Report of the Section on *Human Dimensions of Marine Systems*

The meeting of the Section on *Human Dimensions of Marine Systems* (S-HD) was held 18:00-20:00 on November 6 and 14:00-18:00 on November 9, 2016, in San Diego, USA. Drs. Keith Criddle and Mitsutaku Makino chaired the meeting. Twelve members, representing all six PICES member countries, attended the meeting (***S-HD Endnote 1***). After introductions were made, the meeting agenda was reviewed and accepted without changes (***S-HD Endnote 2***).

S-HD participants at PICES-2016; back row, from left: Keith Criddle, Alan Haynie, Tatiana Semenova, Youngdawng Moh, Jake Rice, Ekaterina Kurilova, not identified, Ron Felthoven; front row, from left: Stephen Kasperski, Mitsutaku Makino, Ian Perry, Shang Chen.

AGENDA ITEM 1
Meeting objectives

Dr. Criddle presented the meeting objectives and an overview/review of the activities of the Section, including:

a. Review the development and evolution of PICES HD expert groups,
b. Review of the S-HD terms of reference and progress update,
c. Other reports,
d. Identify opportunities for S-HD to contribute to FUTURE through collaborations with other PICES expert groups.

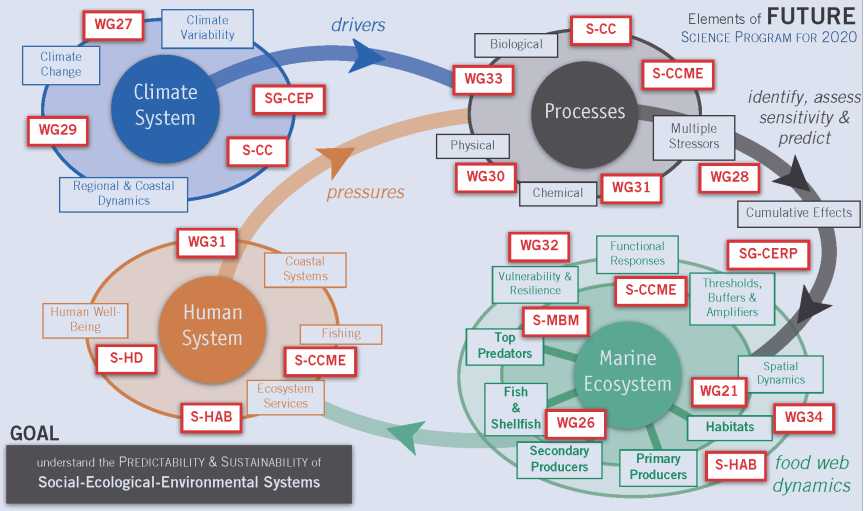
AGENDA ITEM 2

Review of the development and evolution of PICES HD expert groups

The history of PICES expert groups focused on human dimensions of marine systems includes formation of the Study Group on *Human Dimensions* (2009–2011), the Section on *Human Dimensions of Marine Systems* (2011–2017), and the Study Group on *Marine Ecosystem Services* (2016–2017). These expert groups have conducted interdisciplinary research based on a variety of social science disciplines, including, law, economics, sociology, psychology, and anthropology. In addition, members of PICES HD expert groups have actively collaborated with the social scientists in ICES. MSEAS 2016 in Brest, France, and MSEAS-II 2020 in Yokohama, Japan, are key examples of these efforts.

The stated objective for development of these expert groups is:

- To better understand and communicate the societal implications of the conditions and future trends of North Pacific marine ecosystems (FUTURE vision);
- To provide a forum for the integration of FUTURE-related studies using social science approaches and tools; and
- To facilitate the close discussions and communications among researchers from both the natural and social sciences.



