

# **Anthropogenic Influences on Coastal Ecosystems – AICE AP**

Intersessional FUTURE-AP Meeting  
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# FUTURE

## **Objective 1: Understanding Critical Processes in the North Pacific**

- (1) What determines an ecosystem's intrinsic resilience and vulnerability to natural and anthropogenic forcing?
- (2) How do ecosystems respond to natural and anthropogenic forcing, and how might they change in the future?
- (3) How do human activities affect coastal ecosystems and how are societies affected by changes in these ecosystems?

## **Objective 2: Status Reports, Outlooks, Forecasts, and Engagement**

# FUTURE Advisory Panels (APs)

Three Advisory Panels (AICE, COVE and SOFE) provide:

- continuing direction,
- leadership,
- coordination; and
- synthesis within PICES toward attaining the FUTURE goal.

# FUTURE APs in Year 1

- Establish a list of specific FUTURE priority topics, activities and products for review by PICES SB
- Work with the existing expert groups associated with FUTURE to review and revise, if needed, their Terms of Reference;
- Work with the Scientific and Technical Committees and the PICES community to identify gaps in the priorities and activities of the expert groups and to provide recommendations to the Science Board;
- Coordinate with the Scientific and Technical Committees in developing Terms of Reference for new expert groups to be part of FUTURE;

# FUTURE APs in Year 1

- (SOFE only) Coordinate with the Editors of the next version of the North Pacific Ecosystem Status Report on how the Report should be updated in the future. Work with the Communication Study Group and the Study Group on Human Dimensions of Environmental Change to commence the review of user characteristics for FUTURE products.

# AICE – AP Role

1. Provide recommendations for action:
  - Identify and recommend priority tasks to PICES Science Board (SB), the SSC for FUTURE, and relevant Scientific and Technical committees
  - Goal of AICE is to provide answers to the three research themes under Objective 1: Understanding Critical Processes in the North Pacific
  
2. Co-ordinate these actions among PICES Scientific and Technical Committees:
  - Work with existing expert groups to revise ToRs to address FUTURE research needs
  - Work with SB and parent committees to identify new expert groups to address FUTURE research needs
  
3. Synthesize results provided by PICES expert groups:
  - Synthesize information provided by relevant expert groups to address specific research questions/themes
  - Work with SOFE to distribute scientific products related to FUTURE

# New FUTURE Expert Groups

- A further topic for new expert groups under FUTURE is to understand the direct sensitivity of ecosystems to natural and anthropogenic perturbations and the trophic cascades that may result from these perturbations. Marine ecosystems respond to perturbations in various ways.
- Identifying sensitive organisms or processes and how they reflect effects of pressures on the larger ecosystem is essential to understanding the response of ecosystems to perturbation and to accurately forecasting the future state of marine ecosystems.
- Sensitive organisms/processes will vary among ecosystems and among perturbations. Thus, comparisons among ecosystem responses to perturbations should provide insights to ecosystem sensitivity and resiliency, and for informing decisions on conservation measures.

# AICE – AP Objectives

1. Integrated understanding of past coastal ecosystem change caused by anthropogenic forcing, especially hypoxia, eutrophication, chemical pollution, and fishing-related shifts in community or size structure and how societies have been affected by these changes;
2. Comparing the responses of sensitive organisms to specific anthropogenic perturbations and internal community shifts using retrospective data analysis, ecosystem models, field studies, and laboratory and manipulation experiments;
3. Understanding how continued eutrophication, pollution, fishing, and other anthropogenic pressures change future coastal marine ecosystems and how these affect societies; and evaluating how societies can sustain their resilience to inevitable ecosystem changes, and which societal choices lessen the stresses placed on ecosystems.



# AICE – AP Objectives

4. Understanding how natural and human perturbations cascade through ecosystems;
5. The relevance of key species concepts in North Pacific marine ecosystems and their sensitivity to perturbation;
6. Identifying amplifiers and buffers of perturbation effects in marine food webs and what scales and magnitudes of perturbations may induce irreversible ecosystem change;
7. Understanding the mechanisms of recruitment variation in populations of commercially valuable organisms such as finfish, shellfish, shrimp, squid, kelp, etc.

# AICE – AP Terms of Reference

- 1) Agree on AICE Workplan and present to Science Board
  - Inter-sessional meeting of SB, April 2010
  
- 2) Review the Terms of Reference and current and proposed activities of all expert groups, especially HAB-S, WG-21, and WG-24 as these have the greatest connection to AICE.
  - Spring - Fall 2010
  
- 3) Identify priority topics and activities for AICE. Have these approved by Science Board and shared with all expert groups. Identify project leads as necessary and develop timelines for their completion.
  - Fall 2010, priorities to SB at PICES 19 in Portland, OR

# AICE – AP Terms of Reference

- 4) Identify priority topics and activities that have implications for other FUTURE APs (COVE and SOFE) and ensure proposed activities limit redundancy and address as many FUTURE priorities as possible.
  - Fall 2010, ongoing
  
- 5) Work with Committee chairs and expert groups to identify ways to ensure ongoing and planned activities address FUTURE priorities. Revise Terms of Reference of existing expert groups as needed
  - Fall 2010, ongoing

# AICE – AP Terms of Reference

- 6) To address FUTURE priorities not currently being addressed, work with Committee chairs to develop new expert groups to address these priorities.
  - Fall 2011, ongoing
  
- 7) Initiate reviews and synthesis of information to address FUTURE goals. For example, review how North Pacific coastal ecosystems have responded to different anthropogenic stressors.
  - Spring 2011, ongoing

# AICE – AP Activities in 2010

## Work completed so far in 2010:

1. Draft TOR and Work plan developed by AICE – AP (Winter 2010)
2. SB accepted these ToRs at the Intersessional Meeting in Sendai (April 2010)
3. Intersessional Meeting will help solidify AICE – AP Role, Objectives and Products
4. Review of Expert Group ToRs underway (presented here in part)
  - WG 21: Non-indigenous Aquatic Species
  - WG 24: Environmental Interactions of Marine Aquaculture
  - HAB-S: Section on Harmful Algal Blooms

# AICE Goals

- (1) Identify key anthropogenic stressors in North Pacific coastal ecosystems
- (2) Characterize how aquatic communities respond to these stressors and where possible identify indicator species/ecosystem services
- (3) Characterize/forecast how these stressors are likely to change in the future, especially with climate change and/or alter human use of coastal ecosystems
- (4) Understand/forecast how society affects/is affected by these anthropogenic stressors

# AICE Challenges

- (1) How to identify the most appropriate stressors to focus on keeping in mind differences in coastal ecosystems and their use by PICES member countries?
- (2) What indicator species/ecological services should be monitored and how?
- (3) Are stressors identified increasing, decreasing or not changing in magnitude or amplitude?
- (4) Engagement of socio-economic expertise will be difficult as this is an area of expertise relatively foreign to PICES but will be essential to fully understand how societies are affected by anthropogenic stressors in coastal ecosystems.

# An Example AICE Activity

## **Question 1: Increased nutrient loading as a stressor in coastal marine environments.**

- (1) How are non-indigenous aquatic species, marine aquaculture, and/or harmful algal blooms affected by increased nutrient loading in coastal systems?
- (2) What is the impact on society?
- (3) Can indicator species be identified?
- (4) Can the impact of this stressor be predicted?
- (5) What are the primary sources? Do they differ between the eastern and western Pacific? What socio-economic considerations are in place?