

THE ROLE OF IIFET IN BUILDING HUMAN CAPITAL FOR 21ST CENTURY FISHERIES MANAGEMENT

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ABSTRACT

The nations of the world confront complex challenges in managing fisheries resources in the 21st century. While attention focuses on the need for new institutional ideas, designing and implementing effective governance may be imperiled by inadequate investment in the human capital needed to lead, innovate, and manage. Economics, which integrates social, biological, and policy attributes of a fishery, is increasingly recognized as a core discipline, essential to system level decision-making. Building human capital requires leadership and cooperation from the highest levels of national and international authorities. However, management agencies are overwhelmed by challenges that hinder attention to capacity building, and professional organizations rarely focus on rigorous fishery management education. Ideally, an international organization or consortium would be charged with facilitating fishery management training at regional and national scales. Is there a role for IIFET in progressing this goal and assuring the integration of economics in capacity building frameworks? IIFET may be uniquely positioned to contribute in defining training competencies and methods relevant to rigorous integration of economics in initiatives for building human capital.

Keywords: training, human capital, managers

INTRODUCTION

A long list of challenging conceptual and operational issues faces the fishery manager of the 21st Century. There is increasing public demand for stakeholder participation in all aspects of fisheries management. An emphasis on ecosystem management means developing and implementing effective ecosystem level institutional tools and policies. At the same time the manager must contend with lack of basic information about fish stocks, ecosystems, and the economic and social characteristics of the commercial, recreational, and non-consumptive users. Management decisions must be made in the presence of risk and uncertainty inherent in resource stocks, industry, markets, enforcement, and government behavior.

An emphasis on rights-based management and output controls requires the manager to have the wisdom of Solomon to allocate fish resources among stakeholders, including commercial, recreational, and indigenous peoples. Public environmental awareness forces the integration of broad conservation agendas to the satisfaction of their proponents while sustaining economically viable fisheries. A growing international dimension to fisheries management means addressing the relationship of individual and national fisheries to transboundary ecosystems, markets, and legal jurisdictions. These challenges occur within management institutions that strive to continually improve their effectiveness and efficiency. These institutions also operate in increasingly litigious environments and under legal constraints which may stymie development and innovation.

Moving toward multidisciplinary-based decision-making where economics plays a significant role requires involvement of leading professional organizations such as IIFET. To facilitate discussion of IIFET's role in building human capital for fisheries management, we review the scope of training needs as outlined by the *Training Managers for 21st Century Fisheries Initiative* (Jodice et al. 2002, 2003), the importance of economics to fisheries management, and why IIFET has a critical role to play in building human capital.

EQUIPPING MANAGERS FOR FISHERIES MANAGEMENT

Human capital building is the dynamic process of discovering, collecting, and synthesizing knowledge that directs human action in extending existing systems or the creation of new systems (Resilience Alliance 2003). Society's well-being depends upon developing institutions that compel learning, build infrastructure to store and disseminate knowledge, and stimulate flexibility in problem solving. Institutional commitment to building human capital is often a long term goal, but is also often difficult to achieve given the crises currently inherent in fisheries management. Nevertheless, strengthening the management process requires building human capacity to deal with change, surprise, and uncertainty through learning and adaptation (Folke, Colding, and Berkes 2003). Achieving sustainable fisheries will depend upon leadership and sustained commitment to building the adaptive capacity and resilience of the fisheries management process as well as the ecosystem structure and function. Commitment to adaptive management also means understanding that unlearning and new learning are imperative prerequisites for effective ecosystem and cooperative management (Michael 1995). Building adaptive learning capacity should be an inherent goal for 21st Century fisheries management training programs.

Furthermore, well planned training strategies should be coupled with an incentive environment compatible with the effective application of knowledge. Such an environment needs to provide transparency and promote consistent expectations and learning, to assure that managers engage effectively in making long-term decisions and taking action to address uncertainty (Hanna 2002). Training programs must be flexible and supportive of individual and organizational learning (Johnson 2001, Cloughesy 2001). Managers and administrators must not simply support training, but also recognize the importance of their role as learners and that learning and training is an ongoing process. Both academic and continuing education programs should incorporate these principles when revising and developing curricula in anticipation of 21st century fisheries management needs.

