



Stakeholder seminar

INTAROS 20. January 2021

*Arranged by Institute of Marine Research Task 6.2/6.8 group.
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Summary

Institute of Marine Research invited all Norwegian marine and maritime-related authorities and directorates for a stakeholder seminar, presenting the outcome of INTAROS Task 6.2 and inviting for comments, requests and an open discussion on the INTAROS results from Task 6.2 and the work in Task 6.8 can be refined and angled to be of relevance and use for these stakeholders. This was done in a seminar with 34 participants from three scientific institutions and seven national authorities, as well as Aarhus University as international guest and partner in INTAROS. List of participations is attached (Appendix 1). The seminar was arranged as a TEAMS meeting, 20. January 2021.

The aim was to use the stakeholder feedback to build on in the work in Task 6.8, for the deliverables 6.10 and 6.14, making them more user-informed and provide results, advices and suggestions requested by the users. The stakeholders were in general interested in the approach, results and conclusions, from INTAROS D 6.03 Deliverable. The discussion made it clear that as users in charge of sectorial human activity management, they valued scientific testing and suggestions for improving on ecosystem. They recommended that the next step could be to look at not only national data sets indicators but also relate those to an Arctic international setting. D 6.03 was based on fisheries impact in the Barents Sea while the Disko Bay case, also presented, included climatic changes. The Environmental Agency suggested that a climatic approach would be useful also for the Barents Sea. For further work in INTAROS Task 6.8, these suggestions will be followed up on.

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Introduction

The ambition is to demonstrate application of iAOS by delivering a suite of products targeted at issues of societal importance for Europe and on global scale. These pilot applications will demonstrate services towards selected, but diverse groups of end-users. WP6 will integrate remote sensing data and *in situ* observations, from a variety of platforms and geographical scales and locations. Incorporation of these data into analysis and modelling systems, including physical and ecological process models, climate models and forecast methods, will provide support for better products to key societal areas.

The established ecosystem models NORWECOM (NORWegian ECOlogical Model) and ATLANTIS (3D ecosystem box model) will be employed to integrate data from the Barents Sea (BS), and partly the Norwegian Sea, originating from a range of in-situ and remote sensing

platforms and geographically different locations. This includes in situ hydrographical and biological and earth observation data. Integrated model output fields will contribute to oceanography and ecological science, stakeholder groups and data integration by models will be included in the roadmap.

The project will demonstrate the use of iAOS based products for managers, in particular those responsible for the management of the environment and living marine resources. The demonstrations will be given in the form of software available through the INTAROS Portal, reports and direct interaction at workshops and one-to-one meetings. The expected impact is to provide a scientific basis for better-informed decisions and better-documented processes for managers and policy-makers on local, regional and pan-arctic scales.

D. 6.3: Q&A, all presentations

- The importance of obtaining detailed biological information for best possible description of environmental and ecological processes and changes was highlighted in discussion of the Disko Bay case.
- In the Barents Sea case, methods, use of data and indicator types were discussed:
- Use of thresholds for setting and assessing indicator values was found of limited value for users in several of the selected indicators. Environmental data and primary production/biomass are very sensitive to time and place, as well as highly fluctuating between years and seasons, making threshold setting difficult and inaccurate. Time trends are found more robust and easier to interpret for separate and congregated indicators over time.
- Indicator development: Complex indicators are in the process to be operationalized. In this process, modeling scenarios with the suggested and newly accepted indicators would be useful and valuable.
- The Task 6.2 analyses chose water temperature deeper than 50m. Primary production is in shallow waters. The sea temperature in the 0-50m range would be more relevant to analyze.
- If available for the modelers, social indicators could make the models more informative on social impact and consequences for human users, than the present models. The Norwegian approach to holistic marine ecosystem-based management has not included such data and indicators.

Comments and requests from the single users:

Norwegian Environment Agency (NEA)

Comments noted at the workshop:

- Are we sure the data sources use are always the best sources? DE wants to have the data sources and data quality properly presented.
- ED wants in particular more effort and focus on combined data. It was pointed out that the present status reports on the ocean ecosystem mainly are based on single data series, stocks, pollution etc.. This is not fully holistic in an integrated way. However, the new concept of the Expert-Panel System (Siwertson et al. 2019), still in development, were expected to improve the holistic approach in the near future. To reach that goal, it will still be important to keep monitoring the simple indicators that actually used, are central for understanding the main drivers of the ecosystem processes.

