly

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