FUTURE and Human Dimensions of Marine Social-Ecological Systems

In November 2016, to further the integration of natural and HD science within PICES, Governing Council (GC) approved formation of the HD Committee as a standing committee under direction of the Science Board (SB). The HD Committee's area of responsibility is to promote and coordinate interdisciplinary research that leads to increased understanding of the relationship between North Pacific marine ecosystems and the people, communities, and economies that are part of those systems and rely on the resources and services they provide. Particular emphasis will be given to fostering research on (a) methodological and empirical challenges involved in integrating human dimensions into ecosystem analyses and (b) exploration of development pathways that are sustainable from social, economic, and ecological perspectives. The HD Committee will support the work of other PICES expert groups. Where those groups often consider the impact of human activities on ecosystems, the HD Committee will promote not only consideration of these impacts but also the consideration how biophysical changes impact the wellbeing of people, communities, and economies taking into account their values and characteristics. In addition, the Committee will engage with kindred 'human dimension' initiatives of other organizations (*e.g.*, ICES and IMBER).

HD Committee members (as of April 8, 2017):

Dr. Shang Sunny Chen (China)	Dr. Myeonghwa Jung (Korea)	Dr. Keith R. Criddle Chair (USA)
Dr. Yang Han (China)	Dr. Suk-Jae Kwon (Korea)	Dr. Ron Felthoven USA)
Prof. Jingmei Li (China)	Dr. Oleg N. Katugin (Russia)	Dr. Minling Pan (USA)
Dr. Mitsutaku Makino Vice-Chair (Japan)	Ms. Ekaterina Kurilova (Russia)	
	Ms. Tatiana Semenova (Russia)	

It is anticipated that the HD Committee will incorporate the S-HD terms of reference into a plan of work for the Committee. Specifically, the HD Committee will continue to support FUTURE and NPESR3. As a Standing Committee, the HD Committee Chair is a member of Science Board. The HD Committee will organize a ½-day Contributed Paper Session at future PICES Annual Meetings and will have the opportunity, with approval of Science Board, to parent (oversee) study groups (SG) and working groups (WG).

AGENDA ITEM 3

Review of the S-HD terms of reference, task timetable, and sub-team structure

The five key tasks stipulated in the S-HD terms of reference are:

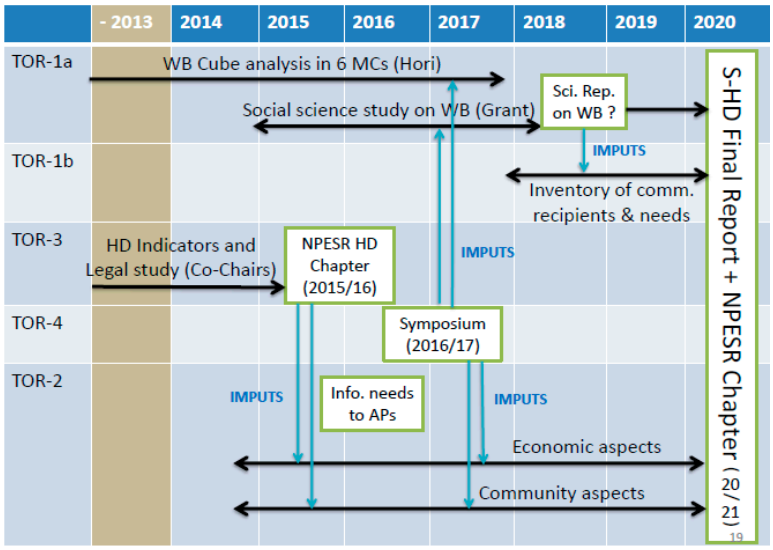
TOR-1a: Clarify differences in societal objectives and needs among stakeholders in different sectors and countries.

TOR-1b: Develop an inventory of potential recipients, and their communication requirements for FUTURE and other PICES products.

TOR-2: Explore the consequences to and responses of marine social-ecological systems to global changes such as CC.

TOR-3: Contribute to NPESR3.

TOR-4: Facilitate academic cooperation with other international research initiatives such as ICES, IMBER, LOICZ, *etc*., and organize a symposium on the study of the human dimensions of marine ecosystems.



