

SUBJECT Extending marine assessment and monitoring framework – Utrecht Workshop**Advice Summary**

ICES considers that the matrix methodology used at the Utrecht workshop is useful in identifying relevant components and pressures and for summarising and communicating the conclusions of an Integrated Ecosystem Assessment (IEA) to stakeholders. The matrix methodology as applied is not a complete method for conducting an IEA since the relationship between ecosystem components is not addressed and the criteria used to evaluate the status of ecosystem components were not appropriate for the groups of species and the broad habitat categories. Considerable work is underway world-wide on developing IEA approaches and results of this work could be adopted for future OSPAR assessments.

Ecosystem status is a continuum influenced by variations in natural forcing including long-term climate fluctuations as well as by human activities. While the specification of threshold values between levels of status can facilitate policy application and communication, thresholds should be interpreted with caution since they are arbitrary points on a continuum of changes in all ecosystem components. Ecosystem status is also an aggregate statement about the status of many ecosystem components, and these components may not vary in the same way to any specific cause. Extrapolating thresholds based on existing regulatory limits should be avoided.

Plankton species are an essential ecosystem component which should be included in any IEA. Their inclusion requires no specific methodological extension beyond that used in assessing other ecosystem components.

The most appropriate scale for assessments linking pressures and status is one in which there is a close association between human pressures (activities), ecological attributes, management objectives and the socio-economic value, because these will result in a more robust outcomes in response to management actions.

Request:***Extending marine assessment and monitoring framework used in Chapter 10 of the QSR 2010 (OSPAR 2010/1)***

To review the methodology used by the OSPAR workshop on the development of Chapter 11 of the QSR 2010 (Utrecht workshop)¹⁾ and taking into account, inter alia, ICES work on integrated assessment, provide advice on the following aspects:

- a. improvements that could be made to the thresholds between different assessment classes, including any scientific basis for proposed thresholds;*
- b. extending the methodology to support the assessment of plankton communities;*
- c. improving the method for working at different scales, such as the level of an OSPAR Region, the level of sub-Regions such as the Irish Sea or the Channel or the level of an estuary or an MPA;*

1) Although the workshop title referred to Chapter 11 the output has subsequently been reflected in Chapter 10 of the QSR.

ICES Advice*Conceptual framework*

Integrated Ecosystems Assessments (IEAs) are an important part of the Ecosystem Approach to Management (EAM) of human activities in the marine environment. Considerable work is underway world-wide on developing IEA approaches and methods at local, regional and global scales (UNEP and IOC-UNESCO, 2009; ICES, 2010; SEAMBOR, 2010). Results of this work could be adopted for future OSPAR assessments. Note should be taken of the concept of developing a specified and well-structured process for conducting IEA rather than an analytical methodology (UNEP and IOC-UNESCO, 2009).

ICES considers that the matrix methodology used at the Utrecht workshop is useful in identifying relevant components and pressures and for summarising and communicating the conclusions of an IEA to stakeholders. The matrix methodology as applied is not a complete method for conducting an IEA since the relationship between ecosystem components is not addressed. An objective process for selecting components and state indicators used to represent them is provided in ICES (2010).

There is growing consensus that IEA approaches should include the following elements (not in any specific order):

- assessment of the status and trends of ecosystem components (species & habitats);
- assessment of status and trends of human activities (pressures);
- assessment of ecosystem component interactions (functions);
- assessment of the impacts and risk to the marine ecosystem; and
- assessment of socio-economic aspects.

ICES recognises that the approach used at the Utrecht workshop was not intended to address all the above elements in full but focused on the linkages between pressures and ecosystem components.

ICES considers that the criteria used at the workshop to evaluate the status of ecosystem components were not appropriate for groups of species such as seabirds, cetaceans, seals, and fish, nor for the broad habitat categories as they were defined. For species groups this is due to natural variations with increases as well as decreases, different responses by different species to external pressures and lack of information and suitable references in many cases. For habitats the criteria cannot be applied at a broad scale unless more detailed information on the various types of habitats that make up the broad scale habitat is known.

The Utrecht workshop approach, or any other approach, aimed at integrated assessments requires, as a starting point, detailed thematic assessments of pressures from human activities and their effects in the marine ecosystem, including cumulative effects. Such thematic assessments need to take into account the ecological interactions including physical forcing and indirect effects resulting from human activities.

Improvements that could be made to the thresholds between different assessment classes, including any scientific basis for proposed thresholds;

Ecosystems are never static, but are influenced by variations in natural forcing, including long term climate fluctuations, and human activities. Ecosystem status is a continuum and variations are not always a result of human activities. It is therefore difficult to establish what is 'good' or what is 'not good' against such natural fluctuations. The use of multiple levels (good, moderate and poor) made this process even more difficult. While the specification of threshold values between levels of status can facilitate policy application and communication, the thresholds should be interpreted with caution since they are arbitrary points on a continuum of changes in all ecosystem components. When managing human activities and defining Good Environmental Status (GES), account needs to be taken of such variations. The Utrecht approach used thresholds that were based on existing regulatory limits (e.g. Habitats Directive) and this should be avoided.

