

Report of Working Group on *Marine Ecosystem Services*

The PICES Working Group on *Marine Ecosystem Services* (WG 41/WG-MES) conducted its second business meeting on October 21, 2019, at PICES-2019 in Victoria, Canada. Dr. Dan Lew presided over the meeting as Co-Chair. Dr. Shang Chen is the other Co-Chair but at the late minute was unable to attend in person. Five working group members were in attendance (***WG 41 Endnote 1***). In addition to WG 41 members in attendance, Dr. Chanda Littles (USA), a coastal ecologist and the invited speaker for the workshop organized by the WG 41 Co-Chairs (HD Workshop W6), and Dr. Meng Su (China), an economist, were in attendance. Dr. Littles indicated an enthusiasm for the working group's activities and willingness to contribute actively to the group's projects moving forward. Dr. Su had been an active participant in the PICES-2018 working group meeting.

AGENDA ITEMS 1 AND 2

Welcome/introductions and adoption of agenda

The meeting began with a welcome from Dr. Lew. This was followed by introductions from those in attendance, a review of the proposed agenda, and a vote to adopt the meeting agenda which was adopted without change (***WG 41 Endnote 2***).

AGENDA ITEM 3

Review of terms of reference and description of WG projects

Dr. Lew presented some background information on the origins of the Working Group, its purpose and terms of reference (TOR), and other background information about marine ecosystem services (MES) intended to help frame subsequent discussion. This included a review of each of the WG 41 TOR (see <https://meetings.pices.int/members/working-groups/wg41>). It also included a review of the projects the Working Group agreed upon to achieve the TOR during PICES-2018.

The two Working Group projects as developed during the PICES-2018 meeting are:

1. Review of MES studies in member countries

The first project is a review of MES studies in PICES member countries, which is anticipated to result in a review paper. This project is intended to address TOR #1, #2, and #3 by assessing the scope of MES available in the North Pacific, reviewing the methods for assessing MES along the ecological, economic, and socio-cultural dimensions, and presenting a select set of case studies of applications of methods for assessing MES in the North Pacific. The review paper will provide insights into the range of quantitative and qualitative methods used to measure and value MES in the North Pacific (review of MES types and methods) as well as illustrate how different countries apply them (case studies). Thus, the paper will address the following questions:

- What is the range of MES in the North Pacific?
- What methods are currently available to assess MES, both in terms of measuring their levels and valuing them individually and collectively?
- What are the similarities and differences between PICES member countries in terms of the range of MES and methods used to measure and value them (as illustrated through case studies)?

2. *Country-specific surveys of agencies and decision makers*

The second project entails the development of country-specific surveys that will be administered to decision makers, analysts, and scientists involved in ocean and coastal management and research in each PICES member country. The goal of the study is to collect information necessary to understand how they view and use MES information, as well as the prospects and challenges currently facing each country for advancing its usage in policy and management and its integration into more integrative management frameworks (like ecosystem-based management).

AGENDA ITEM 4

Status updates and discussion of challenges and progress

Dr. Sarah Dudas provided an update on the Ecological sub-group's efforts to understand the way ecosystem services are assessed from the perspective of ecology. She indicated that no other member countries provided input despite her requests, so the update was primarily a Canada update. It included details of her search methods for identifying ecological assessment methods. The results suggest most studies use ecological value transfer (drawing from existing literature) to inform ecological assessment of ecosystem services. There were also some field surveys done, plus usage of large modeling approaches like InVEST, Ecopath, and Ecosim. "Ecosystem services" appears in the literature often simply as a buzzword, which can be misleading concerning the content of those articles. She discussed a couple case studies, one being conducted by a Canada/U.S. research team and the other by Karen Hunter and Ian Perry of Canada on the Ocean Health Index. Dr. Dudas also raised issues related to defining boundaries between marine and non-marine.

Dr. Jingmei Li presented the results from a survey that is a precursor to the Project 2 MES survey. This presentation was an abridged version of her presentation in a HD Topic Session (S4) on "*The impacts of marine transportation and their cumulative effects on coastal communities and ecosystems*" later in the week. The survey included a number of questions asked of decision-makers and scientists (in research and government institutions) related to ecosystem service valuation and its acceptance for decision-making. The survey was completed in October 2018 and administered during the following winter; 151 surveys were distributed and 126 valid responses were received. The results suggested that the majority of respondents understand the concept of ecosystem service values (ESV), but that the valuation methods are not understood by the majority of respondents. About 52% view ESV information as useful for "informative" purposes, 31% for "technical" purposes, and 17% for "decisions." Results also suggest there is a distrust of these values. The Working Group was enthusiastic about her survey and results and felt it was a good companion study to the Project 2 survey.