Tentative timetable for completion of tasks

Sub-Team structure and membership

The five sub-teams are:

ST-Wellbeing: Human wellbeing in marine social-ecological systems (**TOR 1a**). Juri Hori (Japan), Grant Murray (Canada), EunJung Kang (Korea).

ST-Economy: Economic aspects of the consequences to and responses of human social systems to global changes (**TOR 2**). Minling Pan (USA), Sunny Chen (China), Masahito Hirota (Japan), Xu Wei (China), Ron Felthoven (USA), Keith Criddle (USA).

ST-Community: Community and societal aspects of the consequences to and responses of human social systems to global changes (**TOR 2**). Ron Felthoven (USA), Stephen Kasperski (USA), Ekaterina Kurilova (Russia), Mitsutaku Makino (Japan).

ST-NPESR: Contribute to NPESR-3 (**TOR 3 and TOR 4**). Keith Criddle (USA), Mitsutaku Makino (Japan), Emanuele DiLorenzo (USA), Stephen Kasperski (USA), Ian Perry (Canada).

ST-Communication: Develop an inventory of potential recipients, and their communication requirements for FUTURE and other PICES products (**TOR 1b**). Ekaterina Kurilova (Russia), Naesun Park (Korea), Mitsutaku Makino (Japan).

AGENDA ITEM 4
Progress update ST-Wellbeing

Workplan 2014–2020

Goal 1: Expansion to the wellbeing analysis of PICES member countries
- 2014–17: Brush up of the "interpretations" based on consultations with All

Goal 2: Literature review of wellbeing, including concepts and cases studies in MCs (and elsewhere where applicable)
- 2014–15: Pursue and develop funding
- 2015–16: Hire a post-doc to complete the literature review

Goal 3: Continue case study research in Canada, including First Nations and other contexts. In so doing, develop conceptual/analytical models for possible implementation
- 2014–2020

Goal 4: Contribute findings from both of these to PICES related publications, as well as additional journal articles
- 2016–2020

Accomplishments

Goal 1:

Juri Hori (Japan) reported on psychology-based cross-comparison (among PICES member countries) of aspects of marine ecosystem services that contribute to the structure of human well-being. This study highlights fundamental differences in importance of marine-related social, environmental, and economic factors that affect perceptions of wellbeing. Responses to surveys administered in all six PICES member countries have been completed and analyzed. The results were presented at the MSEAS 2016 Symposium (May 30–June 3, 2016, Brest, France) and have been submitted for journal review.

Goal 2:

Grant Murray (Canada) reported that funding has been obtained from GenomeCanada to support this literature review. A draft of the review is due to be completed in December 2016. (Note: this literature is general, not specific to the PICES member countries)

Goal 3:

Grant Murray (Canada) reported that two case studies were underway:

- Tla-o-qui-aht First Nation (Vancouver Island, BC, Canada) Values related to coho salmon, how that relates to community well-being. Funded by GenomeCanada – 2016–2019)
- Ongoing research with Nuxalk First Nation (Central Coast, BC, Canada). Research related to eulachon, local resource management how that relates to community well-being. Funded by Ocean Canada.

Goal 4:

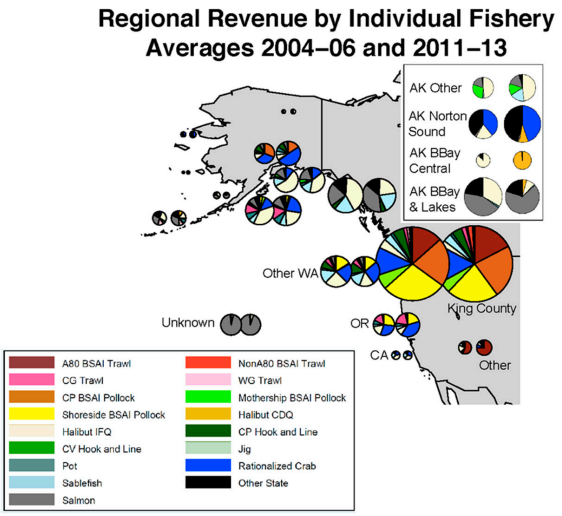
Grant Murray (Canada) reported that articles/reports are in preparation for projects listed under Goals 2 and 3.

