

Ecosystems 2010: Global Progress on Ecosystem-based Fisheries Management

by Gordon Kruse

Since the 1990s, fisheries managers have been advised to broaden their scope of awareness beyond single-species considerations. Reasons for this broader approach include: the typical poor performance of single-species fishery management worldwide, heightened awareness of interactions among fisheries and ecosystems, a growing understanding of the functional value of ecosystems to humans, and recognition of a wider range of societal objectives for marine ecosystems beyond fishery catches. As a result, fisheries management has been shifting toward ecosystem-based fisheries management (EBFM), also called an ecosystem approach to fisheries (EAF). An EAF strives to balance diverse societal objectives by taking into account the knowledge and uncertainties of biotic, abiotic, and human components of ecosystems and their interactions, and applying an integrated approach to fisheries within ecologically meaningful boundaries. This ecosystem approach is an important component of the new PICES Science Program on *Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems* (FUTURE). Indeed, in recent years, PICES has convened several working groups and numerous topic sessions on ecosystem-based approaches to fisheries at their annual meetings.

Considerable progress has been made by organizations, such as the Food and Agriculture Organization of the United Nations (FAO), International Council for the Exploration of the Sea (ICES), PICES and others to develop the conceptual framework, rationale, and international consensus toward such ecosystem approaches. Efforts have been directed toward developing new modeling tools and ecosystem indicators that can be used for implementation. However, substantial challenges still remain, including the need to develop operational objectives, requirements for more empirical information and associated increased costs of implementation, and practical matters of implementing the ecosystem approach by institutions that have failed to successfully implement single-species management.

These considerations motivated an international symposium titled "*Ecosystems 2010: Global progress on ecosystem-based fisheries management*", which was convened November 8–11, 2010, at the Captain Cook Hotel in Anchorage, Alaska, U.S.A. The Symposium Steering Committee included Drs. Gordon Kruse (Chairman, U.S.A.), Howard Browman (ICES, Norway), David Christie (Alaska Sea Grant, U.S.A.), Keven Cochrane (FAO, Italy), Diana Evans (North Pacific Fishery Management Council, U.S.A.), Glen Jamieson (Department of Fisheries and Oceans,

Canada), Patricia Livingston (NOAA Fisheries Service, U.S.A.), Douglas Woodby (Alaska Department of Fish and Game, U.S.A.), and Chang-Ik Zhang (PICES, Republic of Korea). Members of the Steering Committee organized the scientific aspects of the symposium, chaired sessions, and will serve as editors for the symposium proceedings.

The symposium was co-sponsored by PICES, ICES, FAO, and multiple U.S. regional sponsors, including Alaska Sea Grant, NOAA Fisheries Service, North Pacific Fishery Management Council, North Pacific Research Board, Alaska Department of Fish and Game, and the Pollock Conservation Cooperative Research Center. Other supporting organizations included the Institute for Marine Research (Bergen, Norway), School of Fisheries and Ocean Sciences of the University of Alaska Fairbanks (U.S.A.), and Marine Conservation Alliance (U.S.A.). The symposium was hosted by Alaska Sea Grant which handled all meeting logistics. This symposium was part of an ongoing Alaska Sea Grant symposium series; specifically it was the 26th Lowell Wakefield Fisheries Symposium (<http://seagrant.uaf.edu/conferences/wakefield/index.html>).

The symposium attracted broad international interest and was attended by 108 registered participants from 19 countries: Argentina, Australia, Brazil, Canada, Estonia, India, Italy, Japan, Korea, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sweden, Taiwan, Thailand, United Kingdom, and U.S.A. This size and diversity fostered a very collegial atmosphere to discuss and contrast approaches in many regions of the world. The keynote and seven invited speakers further emphasized the international focus of this symposium with presentations on seven contrasting marine ecosystems: Thailand, Korea, Japan, Australia, Namibia, Norway, and Atlantic Canada.