Requests:

- Find ways to get the results from INTAROS included in the future merging of established, planned and developing indicators
- Seek to find ways to build on the INTATOS deliverables and outcome, also after the termination of the projects. The Norwegian management plan scientific and advisory committees would like to reap benefits from the project achievements in the future.
- The Deliverable D6.3 models and conclusion is focused on climate and fisheries impact. Could further model analyses include indicators that may be guidelines also other human impacts? Is it possible to look at common impacts of more than one activity at the time?
- The Arctic Council has for years worked in this field of issues, as in CAFF. A comparison of this work to the sections integrated in INTAROS would be useful to look for synergy and shared information. That would be of value in further analyzes on climatic changes and impact over time.
- NEA and others have requested ecosystem modelling for a long time. In INTAROS, where only the 4.5°C are used, the 2.6 °C would be of interest to see as well, to better understand the expected gains from strong mitigation initiatives versus milder actions.
- The use of models may find some indicators being less valuable than others, but also that some data, looked upon as of less importance today, may turn about to be very valuable later on if the ecosystem or climate changes are getting severe.

Attached is a written statement from NEA on their experience and responses after the workshop (Appendix 6)

Directorate of Fisheries

Comments noted at the workshop:

- Models are already used and important tools for assessing fish stocks. A range of models with specific strength towards ecosystem analyzes will in time build up better ecosystem knowledge and the INTAROS presentation were examples for that.
- Thresholds are decided for a range of commercially exploited species, and thus useful for fisheries indicators.

Requests:

- More insights in collaboration between sectors would be useful
- More work by modelers to show usefulness for manager would be welcome.
- INTAROS Task 6.8 should look not only at national management tools and but also include international indicators, used by international organization like OSPAR. Can OSPAR indicators be analyzed in models and compared to the established Norwegian indicators? When changes are suggested to move from the national indicators to international indicator sets like EFMD and OPSAR, will such changes be beneficial or not? How is the scientific monitoring and management set up to meet such changes? It would be inefficient and costly if Norway should report by two sets of ecosystem indicators, with overlapping intensions.
- The National Surveillance Group, reporting on the state of Norwegian open seas, are to be informed about the OSPAR indicators and the coming Quality State Report 2023.
- Norway will deliver mostly third-state-party assessments, based on the work by the ICES ecosystem working groups and the Norwegian ecosystem state reports. Comparisons on OSPAR and same-topic Norwegian indicators, could be compared. If the Norwegian

approach is providing more accurate and informative information, that would be a strong message back to OSPAR for further considerations if new common indicators.

Norwegian Mapping Authority (by correspondence):

Requests:

Making data and information easily available for managers, at the same time as the results from INTAROS analyzes should be stored in ways to make them accessible for open sharing, references and re-use later.

- Suggests that data, models and other products of the INTAROS tasks are made available and kept according to the FAIR principles.
- Recommend that all data sets, models and products coming from INTAROS work and analyzes and relating to Norwegian Economic Exclusive Zone, are registered at the Norwegian Marine Data Centre (NMDC) and/or Geonorge for easy access. INTAROS and NMDC is connected as partners, and the process for data registrations and use is already in place.

Replies:

- INTAROS can confirm the FAIR principles are already in place while the same principles are now being integrated in all national and international public data- and information collections in Norway, to provide users easy access to quality-checked data and services.
- INTAROS and NMDC is connected as partners, and the process for data registrations and use is already in place.

The Norwegian Coastal Administration

Requests:

- How to connect this fisheries-based analyses to other human activities? It is and will be a growing conflict of area use conflicts between sectors, also including shipping.
- With increased shipping, it will be an increase in pollution risks and actual pollution. Pollution issues would be considered for future model analyzes-
- In general, models could provide more knowledge and more knowledge should reduce the risk for cross-sectorial conflicts and unresolved questions.

Norwegian Maritime Authority

Comment:

Norwegian Maritime Authority offer to share information about shipping traffic and registered environmental impact factors for further models and analyses, including shipping activity.