The *Training Managers for 21st Century Fisheries Initiative (Initiative)* outlines a preliminary framework for curricula consistent with this vision of building human capital and creating an incentive environment for adaptive learning. Table 1 summarizes the range of key skills needed to function effectively as a fishery manager. In addition to understanding basics, meeting fisheries management challenges requires knowledge and skills in: 1) innovative problem solving and institutional design; 2) designing and participating in cooperative research, management, and organizational learning networks; and 3) leadership, trust building, and communications skills.

Basics	Leadership & management	Fisheries specific
<ul style="list-style-type: none"> • Sciences <ul style="list-style-type: none"> ➢ Biology ➢ Ecology • Economics • Social science • Policy & Law • Business 	<ul style="list-style-type: none"> • Communications <ul style="list-style-type: none"> ➢ Conflict resolution ➢ Consensus building ➢ Facilitation ➢ People skills • Intercultural skills • Systems thinking • Critical thinking • Decision-making • Problem solving • Risk analysis 	<ul style="list-style-type: none"> • Fisheries Science • Fisheries Management tools <ul style="list-style-type: none"> ➢ Risk analysis ➢ Stock assessment • Ecosystem management • Knowledge of all stakeholder groups • Managing specialist & decision-maker interface • Incorporating indigenous knowledge • Incorporating industry knowledge

Table 1. Summary of skill and knowledge needs for fisheries management

In light of these challenges and needs, experts agree that an insufficient number of education programs exist that provide professional development, fishery management curricula, which integrate leadership, critical decision-making, and systems level thinking while providing a significant hands on experiential learning opportunities (Jodice et al. 2003). The status of current training is illustrated by the 2001 review (Jodice and Sylvia 2003) of fisheries management academic programs. Seventy-two academic programs offering 165 degree options (primarily postgraduate diploma or certificate, Masters, or PhD) at a total of 46 institutions, with some identified focus on fisheries management training, were discovered through a search of online literature in English. Regardless of degree title, most offered primarily fisheries science curricula. Figure 1 looks at the disciplinary foundation (i.e. disciplinary location) of these 72 programs and demonstrates the relatively minor role of economics. In addition, of the 46 academic institutions, only 31 percent had at least one fisheries economics “course” (a.k.a. “unit,” “class,” “elective”); however, 55 percent had one or more marine or natural resource economics course. Only 20 percent of the 72 programs reviewed emphasized leadership, decision-making, or critical thinking skills in their website literature. These attributes stood in contrast to the leading business management, public administration, and natural resource or forestry education programs, reviewed for comparison, that unanimously emphasized “capstone” integrated courses or requirements with emphasis on leadership, teamwork, and critical decision-making skills.

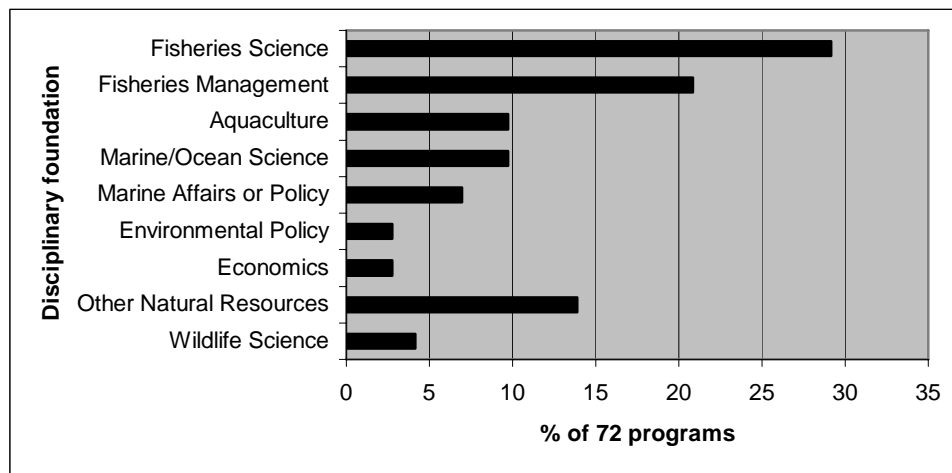


Figure 1. Disciplinary foundation of current fisheries academic programs reviewed in 2001

