Norway request on identification of ecological special/valued areas in the Barents Sea

Advice summary

1. ICES advises a data-driven, expert-informed conceptual framework for mapping ecological and biological value and the subsequent identification of special/valued areas in the Barents Sea. The framework, which uses the EBSA criteria, is fully described in the report of the Workshop on ecological valuing of areas of the Barents Sea (see WKBAR; ICES, 2019).

2. ICES advises that a database of framework derived layers and maps (including associated metadata and confidence levels), conforming to international best practice, be established and maintained.

3. For the framework outputs to be used in decision-making, ICES advises that scientifically robust and transparent methods are applied; with expert decisions fully recorded and documented.

Request

ICES is requested by the Joint Norwegian-Russian Commission on Environmental protection (Norwegian-Russian Working Group on the Marine Environment) to provide advice on the joint identification and aggregation of data on environmental values in coastal and offshore areas in Norwegian and Russian part of the Barents Sea.

Elaboration on the advice

ICES recognises that a sea area can be considered special/valued with respect to its ecosystem structure and function. ICES advises, therefore, that the conceptual framework devised by WKBAR be used for the identification of these areas (see Figure 1). This will deliver:

- An ecological- and biological-value map showing special/valued areas in the Barents Sea; the associated description of each area, the contributing derived base feature layers, and ecological dimension maps will be included.
- A full overlap map of all derived feature layers in the Barents Sea, and associated descriptive metadata.
- A series of maps showcasing the contribution of the derived base features to the four ecological dimensions: foodweb, habitat, biodiversity, and productivity (see Annex 1).

ICES advises that the derived base feature layers (i.e. maps) need to be accessible through a web-based and GIS-capable portal, in addition to accompanying metadata and the uncertainty associated with each layer.

ICES proposes a stepwise conceptual framework to produce the above products. The ecologically and/or biologically significant areas (EBSA) criteria[1], adopted by the Convention on Biological Diversity (CBD), are suitable for identifying special/valued areas in the Barents Sea. First, disaggregated spatial data layers are selected that represent the relevant ecosystem components and ecosystem functions given the EBSA criteria. Second, the core distribution areas of the selected relevant ecosystem components and ecosystem functions are delineated based on available data and expert knowledge to produce a series of disaggregated spatial data layers are produced. These disaggregated spatial data layers are then combined to produce the base feature layers. This is followed by an expert elicitation process to delineate the overall special/valued areas. Component layers are also classified by specific ecological dimensions, allowing the generation of maps representing foodweb, habitat, biodiversity, and productivity in the Barents Sea.

ICES recognises that valuable areas cannot be intrinsically compared to, or substituted by one other. An area containing a single unique feature (e.g. a threatened species) is not intrinsically more, or less, valuable than another that contains multiple similar features (e.g. high biomasses of multiple key species like copepods, cod, and capelin), or that combines

[1] The EBSA criteria are: (i) Uniqueness or rarity; (ii) Special importance for life history of species; (iii) Importance for threatened, endangered, or declining species and/or habitats; (iv) Vulnerability, fragility, sensitivity, slow recovery; (v) Biological productivity; (vi) Biological diversity; and (vii) Naturalness.

structurally different features (e.g. coral reefs, nursery areas, and core primary production locations). These areas are important because they contribute significantly to one or more of the features selected on basis of the EBSA criteria.

ICES also recognises that transparent and scientifically robust expert input is a key requirement of the framework. This input, based on knowledge of the Barents Sea ecosystem and data availability, is required for the following steps:

1. The identification, selection, and augmentation with expert knowledge, of the information required to prepare the disaggregated spatial data layers of the relevant ecosystem components and ecosystem functions used in the framework.
2. The integration and interpretation of the derived base feature layers and ecological dimension maps for the preparation of an ecological and biological value map, and the subsequent identification and delineation of special/valued areas.

The ICES Working Group on the Integrated Assessments of the Barents Sea (WGIBAR), which already brings together Norwegian and Russian scientific experts on an annual basis, can provide the independent scientific platform for such expert input. Other *ad hoc* groups and/or dedicated workshops can also be used to further operationalize the framework and subsequent management tools.

Suggestions

The conceptual framework can be applied within the broader scope of integrated ecosystem assessments, where the identification and delineation of special/valued areas is a core component in the implementation of ecosystem-based management of the Barents Sea.

Additional disaggregated spatial data layers, such as human activities, can be included; the EBSA criteria of vulnerability and naturalness are relevant for assessing sensitivity to human activities and can, therefore, be facilitated within the framework.

Assessing vulnerability, in the context of climate change, will be particularly important for the Barents Sea given the accelerated rate of change.

The conceptual framework is generic and can be applied in other regions outside of the Barents Sea.