Norwegian Radiation and Nuclear Safety Authority

Comments:

- Will including environmental polluting components be considered for inclusion in the ecosystem models. There are 40 different components listed as pollution indicators in the marine management plan. Is pollution actually included in INTAROS, anywhere?
- Important to work towards aggregated indicator analyzes, like in the Baltic Sea, OSPAR and other international activities.

Reply: INTAROS do look at littering and social activities for monitoring this. AT IMR, several projects, published, running and planned, study pollution impacts. This is an important field.

Plenary discussion

The plenary discussion was free for all. It picked up on several of the issues already given by users and scientists in the previous part of the seminar. After one hour, a short break was given while the highlights from the discussion was sorted and grouped, for a final run-through in plenary.

Three topics turned out to be of special interest for the participants.

Access to and use of data

- The INTAROS data catalogue is probably not easy to access from outside. However, it will inform about the data providers and allow users to find out who would be the best source and contact person to turn to directly.
- This will clearly be the case after INTAROS finish by the end of 2021. The scientists involved in INTAROS and WP 5 the data catalogue, the involved scientists who provided data sets and build the data catalogue will still be available for contact.
- The data sets will be kept and the catalogue available on net, although it is not certain it will be maintained and updated.
- Of particular interest for Norwegian and Danish users, Norway and Denmark will continue the collaboration also after INTAROS finish, with continuous use of updated data sets.
- Request from the Norwegian Areal Tool programme. Any data on time and space should be made convertible to this programme and included for this mapping service, which is made for and in increasingly degree being used by the managers for considering, preparing and put out regulations and jurisdictions for marine areal and resource exploitation. be even
- The wish for including social economic indicators for analyzing impact and consequences of state and trends in the marine ecosystems were mentioned but was by the member of this seminar found to be better suited for followed up on outside Tasks 6.2 and 6.8. This reflects the Norwegian management models, whit common management plans for the open sea, but with no jurisdiction to steer the directorates and sector authorities. Each one has the unique rights to make and sustain regulations and laws made within the leading ministry and authority for their sector activity, as well as the social economic statistics and analyzes.

Choices of indicator types and sets

- Before the final set of recommendations and advices will be given by INTAROS, a wider set of indicators should be looked at and preferably analyzed in similar analyzes as the Norwegian indicators already published in INTAROS deliverable D 6.3.
- Going on to look at the wider sets of indicators internationally, look for what each method presents as missing or weak information.
- Keep on close dialogue with the Norwegian Surveillance Group, also keeping track of international indicator development and the project developing the Science Panel Method for Ecosystem State Assessments, to be included in the Norwegian management plans when made operational. Model analyzes, as shown in D 6.3 show how useful ecosystem models are for providing important tests and analyses to indicator set development and quality tests. However, the Surveillance Group will decide what indicators and indicator sets will finally be proposed for inclusion the management plans.
- The classification of indicators based on reference base lines should be further investigated in relationship to both causes and consequences. This is a difficult topic but very important line of progress to improve on the reliability of such indicators.

- Develop the model runs for time series to capture more than the limited number of indicators and variables used so far.
- Make sure to put the INTAROS indicator tests and analyses in a wider context, relating the final conclusions and advices to present indicator systems.
- Keep in mind the user request to make sure INTAROS adds to and seek to improve on the use of indicators and will not suggest new and even more complicated indicator systems.

Data sufficiency and uncertainty within available data material

- While the in D 6.3 was shown that data selected for certain area or seasons may deliver general information for a wider space and time, it is important to keep in mind that may not be the case for all kind of data. It will be important to carefully test and evaluate each indicator and data set before deciding to eventually limit the time and coverage of monitoring.
- Another precaution for limiting the monitoring to restricted times and areas is the possibility that that would limit the possibility to observe trends in drifts and distribution ranges.
- The example of modeling mackerel stock and distribution t was used to show how still limitation are present to provide a reliable explanation and scenarios, because of the need for even better understanding and knowledge of ecology, physiology, life history traits and environmental impacts.
- Testing models to historic data and trends will continue for a long time still, for verification of the reliability of the model outcomes. They are to be used as tools, but in many cases the ecosystem models are useful as scenario builders but not as sole input to management regulations.
- In data that show large variation in time and space, a limited area and time for observation data should be avoided if the data needed by the managers are better met with more and widespread data to be sure they cover the actual information needed by the user.
- New monitoring attempts should lead to economic and scientific improvements.
- One strength with models is the abilities to add to observations to fill in gaps in time and space.
- When put together with observation data, models will provide better holistic information and knowledge.
- It is important to keep critical view to the model parameters and results, to avoid being led in to a model bubble out of relevance for the actual ecosystem
- Well used and considered models will be valuable for making good decision for sustainable management.