LIMITS OF ECOLOGICAL/BIOLOGICAL SCIENCES

Given the predominance of biological and ecological science training among fisheries managers, it is not surprising they assume that robust biological and ecological principles and empirical evidence must underpin their recommendations. The prevalent role of science in fisheries management has been a response to the last 50 years of transformation from emphasis on optimization to risk minimization and the precautionary approach (Degnbol 2003). During this same period, many of the theoretical foundations of fisheries science have been challenged. Ecology and biology have neither unambiguous definitions of basic concepts such as species, stock, or marine ecosystem, nor a testable general theory capable of providing prescriptive guidance to fisheries managers. Emerging debates in ecology and biology undermine the rationale for management practices built around preconceived notions of equilibrium such as maximum sustainable yield as a proxy for ecological sustainability. It is often not possible to identify a single organizational state of a marine ecosystem that corresponds to sustainability. Instead there may be a range of states that can be sustained with different levels of fishing effort and types of management practice. The more recent evolution toward ecosystem management demands even more complex

scientific models and analyses. However, the essential diversity of scientific disciplines involved in the ecosystem approach and breadth of knowledge and experience required to provide balanced and credible advice are overwhelming for managers (Jennings 2004). Furthermore, there currently exists no general, unified theory of the functioning of marine ecosystems, nor a model which provides a reliable measure for resolving patterns indicative of key ecosystem responses (Cury 2004). Paradoxically the utility of such models and analyses is also much reduced when faced with uncertainty.

Wynne (1992) has developed a taxonomy of risk and uncertainty, useful to this discussion:

- Risk: Systems behavior is essentially known, and outcomes can be assigned a probabilistic value.
- Uncertainty: Significant systems parameters are known, but not the probability distributions.
- Ignorance: What is not known is not known.
- Indeterminacy: Causal links, networks and/or processes are open and therefore defy prediction.

Ignorance and indeterminacy are the antithesis of what fisheries managers are seeking, yet define most fisheries management problems. States of uncertainty, ignorance and indeterminacy are the norm rather than the exception. This knowledge is camouflaged by the widespread use of complex mathematics that reinforces the continued privilege that stock assessments and other mathematical tools enjoy in fisheries management processes. Managers have been lulled into believing that fish-stocks can be managed sustainably because they are modeled as functionally and structurally complete systems. The focus on single species management and belief that living systems tend towards a specific steady state has caused fisheries research to center on the outcome of ecological processes and interactions rather than the inherent characteristics of the interactions and processes themselves. In addition, the limits to predictability of any natural system often mean achieving reliable scientific models is cost and time prohibitive with regard to data required to support such models (Degnbol 2003).

The desire for certainty in inherently indeterminate fisheries management contexts is heightened by the need for fisheries managers to be accountable to a wide range of stakeholders. Few people are willing to accept uncertainty for failed fisheries management. It is expected that fisheries managers will have already factored in the relevant considerations. The reality is that fisheries outcomes are influenced by a multitude of factors, many of them uncertain or indeterminate. However, because fishery managers and policy makers are often borrowing from unfamiliar disciplines, they cannot make the same judgements about information quality that they would when making judgements in their own areas of specialization. We are learning from complex systems thinking that conventional scientific and technological approaches to resource and ecosystem management are not working well, and that adaptable and flexible management processes are more able to deal with uncertainty and surprise, given a system has many potential states (Berkes, Colding and Folke 2003).

For these reasons, the scientific disciplines are inherently limited in providing the degree of certainty and adaptability sought by managers who must also consider a multitude of environmental, social, economic, and political factors in their decisions. It is time that the privileged position of biologists and ecologists in fisheries management is challenged. These scientists may inform management but can rarely claim to have a standing that is greater than other stakeholder groups involved in managing fisheries.

