

Future Integrative Science Program – Progress report

By John E. Stein

The Climate Change and Carrying Capacity (CCCC) Program was our first – and so far only – major science initiative in PICES. Over the years, our colleagues have come together well in the CCCC Program to develop a science that stretches across the North Pacific. They are now in the challenging phase of synthesizing the results of their research (see the summary of the CCCC Synthesis Symposium by Harold Batchelder and Suam Kim in this issue). As the CCCC Program enters the synthesis phase, it is time to start thinking about the next future integrative science program (FISP) of PICES. FISP was discussed initially in 2003, at the first inter-sessional Science Board/Governing Council meeting. At that meeting, Science Board and Governing Council asked Dr. Makoto Kashiwai, a former Chairman of PICES Science Board and co-convenor of the 1994 PICES/GLOBEC Workshop on Climate Change and Carrying Capacity Program, to prepare guidelines for developing a new scientific program in PICES (PICES Press Vol. 11, No. 2). This insightful article has proven to be very useful to ensure that we take into account the lessons learned in developing the CCCC Program. The process gained momentum in 2005, when the Governing Council established a Study Group on FISP. The major function of the Study Group was to develop ideas for one or more new integrative science programs to be undertaken by scientists in PICES member countries. It was also emphasized that the next integrative science program has to be well aligned with the PICES Strategic Plan approved in 2004 (http://www.pices.int/about/PICES_strategy.pdf).

This article describes the progress we have made, especially between PICES XIV in Vladivostok and the just-completed inter-sessional Science Board/Governing Council meeting, held from April 17–18, 2006, in Honolulu. I represent the Study Group on FISP whose members are: Harold P. Batchelder, Michael G. Foreman, Yukimasa Ishida, Kuh Kim, Suam Kim, David L. Mackas, Jeffrey M. Napp, Fangli Qiao, Hiroaki Saito, and myself.

We were asked by Governing Council to address the following Terms of Reference:

1. Solicit ideas (short 1-page descriptions) from PICES Committees, the CCCC Program, and more broadly as appropriate, concerning future major scientific endeavors for PICES;
2. Compile, review and assess the responses; develop themes of potential interest to all member countries, and present the results to Governing Council at PICES XIV, indicating preferences of the Study Group if more than one theme is recommended;
3. Disseminate findings and recommendations after meeting with Governing Council, and seek feedback from the PICES scientific community;
4. Present revised themes and recommendations for proceeding with the implementation of the selected theme(s) to Governing Council at its inter-sessional meeting in spring 2006;
5. Provide the final report to Governing Council and make an open forum presentation on the preferred theme(s) at PICES XV.

Following our inter-sessional Science Board/Governing Council meeting in April 2005, the Study Group developed short descriptions of candidate themes. We received six descriptions, which we reviewed and discussed at a special meeting of the Study Group at PICES XIV:

- Ecosystem-based fisheries management and sustainable use;
- North Pacific marine ecosystem response to global change;
- A new integrative scientific program built upon the foundation of the CCCC Program;
- North Pacific ocean sustainability;
- Coastal Ocean ecosystems – The human dimension and climate;
- Status and trends in marine biodiversity.



Discussing FISP proposals at the inter-sessional Science Board/Governing Council meeting, April 2006, Honolulu.

We had a lively and productive discussion in Vladivostok. Rather than having widely divergent views, there were common elements arising from nearly all of the candidate themes and the views of the Study Group members. Those of you who attended the meeting in Vladivostok, may recall that I gave a presentation at the Closing Session summarizing the progress of the Study Group; the presentation can be found on the PICES website at http://www.pices.int/members/study_groups/SGFISP/FISP_theme_proposals.aspx (click on the “Report on Future Integrative Scientific Program(s)” link located at the bottom of the table). In brief, the common elements or key words in the candidate themes were – *climate, forecasting, scenarios and uncertainty, human dimension and outreach, ecosystem response to change, sustainability, biodiversity, indicators and mechanisms*. It also became evident that the candidate themes represented an evolution of the science in the CCCC Program and a recognition of topics covered in recent Science Board Symposia, like the human dimension. While we saw the value of building on the progress and success of the PICES’ first integrative science program, the Study Group was encouraged to look broadly to make sure that we are addressing those scientific questions that will be the key questions over the next decade.

The discussions in Vladivostok led to consensus that the next major science program should: (1) build upon the successful CCCC Program; (2) move from climate variability to global change; and (3) bring climate into management models. We also proposed that the program should have the following key elements – development forecasts, more explicit inclusion of the human dimension, a focus on mechanisms, development of scenarios for the range of effects of climate change on ecosystem structure and function, and the delivery of ecosystem goods and services that are important for human societies. The following was suggested as a possible name for the new program: **FUTURE – Forecasting and Understanding Trends, Uncertainty and Response of Ecosystems**. After Dr. Kuh Kim, Science Board Chairman, and I gave an



Whiteboard of the FISP Study Group meeting in Vladivostok.

overview of the progress to Governing Council, the Study Group was asked to move ahead ‘smartly’ to narrow the number of candidate themes, to request comments from the PICES community, and to be prepared to have a full discussion at the next inter-sessional Science Board/Governing Council meeting. As we say in the western Pacific – we had our marching orders.