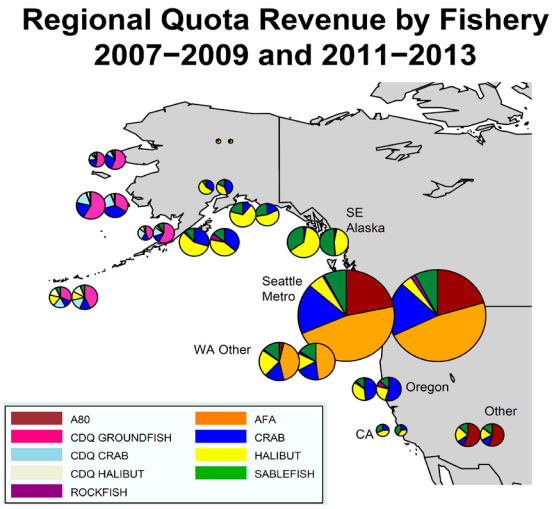
AGENDA ITEM 5

Progress update ST-Economy

Accomplishments

Dr. Ron Felthoven (USA) reported on pilot analyses conducted with Chris Anderson (USA) and Jennifer Meredith (USA) on the "Distribution of Fishing Quota Revenue in the North Pacific by Region and Community Scale". Together, they analyzed the distribution of each fleet's revenue by vessel and quota owner to determine how community location, scale, and the presence of individual fishing quotas IFQs and *American Fisheries Act* Cooperatives affect the distribution of value from fisheries. They conclude that similar analyses could be conducted at an ecosystem scale.



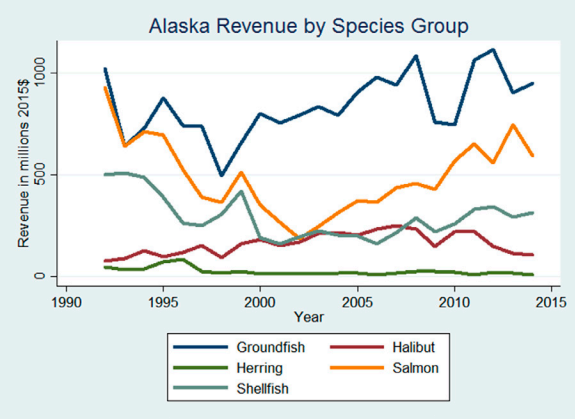


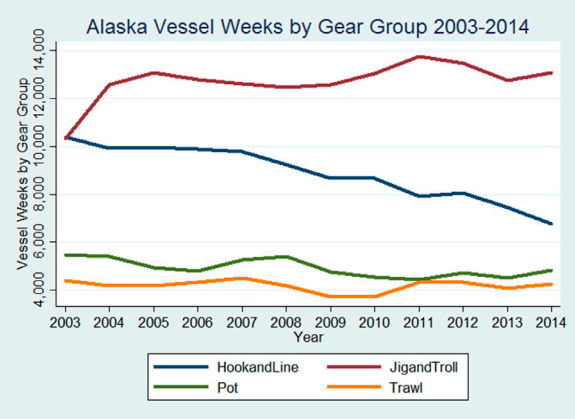
While they find evidence of consolidation in the number of vessels through time, the consolidation does not appear to have led to wholesale shifts in the distribution of revenue across regions. They conclude that contrary to stakeholder sentiment, there is relative stability of distribution of revenues by region and that rationalization is not driving rural regions into shrinking pool of low-value fisheries. They note that revenues are most volatile in King County (Seattle, Washington), the most urban region, where the volatility is largely driven by fluctuations in allowable catches and wholesale prices for pollock. They also find that the smallest communities are becoming more diverse (in terms of fisheries) while medium size communities are becoming less diverse. In addition, they find that implementation of catch shares have not caused vessels to specialize in a smaller number of fisheries. However, they note that there is a trend towards concentration of quota ownership to larger cities and to regions outside Alaska.

