



Ecosystem Approach to Management

Progress Report

2017-2019

May 2019

Ecosystem Approach to management

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Joint Group of Experts on the Ecosystem Approach to Management

May 2019

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Background

PAME established an expert group on the Ecosystem Approach to Management (the EA-EG) in 2007. This was broadened in 2011 to become a PAME-led joint expert group with participation also of other Arctic Council working groups (AMAP, CAFF and SDWG). Norway and USA are co-lead countries for the theme 'Ecosystem Approach to management' (EA) under PAME.

The EA-EG has held 6 workshops and one conference on various aspects of the Ecosystem Approach to management (EA) in the Arctic between 2011 and 2016. Progress reports on the work have been prepared regularly. The group prepared a progress report for the 2015-2017 work plan period, and a report on 'Status of implementation of the Ecosystem Approach to management in the Arctic', by the end of the U.S. chairmanship in spring 2017.

The various reports prepared by the EA-EG as referred to above are available at the PAME webpage under the Ecosystem Approach topic.

We report here on the progress of EA work during the 2017-2019 work plan.

2017-2019 Work Plan

The EA work is part of the PAME Work Plan 2017-2019 under the item AMSP (Arctic Marine Strategic Plan) Goal 2: Conserve and protect ecosystem function and marine biodiversity to enhance resilience and the provision of ecosystem services. The EA work plan is included in Annex 1 and contains four elements:

1. Prepare guidelines addressing EA/EBM implementation in Arctic (marine) ecosystems.
2. Hold the 6th EA workshop.
3. Hold a 2nd International EA Conference.
4. Report on work on Integrated Ecosystem Assessment and the ICES/PICES/PAME WGICA for the central Arctic Ocean.

1) Guidelines for practical implementation of the Ecosystem Approach to management of Arctic marine ecosystems

The Arctic Council Ministers in the Iqaluit Declaration in 2015, and again in the Fairbanks Declaration in May 2017, requested and encouraged the development of practical guidelines for implementing an ecosystem approach to management in the Arctic. The request for EA guidelines was placed as the main item on the 2017-2019 work plan for the EA-EG.

The work to develop guidelines was started at the 6th EA workshop held in January 2018 in Seattle (see next item for more details). The outcome of the workshop was reported to PAME I-2018 in Quebec City in February. At that meeting a more detailed plan of work was agreed as part of the Record of Decisions for developing guidelines for implementing EA to management in the Arctic following the six-element EA framework.

The co-leads prepared a first draft set of guidelines based on the outcome of the 6th EA workshop in Seattle, in consultation with members of the EA-EG. The draft guidelines were presented to PAME II-2018 in Vladivostok in September and were also sent to AMAP, CAFF, and SDWG for their review and consideration.

The draft guidelines were presented at a session (EBM 8) at the Arctic Biodiversity Congress in Rovaniemi, Finland, 12 October. Comments expressed there were generally positive and supportive.

A revised, second draft was prepared based on comments received. This was sent to the Arctic Council working groups (AMAP, CAFF, PAME, and SDWG) in late November asking for comments by 19 December 2018. Comments to this version were received from the Kingdom of Denmark, USA, ICC, AMAP, CAFF, SDWG, and the European Environment Agency. Sweden informed that they supported the guidelines and had no comments. Singapore likewise informed that they had no comments.

A revised, third draft was prepared and submitted to the PAME I-2019 meeting in Malmö, Sweden, 4-8 February 2019. PAME approved the guidelines, subject to final edits and comments received by February 12. A few additional comments were received after the Malmö meeting and they have been incorporated into the draft guidelines.

The 2nd EA Conference will be held from 25-27 June 2019 in Bergen, Norway. Information on registration and abstract submission is available on the Conference site: [here](#)

2) 6th EA workshop, Seattle, 9-11 January 2018

The 6th EA workshop was held at the NOAA Alaska Fisheries Science Center facility in Seattle, 9-11 January 2018. The workshop addressed two related topics:

1. Scope and start work on development of guidelines for Ecosystem Approach to management (EA) in the Arctic.
2. Review status of work on developing and doing Integrated Ecosystem Assessment (IEA) to develop best practices for Arctic IEA.

