

CREATING A POSITIVE FUTURE FOR FISHERIES AND COASTAL COMMUNITIES WORLDWIDE

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ABSTRACT

Fisheries research is gradually becoming more ecosystem-based and integrative, as indicated by an assessment of the science presented at the recently held 4th World Fisheries Congress. The standard approach to fisheries policy and management is to use research inputs from the natural sciences, while the paucity of research inputs from the social science is notable. At the same time, there is a broad range of concerns and challenges currently facing fisheries, including, ecosystem health, social justice, livelihood and employment and food security. Addressing these challenges requires that social and human dimensions be explicitly incorporated into fisheries research and management frameworks necessitating changes in the way fisheries problems are addressed and in the objectives and directions of research programs. As an extension to ecosystem-based fisheries research, we propose a people-centered research program that focuses on five key issues: social justice, total values, business and power, governance and ethics. We believe that promoting and implementing such a research program is required for its potential, despite challenges, to contribute to creating a positive future for fisheries and coastal communities worldwide.

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INTRODUCTION

The 4th World Fisheries Congress (4WFC), held in May 2004 in Vancouver Canada, had as its theme reconciling fisheries with conservation. An analysis of the over 200 papers presented at the conference indicates a strong consensus that the solution to contemporary fishery problems is not to be found in the natural sciences alone, but also within the realm of the social sciences (Chuenpagdee *et al.*, 2005). Two themes were identified as keystones for positive change: “management” and “communication”. In brief, we need (1) different and better management of our fisheries and (2) improved communication between scientists, managers, resource users and other stakeholders. These are not new ideas, but they were given wide airing at the conference. While natural and social scientists are not managers, they are also not exonerated from the responsibility of working towards better management and communication. The identification of these goals indicates the direction future research efforts must take, and what sciences can contribute to creating a positive future for fisheries and coastal communities.

Many sciences play a role in providing information to support management and policy decisions. The challenge has always been to identify what key scientific inputs (e.g., anthropology, biology, ecology, economics, etc.) are required and what mechanisms are needed for management to effectively use the information provided by these disciplines. There has been much debate and discussion on the interaction between science, management and policy (see Dingerson *et al.*, 2005). Here, we limit our focus to addressing the first part of the challenge, which is to identify research areas that are currently under-investigated, but hold high promise for increasing our understanding and improving our management of the interaction between human and natural systems. In the following, we use the term “science” to include natural and social sciences.

Although the 4WFC focused on reconciling fisheries with conservation, the question we pose goes beyond that, i.e., “what research is required to create a positive future for fisheries and coastal communities?” We answer this question by first presenting the underlying concerns in fisheries and fishing communities and the main challenges faced in their management. Next, based on the assessment of current research presented at the 4WFC (Chuenpagdee *et al.*, 2005a), we evaluate the effectiveness and applicability of existing principles and tools employed to address fisheries problems. We then propose a people-centered research program that focuses on five key areas that have received relatively little attention in the past – social justice, comprehensive valuation, business and power, governance, and ethics – as a way to move towards a positive future for fisheries and fishing communities worldwide.

CONCERNS AND CHALLENGES IN WORLD FISHERIES

The concerns facing today’s fisheries management can be grouped into four major areas (Chuenpagdee *et al.*, 2005b): ecosystem health, social justice, employment and livelihood, and food security. The emphasis at the 4WFC was on conservation, and the number of papers presented on natural systems (Bundy *et al.*, 2005a) suggests an overwhelming concern with ecosystem health.

It is commonly thought that when we take care of an ecosystem, we take care of the people who rely on it for food, livelihood and employment. However, this assumption may not always be valid, particularly if issues related to social justice and distribution of power are not addressed. Consider, for example, the case of industrial and small-scale fishing sectors. Conflicts arise not only due to these fisheries operating in the same areas or due to one activity having negative ecological and economic impacts on the other, but also because the two sectors usually receive differential treatment and support from governments, such as the industrial sector benefiting from more subsidies (Munro and Sumaila, 2002).

Small-scale fishers are often marginalised for reasons such as their remote physical location, lack of access to markets, and distance from or lack of interaction with political and management bodies (Pauly, 1997). In short, without consideration of social justice, healthy ecosystems alone do not guarantee fair distribution of food, equitable job opportunities, and increased quality of life for coastal peoples.