FISHERIES AS A SOCIAL CONSTRUCT

It is more appropriate to view fisheries management as a social process rather than a set of scientific issues. Increasingly, authors emphasize the need to recognize that natural resource management is the management of a social-ecological system and public resource policy requires active participation by all stakeholders (Folke, Colding, and Berkes 2003; Zeller and Pauly 2004). Of the many major issues imbedded in the fisheries management decision-making process, this principle is best illustrated by again

examining the role of uncertainty. Vested interest groups may use uncertainty to argue for a *status quo* policy; thus the scientific community “is often embedded in and operates within multiple sets of other human-dominated systems” (Gunderson, 2003). Fisheries can be described in biological terms, but management processes are unavoidably dealing with human preferences for some ecosystem states over others based on the utility derived from their exploitation. The key influences are not biological but economic and include considerations such as individual wellbeing, social and cultural identities of fishers and their communities, and responsibilities to future generations.

A wider acceptance of a social approach to fisheries management could break a long tradition of issue polarization in fisheries management by leading to a greater awareness of the need to understand the social context in which fisheries management problems are manifested. A social approach at its simplest means managers actively seek to understand the assumptions shaping their own understanding of fisheries management, recognize other stakeholders’ assumptions and values, and engage in the collective negotiation of meanings, definitions, and assessments that form the basis of fisheries management decisions. Without an understanding of the social dimension of fisheries it is unlikely that fisheries management will be able to promote solutions that address most management objectives and that are ecologically sound, reasonably realistic, socially acceptable, and politically supported.

Role of Economics

Human societies and cultures continually demonstrate preferences for some attributes of marine ecosystems over others. In terrestrial systems, society is willing to accept some impact on natural systems to allow other preferred ecological-economic systems to expand; for example, the draining of some swamps and clearance of forest to create lands for other urban or rural uses. Although perhaps a less conscious choice, human exploitation of fisheries reveals similar preferences. In fisheries, social preferences regarding desirable ecosystem attributes and their contribution to sustainable human welfare should be given significant weighting relative to any values based on strictly biological or ecological attributes.

Economics is inherently able to capture the human/ecosystem interface more broadly than the relatively more reductionist disciplines of ecology and biology. Moreover it can do this without diminishing the contribution of biology and ecology because these disciplines provide vital information about system processes that constrain the extent to which societal preferences can be realized. In addition, economics is a core discipline for understanding how institutions and social incentives can affect human behavior, manage complex systems, and lead to greater social benefits while supporting sustainable fisheries and underlying ecosystems. Economic tools are valuable for demonstrating tradeoffs among competing social objectives and providing information to support an efficient system of bargaining within the policy process that characterizes fishery management.

ROLE OF IIFET IN PROMOTING ECONOMICS AS A CORE DISCIPLINE IN FISHERIES MANAGEMENT

Socioeconomic impact analysis is being increasingly integrated into fisheries policy, but managers lack tools to respond effectively or at the very least define an implementation process. As demonstrated in Figure 1 above and by the 2001 review (Jodice and Sylvia 2003), academic training of fisheries managers is still relatively weak in economics. Many managers lack an appreciation of the relevance of economics in its various guises—environmental, ecological, natural resource, industrial, labor, and institutional—to fisheries management issues or the ability to apply economic concepts to impact analysis.

Fisheries economics training has grown over the last 25 years, perhaps stimulated by the founding of IIFET in 1982. IIFET with its broad membership covers all the subdisciplines of economics with a special focus on fisheries management issues. Currently, IIFET has 450 members. This is an international group of economists, government managers, and private industry managers from over 60 countries, but only 32 (7%) are students (Shriver 2004). The IIFET conference provides an excellent form of professional training for fisheries economists. However, IIFET can play a more crucial role in advocating for the proper recognition of economics as a core discipline that should be at the center of fisheries management rather than on the periphery.