Further work based on ideas for Tasks 6,8, coming out of the seminar

Ecosystem modeling:

- Running comparative tests, by analyzing among others, Joint Norwegian/Russian Environmental Commission, OSPAR, Arctic Council indicators alongside with Norwegian-developed indicators.
- Running scenarios for different range of warming scenarios
- Consider if social indicators could be included in the models, as this would be of general interest outside the Norwegian EEZ and could be useful when considering the final, common advice to be given by INTAROS (to be decided)

Concluding remarks

The seminar provided the INTAROS team both a positive inspiration, support for the approach taken in Task 6.2 and ideas for Task 6.8 as well as provide valuable material to deliverable D. 6.10.

The inputs will also be kept and with the messages from the stakeholders in mind, new compilations for new model products will be run and the outcomes will be the basis for recommendations for use of indicators in arctic regions, based on iAOS data and local information (D 6.13).

This seminar highlighted the importance to invite stakeholders responsible for all sectors of marine-related human activities to dialogues with research and monitoring of the climate, natural resources and ecosystems. In a fast-changing scientific world, with new knowledge, increasing amount of data and research, it will be important to be informed and up front to recognize and deliver the best possible information to allow for long-term sustainable use of marine resources.

APPENDIX 1 Participants INTAROS stakeholder 20. january 2021		Participators background		
Name	Affiliation	INTAROS	Stakeholders	Scientists
Hansen, Cecilie	Institute of Marine Research	X		X
Skogen, Morten D	Institute of Marine Research	X		X
Loeng, Harald	Institute of Marine Research	X		X
'Geir Ottersen'	Institute of Marine Research	X		X
Meeren, Gro van der	Institute of Marine Research	X		X
Arneberg, Per	Institute of Marine Research			X
Frie, Anne Kirstine	Institute of Marine Research			X
Margaret McBride	Institute of Marine Research			X
Skern-Mauritzen, Mette	Institute of Marine Research			X
Jelmert, Anders	Institute of Marine Research			X
Marie Maar	Aarhus University, Denmark	X		X
Hanne Johnsen	Norwegian Polar Institute		X	X
Jensen Andre Frantzen	Norwegian Polar Institute		X	X
Ida Kristin Danielsen	Norwegian Polar Institute		X	X
Cecilie von Quillfeldt	Norwegian Polar Institute		X	X
Norman Whitaker Green	Norwegian Institute of Water Research			X
Jensen Henning	Geological Survey of Norway			X
Terje Thorsnes	Geological Survey of Norway		X	
Anne Kjos Veim	Directorate of Fisheries		(X)	
Gunnstein Bakke	Directorate of Fisheries		X	
Thorbjørn Thorvik	Directorate of Fisheries		X	
Modulf Overvik	Directorate of Fisheries		X	
Øystein Leiknes	Norwegian Environment Agency		X	
Ingunn Lindeman	Norwegian Environment Agency		X	
Kristine Orset Stene	Norwegian Environment Agency		X	
Liv Tone Robertsen	Norwegian Environment Agency		X	
Cecilie Østby	Norwegian Environment Agency		X	
Eirin Sva Stomperudhaugen	Norwegian Environment Agency		X	
Hanne-Grete Nilsen	Norwegian Environment Agency		X	
Marianne Kroglund	Norwegian Environment Agency		X	
Fjærbu, Rolf Jørn	The Norwegian Coastal Administration		X	
Ove Tautra	Norwegian Maritime Authority		X	
Hilde Kristin Skjerdal	Norwegian Radiation and Nuclear Safety Authority		X	
Jarandsen Bente	Norwegian Petroleum Directorate		X	
Gerhard Heggebø	Norwegian Mapping Authority		by correspondence	