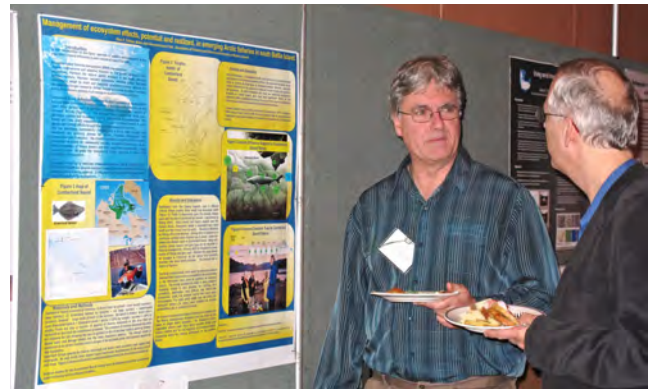
The goals of *Ecosystems 2010* were to: (1) evaluate global progress toward EBFM by reviewing regional case studies, development of new analytical tools and practical approaches toward future progress, and (2) offer explicit, practical advice for future progress in implementation of EBFM. To meet these goals, oral presentations and posters were organized along four main themes: (1) progress on regional applications, (2) new analytical tools and evaluation of ecosystem indicators, (3) human dimensions, and (4) case studies and practical solutions.

Alaska Sea Grant Director, Dr. David Christie, and Steering Committee Chairman, Dr. Gordon Kruse, opened the symposium with welcoming addresses. The keynote speaker was Dr. Howard Browman, who kicked off the

symposium with a provocative and challenging “devil’s advocate” position. He questioned the extent to which EBFM can be operationalized, whether ecological principles have been incorporated into EBFM and, in fact, whether ecology is necessary to meet the main objectives of EBFM. Finally, he considered whether we have the resources needed to apply EBFM broadly and completely, and whether EBFM will really improve the sustainable management of marine resources.

All sessions were conducted in plenary to maximize involvement of all participants. The first Topic Session addressed “*Progress on regional applications*” and spanned just over one full day. It was chaired by Drs. Douglas Woodby and Kwame Koranteng (FAO, Ghana). An invited talk was given by Dr. Chris O’Brien (Thailand) on the Bay of Bengal Large Marine Ecosystem (BOBLME) Project. He described the strategies and challenges associated with working simultaneously in eight developing countries to implement the BOBLME Project. They are attempting to integrate ecological, economic, social, and governance aspects into the management of three trans-boundary fisheries, as well as into an overall strategic plan for coordinated management and remediation of the degraded Bay of Bengal marine ecosystem. The challenge is daunting, as the regional fisheries involve 380,000 fishing vessels, with landings valued at US \$6.0 billion, and 4.5 million people employed in the fishing industry. Lessons learned are likely most relevant to PICES countries in the western North Pacific. This interesting session also included examples of other regional EBFM applications in very diverse regions such as India, Thailand, Sweden, South Africa, west coast of Canada, New England (U.S.A.), and even tropical river systems of Brazil.

The second full-day Topic Session addressed “*New analytical tools and evaluation of ecosystem indicators*”. It was chaired by PICES representatives, Patricia Livingston and Dr. Chang-Ik Zhang, and included two invited talks. In the first, Dr. Rick Fletcher (Australia) introduced an EBFM framework to set priorities based on risk assessment. The framework integrates individual fishery level risks and outcomes at a regional level so as to develop a practical, prioritized agency planning process. An example of applying this step-wise, hierarchical approach was given for the West Coast Bioregion of Western Australia. Over 600 ecological assets, social and economic outcomes, governance systems, and external drivers were identified. However, these were consolidated into just 24 department-level priorities ranging from urgent to very low after applying the hierarchical approach, which culminated in a multi-criteria analysis. The approach appears to be remarkably successful, as these EBFM-based assets and priorities now form the basis for all planning and budget setting processes in the agency, plus they are facilitating improved linkages with other government agencies and regional level processes. In the second talk, Dr. Zhang reviewed new analytical tools



Ross F. Tallman, Fisheries and Oceans Canada, discusses his poster “*Management of Ecosystem Effects, Potential and Realized, in Emerging Arctic Fisheries in South Baffin Island*” at the evening poster session and reception at the 26th Lowell Wakefield Fisheries Symposium.

for EBFM assessment and management. He gave two examples showing how ecosystem-based assessments can assist fisheries management in practice. The first was the Marine Stewardship Council’s Fishery Assessment Methodology, and the second was the Integrated Fisheries Risk Analysis Method for Ecosystems (IFRAME) developed by Dr. Zhang and colleagues. Other presentations in this session addressed ecosystem indicators, integrated ecosystem assessments, and models ranging from multi-species surplus production models to full ecosystem models.