There are several challenges to addressing these four concerns. The main factors contributing to unsustainability and over-exploitation in fisheries include inappropriate incentives, high demand for limited resources, overcapacity, poverty and lack of livelihood alternatives, lack of good governance,

interactions with other sectors such as land-based and coastal activities, and inappropriate assessment and management tools (Swan and Gréboval, 2004). When external forces that influence fisheries management, such as globalised markets, power and politics are added to this list, we end up with complex problems. However, by setting clear priorities, and by engaging in innovative thinking outside the standard box of fisheries science, we can start to understand this complexity and be in a position to make progress toward creating a positive future for fisheries and coastal communities, as suggested in section 4. First, however, in the following section we examine current approaches, trends and needs in fisheries management.

ASSESSING CURRENT APPROACHES AND PRINCIPLES

Historically, a major focus of fisheries research has been to estimate maximum sustainable catch levels. Much effort has been placed on improving the methods used to do this, and although methods have changed over the decades, the essential question has remained the same. In recent years however, there has been a shift, at least at the rhetorical level, toward a broadened approach, with various international agreements such as UNCLOS (1982) and the Food and Agriculture Organization (FAO)'s Code of Conduct for Responsible Fisheries (FAO, 1995), aiming to set international principles such as the precautionary principle and international standards. Australia, Canada and the United States are examples of countries attempting ecosystem-based approaches to fisheries management (Juda, 2003), in contrast to single species approaches.

This shift is reflected in three cross-cutting and recurring topics mentioned in the majority of the papers presented at the 4WFC: stakeholders' participation in fisheries research and management, interdisciplinary approach to fisheries issues, and ecosystem-based management (Chuenpagdee *et al.*, 2005). These are representative of the human dimension, science, and management and are discussed further below.

Stakeholders' participation in fisheries research and management

Recent interest in meaningful involvement of stakeholders in fisheries management, through co-management, community-based management, and participatory research is widely appreciated, particularly as a route to more successful management of resources and better communication between resource users, scientists and managers. However, stakeholders' participation in research and management is not the norm, and is challenging at both large and small scales. The Eastern Scotian Shelf Integrated Management Initiative (Rutherford *et al.*, 2005) is an example of a large-scale governmental approach to the inclusion of all stakeholders (including the fishing industry, coastal communities, environmental interest groups, provincial and federal government, the shipping industry, the oil and gas industry, etc.) in ocean management plans. This program is still evolving, but there have been challenges, such as maintaining stakeholder engagement in the collaborative planning process due to the time and resources required by, and the capacity of the stakeholders to participate, as well as questions of trust and sectoral protectionism. On a small scale, the case of community-based management of a marine reserve, Actam Chuleb, in Yucatan, Mexico (Chuenpagdee *et al.*, 2004) is one example among numerous others that exist worldwide. Local community members participated in this interdisciplinary research by engaging in survey of seagrass beds and mapping of lobster grounds, expressing preference judgments about resource importance through surveys and interviews, discussing management issues and options at stakeholders' workshops, and disseminating research results at conferences. The study showed that one community (San Felipe) was better equipped to participate in research and community-based management than the other (Dzilam de Bravo) because they were generally better organised and there were less migrants in the community.

Further research is thus required to better understand the conditions under which both large and small scale participatory approaches can be successfully undertaken. Stakeholder analysis is a tool that is initially conducted to gain understanding about the characteristics of stakeholders, their mobility, capability, and underlying values. Research on local knowledge and its contribution to informing sciences and management has increased, but more is needed (Liguori *et al.*, 2005). Essential questions about the legitimacy and validity of local knowledge and its uses and contributions to fisheries management remain (Davis and Wagner, 2003). Other research questions include what motivates people to fish for a living, in

the developed and developing worlds and in industrial and small-scale sectors, and how this is affected by the opportunity for alternative livelihoods. This type of research is on-going at the micro-level, but should be broadly incorporated into fisheries science (McGoodwin 1990, Charles 1995, Davis 1996, Neis *et al.*, 1999). Ultimately, more effort is required to change the role of stakeholders from one of research subjects and passive informants to one of active partners in research and management, or of leadership, or both.