Beyond serving as a catalyst and supporting greater recognition of economics in fisheries management IIFET can take on the broader role of encouraging human capital development in all spheres of fisheries management. In undertaking a human capital initiative, IIFET could have a direct or indirect role in the strategic initiatives outlined in Table 2:

<i>Initiative Strategies (2001 NZ Workshop)</i>	<i>Initiative progress</i>	<i>Possible IIFET Role as facilitator</i>
1. Develop creative partnerships	Discussion with FAO re: capacity building initiative and partnership potential	○ Involvement of members in partnership building.
2. Use the management process as a participatory learning experience	Case Study workshop at IIFET 2004	○ Workshops/special sessions at IIFET conference
3. Broaden and lengthen the fishery management career path		○ Student or regional chapters of IIFET associated with fisheries management programs.
4. Conduct needs assessment and gap analyses (includes development of competencies and benchmarking processes for each managerial class)	2001 NZ Workshop Report printing and dissemination (broad definition of knowledge and skill areas)	○ Use of IIFET network/membership to facilitate competency definition, needs assessment/gap analysis, and benchmarking.
5. Develop an international fishery management education and training website/clearinghouse	Website with some resources, 2001 workshop report; trainfishmngtr listserv	○ Training provider website accessed via IIFET portal ○ IIFET participation in peer review of training programs.
6. Encourage Industry Scholarships		○ Use of IIFET network to facilitate scholarship development and partnership.
7. Develop a library of fishery management case studies	Case study development workshop at IIFET 2004	○ Support case study library portal – copyright owned by IIFET, free to IIFET members, charge for non-members (potential revenue) ○ Involvement of IIFET membership in peer review and piloting of cases ○ Continuous IIFET conference track dedicated to case study development
8. Establish a training providers network		○ Communications with members regarding involvement in network

Table 2: Possible IIFET role relative to Initiative strategies and activities.

Many of the *Initiative* strategies are already being implemented to a limited extent and scale at different levels of governance. Given the evolution of fisheries management toward co-management, stakeholders, managers, and administrators from all sectors of management must be involved in the implementation of these strategies in order to assure ownership, commitment, and trust in the learning process. Collective involvement of industry, NGOs, government, and academic institutions is also important to the creation of integrated, efficient, and well-funded training programs.

Supporting this development of human capital requires leadership, cooperation, and commitment from the highest levels of national management authorities and international bodies. A strong coordinating mechanism is necessary. Ideally this would be an international level organization or consortium charged with facilitating fishery management capacity building at a variety of scales. This could perhaps be formed using existing institutions, a network of academic institution-based centers co-located with the top fisheries management training programs, and/or a network of industry or government based training centers. These activities would ultimately improve alignment and efficiency of training efforts and progress initiative at a global level. IIFET can play a role in making this happen.

CONCLUSION

Contemporary fisheries management decisions should be informed by the analyses of multi-disciplinary teams of researchers and advisers working with a lead manager or managerial organization responsible for policy-making and decision-making. Fisheries managers must not only be able to lead a policy process but lead teams of competent professionals capable of addressing management challenges. To be effective policy leaders, they must also possess significant moral character and intellectual ability. They must be passionate about improving management of fishery resources and increasing public and private benefits. They must also have the necessary technical management skills, but must not lose touch with the physical and human components of fishery management—fish, water, fishermen, and seafood processors. Strengthening and development of management training programs is necessary to build these qualities among fisheries managers.

Human decision-making (under uncertainty) suggests fisheries management is a social construct and can no longer occur based on purely biological or ecological sciences. Economics, dealing with preferences and trade-offs, needs to be a significant component as an integrative discipline for management training. IIFET is in a unique position to facilitate building of human intellectual capital particularly with respect to defining the knowledge and skills necessary for managerial competencies in economics at all levels of management.

Co-ordinating organizations must play a larger role in bringing together academics, agencies, industries, NGO's, etc. to focus on building capacity for innovation in fishery management policy, governance, and adaptive ecosystem management at local, national and international levels. IIFET can assist in the identification of an international level co-ordinating organisation that would be responsible for facilitating the strengthening of current training and partnership building efforts through co-ordinated communication and reporting on well conceived programs (including evaluation of outcomes).

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