APPENDIX 2 Agenda

Kl. 12:30 Welcome *Gro I. van der Meeren, IMR, Appendix 2*

Kl 12:35 Introduction to INTAROS, purpose and aims *Geir Ottersen, IMR*

Kl 12:40 Introduction to Tasks 6.2 and 6.8 (D 6.3, delivered May 2020), purpose and aims 6.2 og 6.8 by IMR *Gro I. van der Meeren, IMR*

Kl 12:50: Presentation of Tasks 6.2 and 6.8 by Danish partners *Marie Maar, AU, Appendix 3*

Kl. 13:10: Presentations of Norwegian use of methods, results and conclusions from analysing selected management indicators established or suggested to be established for the Barents Sea (Data available at NMDC, WP5):

KL 13:10: NORWECOM: Analysing environmental, primary production and fisheries stock data. *Morten Skogen, IMR, Appendix 4*

Kl 13:20: NoBa ATLANTIS: Analysing complex indicators for the ecosystem, using historic and modeled scenarios from 1990 to 2060. *Cecilie Hansen, IMR, Appendix 5*

Kl. 13:40-14:15: Inputs from the management bodies, what are their main duties and how relevant do they find the INTAROS analyses and conclusions.

Kl 13:40: Norwegian Environment Agency

Kl 13:50: Directory of Fisheries

Kl 13:55: Norwegian Mapping Authority (by correspondence)

Kl 14:00: Norwegian Coastal Administration/Norwegian Maritime Authority

Kl 14:10: Directorate of Radiation and Nuclear Safety Authority

Kl 14:25-15:14: Plenary discussion, Q&A

Kl 15:30-15:45: Summary

Introduction and presentations of Task 6.2 results and recommendations is available as appendix 2 to 5, as separate files.

APPENDIX 3-6 Presentations

See separate attachments:

Appendix 3 Welcome and introduction

Appendix 4 The Greenland and Disko Bay case presentation

Appendix 5 The Barents Sea/Norwecom single indicators cases

Appendix 6 The Barents Sea/NoBa Atlantis complex indicator cases

Appendix 7 Authorities feedback

7.1 The Norwegian Directorate of Fisheries

Initially, the Directorate of Fisheries participants found the INTAROS project interesting to learn about. In particular the presentation of the Greenland Disko Bay case was appreciated. That made the point clear that INTAROS could provide the basis for improved monitoring and building knowledge also in this still data-poor region.

Further, the suggestion rised at this seminar, that in the future models and systematic monitoring together would make for å better holistic information, where models fill in gaps in field-based knowledge. We expect this is still a marine science topic, but this approach may in time be found of use and relevance also for the fisheries management. However, we consider more time is needed before this will actual be achievable.

Finally, the point made for model testing indicators candidates and actual indicators is an important point. It was reassuring to see that the results from Task 6.2, for the selected indicators tested for the Barents Sea, show that the original set of indicators decided on are working as intended and were not far off. Regarding to the range of indicator sets, being mentioned in the discussion, like OSPAR indicators for their Quality State Reports and the Barents Sea ecosystem state reports, show the need for carefully considering how to implement indicators. In order to achieve clarity and to avoid unnecessary work two (or more) different sets of indicators should not apply to the same ecosystem This approach should be an important guideline for all work on indicators both nationally and in international organisations.

7.2 The Norwegian Environment Agency

The Norwegian Environment Agency (NEA) is of the opinion that INTAROS is a good project for pulling together data from various sources. As of now, there are many different data providers in the Arctic, and they are often not collaborating to merge the data and make them available. When working with integrated ecosystem-based management plans, it is important to have a holistic approach, and the contribution from INTAROS is in therefore important. The interface between research, management and policy making can be the most challenging part of ecosystem-based management, but important to address.

The presentations at the meeting were very interesting and provided input to important questions: What is an indicator and what can we use it for? Do we have the sufficient indicators? It was interesting to hear that modelling indicates that the chosen set of indicators used for the management plans are sufficient for the modelling.

An important part of the scientific base for the management plans is the state description of the marine environment. State and development is often described per indicator, and conclusions on the state of the ecosystem are often absent or vague. There are some composite indicators being developed through the classification system for ecological status that will improve this.