Interdisciplinary approach to fisheries issues

An interdisciplinary approach to fisheries is essential since fisheries are complex, diverse and dynamic. While there will be an ongoing need for basic disciplinary research, the exciting advances are those that combine methods and use disciplinary knowledge to develop more holistic approaches to fisheries research. Addressing concerns related to ecosystem health, social justice, employment and livelihood, and food security in the same research framework is challenging. Interdisciplinary research requires exchange of knowledge and understanding in the way that sciences are conducted, data interpreted and results disseminated. This acknowledges the complementarities of the sciences. For example, natural sciences provide knowledge about ecosystems, while social sciences offer insights about institutions responsible for ecosystem-based management, as seen, for example, in capacity building for ocean and coastal management (Smith, 2002), and in the design and management of marine protected areas (Christie *et al.*, 2003, Rudd *et al.*, 2003). The strengths of different disciplines can be used to create a more robust and productive research framework. Since interaction and collaboration between scientists from different disciplines can result in a research protocol that draws upon knowledge from various disciplines (e.g., Decker *et al.*, 1992, Parker, 2003), this implies that there is a need within each discipline to explore creative approaches to interdisciplinary research. An interdisciplinary approach to assess ecosystem values, for example, can draw upon methods that involve assessing ecological functions and services of an ecosystem, accounting for both monetary and non-monetary values of an ecosystem (van Kooten and Bulte, 2000), as well as methods that elicit preferences and judgments of resource users and stakeholders of current and future generations (Chuenpagdee *et al.*, 2003, Sumaila and Walters, 2005, Liu *et al.*, 2005).

Ecosystem-based management

The last decade has witnessed the development of fisheries management principles that are precautionary and ecosystem-based. Management efforts are geared to address commonly stated concerns and challenges such as overfishing, fishing gear impacts, bycatch, illegal fishing, resource allocation, sustainability, restoration, co-management, and stakeholders' conflicts. Ecosystem-based management (EBM) addresses these issues in an integrated fashion, and is a response to calls from a growing number of scientists for protection and rebuilding of ecosystems (e.g., Pitcher and Pauly, 1998, NRC, 1999, Pauly and Maclean, 2003). Frameworks for EBM have been proposed and widely endorsed (EPAP, 1999, Ward 2002, Fletcher *et al.*, 2003, Hall and Mainprize, 2004, Livingston *et al.*, 2005, O'Boyle *et al.*, 2005, Pikitch *et al.*, 2005). However, in most cases they are not fully operationalised, and the development of useful ecosystem indicators and their translation into decision criteria is an on-going process (Bundy *et al.*, 2005a, Fulton *et al.*, 2005, Link, 2005, Rudd, 2004). Furthermore, the effectiveness of ecosystem-based management as practiced to date has yet to be evaluated, although tools such as the management strategy framework (Sainsbury *et al.*, 2000) are being developed for this purpose. A framework similar to EBM philosophically, but with a broader emphasis, is integrated coastal management (ICM). ICM focuses on ensuring that the various uses, activities and development in coastal areas are well-coordinated and incorporate environment, economic and social considerations (Cicin-Sain and Knecht, 1998). There are at least 700 ICM efforts throughout the world in over 145 coastal states, although only 45% are in operation, with varying levels of success and effectiveness (Sorensen, 2002). Interestingly, the degree of integration of fisheries within ICM, or of social dimensions within EBM is debatable (Bundy *et al.*, 2005b).

AN INTEGRATED ECOSYSTEM APPROACH FOR A POSITIVE FUTURE FOR FISHERIES AND COASTAL COMMUNITIES

Ecosystems are complex, non-linear systems composed of a multitude of interacting components. Similarly, anthropogenic activities in the marine environment occur within a complex set of interdependent components. There are many facets to these human activities, many of which have received little or no study in relation to the underlying ecosystems. Together, these components form a full

'fishery system' that includes the ecosystem and human dimensions (Charles 2001). The broad nature of these systems is reflected in statements like 'without fish and their ecosystems, there can be no fishery' and 'management of fisheries (and ecosystems) requires management of people'.

These simple truisms form the core of our approach, but not its entirety. To improve our ability to manage, and to create a positive future for fisheries, we need to increase our knowledge of both ecosystems and their response to perturbations, and the interactions between humans and aquatic ecosystems. Here we extend the idea of EBM to Integrated Ecosystem Approaches to Fisheries (IEAF), which explicitly includes natural and social sciences methodological approaches and understandings.

