Implementation Plan for Phase 4 (2021-2025) PICES-ICES Section on Climate Change Effects on Marine Ecosystems

Vision

PICES and ICES will become the leading international organizations providing science and advice related to the effects of climate change and variability on marine resources and ecosystems.

PICES and ICES will develop the scientific basis for evaluating the vulnerability, status and sustainability of marine systems under changing climate conditions. Collaborative research within PICES and ICES will facilitate the development, maintenance and evolution of a network of regional interdisciplinary research teams that will share research approaches on a global scale to foster laboratory, field and modelling activities that will provide data and understanding at the spatial and temporal scales needed to monitor, assess and project climate change impacts on marine ecosystems.

Background

In the spring of 2011, PICES and ICES agreed to move forward on the Science Plan for a PICES-ICES Section on Climate Change effects on Marine Ecosystems (S-CCME IP). This project is known within ICES as the Strategic Initiative on Climate Change effects on Marine Ecosystems (SICCME). As stated in the Science Plan the goal of S-CCME will be to:

1. Define the research activities needed to understand, assess and project climate change impacts on marine ecosystems with sufficient spatial and temporal resolution to plan strategies for sustaining the delivery of ecosystem goods and services and the preservation of biodiversity. When possible projections should quantify estimations of uncertainty.

2. Define and quantify the vulnerability of marine ecosystems to climate change, including the cumulative impacts and synergetic effects of climate and marine resource use.

3. Build global ocean prediction frameworks, through international collaborations and research, building on ICES and PICES monitoring programs.

The PICES and ICES co-chairs published an initial Science Plan and a 2012-2014 Implementation Plan (IP) for this initiative (Hollowed et al, 2013: Appendix 4, S-CCME IP). A phased implementation approach was proposed within the IP and both organizations recognized that while the specific activities of S-CCME may change overtime, three activities of the S-CCME IP were expected to be continuous:

1. Synthesis of existing knowledge,
2. Advancement of new science and methodology, and
3. Communication of research findings.

Phase 2 (2015-2017) IP included:

- Continue to advance new science focused on climate change effects on marine ecosystems through theme/topic sessions and workshops;
- Update and improve forecasts with IPCC AR5 scenarios;
- Convene an international symposium in 2016;
- Develop regional synthesis reports;
- Initiate inter-sessional training for projecting climate change impacts on marine ecosystems;
- Continue collaboration with global climate change research community.

Phase 3 (2018-2020) IP included:

- Continue to advance new science focused on climate change effects on marine ecosystems through theme/topic Sessions and workshops;
- Update and improve predictions with IPCC AR6 scenarios;
- Develop regional synthesis reports;
- Convene an international symposium in 2018.

At the PICES Annual Meeting in 2019, S-CMME requested that IP Phase durations be extended to 5 years; this request was approved by Governing Council. Phase 4 IP for S-CMME will cover activities from 2021-2025.

PICES and ICES are well positioned to be leading organizations participating in the UN Decade of Ocean Science for Sustainable Development ("Decade" 2021-2030). The Decade is intended to provide a common framework for international collaboration on ocean scientific research and innovative technologies in support of ocean sustainability. The Decade will contribute to the UN 2030 Agenda for Sustainable Development by fostering international cooperation aligned with 7 main societal goals:

1. A clean ocean where sources of pollution are identified and removed;
2. A healthy and resilient ocean where marine ecosystems are mapped and protected;
3. A predictable ocean where society has the capacity to understand current and future ocean conditions;
4. A safe ocean where people are protected from ocean hazards;
5. A sustainably harvested ocean ensuring the provision of food supply;
6. A transparent ocean with open access to data, information and technologies;
7. An inspiring and engaging ocean - where society understands and values the ocean in relation to human wellbeing and sustainable development.

The goals of S-CCME align well with all the Decade objectives, particularly a predictable ocean. PICES and ICES intend to participate in the Decade through Actions, although at this time it not known if that participation will be at the level of programmes, projects, or activities. In anticipation of PICES and ICES participation, S-CCME activities that are related to the Decade, and would support broader participation, are indicated below.