Following our Annual Meeting in Vladivostok, the Study Group sought comments from the broader PICES community – we really wanted to hear from our fellow ‘PICESians’. This is an extremely important step that we are just starting. It is very important to hear from as many of you as possible since this is *your* next major science program and it will only be as successful as is the acceptance and energy that you bring to the program. The Study Group also feels that it is crucial for the theme to be scientifically compelling and interesting to as wide a range of our members as possible. While this may be an obvious goal, it is one that requires special attention because it is so important to the success of the new integrative science program.



Members of the FISP Study Group and invitees participate enthusiastically in the group’s meeting at PICES XIV.

We received comments from PICES colleagues and additional feedback from Study Group members. This served to stimulate an in-depth discussion of FISP at the recent inter-sessional Science Board/Governing Council meeting in Honolulu. Having Governing Council members present added to the breadth of the discussion as we worked to refine our vision of the next integrative science program. It is hard to summarize all of the comments we received, plus an entire day’s discussion, but here is my attempt. The next science program should build off the ‘PICES trademark’ of understanding climate–ecosystem linkages. It must be integrative and involve all PICES countries and all scientific committees, have a duration of about 10 years, contain the key elements outlined above, and accept that a need exists for translating complex ecosystem-scale data for use by management agencies and the general public. PICES should tackle the need to be ‘translators’ who derive indices of ecosystem patterns,

trends, variability, and uncertainty that will be useful to, and understood by, individuals outside the scientific community. There was a great deal of discussion around the latter point, with strong consensus that we must do this. Nevertheless, it is not clear yet how to do it, to what extent, who should be involved, and if we should partner with other organizations. Noting as well, these activities have elements that broach the social sciences considered desirable for FISP. The Study Group was challenged to be bold and to think broadly, but to have clear objectives, and to be aware of major initiatives and geopolitical momentum around issues such as biodiversity. Over the last decade or so, we have learned a great deal about climate and ecosystem linkages, but this knowledge is not necessarily incorporated in the development of policy and management of our oceans and coasts.

Here is a 'sneak preview' of a description of FUTURE that is a result of the progress to date, and will be part of a short document to go Study Group, Science Board and Governing Council members for further review, and then out to you to seek your very important comments:

FUTURE will build on the success of the CCCC Program and is motivated by three universal societal issues:

1. the loss of natural environmental capital, such as renewable resources, non-renewable resources, and habitat;
2. the loss of socioeconomic opportunities within PICES member countries due to natural and anthropogenic change; and
3. increased uncertainty and risk faced by managers and policy makers.

These issues drive the need for improved scientific information and for better communication of that information to all facets of society.

The implementation of FUTURE will be to build on the improved understanding of marine ecosystems gained through programs like CCCC and GLOBEC; through the availability of the next generation of Intergovernmental Panel on Climate Change (IPCC) models; improved biological, physical, and geochemical time series in many PICES member countries; and substantial progress made in building models to synthesize existing data and test key

hypotheses on the responses of North Pacific ecosystems to climate and human forcing. FUTURE will extend these past programs by focusing on better understanding of the mechanisms underlying ecosystem response, by developing a forecasting capability, and by providing estimates of the uncertainty associated with these forecasts. The challenge is not only to improve our scientific understanding of interactions between the North Pacific Ocean, climate, and biological communities, but also to communicate this information effectively to societies and governments so they can set policy and management directions for our oceans and coasts and the biological communities, including humans, that are in these ecosystems. In short, we need to clarify, anticipate, and communicate the linkages between climate, ecosystems and societies.

We are at an important juncture in the growth of PICES as an international organization as we develop our next major integrative science program. It is my view that we are building off the successes in PICES and the identity that PICES has established as a leader in improving our understanding of how marine ecosystems respond to climate variability. As I mentioned above, our challenges are to make the next major science program more integrative across the breadth of PICES scientific committees, move to forecasting what may be the consequences of changes in the ecosystems of the North Pacific, and be much more deliberate and active in informing those outside of PICES about what we do know and how it should be considered as our societies make decisions that affect the North Pacific ecosystem – from the basin to marginal seas and coasts.

Our next integrative science program will only be as good as the level of involvement from you, the PICES community. So I encourage all of you to come to the Open Science Forum on FISP planned for Thursday, October 19, at our next Annual Meeting in Yokohama. I encourage all of you to attend the meetings of your committees and groups to discuss FISP as well, because we want FUTURE to be truly multidisciplinary and involve all of the PICES Scientific and Technical Committees and meet the needs of our member countries. Make your voice heard by contacting any of the members of the FISP Study Group with ideas or comments on FUTURE.



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