IEAF provides a framework for resolving conflicts and an opportunity to take a proactive approach for fostering and supporting sustainable communities and livelihoods in the fisheries sector and beyond. Overall, it uses the synergy between the health of ecosystems and of people as a key to creating a positive future for fisheries and coastal communities. This implies recognizing and exploring alternative strategies for ecosystem protection and community development.

In this paper, IEAF thinking is used to address the specific concerns in fisheries described earlier, i.e., ecosystem health, social justice, livelihood and employment, and food security. A greater emphasis is placed here on the human dimensions of IEAF, rather than the ecosystem aspects, since we know from the assessment of papers at the 4WFC that internationally, ecosystem science is already high on the research agenda of natural scientists and thus is receiving considerable attention (Bundy *et al.*, 2005b). While there are still many ecosystem-related research questions that remain open, such as identifying emergent properties of ecosystems and the resiliency of ecosystems to perturbations, progress is being made.

At the same time, there are human issues and areas of research that are critical to fostering a positive future for fisheries, but which are not being addressed. These human aspects all have ecosystem impacts, and by studying them with respect to their interaction with ecosystems, we may learn how to address key fisheries concerns. In the following, we describe our initial thoughts on research aspects focusing on the five human dimension issues outlined earlier – social justice, comprehensive valuation, business and power, governance, and ethics. These issues extend and complement sets of management and policy directions advocated for fisheries elsewhere (e.g., Pitcher *et al.*, 1998, Charles, 2001, 2004). They contribute both to the overall ecosystem-oriented and human-centric IEAF approach, and to the ongoing discussions on EBM.

Adjusting for social justice

Fisheries management decisions at the local, national and international level are often considered unfair to certain groups. For example, decisions favoring industrial, capital-intensive, large-scale fishing enterprises may harm small-scale fishers, as manifested in diminished, or lost, access to fishing, livelihoods, fish for food and decision making. One of the reasons for this is the failure of decision makers to fully comprehend or care about the value and contribution of the sector to the socioeconomic wellbeing of the communities involved.

Social justice has many definitions. To avoid philosophical discussions of the distinctions of these definitions, we use a simple description of five basic rights provided by Oxfam, an international aid and development agency¹: (i) the right to a sustainable livelihood, (ii) the right to life and security, (iii) the right to basic social services, (iv) the right to an identity, and (v) the right to be heard. These principles may be useful in thinking about social justice. First, an analysis of power, its distribution and use, is required in order to understand how power influences management and policy decisions at all levels in fisheries exploitation and livelihood settings. More generally, research on social justice should address the following questions: What are the politics of decision making, the influence of corporate, business-oriented approaches, the integrity of management systems and their susceptibility to legal and illegal influence (i.e., lobbying and corruption), and the overall effectiveness of fisheries policies and agreements? How do these vary between local, national, and international levels? How can we effectively use the results of such analyses, i.e., how can we move from the study of power and decision making to the goals of affecting change?

¹ <http://www.oxfam.org>

Questions concerning social justice cover both inclusion and exclusion issues. The emphasis on inclusion issues is clear as seen in discussions of access rights for different stakeholders in communities (e.g., Davis and Jentoft, 2001). Social exclusion due to race, gender, and class, however, is not often discussed, although it is an important issue shaping management decisions (Sundberg, 2002). Recently, discussion about social justice was extended from a national perspective to an international perspective, relating to foreign industrial fishing fleets gaining agreements to fish in the waters of developing countries (Kaczynski and Fluharty, 2002). Questions about compensation and the trickle-down effects (positive and negative, and economic and ecological) to local fishing communities are at the forefront of the discussion.

Does social justice in fisheries distribution and access lead to more sustainable fisheries and healthy ecosystems? There may be no clear answer to this, as fisheries management and social justice necessarily interact within a broader policy environment. Management outcomes are context dependent and may not be directly related to whether the management style is top-down, open-access or community-based. Therefore, one approach to answering the above question would be to explore whether there is an empirical relationship between regimes that do afford a certain level of social justice and sustainable fisheries. A good place to start is an exploration across a broad range of fisheries and other common pool resource-type activities, and a comparative analysis of management regime, context and social justice (e.g., Pitcher and Power, 2000).