The workshop was arranged jointly with the International Council of Exploration of the Sea (ICES) as a PAME (Joint EA-EG)/ICES workshop. The report from the workshop is found at the PAME webpage (under the Ecosystem Approach topic) and at ICES as the ICES WKEAMA Report (ICES CM 2018/IEASG:01).

The workshop was prepared by a planning group with members from the EA-EG and ICES, as well as from NOAA through their IEA program. A background document with questions to guide discussions were prepared and circulated in advance of the workshop. A total of 59 persons registered for the workshop, with participants from five countries and several organizations, including indigenous organizations and communities. The program consisted of presentations and discussions in breakout groups and plenary.

The outcome of the workshop was reflected as a set of conclusions under each of the two topics and suggested next steps. They are included in Annex 2. The conclusions and next steps were presented and noted by PAME I-2018. The conclusions and workshop minutes on the guideline issue were used when preparing the 1st draft guidelines which were circulated to the EA-EG. We will consider the other conclusions and suggested next steps in the further EA work.

3) *Second International EA Conference*

PAME I-2018 decided to postpone the 2nd EA conference to 2019, under the Icelandic chairmanship. A draft prospectus for the conference was presented to PAME II-2018. The main topic for the conference will be scale integration, or how we deal with information at different scales, particularly at smaller and local scales, in the framework of EA implementation at the scale of Large Marine Ecosystems (LMEs).

At the 2nd conference we are seeking to elucidate the issue of scale and scale integration in five topics related to the EA implementation framework:

1. Integrated Ecosystem Assessment
2. Ecological Quality Objectives
3. Marine Protected Areas (MPAs) and other special areas
4. National EA implementation by Arctic states
5. The Central Arctic Ocean

A planning group was established in November 2018 to help draw up a program for the conference. The planning group prepared an announcement to invite contributions (both oral presentations and posters). The announcement was circulated to PAME, AMAP, CAFF, and SDWG, and also to ICES and PICES. A venue in Bergen, Norway has been confirmed and the dates have been set (June 25-27). Further information are available [here](#).

4) *Integrated Ecosystem Assessment (IEA) and WGICA for the central Arctic Ocean*

Integrated Ecosystem Assessment (IEA) is a core component of the EA framework (element number 4). The work plan item is to continue emphasis on development of IEAs and to report specifically from the on-going work in the joint (ICES/PICES/PAME) working group for the central Arctic Ocean (WGICA).

IEA was one of the two main topics for the 6th EA workshop in Seattle in January (see earlier section). ICES has established several WGs to carry out IEA of regional seas, such as the Barents Sea (WGIBAR) and the Norwegian Sea (WGINOR) which are Arctic LMEs, and a steering group has been set up to coordinate the IEA work within ICES. The workshop in Seattle was carried out jointly with ICES. We were also fortunate to have strong participation in planning as well at the workshop from the IEA program within NOAA of the USA.

Three main conclusions on the IEA topic were drawn at the workshop (see Annex 2). Basically, there are many different approaches and methods in use, we are still on a steep 'learning-by-

doing' curve, and we must continue to exchange and share experiences and compare across regions.

The ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment for the central Arctic Ocean (WGICA) held its third meeting, hosted by Canada, in St. John's, Newfoundland, 24-26 April 2018. The report from the meeting is available (from the ICES and PAME webpages) and was presented to PAME II-2018 as a document under the Ecosystem Approach agenda point.

WGICA is finalizing an IEA report for the central Arctic Ocean. The title for this report is: Integrated Ecosystem Assessment of the Central Arctic Ocean: Ecosystem Description and Vulnerability Characterization.