Phase 4 (2021-2025) Phase 4 S-CCME activities will continue Phase 1-3 initiatives:

1. Provide forums for communication and coordination between national climate research nodes modeling teams. A key element of this process will be to propose investigator meetings during the PICES and ICES annual meetings.

2. Evaluate and compare ecosystem projections and outcomes based on CMIP6 projections and IPCC AR6 results released in 2021. [Decade relevant]

3. Continue to expand core research activities, including laboratory and field activities, needed to advance the global synthesis of climate change impacts on marine ecosystems for sustaining the delivery of ecosystem goods and services. Particular focus will be placed on research activities to define and quantify the vulnerability of marine ecosystems and key living marine resources to climate change, including the cumulative impacts and synergetic effects of climate and marine resource use. This will be used to assess research gaps. [Decade relevant]

4. Convene dedicated S-CCME topic sessions for PICES and ICES Annual meetings. [Decade relevant]

5. Provide a forum for the assessment and synthesis of existing projections of climate change impacts on marine ecosystems through joint theme or topic sessions and workshops at internatioanal symposia including the 5th Effects of Climate Change on the World's Oceans Symposium (tentatively scheduled for June 2023 in Bergen, Norway). [Decade relevant]

6. Encourage integration with the PICES Human Dimensions Committee and the ICES Strategic Initiative on Human Dimensions through joint theme or topic sessions and workshops.

7. Publish regional summaries in a timely manner to allow their consideration by the relevant IPCC Assessment Reports. This effort will facilitate international collaboration and will provide a vehicle to communicate our current knowledge to stakeholders and the broader scientific community.

In Phase 4 S-CCME will be advancing on the following activities:

8. Synthesize current social-ecological climate change modelling efforts (S-CCME regional nodes) to inform climate-resilient development pathways through analyses that include emergent trends in climate projections, adaptation measures, residual risk and synergies across UN Sustainable Development Goals. [Decade relevant]

9. Help develop and align future scenarios for exploring cultural and social impacts of climate change on fisheries and fishery dependent communities. This would include developing social science metric jointly with the PICES Human Dimension Committee and the ICES Strategic Initiative on Human Dimensions. [Decade relevant]

10. Encourage and integrate S-CCME Science with and between external climate assessment organizations, for example IMBER, and provide knowledge to the scientific communities, national and global advisory bodies such as the IPCC and IPBES on the impacts of climate change on marine ecosystems.

11. Promote innovation in coupled bio-physical-social modelling through workshops and topic sessions. This activity would address things such as: exploration of methodologies in the role of watersheds to ocean coupling and land-sea margins; uptake of nutrients and chemistry; advancements in regional ocean modelling; bias corrections; ensemble modelling scenarios and uncertainty. [Decade relevant]

12. Engage Early Career Ocean Professionals in PICES and ICES and continue to increase communication with Early Career Ocean Professionals to contribute to a predictable ocean where society has the capacity to understand current and future ocean conditions [Decade relevant]

13. Coordinate or support training programs for scientists involved in providing strategic advice on climate change effects on marine ecosystems. Courses of interest to S-CCME:
    a. technical courses for applied research (e.g. geospatial models, size spectral models, EwE, Atlantis). [Decade relevant]
    b. training for communicating climate impacts to the general public, NGOs and decision makers. This training should include a focus on communication of uncertainty. [Decade relevant]

14. Develop and maintain an internal and external S-CCME communication strategy by:
    a. working with SICCME to develop a joint forum for members to exchange information and establish a means of communication. Leadership for this forum could come from ICES/PICES Early Career Ocean Professionals.
    b. maintaining PICES website: links to data repositories and delivery sites such as ClimeFish, links to other coordinating regional and global programmes, such as ESSAS, CLIOTOP and IMBER;
    c. Co-chairs working with members to maintain relevant information on publications and presentations;
    d. coordinate with TCODE to identify data management policy for contributions to shared databases;
    e. establish appropriate S-CCME protocols to facilitate comparitive studies and synthesis of climate change effects. This could include consultation with other similar projects, e.g. FishMIP.