Accounting for comprehensive values

In practice, fishery decision making is based largely on monetary values of fisheries and aquatic ecosystems, despite the widespread recognition of other types of values such as non-use values and the inherent values for existence of ecosystems. These values do exist even though they may be more difficult to conceptualise, let alone measure. When they are measured, they are often discounted within the economically dominated sphere of fisheries management. Moreover, policy decisions are often made on the basis of the gross revenues that a fishery generates and the regional spin-off and employment benefits derived from those revenues, rather than the net benefits of revenues less true fishery costs. In a heavily subsidised fishery, this results in decisions favoring harvesting more fish than is ecologically sustainable as opposed to supporting a sustainable fishery operating at a lower level of activity with lower gross revenues.

Addressing how the range of values associated with ecosystems and our relationships to them are incorporated into decision-making requires both philosophical and technical discussion. The first set of questions are whether values experienced by people differ in scale and in kind, what difference would recognition of divergent value systems make to management decisions, and whether they are worth quantifying and incorporating in the decision-making process. If so, are there alternative approaches and tools, other than the standard valuation techniques, that help understand complex relationship between human and natural systems?

Research is also required to address the common disconnect between production and consumption systems. Consumers, particularly in the western industrialised countries, have abdicated their responsibility for food harvesting and production to fishers and aquaculturists (and farmers). Thus, they often have little or no knowledge of the true ecological or social costs of the seafood that they are eating and the broader range of environmental impacts associated with the provision of typical highly processed, consumer-ready products (Hospido and Tyedmers, in press). It is imperative that consumers are equipped with information about these costs in order to make their own value judgments concerning their choice of seafood consumption (see below).

Next are questions dealing with values and other factors that drive behavior and personal choices of fishers and other stakeholders (Charles, 1995, Salas and Gaertner, 2004). What are the forces that motivate different fishing sectors, e.g., industrialised or small-scale, to sacrifice conservation concerns, or the intrinsic value of a resource for more immediate monetary values? Do they recognise the values that they are implicitly giving to these resources? What mechanisms can be employed to ensure that these values are accounted for in their daily individual decision-making processes? What incentive or disincentive schemes can be used to influence individual and corporate behaviour? Can corporations have the same value systems as individuals?

Finally, there are many principles and approaches upon which the discussion of values can be based, such as the precautionary principle, ecosystem-based management, and intergenerational equity. A research

program could focus on how countries that adopt these approaches incorporate values into their fisheries management and policies.

Talking business

The presence of the 'human dimension' in fishery research has occurred mainly in the field of fishery economics, in particular production economics, bio-economics, socio-economics and trade and marketing (Whitmarsh and Charles, 2001). However, relatively little attention has been paid to the implications of treating fishing enterprises (particularly in large-scale and/or industrial fisheries) as businesses, comparable to other business sectors with an impact on the environment. Considering that the majority of fish landings are taken by corporations engaged in industrial fishing operations (Bundy and Davis, 2004), analysing fisheries and aquaculture from a business perspective may result in a better understanding of the incentives driving the operations and likely lead to better ecosystem-based management.

One aspect of this approach lies in seeking a better understanding of the 'aquatic food supply chain'. Globalisation has led to these supply chains stretching around the world, creating trade patterns with strong social and economic impacts on developing countries and small-scale fishing communities, particularly those with less buying power. It is important to understand the positive and negative impacts of the globalization of fish and seafood trade: the structure of the supply chain, the way it influences the distribution of products, the generation of profits for supply chain actors, as well as the provision of information that relays market demand signals to producers. The aquatic food supply chain can be complex, and research is required to identify corporate structure and linkages between companies. For example, who are the key actors in the marketplace, from fishing companies and aquaculture firms, through processors and distributors, to the end consumers? When products are sold in global markets, to what extent are individual corporations vertically integrated and control the entire supply chain? In some parts of the aquaculture industry, for example, corporations are involved not only in the production of juveniles and farm grow-out operations but also in feed production, reduction fishing operations for fish meal and oil along with downstream processing and the distribution of finished products. Thus, to what extent has this type of vertical integration and concentration of market power, generated externalities and can these externalities be internalised?