AGENDA ITEM 6
ST- Progress update Community

Accomplishments

Drs. Ron Felthoven (USA) and Stephen Kasperski (USA) reported on progress towards refinement of Alaska region PICES Human Dimensions Indicator Data. The Economic and Social Science Research program has developed community profiles that characterize time series observations of indicators of fisheries engagement (commercial, recreation, subsistence) and employment, demographic, and social factors that contribute to the vulnerability and resilience of fisheries dependent communities. In addition to supporting interregional comparisons, these data provide a foundation for intertemporal comparisons. For example, time plots of revenue and participation (below) highlight the collapse and recovery of value in salmon harvests and comparative stability of groundfish revenues. At the same time, there is a steady decline in longline fishing effort and a substantial increase in jig and troll fishing effort. These trends can be examined at regional and community scales for each of the Tier 1 and Tier 2 NPESR3 HD indicators.





AGENDA ITEM 6
Progress update ST-NPESR

Dr. Keith Criddle (USA) reported on the Study Group on *North Pacific Ecosystem Status Report* (SG-NPESR3) inter-sessional workshop in Sidney, BC, Canada, in June 2016 and presented a set of slides describing the preferred biogeographical classification of data and online interface to the data management system. Participants reviewed and evaluated more than 280 data sets nominated by PICES standing committees, Working Group on *Emerging Topics in Marine Pollution* (WG 31), and the Section on *Human Dimensions of Marine Systems*. The workshop summarized the number of ecosystem time series observations (ETSO) submissions by discipline and by the number of localities represented. The analysis permitted recommendations to the NPESR3 editorial board on where relevant additional ETSOs are known to exist, where more ETSOs are required, where there is adequate representation, and where broader geographic coverage is required. The timetable for completion of NPESR3 has slipped by approximately 6–12 months.

NPESR Timetable

Task		2016												2017											
	Who?	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1. ETSO System Development	Data Management Contractor																								
2. ETSO Maintenance	Data Management Contractor																								
3. ETSO Nominations	BIO_FIS_MEQ_POC_TCODE_MONITOR																								
4. ETSO Submissions	Authors																								
5. Interim Workshop on NPESR Time Series	SG-NPESR et al.																								
6. Ed Board Review & Adds Nominations	NPESR Editorial Board																								
7. Establish NPESR Synthesis Expert Group	Governing Council																								
8. Invitations & Confirmations to Authors	NPESR Editorial Board																								
9. Present selections to PICES 2016	SG-NPESR																								
10. Synthesis	NPESR SWG																								
11. North Pacific Synthesis Workshop	NPESR SWG et al.																								
12. Editing	NPESR SWG, NPESR Editorial Board																								
13. Formatting NPESR	Data Management Contractor																								
14. Review and Adoption NPESR	NPESR Editorial Board																								

It is anticipated that synthesis analyses will be disseminated, starting in 2018, through web-based and printed reports (with ISBN) and in special volumes in peer-reviewed science literature.

AGENDA ITEM 8
Progress update ST-Communication

No updates were reported.

AGENDA ITEM 9
Progress update TOR 4

TOR 4—Facilitate academic cooperation with other international research initiatives such as ICES, IMBER, LOICZ, *etc*., and organize a symposium on the study of the human dimensions of marine ecosystems.

Symposia in 2016

- ICES Symposium, MSEAS 2016 on "*Understanding marine socio-ecological systems: including the human dimension in Integrated Ecosystem Assessments*", co-sponsored by PICES, May 30–June 3, 2016, Brest, France.
- The objectives of MSEAS 2016 were to advance understanding of marine social-ecological systems, to foster interdisciplinary discussions and collaborations, to identify challenges ahead and key areas for future research, to support the uptake of human dimensions in integrated assessments, and to further the development and uptake of Ecosystem-Based Management. Over 230 attendees and 125 oral presentations. The PICES region was represented by 20 attendees.
- ICES/PICES_WKeconSICCME Workshop on "Economic modelling of the effects of climate change on fish and fisheries"; Convenors: Alan Haynie (USA), John Pinnegar (UK), Lisa Pfeiffer (USA),

Mitsutaku Makino (Japan), Jörn Schmidt (Germany), Sophie Gourget (France). June 3–4, 2016, Brest, France.