The subtitle describes the two main parts of the report. The first is a description of the ecosystem with emphasis on spatial aspects (distributions, migrations, transport with currents) and trophic linkages. It contains information on oceanography, sea ice, plankton, sea ice biota, benthos, and fish. For birds and marine mammals, we describe which species are found, and where, in the central Arctic Ocean, what they are doing there, and which roles habitats in the central Arctic Ocean play for populations. The vulnerability section is a first go at describing characteristics related to vulnerability, as well as addressing spatial and temporal vulnerability to shipping (notably oil spills and disturbances).

An outline of the IEA report was given as annex 3 in the WGICA 2018 report. The aim is to have the first full draft completed by the end of February 2019. The report was listed as a possible deliverable through PAME to the 2019 Ministerial (Annex II of the RoDs from PAME II-2018 in Vladivostok). (Update with information pending outcome of discussions at PAME I-2019).

The working group (WGICA) discussed and recommended a continuation of the work on IEA of the CAO at its last meeting in St. John's, Canada, in April last year. A draft set of Terms of Reference (ToRs) for the next 3 years of work by the joint WGICA was included in the 2018 WGICA report and reported to PAME II-2018. PAME was invited to review the ToRs for the joint WGICA 2019-2021, and to provide any comments and guidance on the ToRs and the work of WGICA. The new ToRs for WGICA is given as Annex 3.

The next meeting of WGICA is scheduled for 8-10 May 2019 in Sapporo, Japan, at the premises of the University of Hokkaido.

Other activities

Outreach and communication

One item that was identified at the 6th EA workshop was a need for more communication with Arctic communities regarding development and implementation of the EA. As a next step it was suggested to have one or more meetings in northern communities to improve communication on important aspects of the EA and IEA, such as use of TLK in IEA, involvement of Indigenous and local communities, and co-management.

The co-leads have made some initial consultations and will continue this with the aim to have some first meeting(s) to start a dialogue on this important topic.

Work plan 2019-2021

The co-leads are preparing a final draft version of a work plan for the EA topic for the next two years. Items on this plan are:

1. Convene the 2nd International Science and Policy Conference on Implementation of the Ecosystem Approach to Management in the Arctic in Bergen, Norway, 25-27 June 2019.
2. Convene a 7th EA workshop in 2020 with a focus on element No. 5 of the EA framework: Value the cultural, social, and economic goods and services produced by the ecosystem.
3. Report on developments in defining or setting ecological quality objectives in the context of EA implementation in national and international processes.
4. Continue emphasis on development of Integrated Ecosystem Assessment (IEA). Continue to report on developments within ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment (WGICA) as well as other ICES activities on IEA, the meetings of scientific experts on fish stocks in the central Arctic Ocean, and any other relevant activities, e.g., in the U.S. NOAA IEA program.

The EA work plan will be discussed at the EA breakout sessions at PAME I-2019. A final draft will be circulated to the other AC working groups for their input before finalization in early 2019. (Update after PAME I-2019).

Large Marine Ecosystems (LMEs) Fact Sheets

The PAME secretariat has prepared a set of LME fact sheets, one for each of the 18 Arctic LMEs following the revised LME map from 2013. The fact sheets provide information on species and ecological features of the Arctic LMEs. They are based largely on material put together as draft LME descriptions used as basis for the AMAP Assessment (2007-2010) of Oil and Gas Activities in the Arctic, the Arctic Marine Shipping Assessment (AMSA 2009), and the AMSA IIC report in 2013 on areas of ecologically (and culturally) heightened significance. Updated versions of the LME descriptions are now being edited and prepared for publication, intended as baseline reference documents in relation to assessments of impacts of climate change and human activities on Arctic marine ecosystems.

The LME fact sheets are found on the PAME webpage under the Ecosystem Approach topic (<https://pame.is/index.php/projects/ecosystem-approach/arctic-large-marine-ecosystems-lme-s>).