When considering reference conditions against which thresholds should be defined ICES recommends :

- the use of reliable data to provide information on the ecosystem status at a time when it was unimpacted or when it was used sustainably,
- the use of process based models to hindcast to when the ecosystem status was unimpacted or when it was used sustainably;
- the use of unimpacted areas for ecosystems attributes that are relatively stationary in space;
- in situations when the above is lacking, the use of observed data with sufficient contrast (i.e. range of conditions) in statistical models to extrapolate to when the ecosystem was less impacted;
- use of expert opinion where appropriate;

At the Utrecht workshop, the criteria used to set thresholds between Good, Moderate and Poor status were based on i) declines in population range and size; and ii) alterations in condition such that there were "strong deviations in reproduction, mortality or age structure relative to former natural conditions". The changes reported by ICES (ICES, 2008a) include substantial declines *and* increases in abundance and distribution of zooplankton and fish assemblages in specific OSPAR regions. The Utrecht approach is generally predicated on impacts leading to "declines" which is not always the case.

The issue is not really about the thresholds per se but about defining a robust process to evaluate the pressures that impact on ecosystem structure, function and processes and to integrate these in a consistent fashion. This has not been achieved to date and will require continued work by the scientific community.

Extending the methodology to support the assessment of plankton communities;

Plankton are an essential ecosystem component which should be included in any IEA alongside the "species" level components e.g. seabirds, cetaceans, seals and fish. The methodologies and approaches appropriate for assessing other

ecosystem components are also appropriate for assessing the plankton component. As discussed above the criteria and thresholds used in the Utrecht workshop were not appropriate for some of the components assessed and this also applies to the plankton. Their inclusion requires no specific methodological extension beyond that used in assessing other ecosystem components.

Data from Continuous Plankton Recorded (CPR) Survey, and from other time series in the OSPAR area, could be used to assess plankton abundance, diversity and population dynamics along with plankton species that act as indicators of climate change. ICES publishes an annual report of the status and trends of zooplankton in the ICES area based upon the data from national monitoring programmes (ICES, 2008b). The ICES work on developing an integrated assessment of the status of the North Sea ecosystem includes the plankton component using data from the CPR Survey (ICES, 2009).

Improving the method for working at different scales, such as the level of an OSPAR Region, the level of sub-Regions such as the Irish Sea or the Channel or the level of an estuary or an MPA;

The methodology used at the Utrecht workshop was intended to be applied at any spatial scale. The most appropriate scale for assessments linking pressures and status is one in which there is a close association between human pressures (activities), ecological attributes, management objectives and the socio-economic value, because these will result in more robust outcomes in response to management actions.

A relationship exists between the habitat classification level and spatial scale. For large spatial scales, such as shelf habitats in the North Sea, the criteria for range and extent will not be appropriate as these broad habitat types are not likely to change in range or extent. At finer habitat classifications, such as the more resolved EUNIS levels, these criteria may be more meaningful. At these finer scales the practicality of mapping habitat distributions with sufficient accuracy and precision remains an impediment to using range and extent of habitats in all but local assessments.

The scale at which information is available for the particular species or habitat is also important. For example, at the scale of the North Sea or Irish Sea, fish stock status information is detailed and comprehensive but is not available (for highly mobile species may not be meaningful) at the scale of an MPA. Conversely, habitat data may be much more detailed for an MPA than for the entire North Sea. Thus certain types of data seem more relevant for assessments at large scales but less at local scales and other types of data are relevant at local scales rather than at larger scales.

Basis of advice

For a detailed review and discussion on IEA see ICES 2009 and ICES 2010.

Sources

- ICES. 2008a. The effect of climate change on the distribution and abundance of marine species in the OSPAR Maritime Area. ICES Cooperative Research Report, 293. 45 pp.
- ICES. 2008b. ICES Zooplankton Status Report 2006/2007. ICES Cooperative Research Report, 292. 168 pp.
- ICES. 2009. Report of the Working Group on Holistic Assessments of Regional Marine Ecosystems (WGHAME). ICES CM 2009/RMC:13. 76 pp.
- ICES. 2010. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO). ICES CM 2010/ACOM: 23
- SEAMBOR. 2010. Science dimensions of an Ecosystem Approach to Management of Biotic Ocean Resources (SEAMBOR). Marine Board-ESF Position Paper 14. Coordinating author and editor
- Jake Rice.
- UNEP and IOC-UNESCO. 2009. An Assessment of Assessments, Findings of the Group of Experts. Start-up Phase of a Regular Process for Global Reporting and Assessment of the State of the Marine Environment including Socio-economic Aspects. IOC-UNESCO-Paris. http://www.unga-regular-process.org/index.php?option=com_content&task=view&id=18&Itemid=20.