Contributions to PICES Press

- Criddle K. 2016. MSEAS 2016—Understanding marine socio-ecological systems: Including the human dimension in Integrated Ecosystem Assessments. Vol 24(2).

AGENDA ITEM 9
New MAFF Project

Dr. Masahito Hirota (Japan) reported on a proposed new MAFF Project: Building Capacity for Ecosystem Based Management in Small-scale Nearshore Fisheries Impacted by Coastal Zone Development

This project will build capacity for community-scale ecosystem based co-management (EBCM) of fisheries and the coastal zone in small communities of the Pacific region. This project emphasizes facilitation of well-balanced co-management systems that support sustainable fisheries and sustainable development of the coastal zone through application of PICES's scientific expertise. The project will:

a. Support community-scale ecosystem based co-management (EBCM) of fisheries and development in the coastal zone for small communities, through training in resource assessment, sustainable fisheries management practices, and enhancement of Value Chain systems to ensure sustainability and increase resilience, including through local support for measures that increase stewardship if fishery resources including through efforts to improve catch accounting.

b. Continues the EBFM focus of past PICES MAFF projects, and will use those results to jump-start collaboration between PICES scientists, local stakeholders, and responsible parties in the host countries (Vietnam, Indonesia, and Guatemala).

c. Facilitate capacity building program as an outreach of the past two PICES MAFF, and facilitating the database and the manual for community people/local staffs, for good management advice.

AGENDA ITEM 10
Topic session and workshop proposals for PICES-2017 and proposals for inter-sessional meetings

- PICES-2017 Topic Session
  1-day Topic Session on "*Marine ecosystem health and human well-being: a social-ecological systems approach*" (proposed by Mitsutaku Makino; ***S-HD Endnote 3***)

- PICES-2017 workshop
  1-day Workshop on "*Coastal ecosystem services in the North Pacific and analytical tools/methodologies for the assessment*" (proposed by Shang Chen; ***S-HD Endnote 3***)

- Inter-sessional meeting (SG-MES)
  1-day Workshop on "*Taking stock of marine ecosystem services in the North Pacific—exploring examples and examining methods*" (proposed by Shang Chen) Convenors: Shang Chen (China), Daniel K. Lew (USA). In association with the UNSECO/IOC/WESTPAC International Scientific Conference (Qingdao, China, April 2017)

- Inter-sessional meeting proposal
  MSEAS II on "*Understanding marine socio-ecological systems: including the human dimension in integrated ecosystem assessment*", May or June 2020, Yokohama, Japan. Sponsors to include: ICES, PICES, NOAA, CSIRO. Convenors: TBA. Planning Committee: Rich Little (CSIRO, Australia), Olivier Thébaud' (Ifremer, France), Jörn Schmidt (University of Keil, Germany), Mitsutaku Makino (FRA, Japan), Jan Jaap Poos (Wageningen University, the Netherlands), Doug Lipton (NOAA, USA), Keith Criddle (University of Alaska, USA), and Alan Haynie (NOAA, USA)

S-HD Endnote 1

S-HD meeting participants

Members

Shang Sunny Chen (China)
Keith Criddle (USA, Co-Chair)
Emanuele Di Lorenzo (USA)
Ron Felthoven (USA)
Masahito Hirota (Japan)
Myeonghwa Jung (Korea)
Stephen Kasperski (USA)
Ekaterina Kurilova (Russia)
Suk-Jae Kwon (Korea)
Mitsutaku Makino (Japan, Co-Chair)
Ian Perry (Canada)
Tatiana Semenova (Russia)

Members unable to attend

Canada: Grant Murray, Robert Stephenson
China: Feiyan Du, Yangguang Gu, Yue Hao, Ningsheng Yang, Shouying Zeng
Korea: EunJung Kang, Naesun Park, Junam Seo
Russia: Elena Anferova
USA: Minling Pan