Annex 1 - EA Work plan 2017-2019

AMSP Goal 2: *Conserve and protect ecosystem function and marine biodiversity to enhance resilience and the provision of ecosystem services.*

BACKGROUND:

Arctic marine ecosystems are under increasing pressure from multiple stressors including climate change, ocean acidification, long-range pollution, invasive species and increased human activities. These stressors, individual and cumulative, pose a challenge to the health and sustained viability of Arctic marine ecosystems. Stressors often exacerbate one another, leading to amplified cumulative impacts. Adding to that is the complex and trans-boundary nature of those stressors, which means that solutions often will require international and regional co-operation.

Arctic ecosystem services are of local, regional and global importance. Taking an ecosystem approach to management (EA) can enhance the resilience of marine and coastal biodiversity and help to safeguard marine ecosystems and their functions, allowing people to continue to benefit from the services that flow from healthy ecosystems.

Project/activity	Description	Lead(s) and partners
<i>Ecosystem Approach to Management</i>		
Preparation of Guidelines for EA/EBM Implementation in the Arctic <i>Continue to integrate the ecosystem approach into assessments and management recommendations through follow-up to the 2013 EBM marine-related recommendations, taking into account previous work on Large Marine Ecosystems</i>	<p>1) Prepare guidelines addressing EA/EBM implementation in Arctic (marine) ecosystems (per Iqaluit declaration) following the EA Framework elements; adopt LMEs for management, describe Arctic Ecosystems, integrated ecosystem assessments, ecological objectives, and valuation of ecosystem services. EA Framework elements to receive particular attention are ecological objectives and integrated assessments.</p> <p>2) Hold 6th EA workshop in late autumn 2017/spring 2018 scoping guidelines for implementing EA in the Arctic, with a focus on Integrated Ecosystem Assessment.</p>	<p>Norway, USA, Joint EA Expert Group</p> <p>Partners: CAFF, AMAP, SDWG, WWF</p>

<i>(LMEs), and new and ongoing EA activities of cross-cutting nature.</i>	3) Hold 2nd International EA Conference 2018 on Integrated Ecosystem Assessment in the Arctic, Marine Protected Areas in Implementation of EA, and Review status of implementation EA and EA framework elements. Continue to promote common understandings and share knowledge and experiences on EA.	
Integrated Ecosystem Assessment of the Central Arctic Ocean	Continue emphasis on development of Integrated Ecosystem Assessment. Continue to report on developments within ICES1 /PICES2 /PAME Working Group on Integrated Ecosystem Assessment (WGICA) and other ICES activities, and the meetings of scientific experts on fish stocks in the central Arctic Ocean.	cross-cutting initiative in cooperation with ICES/PICES, CAFF, AMAP

Annex 2 - Sixth EA Workshop: Conclusions and next steps

EA guidelines

Keep it simple, flexible and inclusive – The guidelines should be written in clear and plain language and be kept as simple as possible. They should also allow the necessary flexibility for adaptive management practices in relation to different and shifting ecological, social, and cultural conditions. Furthermore, the guidelines should be inclusive to allow a participatory process in the conduct of EA to management.

1st set of guidelines – A first set of guidelines could be developed based on the 6-element EA framework at the scale of LMEs. This set of guidelines should be kept general and in accordance with the agreed definition and principles for EA. The need for scale integration should be addressed as part of the guidelines.

Further development of guidelines – Development of guidelines should proceed with the aim to produce more specific guidelines for elements of the EA framework (e.g. how to set ecological objectives, and how to carry out IEA) including the application of the principles of EA at smaller scale (e.g. local communities). The many specific views and suggestions expressed and reflected in the notes from the workshop will be kept and used for reference in the further work on the EA guidelines.