NEA posed some questions to the further work of the project:

How will the work done in the project align with the activities of the surveillance group and the group developing the classification system for ecological status of the Norwegian seas?

Is this project providing input to the evaluation of the indicator sets used for reporting environmental status through the surveillance group?

Have the INTAROS consortium discussed future use of the knowledge and tools that are being developed through the project?

How can the models be used to provide input and advise for management of other activities (than fishing)? Other data sets/sources (e.g. pollution) can be of relevance for those models. Could it be relevant for INTAROS to assess other data sources?

Is there any connection or collaboration between INTAROS and other projects that focus on cumulative effects, like BarentsRISK?

Are there any similarities when comparing the Greenland Ecosystem Monitoring with the ecological state-project?

Two of the working groups under the Arctic Council, AMAP and CAFF, are planning a joint project of climate change and ecosystem effects in the Arctic. The lessons learned from the INTAROS-project would be valuable input to this project, for example the results from the Greenland study.

We were asked if we are ready to embrace modelling as a part of the management. NEA and others have requested ecosystem modelling for a long time. Modelling different emission scenarios will also be a part of the above mentioned AMAP/CAFF-project. NEA have also been requested by the Ministry of Climate and Environment to initiate a project that will assess climate risk for Norwegian sea areas under various emission scenarios.

NEA would also like to stress that time series are of increasing value with increasing length in time. Therefore, it's important to carefully evaluate any suggestions to terminate existing monitoring. Even if evaluation should show some parts of the monitoring to be of less importance, we often do not know what would be of importance in the future.

Background literature

Hansen, C., van der Meeren, G., Loeng, H. and Skogen, M.D., resubmitted, Assessing the state of the Barents Sea using indicators. How, when and where? ICES journal of marine science jan. 2021

Hansen, C., van der Meeren, G., Loeng, H. and Skogen, M.D., INTAROS: INTEGRATED ARCTIC OBSERVATION SYSTEM (INTAROS) Barentshavet analysert med økosystem-modeller basert på observerte indikatorer; benyttes de beste indikatorene og er omfanget av datainnhenting optimalt? Note (in Norwegian) to be discussed by Norwegian stakeholders 2021 at seminar January 2021. Bergen/Austevoll 3. november 2020

Larsen J., Maar M., Mohn C., Pastor A., 2020. A versatile marine modelling tool applied to arctic, temperate and tropical waters. PLOS ONE 15(4): e0231193.

<https://doi.org/10.1371/journal.pone.0231193>.

Meld. St. 20 (2014–2015) Update of the integrated management plan for the Barents Sea–Lofoten area including an update of the delimitation of the marginal ice zone — Meld. St. 20 (2014–2015) Report to the Storting (white paper). Royal Ministry of Climate and Environment 2015.

<https://www.regjeringen.no/en/dokumenter/meld.-st.-20-20142015/id2408321/>

Siwertson, A, Arneberg, P., 2019. Pilottest av Fagpanelprotokollen for vurdering av god økologisk tilstand – arktisk del av Barentshavet (Pilottest of the expert panel protocol for assessing good ecosystem state – Arctic region of the Barents Sea, in Norwegian)

Skagseth, Ø., Furevik, T., Loeng, H., Ingvaldsen, R., van der Meeren, GI, Maar, M, Hansen, C, Friis Møller, E, Larsen, J, Loeng, H, Skogen M 2020. Extension of ecosystem management systems: Use existing environmental and fisheries reporting and management systems of the Barents Sea and off Greenland to demonstrate how data from an iAOS may allow for implementing similar procedures in other parts of the Arctic. Deliverable 6.3 INTAROS, May 2020, 47 pp.

Links to participating institutes, agencies and directorates

Institute of Marine Research
Aarhus University, Denmark
Norwegian Polar Institute
Norwegian Institute of Water Research
Geological Survey of Norway
Directorate of Fisheries
Norwegian Environment Agency
The Norwegian Coastal Administration
Norwegian Maritime Authority
Norwegian Radiation and Nuclear Safety Authority
Norwegian Petroleum Directorate
Norwegian Mapping Authority