With the current structure, dominant corporations with concentrated market power may enjoy excessive profits in the face of reduced competition. For firms operating globally, there is also an issue of where profits are taken (known as transfer pricing) and whether profitability can be increased by arranging transactions between related companies such that the bulk of profits are taken in countries with low tax rates or where tax collection compliance is weak. Similarly, it may be possible to conduct certain aspects of business in regions with weak environmental regulations, basically permitting international firms to 'export' harmful production activities and impose externalities on those regions (that often tend to be the poorest and most vulnerable due to poverty).

As in other resource extraction activities, fishing results in a wide range of externalities impacting ecosystems, economy and society as a whole (Seijo *et al.*, 1998). These include the ecosystem effects of fishing (ICES, 2000, Bundy, 2004, Bundy and Fanning, 2005), damage to seafloor habitats by trawlers or dredgers (Steele *et al.*, 2002, Kaiser *et al.*, 1998), ecosystem effects of bycatch and discarding (Chuenpagdee *et al.*, 2003), ecosystem effects of illegal, misreported, and underreported catches (Sumaila *et al.*, 2004), the accumulated impacts on stocks being fished (Pauly *et al.*, 1998, Bianchi *et al.*, 2000, Zwanenburg 2000), substantial contributions to climate change (Tyedmers 2001, Tyedmers *et al.*, in press, Hospido and Tyedmers, in press), and loss of coastal community resilience through overfishing or through loss of community fishery access (Charles, 2001). Treating fishing enterprises as businesses introduces the idea of incorporating such externalities into decision making.

One approach would be to subject enterprises to remediation rules, such as the "Polluter Pays Principle", or to environmental impact assessments before licenses are granted. A similar argument for aquaculture firms suggests following the same principle if, for example, pollution from farms impairs juvenile fish production for wild fisheries in their vicinity or have some other deleterious effect on the environment. Incorporating externalities into the corporate cost function will affect their profitability, potentially driving improvements in fishing and farming technology that are environmental friendly. There is a need for research to assess the extent to which this would lead to positive substitutions among natural, manufactured, human, social and financial capital in the production process. Correcting market

distortions caused by externalities may improve inefficient resource allocation and should encourage investments in business activities and infrastructure that promote ecological and social sustainability.

Understanding fisheries governance

Fisheries governance encompasses all areas relevant to decision-making at all levels of management, and includes both formal and informal systems of management. The theme of governance provides a theoretical and practical framework within which to study societal problems occurring at various scales, e.g., individual, households, community, state, region and global (Kooiman, 2003). Governance studies must incorporate the diversity of values and ethical considerations that are taken into account in decision-making. Just as governance issues span multiple scales, so does implementation of measures to address them.

Several research questions arise from a discussion of good governance. At the theoretical level, it is important to examine how the governance concept came into use in fisheries and how its use has evolved and changed through time. This examination needs to occur within different disciplinary, cultural and contextual perspectives in order to eliminate confusion. The next set of questions relate to the underlying principles of good governance, what they are, how they can be achieved, and how they contribute to effective enforcement, compliance and dispute resolution. A comprehensive study on fisheries governance (Rudd, 2004, Kooiman *et al.*, 2005) provides a good place to start this kind of investigation.

An analysis of different governance models and the scale of their applicability would particularly help to understand the circumstances under which communities are empowered and how tension between different stakeholders is mediated. Identifying governance gaps and their effects on resources and ecosystems can help anticipate future problems for fisheries and coastal communities, particularly given emerging ocean and coastal uses such as offshore aquaculture and wind energy.

At the practical level, research questions concern who should be included in the discussion about governance, the appropriate criteria for decision-making under different scales and contexts, and the limitations of relying only on single disciplinary research or “sound science” in decision-making. This last point relates to the use of “lack of data” or uncertainty as reasons to maintain the status quo. Research is also required to operationalise the fisheries governance concept through, for example, identification of factors of governability (i.e., the capability of the governing system and the characteristics of the system to be governed) and examination of ways to strengthen existing governance systems.

Finally, a comparative analysis of national and regional approaches to governance, challenges and measures to address the challenges is encouraged. For instance, issues related to governance constraints and reforms in regional fisheries management organizations (Swan, 2004) and management of species at risk (VanderZwaag and Hutchings, in press) are increasingly important to national and regional fisheries management, and have direct implications to ecosystems. Further, an analysis of the effectiveness of various governing institutions, at local, national and international levels, in dealing with fisheries and aquatic ecosystems is required. Institutional reform may be needed to correspond with emerging and challenging goals related to EBM.