The framework, which uses the EBSA criteria, is fully described in the Report of the Workshop on ecological valuing of areas of the Barents Sea (WKBAR; ICES, 2019).

Basis of the advice

The basis of the advice is the WKBAR report (ICES, 2019), the review of the OCEAN-1 project report (also known as HAV-1) (Aune *et al.*, 2017), and the report of ICES Working Group on the Integrated Assessment of the Barents Sea (WGIBAR; ICES, 2018).

Background

The ICES Workshop on ecological valuing of areas of the Barents Sea (WKBAR) was tasked with the following:

- developing a common framework based on the environmental value of seabirds, fish, benthic organisms/habitats, and marine mammals;
- considering ways of reporting on a seasonal or monthly frequency, while ensuring coverage of the CBD EBSA criterion related to "*Special importance for life history stages of species*";
- using worked examples to identify potential data flows and data management best practices;
- developing guidance to ensure that data products can be disseminated as web-based maps for decision-makers in Norway and Russia, as well as for any other parties concerned.

Previous work carried out in Norway and Russia summarized in the OCEAN-1 report and the WGIBAR report (ICES, 2018) was reviewed by the Ecological Valuing of Barents Sea Review Group (RGBAR) prior to the WKBAR in 2019, and used as a starting point. RGBAR has also been tasked by ICES to chair WKBAR and to prepare initial draft documents for the workshop.

Results

A brief summary of the main aspects of the framework is provided here, but the reader is directed to the WKBAR report (see WKBAR; ICES, 2019) for a detailed description of the conceptual framework.

Ecological value is a concept that must be understood in a relative sense. If some areas are identified as being of value for some species, and thereby important for ecosystem functioning, this does not mean that other areas are of low value. It simply means that the identified areas require special management attention, while remaining areas must not be neglected.

While consideration of the benefits for humans is relevant from a policy- and decision-making perspective, the focus of the request, and subsequently this advice, is on the assessment of an area's ecological value without considering its vulnerability or sensitivity to human activities.

The identification and delineation of special/valued areas from an ecosystem structure and functionality perspective requires a broad evaluation of biological and ecological components and processes. This needs to be done by identifying the relevant features, both in terms of structure and function. By starting from a list of components and associated features, rather than simply classifying available layers, the organization of existing information as well as the detection of potential gaps and/or uneven coverage in that information is made possible.

