Coping with Global Change in Marine Social–Ecological Systems: An International Symposium

by R. Ian Perry, Samuel Pooley, Mitsutaku Makino and Rosemary Ommer

Humans are integral components of marine social–ecological systems, not "exogenous" to an otherwise "natural" ecosystem. Such systems have marine (including physical–biological) and human (including cultural, management, economic, and socio–political) components which are highly inter-connected and interactive. Changes in marine ecosystems have impacts on, and consequences for, the human communities that depend on these systems, and *vice versa*, and how these human communities respond to changes in their environment can have reciprocal impacts on marine ecosystems. However, "natural" marine ecosystems are usually studied separately from their human components, and by different scientific disciplines with different scientific traditions (natural scientists, economists, social scientists, and humanists). Understanding the important issues and collaborating with other disciplines is essential for correctly interpreting the causes and dealing with the consequences of global changes in marine social–ecological systems, and for developing practical and successful methods for managing marine resources using ecosystem-based approaches (which is one of the goals of the PICES FUTURE program).

Meeting this objective was what an international symposium on "*Coping with global change in marine social–ecological systems*", co-sponsored by GLOBEC, Eur-OCEANS, and FAO, held July 8–11, 2008, at FAO Headquarters in Rome, Italy, was intended to achieve by discussing these issues in a truly inter-disciplinary fashion. The symposium was supported by PICES along with the Institut de Recherche pour le Développement (IRD, France), Institut français de recherche pour l'exploitation de la mer (IFREMER), the Scientific Committee on Oceanic Research (SCOR), the International Council for the Exploration of the Sea (ICES), the Integrated Marine Biogeochemistry and Ecosystem Research program (IMBER), the Social Sciences and Humanities Research Council of Canada (SSHRC), and the WorldFish Centre, and was endorsed by the International Human Dimensions Program (IHDP).

The central goals of the symposium were to share experiences across disciplines and to identify the key next steps and common elements and approaches that promote resilience of marine social–ecological systems in the face of global changes. This involved:

- exploring conceptual issues relating to social–ecological responses in marine systems to global changes;
- analysing case studies of specific examples of social–ecological responses in marine systems to significant environmental changes manifested locally;
- synthesising the work of natural and social scientists and building comparisons of social–ecological responses in marine ecosystems subjected to major environmental variability;
- developing innovative approaches to the use of science and knowledge in management, policy and advice; and
- identifying lessons for governance for building resilient social-ecological systems.

The symposium was highly successful, and achieved these goals. Over 150 people from 38 countries participated, and a broad range of disciplines was included, from marine biology and ecosystem modeling to fisheries economics and anthropology. The presentations and posters dealt with issues of economics, society, environment, and technology as these relate to coastal and ocean issues in the face of both social (*e.g.*, globalization) and natural (*e.g.*, climate) global changes. It was noted that wild capture fisheries are fundamentally different than other food production systems, and therefore, their responses to environmental and climate changes must be considered separately from those of terrestrial food production systems.

Participants at the Rome symposium: (from left) James McGoodwin, Svein Jentoft, Ian Perry and Fikret Berkes.

Keynote presentations (by Fikret Berkes, Bonnie McCay, Katrina Brown, and Judith Kildow) emphasized that fisheries are linked social–ecological systems which require a humans-in-ecosystems approach. Including people leads to the recognition of larger and more complex "communities" (*e.g.*, of fish and fishers) which include exploiters, drivers, disrupters, and participants in, and agents of, change. The interactions among multiple social, economic, and environmental stressors are particular challenges (as underlined by recent rises in fuel prices) and suggest that a resilience perspective focused on adaptive capacity would be a useful approach. There was also discussion that we should move from the narrowly-defined government regulatory approach to include broader concepts of governance to deal with these complex systems. One keynote speaker suggested that the solution does not lie with "more technology" but with humans, such as clear understanding of the *interactive* nature of the

issues, effective scientific communication, and public education and engagement.

The final panel and summary session pointed out that not all global changes will be negative, that there will be winners and losers, and that some industrial development strategies, intended to reduce poverty in fishing communities, may inadvertently undermine their economic basis and make their poverty worse. It was also noted that exposure, resilience and susceptibility vary immensely in terms of spatial scale, and that one framework and policy response may not apply to all situations. In which case, the important question is how can policies be developed which are flexible and support a wide range of adaptation situations? Fisheries stock assessments, it was noted, have yet to fully integrate the environment, climate change, ecology and human behavior into their models and management recommend-dations. This is a critical step in the implementation of science-based ecosystem approaches and should be a priority. Thus, continued development of models will remain very important, as will continued synthesis and integration of the work of natural and social scientists.

Several presentations noted that, although life is mostly lived locally, we must continue to think globally, while remembering that most fishers' perspectives are decidedly local, and their lives are embedded in the particular local environment in which they live. There were calls to promote international cooperation and support to help humanity face the challenges posed by global change. It was also emphasized that a coordinated world-wide system to monitor global changes needs much additional development. New conventions may also be needed to help the world's nations to cooperatively engage in problem solving and coping with global change—in particular, as it impacts marine environments. Organizations and programs such as PICES, ICES, FAO, UNEP, GLOBEC, and others can play important leadership roles to bring about this enhanced international cooperation.

The participation at this symposium by both "natural" and "social" scientists, who do not normally meet together, and discussions during breaks and in the evenings, was extraordinary. As one of the members of the Closing Panel (Mitsutauku Makino, Japan) commented, the symposium poster represented a good balance of the topics of the symposium: 4 people and 3 and a half fish! The symposium demonstrated the significance and timeliness of the topic of this symposium. Several comments were made that a follow-up symposium should be held in a few years, perhaps devoted to more specific topics. There is great scope for continued progress in studying such coupled marine social–ecological systems. Publication of the symposium proceedings, in both an edited book and a special issue of the journal *Marine Policy*, is planned for the near future. Further information about the symposium, including links to the presentations and posters, is available on the symposium website at http://www.peopleandfish.org.




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