Dr. Lew provided an update on the Project 2 MES survey. This included a discussion of how a survey template had been developed with cooperation between U.S. and China, which had been developing separate, but somewhat similar, surveys already. The update included a presentation of the test-version of the web-based MES survey developed by the U.S. and detailed discussion of the questions and content of the survey and the plan for testing and administering it. An important departure in the U.S. version from the original project description and survey template was that the questions about ecosystem-based management (EBM) were dropped due to feedback from reviewers during initial testing indicating that these questions were problematic in the context of a survey primarily oriented towards MES values (*i.e.*, economic values and valuation of MES). He indicated that the U.S. has some programming budget flexibility that will allow the programming of other PICES country-specific surveys so long as they are translated and conform somewhat closely (though not identically) to the U.S. version. It is anticipated that the list of MES and decision contexts in the survey will be different across PICES member countries and that there may also be a few other minor differences in some questions. Each country would need to create their own introductory video to be shown at the beginning of the survey as well. They would also need to do their own qualitative pretesting of the survey that would ensure comprehension of questions and

increase the chances of getting valid and desired data. The Canada representatives indicated enthusiasm for using the U.S. survey resources and will provide Canada-specific translations for programming during the coming year. Some discussion of methods for qualitatively pretesting the surveys before they are administered occurred and a preliminary timeline was discussed (need translated versions within next 6 months).

WG 41 members also provided some useful suggestions for wording and flow changes that would improve the survey. Considerable time was spent discussing how to identify the sampling frame (list of the respondent universe)—currently being identified through a combination of snowball sampling methods and using public lists of agency/council members. This approach seemed reasonable to the group. There was also a discussion about the merit of asking additional demographic questions (age, gender) and balancing the added value *versus* sensitivity of those questions that may affect response rates. There was agreement that expanding the survey beyond NOAA Fisheries to NOAA would be useful in the future.

In addition to Canada’s desire to utilize the U.S. version web infrastructure, China indicated that they would use some of the questions from the U.S. template in a follow-up survey of their own. There was also discussion about whether we should exert any effort trying to get other, currently non-participating, PICES member countries to administer the survey. There was a sentiment among Working Group members that it is likely unfeasible to get other countries to commit to participate in the Project 2 survey. Note: After the meeting, Dr. Lew spoke with Dr. Aoi Sugimoto, a Working Group member representing Japan. She indicated that due to time limitations, Japan probably would not be administering a Japan-specific survey.

Dr. Lew also presented an update on Economic sub-group activities, which similarly to the Ecological sub-group, was really a one-country update, given a lack of participation by other member countries. He presented an outline of the economic assessment section, and the group engaged in a useful discussion of several components that were mentioned (especially the need for issues related to scale, discount rates, and temporal/spatial issues to be discussed). He also discussed some uses for MES economic values, which would provide context to show the importance of these economic values in the report. Dr. Dudas noted that the ecosystem section would be very different structurally from the economic one, which everyone agreed would be fine. Dr. Kirsten Leong indicated that in her related work, she and colleagues have been struggling with well-being measures being used as endpoints *versus* ecosystem services being endpoints as it relates to socio-cultural ecosystem service valuation.

Note: Dr. Lew made a presentation during the afternoon of the HD Workshop (W6) on “*Assessing marine ecosystem services: A comparative view across the North Pacific*” (October 19) on the definition and classification of MES in the scientific literature and argued for the inclusion of that content in the Project 1 MES review.

AGENDA ITEMS 5–7

Projects and project-related tasks

Discussion continued about how to complete the two Working Group projects. As noted above, for Project 2 Canada agreed to use the U.S. web survey infrastructure. China will use pieces of the U.S. survey to supplement the work they have done and are doing in China. Thus, China will handle its own implementation of a supplemental survey. Dr. Lew will provide paper versions of the U.S. survey for translation and testing by Canada (and China, to an extent). Canada will be responsible for developing its own video, customizing the survey to the MES and decision-contexts relevant for Canada, translating all materials to facilitate programming by the U.S. contractors, and pretesting the survey before final implementation. Within the next 6 months, Canada agreed to provide a translated version for programming.

The Project 1 (review of MES) basic outline established at PICES-2018, and that continues to be the

working outline for the review, was the following:

1. Introduction
2. What are MES?
3. Assessing MES (quantifying, measuring, and valuing)
4. Case studies
5. Discussion
6. Conclusion

For Project 1, the Section 3 methodology (ecological, economic, and socio-cultural methods) reviews would be general and not geographically constrained to what is done in individual countries (though discussion of this would help provide context). The main focus should be on providing a review of the methods used to assess MES, with particular emphasis on best practices. This need not be a fully exhaustive literature search and review, but rather a review that highlights the main methods and applications. Dr. Lew indicated he would take the lead on Section 2 and incorporate the materials he presented on the definition and classification of ecosystem services presented during the W6 discussion. He is also the lead for the economic assessment portion of Section 3. Dr. Dudas is the lead on the ecological assessment portion, and Dr. Sugimoto and Dr. Leong will coordinate the socio-cultural assessment portion of Section 3.