Emphasising ethics

Ethics are the mental constructs within which people make their day-to-day decisions. Ethics function and are expressed as values and choices in the entire aquatic food supply chain, with scientists playing an important role in informing the process. Ethical concerns are closely related to social justice and values, but are also reflected in individual and community behaviour. With few exceptions (e.g., Coward *et al.*, 2000; Safina, 2002), the importance of ethics in fisheries discussions is rarely emphasised. Fundamental questions that need to be examined include the value of including ethics in fisheries decision making, the extent to which ethical perspectives are already incorporated in different fisheries contexts, and how these views have changed through time.

Discussion about ethics starts from an understanding of what the societal goals are for a community or a country and the implications of a lack of societal goals. Can social pressure, which often enforces a sense of fairness and equity in some small groups, operate at larger scale? In a fisheries context, this question can

be directed at evaluating ethics and interactions at various levels, such as within the corporate industrial sector, within coastal fishing communities, and between the corporate sector and coastal fishing communities. There is growing ethical concern, for example, related to the use of ecologically sustainable fishing methods. One approach to address this concern uses market forces, including initiatives such as eco-labeling and product certification by Marine Stewardship Council and others, and a range of consumer seafood guides (e.g., Fish List² compiled by Blue Ocean Institute, Environmental Defense, Monterey Bay Aquarium's Seafood Watch Program and Seafood Choices Alliance). These provide incentives, for corporations and consumers alike, to consider sustainable practices (Peterman, 2002). Important research questions related to this issue include whether existing schemes in fisheries certification and labeling of fisheries products reflect ethical considerations. Further, what is the role of ethics in the certification and labeling of fisheries products and the establishment of the burden of proof such that large-scale fishing enterprises need to show, for example, that their activities do no harm (Dayton, 1988)? How do these certification processes become properly established and how effective are such schemes in influencing corporate and consumer behaviours?

Research on this issue can be extended to an analysis of the effectiveness of existing international mechanisms and regulations that aim to instil equity and fairness in corporate behavior (Glover and Earle, 2004). Similarly, there are research questions regarding the impact of ethics on the development and interpretation of principles such as sustainability goals, the precautionary approach, ecosystem-based management, and intergenerational equity (see Coward *et al.*, 2000).

Ethical considerations are important at an individual level, and discussion can be encouraged through formal and informal education, and awareness-building programmes. One of the first questions is whether ethics can or should be taught to fishers, managers, and scientists. Currently, there is no liability for fishers, managers, or fisheries scientists whose actions result in loss or damage to natural resources or negative social or economic impacts for coastal communities. Would establishing a system of liabilities change or improve the performance of fisheries stakeholders, managers or scientists? These issues need to be captured in the research on ethical frameworks.

CONCLUSION

We have emphasised in this paper that humans are an integral part of marine ecosystems and that the behaviour and dynamics of both are complex and linked. In order to move through this complexity, and to address the problems faced by today's fisheries, ecosystem-based management approaches alone may not be sufficient. Here we propose a framework of 'Integrated Ecosystem Approaches to Fisheries' (IEAF) - one that explicitly focuses on interactions of humans and ecosystems, and that requires natural and social scientists to interact and collaborate in order to address global concerns in fisheries related to ecosystem health, social justice, livelihood, and food security.

The emphasis here has been on five key 'human dimension' issues – social justice, comprehensive valuation, business and power, governance, and ethics. Research on these key issues will help create the potential for a positive future for fisheries and coastal communities. The emphasis on the human dimensions of IEAF in this paper implies the setting of new priorities in related spheres – in research funding for theoretical, methodological and analytical development, in determining fisheries policy goals and management methods. These research issues require new thinking by all parties concerned with aquatic resource management, from governments and funding bodies to scientists and resource users, and new (or different) institutional arrangements and governance systems. They should be further explored and supported by existing theoretical frameworks, particularly to situate them in current ecosystem-based fisheries management. For example, an aspect of baseline research at this stage would involve exploring the possible consequences of incorporating consideration of these issues into future fisheries management plans, using approaches such as scenario analysis (Pauly *et al.*, 2003).

² www.thefishlist.org

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