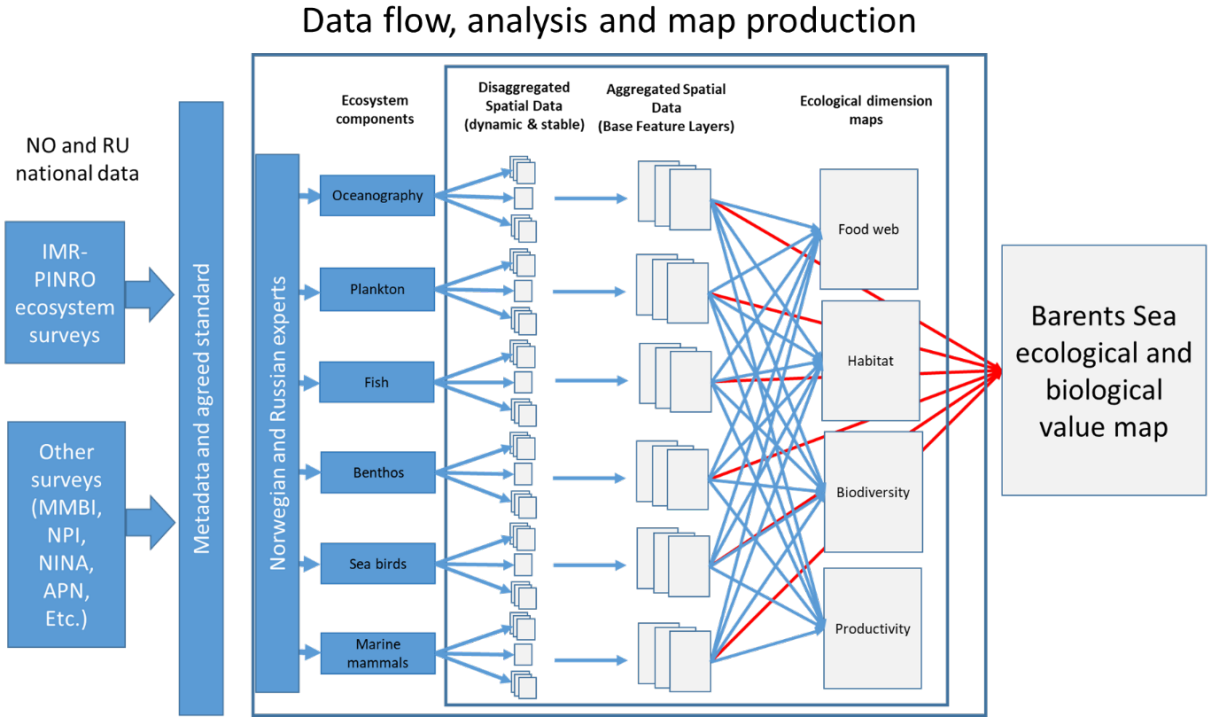

Figure 1 Diagram of the conceptual framework with ecosystem components and associated features that represent the structure and functioning of the ecosystem, and data flow to aggregate data into the base feature layers used to produce a map of special/valued areas in the Barents Sea. Note that the base feature layers can be based on observational data (data layer) as well as on scientific knowledge (knowledge layer).

Figure 1 provides a diagram of the conceptual framework and the associated flow of data/information. Candidate disaggregated spatial data layers under each ecosystem component are compiled from observational data (e.g. fish density derived from specific research surveys), or from specific scientific knowledge (e.g. spawning areas delineated by experts

on the basis of multiple sources and analyses). Candidate disaggregated spatial data layers that meet one or more of the EBSA criteria are selected. The derived base feature layers provide information on the spatial distribution of important locations of the target features. Because ecosystem features can vary in space and time (e.g. reflecting the migratory dynamics of populations of fish, birds, and marine mammals), base feature layers should reflect this variability.

Each derived base feature layer would also be classified as contributing to four general ecological dimensions: foodweb, habitat, diversity, and productivity (see Annex 1). These general ecological dimensions are easy to communicate to, and understand by, a broad suite of managers and stakeholders, and would allow the production of maps displaying how different areas in the Barents Sea are contributing to these general ecological dimensions.

Once all base feature layers are defined and overlayed, the identification and delineation of special/valued areas is done through expert interpretation of the resulting overlaps. This final integration of layers and identification of areas would be expected to be done in a workshop setting, and with the participation of the experts that contributed to their development. The result of this exercise will be an ecological and biological value map, showing the deliminated special/valued areas for the Barents Sea.

This conceptual framework can also be applied within the broader scope of integrated ecosystem assessments, where the identification and delineation of special/valued areas is a core component of the implementation of ecosystem-based management of the Barents Sea.

Data management and good practice

To ensure scientific credibility when using this framework, scientific robust and transparent methods should be applied in combination with best practices in data management.

It is important to understand the level of confidence associated with the disaggregated spatial data layers, expert knowledge, derived base feature layers, and the subsequent outputs of the framework. Considerations in this regard include the importance of understanding the metadata, sources of bias and their implications, data limitations such as spatial and temporal resolution, and the potential for unaccounted interactions and trends. This is essential information when using the output of the framework in decision-making.

A database of the derived base feature layers, with associated metadata and confidence levels, needs to be created and maintained. This will facilitate subsequent analysis. Information can be disseminated through a web-based data portal.

ICES notes that the Norwegian Environment Agency's web portal www.havmiljo.no could support the application of this framework but would require further development to do so.

Sources and references

Aune, M., Bambulyak, A., Sagerup, K., Aniceto, A. S., Moiseev, D., Vaschenko, P., Kalinka, O., and Dukhno, G. 2017. Report OCEAN-1: Valuable areas in the Barents Sea Phase 1. Akvaplan-niva AS, 2017. Rapport 8328. 68 pp.

ICES. 2018. Interim Report of the Working Group on the Integrated Assessments of the Barents Sea (WGIBAR), 9–12 March 2018, Tromsø, Norway. ICES CM 2018/IEASG:04. 210 pp. https://doi.org/10.17895/ices.pub.5436

ICES 2019. Workshop on ecological valuing of areas of the Barents Sea (WKBAR).ICES Scientific Reports. 1:39. 35 pp. http://doi.org/10.17895/ices.pub.5444

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Annex 1

The four general ecological dimensions used in the framework are:

Foodweb: Preserving the integrity of the foodweb is key to maintaining ecosystem structure and function. From a practical perspective this means safegarding those biological/ecological components that play major roles in the transfer of energy across trophic levels, and in the context of special/valued areas, the core locations where these interactions take place. While information on spatially resolved trophic interactions may not be broadly available, data on feeding grounds for important species and general areas of concentration observed from scientific surveys may be available and can be used as proxy for the location of trophic interactions.

Habitat: Benthic processes, biogenic/complex habitats, and nursery grounds, but also ice edge and polar front. Whenever possible, habitats should be distinguished between major ecoregions, for example Atlantic vs. Arctic communities on either side of the polar front.

Biodiversity: Endangered species and areas of high local diversity (within major ecoregions if feasible).

Productivity: Primary/secondary production, species concentrating biomass, and spawning grounds (within major ecoregions if feasible).