For Section 4 (case studies), the group discussed several options. Initial discussion was about defining geographic-based (*e.g.*, specific region) case studies *versus* landscape (*e.g.*, ecosystem type) case studies. Dr. Lew pointed the group back to an earlier suggestion about basing the case studies on a specific ecosystem service. The group agreed this was a useful approach and aquaculture was selected as the MES to use in the case studies. The form of the case studies will be mini-literature reviews of the methods used in each PICES member country to assess the ecosystem service. Dr. Dudas suggested we come up with a matrix that can be filled in. Dr. Lew will work with her to develop the matrix and then distribute it to the group.

AGENDA ITEM 8

Proposals of Topic Sessions or workshops at PICES-2020

Working Group members agreed that a topic session at PICES-2020 would be beneficial for advancing the goals of the Working Group. Dr. Dudas (Canada) and Dr. Li (China) volunteered to co-convene the topic session. An outline of the goals and description of the session was developed (see *WG 41 Endnote 3*).

AGENDA ITEM 9

Other business

The Working Group briefly discussed a couple other issues. Concerns about membership were talked about in the context of there being a lack of participation by several member countries (Russia and Korea) and the uneven expertise the group has with respect to certain subject areas, socio-cultural expertise in particular. It was recognized that additional socio-cultural experts would be beneficial, but that trying to get participation by those PICES member countries currently not participating would not be too helpful at this point, given only one year remains in WG 41's term. Additional concerns were expressed about communication problems (*e.g.*, members not participating in helping with projects and not responding to e-mails) that have thwarted progress, and a discussion about how to improve that communication occurred. It was recognized that there could be staffing time, resource constraints, language limitations, and other issues that underlie these issues, so the Working Group will focus on sustaining efforts by the active participating countries and members. Some ideas were put forward as a way for us to communicate

electronically beyond e-mail, *e.g.*, weChat, Zoom, and WebEx? No one was sure what limitations there may be with respect to different platforms (*e.g.*, being prohibited for use by specific governments), so this item needs follow-up.

In addition, the Working Group discussed the possibility of asking for a one-year extension to enable completion of both projects. In particular, there was concern that the Project 2 survey would not be able to be both fielded and then analyzed and reported on before the end of the Working Group's term. The group agreed an extension was needed. Dr. Lew presented the request to the HD committee meeting later in the evening.

AGENDA ITEM 10

Concluding remarks

Dr. Lew thanked the members and attendees for their valuable contributions and indicated he was looking forward to fruitful collaborations on the projects. The meeting then adjourned as per the agenda.

WG 41 Endnote 1

WG 41 participation list

Members

Dan Lew (USA, Co-Chair)
Kirsten Leong (USA)*
Sarah Dudas (Canada)
Gisele Magnusson (Canada)
Jingmei Li (China)
Wei Liu (China)

*Participated remotely

Members unable to attend

China: Shang Chen (Co-Chair), Benrong Peng
Japan: Aoi Sugimoto
Korea: Hye Seon Kim, Changsu Lee, Jungho Nam,
Seung-Hoon Yoo
USA: Kristy Wallmo

Observers

Chanda Littles (USA)
Meng Su (China)

WG 41 Endnote 2

WG 41 meeting agenda

1. Welcome/introductions
2. Adoption of the agenda
3. Review of terms of reference and description of WG projects
4. Status updates and discussion of challenges and progress
5. Discussion of lists of MES and planning Project 1 (Review of MES) case studies
6. Project 1 (Review of MES) – breakout groups (ecological and economic/socio-cultural)
7. Project 2 (MES Survey) – discussion of survey design, testing, and implementation
8. Proposals of Topic Sessions or workshops at PICES-2020
9. Other topics
10. Concluding remarks (next steps, assignments, *etc.*)

WG 41 Endnote 3

**Proposal for a Topic Session on
“Marine Ecosystem Services – Connecting science to decision making” at PICES-2020**

Duration: ½ day

Convenors: Sarah Dudas (Canada), Jingmei Liu (China)

Marine Ecosystem Services provide a conceptual framework to understand and communicate the value our coastal and marine ecosystems have from ecological, economic, and socio-cultural perspectives. All species and habitats provide ecosystem functions and produce ‘services’. This session seeks to bring together natural scientists (ecologists, biologists, oceanographers, *etc.*) studying species and habitats that provide these services with the social scientists (economists, anthropologists, sociologists, *etc.*), policy makers, managers, and others that use the concept of MES to affect decision making. The session will include discussions on ecological, economic, and socio-cultural metrics to identify synergies between them. An objective of this session will be to help bridge the gaps in communication and understanding about ecosystem services between natural and social scientists in PICES nations and to illustrate the range of applications studying marine ecosystem services