Human dimension – The human dimension should be recognized and integrated in the EA guidelines to be developed. This is to reflect that we are developing guidelines for management of coupled socio-ecological systems where humans are part of the natural ecosystems, yet exert pressures that to some extent are extrinsic to the system (e.g. climate change, long-range transport of pollutants). Methods should be careful to address for what purposes or for whom IEAs are conducted.

Communication – Communication with Arctic communities and other participants and stakeholders of an EA management system is important to increase awareness and understanding and to achieve support for more resilient and robust implementation. This is related to the principle of inclusiveness and engagement which will be reflected by the guidelines.

Integrated Ecosystem Assessment

Diversity of approach and methods – There is a diversity of approaches and methods used in doing Integrated Ecosystem Assessments (IEAs). This applies among others to the roles indicators and quantitative models play, and the ways they are used. It also applies to risk assessment, management strategy evaluation, and the way human pressures and their effects in the environment are expressed and linked. However, there are also considerable commonalities, such as use of time-series for environmental conditions and biological resources (e.g. fish stocks) to express and analyze changing states in the ecosystems.

Learning by doing – In ICES and other places, we are learning by doing as we carry out IEAs. In ICES, this is done in formal working groups that meet annually to examine status and ongoing changes in regional ecosystems. Arctic council working groups or subgroups (e.g. CBMP-marine) also meet annually to assess biological ecosystem components and consider how to proceed towards full ecosystem assessment on a Pan-Arctic scale. Collectively, we are still on a learning curve as a community of IEA practitioners.

Comparisons across LMEs – We can learn more about similarities and differences in doing IEA through more detailed and in-depth comparisons of approach and methods applied in different LMEs. This should also include comparisons at different scales within and between LMEs. Such evaluations may be a step towards developing guidance on best practices for doing IEAs. Two candidate ecosystems which could be compared are the Barents Sea and the East Bering Sea LMEs, which are assessed by ICES and NOAA, respectively.

Next steps

Draft first set of EA guidelines – The two co-leads of the EA-EG will prepare a first draft set of guidelines for implementation of the EA to management of the marine Arctic, based on the outcome from the workshop and in consultation with members of the EA-EG.

Comparison of IEAs – An activity should be carried out to compare approaches and methods for doing IEAs for selected LMEs, e.g. the Barents Sea and East Bering Sea LMEs. This may require a project and be put on a future work plan for the EA-EG. However, it should be attempted to start the work as a collaboration between the EAEG, ICES, and the NOAA IEA program, with participation also of other interested parties such as OSPAR.

2nd EA conference – According to the work plan for the EA-EG, a second EA conference is scheduled for late 2018. This could preferably be delayed till early 2019. One topic for the conference will be the draft EA guidelines, and outcome of the conference will be used to adjust the draft guidelines with the aim to present them to SAOs and the ministers at the end of the Finnish chairmanship in spring 2019. A second topic for the conference can be IEA with emphasize on comparisons across LMEs and identification of best practices. A third topic may be social-ecological systems and linkages with human dimension.

New IEA working groups – Establishment of new working groups for doing IEA of more Arctic LMEs should be considered, in line with one of the EBM recommendations from Kiruna in 2013. Two candidate LMEs could be the Northern Bering-Chukchi Sea LME and the Beaufort Sea LME. Both LMEs include waters under national jurisdiction of two countries as well as international 'High Seas' waters, and both are arenas for cooperation between Indigenous Peoples organizations with co-management arrangements.

Communication – One or more meetings in northern communities should be arranged to improve communication on important aspects of the EA and IEA, such as use of TLK in IEA, involvement of Indigenous and local communities, and co-management.