The third Topic Session spanned a half-day and addressed “*Human dimensions*”. It was chaired by Drs. Glen Jamieson and Diana Evans, and also included two invited talks. In the first, Dr. Anthony Charles (Canada) examined the human context for EBFM, as part of a multi-objective “systems” approach, as well as the human dimensions of implementing ecosystem-based management. He emphasized a number of challenges, including the challenge to scale up or scale down new governance initiatives to fit the multiple scales of fished ecosystems. Dr. Mitsutaku Makino (PICES, Japan) spoke about fisheries at the Shiretoko World Natural Heritage site. He pointed out that a key to effective management is the participation of the fisheries sector from the beginning of the planning process. Involvement of stakeholders requires a very large number of frequent public meetings. A notable benefit of this involvement is “buy-in” of the stakeholders to the management actions, resulting in a considerable reduction of the administrative costs for conservation measures. Lessons learned from this case study of co-management may be particularly helpful to other situations in the world where large numbers of small-scale fishers harvest a wide range of species. Other interesting talks in this session covered social aspects of overfishing of small-scale fishery resources in Estonia, governance models in Western Australia, development of spatially explicit, decision-support tools for public involvement along the west coast of the U.S. and Canada, and conflict resolution methods for design of marine protected areas in Taiwan, among others.

The final Topic Session addressed “*Case studies and practical solutions.*” It was chaired by Drs. Gordon Kruse and Howard Browman (Norway). Dr. Johann Augustyn (Namibia) delivered the first invited talk on EBFM in the Benguela Current region. The Benguela Current Commission involves Namibia, Angola, and South Africa. These three countries have established structures and mechanisms to manage their fisheries using an ecosystem approach to varying degrees, and they have also initiated research projects to develop ecosystem indicators to monitor progress. In the second talk, Dr. Robert Stephenson (Canada) reported on progress toward EBFM in the Gulf of Maine. In this region, there have been many advances in the understanding of ecosystem processes and progress in networking of people and information. Remaining impediments include the need for enhanced monitoring and information about this complex ecosystem to support evolving management, as well as the need for changes in governance to support cross-disciplinary and inter-jurisdictional considerations. In other presentations in this session, Dr. Kwame Koranteng discussed the approach to EBFM in a number of developing countries and regions around the world, current progress, and practical obstacles that are being encountered. The session was concluded with four talks addressing case studies of EBFM involving considerations of marine mammals, fishing, climate, and other factors in marine ecosystems of the Gulf of Alaska and eastern Bering Sea.

The symposium was concluded with a panel discussion, which included Drs. Howard Browman, Rick Fletcher, Glen Jamieson (Chairman), Kwame Koranteng, Mitsutaku Makino, and Patricia Livingston. Panelists offered their perspectives on the take-home messages from the symposium, and meeting participants posed questions and proffered their insights.

Based on the panel discussion, it appears that the symposium achieved a general consensus on several aspects of EBFM. There was a convergence on broad ecosystem management objectives, principles, approaches, tools, and involvement

of stakeholders. A clear consensus also emerged on the need to conduct risk assessments to set priorities. In general, the greatest risk identified for many of the regions of the world is the lack of effective governance. Rectifying this central problem is a prerequisite for any form of sound fishery management. Other common struggles include the difficulty to obtain clear operational objectives from policy makers and the need to develop practical approaches that can be implemented in developing countries with limited fiscal resources. In developed countries, ecosystem models have been constructed to improve understanding of ecosystem dynamics in many regions, but it remains unclear whether these models are capable of providing explicit management advice, such as prescription of biological reference points and total allowable catches.

In conclusion, this symposium was another outstanding successful collaboration of PICES with other international organizations. It was a pleasure and privilege for me to work with PICES, ICES, FAO, and other colleagues from around the world on this topic, which is very relevant to the PICES FUTURE program. Details about this symposium, “*Ecosystems 2010: Global progress on ecosystem-based fisheries management*”, including the program, copies of presentations, and book of abstracts are available on the symposium website at <http://seagrant.uaf.edu/conferences/2010/wakefield-ecosystems/index.php>. Accepted papers presented at the symposium will be published in a peer-reviewed, edited book expected to be completed in late 2011. The book will be available electronically over the Internet for easy and affordable access to the PICES community.



Kwame Koranteng of the Ghana Oceanographic Data Centre speaks at the panel discussion on “*Necessary steps for future progress. What’s next?*”.



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