Observers

Alan Haynie (USA)
Gro van der Meeren (IMBER)
Youngdawng Moh (Korea)
Jake Rice (Canada)
Chaewon Yoo (Korea)

S-HD Endnote 2

S-HD meeting agenda

1. Introduction and meeting objectives
2. A brief review of the development and evolution of PICES HD expert groups
3. A review of the S-HD TORs, task timetable, and sub-team structure
4. Progress update ST-Wellbeing
5. Progress update ST-Economy:
6. ST- Progress update Community
7. Progress update ST-NPESR
8. Progress update ST-Communication
9. Progress update TOR 4
10. New MAFF Project
11. Topic session and workshop proposals for PICES 2016 and proposals for intersessional meetings

S-HD Endnote 3

Proposal for a 1-day Topic Session on
"*Marine ecosystem health and human well-being: a social-ecological systems approach*"
at PICES-2017

Convenors: Mitsutaku Makino (Japan), Ian Perry (Canada), Mark Wells (USA), Masahito Hirota (Japan)

Ecosystem-based fisheries management seeks to restore, enhance, and protect living resources, their habitats, and ecological relationships to sustain all fisheries and provide for balanced ecosystems. Progress has been made internationally toward adopting ecosystem based fisheries management of marine systems (EBFM), with PICES countries contributing through regional applications in the North Pacific. Examples are the Study Group on Ecosystem-based management science and its application to the North Pacific (SG-EBM: 2003–2004) and the Working Group on *Ecosystem-based Management Science and its Application to the North Pacific* (WG 19: 2004–2009). Recent initiatives have expanded the concept of ecosystem to include human influences, both positive and negative, which is emerging as coupled marine social-ecological studies (Marine SES). An integrated understanding of how ecosystem changes affect human social systems and their well-being, and *vice versa*, are necessary to improve environmental stewardship. The PICES Study Group on *Human Dimensions* (SG-HD: 2009–2011), Section on *Human Dimensions of Marine Systems* (S-HD: 2011–), and PICES-MAFF Project on Marine Ecosystem Health and Human Well-being (MarWeB: 2012–2017) have contributed to ecosystem-based management efforts in the North Pacific. Also, international corporation with other international scientific organizations/programs have been developing, such as MSEAS 2016 which was co-sponsored by PICES, ICES, Ifremer, *etc*. Key questions that structure these scientific activities are: (a) how do marine ecosystems support human well-being and (b) how do human communities support sustainable and productive marine ecosystems? This Topic Session welcomes papers that addresses all aspects of Marine SES, and particularly research that addresses the above two questions.

Proposal for a 1-day Workshop on
"*Coastal ecosystem services in the North Pacific and analytical tools/methodologies for the assessment*"
at PICES-2017

Convenors: Shang (Sunny) Chen (China), Mitsutaku Makino (Japan), Daniel K. Lew (USA), Minling Pan,USA), Sebastian Villasante (Spain/ICES)

Co-sponsor: ICES

Coastal ecosystem services are the benefits people obtain from the coastal ecosystem. These services include seafood, regulation of climate, reduction of storm impacts, waste assimilation, recreation and leisure, and biodiversity maintenance *etc*. The identification, quantification, and valuation of ecosystem services and understanding the impacts of human activities and climate change on ecosystem services are key scientific questions. The ecosystem services-based approach to marine ecosystem management is a new approach meant, in part, to enhance human well-being. The goals of this workshop are: (1) to present research that enhance understanding of the interactions between human activities and ecosystem services; (2) to provide a venue for natural scientists and social scientists to exchange results from research on identification, assessment, management and investment of ecosystem services, and (3) to provide SG-MES members and scientists around the North Pacific a chance to discuss collaboration on scientific projects within the North Pacific Ocean. We believe this workshop will contribute to a greater understanding of the status of human dimensions of the North Pacific ecosystem and fill the gaps to achieve the FUTURE Objectives.