Annex 3 – Terms of Reference for ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment for the Central Arctic Ocean (WGICA)

A Joint **ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment of the Central Arctic Ocean (WGICA)**, chaired by John Bengtson (USA), Sei-Ichi Saitoh (Japan), and Hein Rune Skjoldal (Norway) will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2019	8-10 May 2019	Sapporo, Japan	Interim report by 1 September 2019 to IEASG	
Year 2020	To be decided	To be decided	Interim report by 1 September 2020 to IEASG	
Year 2021	To be decided	To be decided	Final report by 31 December 2021 to IEASG	Change of chairs

ToR descriptors

TOR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Review and consider approaches and methodologies for conducting an IEA of the CAO ecosystem.	WGICA has produced a first version IEA report for the CAO. Before producing an updated and extended version, the basic approach and methodologies should again be considered.	2.2, 6.1, 6.5	Year 1	Report outcome in the 2019 interim report.
b	Review and report on ongoing and recent changes and events in the CAO ecosystem associated with changes such as in sea ice, oceanographic circulation, and hydrographic properties.	There is a need to follow developments in the CAO resulting from the predicted further loss of sea ice and other physical changes associated with global climate change.	1.1, 2.2, 6.5	Years 1-3	New information will be reported in interim reports in 2019 and 2020. A more full account will be given as part of a second version IEA report for the CAO in 2021.

c	Continue to examine effects of climate change on the CAO ecosystem by compiling and reviewing information on changes in response to the ongoing 'Great melt', and assess likely consequences to the CAO ecosystem of projected future changes associated with further loss of sea ice and other climate-related changes (i.e. a climate impact assessment).	This activity was started in the first 3-year period, and some information is included in the 2018 IEA report. There is a need to continue and carry out a more detailed assessment of the documented and/or inferred biological and ecological changes associated with the large physical changes that have already taken place (e.g. loss of half the area and ¾ of volume of summer sea ice).	1.1, 1.3, 6.1, 6.5	Years 1-3	Progress will be reported in interim reports in 2019 and 2020. A more full account will be given as part of the new version of the IEA report for the CAO in 2021.
d	Assess the consequences of recent and ongoing climatic and oceanographic changes on transport pathways (physical and biological) and potential effects of contaminants in the CAO ecosystem.	This is a new activity which relates to assessment of pollution in the CAO. Pollution can be expected to be one of the more serious threat to the CAO ecosystem and should be included in an IEA.	2.1, 2.5, 6.1	Years 2, 3	Progress will be reported in interim report in 2020. Aspects of pollution will be included in the new IEA report for the CAO in 2021.
e	Review and report on new studies on fish as well as other biological components of the CAO ecosystem.	The information on many parts of the CAO ecosystem is still limited. New information is expected to come over the next few years as research ice-breakers pay more attention and use scientific echosounders and other observation techniques to record fish and other organisms in the water column and at the seafloor.	5.2, 6.1, 6.5, 6.6	Years 1-3	Progress will be reported in interim reports in 2019 and 2020. A more full account will be given as part of the new version of the IEA report for the CAO in 2021.
f	Continue to identify priority research needs and monitor how identified knowledge gaps (needed to improve IEA and management effectiveness) are being addressed and filled.	A by-product of doing the first version IEA of the CAO is a priority list of research needs. It is necessary to monitor how knowledge gaps are filled that will improve new versions of IEA.	1.3, 2.2, 3.1, 6.1, 6.5	Years 2, 3	Progress will be reported in the interim report in 2020 and outcome reported in 2021.

g	Prepare an Ecosystem Overview for the CAO ecosystem	This will be an addition to the series of Ecosystem Overviews prepared by ICES.	6.5, 6.6	Years 2, 3	Draft version will be reported in the interim report in 2020 and final version reported in 2021.
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Summary of the Work Plan

Year 1	Review IEA methodologies for IEA of the CAO. Review and report new information and changes in the CAO ecosystem.
Year 2	Review and report new information and changes in the CAO ecosystem. Address pathways and effects of contaminants, make an initial list of research needs, and prepare draft Ecosystem Overview.
Year 3	Prepare a second version IEA report for the CAO with information on status and trends, including impacts of climate change, pollution, and other relevant human pressures. Report on research needs and prepare final draft of Ecosystem Overview.



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