

Theme session R: ICES advice in a changing world!

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Background

This Theme Session arose from discussion amongst Resource Management Committee members at the 2004 ICES Conference in Vigo. The primary motivation was the need to consider how ICES advice would need to develop to meet the challenge of the changing world in which it finds itself.

Management advice, both on fisheries and in relation to the environment, is based on the limited amount of information and insight that we possess, supplemented by assumptions and premises. One of these premises is that past history can be used to predict the future. Historical information on the dynamics of fish stocks and fisheries anyway should guide future management under environmental uncertainty. Basic features like the productivity of stocks and interactions in the ecosystem can be inferred from historical experience.

This Session tried to look beyond mere prediction and related advice and attempt to answer the question:

How can, and should, management advice account for environmental variability and trends – either foreseen or unforeseen?

This theme issue includes how to assess and categorise environmental variability, how to recognise major ecosystem changes, what adequate advice to give in such situations, and how to evaluate subsequent management in support of its future quality?

Policy-makers are heavily dependent upon the quality of scientific advice and on the way various kinds of uncertainty are accounted for, environmental variability in particular. The credibility of the advice given by fishery scientists is thus of the utmost importance; not least because proposed actions to regulate fisheries affect the lives of many people and can be costly if subsequently found to be inappropriate.

Clearly, ICES cannot ignore changes in the environment – whether of natural or anthropogenic origin – without either being criticised or losing credibility for the oversight. If managers do not want to be confronted with various sources of uncertainty in the advice that they receive, should they be informed more explicitly then about variances and trends in the marine ecosystem, including the ones related to the up-warming? How can the management account for changes in the environment in a more systematic manner?

In addition, there are new demands being made on the advisory structure from policy, both European (the European Marine Strategy and future framework directive) and global, e.g. the Convention on Biodiversity. How can these be incorporated into ICES advice?

Types of change, types of management

In a changing world environmental parameters seldom vary stochastically (white noise). Certainly in population parameters for the fish stocks, such as growth and recruitment, we see evidence of persistence. Such persistence shows up as short- or long-term trends in the time series. A succession of short-term trends points at blue noise in the series, as in case of the NAO-index, whereas a succession of long-term trends point at red noise. See for red noise for instance the increase and decrease in cod recruitment in the North Sea, known as the gadoid outburst. Red noise understandably will only show up when large time windows of many years are inspected.

Do we need a particular type of management that is able to respond effectively to persistence in the system? What frequency of assessment and giving of advice and what kind of decision-making is apt here? Do we need the present day tactical management that responds to every annual change in the system? Or is a more strategic multi-annual approach the proper answer to persistence in the system at various time scales? What is the role of the present more rigid harvest control here? Rules that mostly start from the size of the spawning stock, which is certainly affected by persistent trends in the environment. Finally, how can science serve management in this respect by coming up with a clear and robust management advice? How much insight can science give the management into its technical considerations that lead to such a robust advice?

Papers in response

From the range of titles submitted to this Theme Session it was clear that the fairly broad Theme Session description had attracted wide interest and been interpreted in a number of ways. A number of papers tackled head on the main theme of dealing with a changing environment.

A number of other papers picked up the Theme of ICES readiness and current response to the need for a different kind of advice centered not so much on exploited target fish populations but on broader ecosystem themes. Some of these presented insights from the perspective of client organizations and there were challenging contributions questioning whether ICES had grasped the urgent need for a much greater focus on biodiversity issues – emerging as the most significant environmental policy driver affecting governments.

Stages

In general the Theme issue centers on the question how we use information on past changes in managing fish stocks and ecosystems.

A systematic approach is needed to discuss and answer this question:

- It starts with detecting changes, what parameters are used and how large is the statistical power to detect a change in such parameters (Rothschild on changes in F and SSB and their causal relationship).
- Successively there is the question how to respond to such changes; by science at first instance. An example is Dickey-Collas on changes in ecosystem or stock productivity that should translate into a new assessment of reference points for North Sea herring. But do we have the statistical power to infer and decide on a change in these reference points?
- Another approach is to scan all possible responses of the management to different types of change in the system and the fish stocks. Kell advocates a heavy modeling approach here (Management Strategy Evaluation), with socio-economics taken on board even, but with a robust and simple management advice as the outcome. Is the development of such an advice still transparent enough for the scientists? to guarantee that managers can take their responsibility in the decision-making process?
- Next, should change always be responded to in that the trend must be reversed (directly)? The UNCOVER program heavily rests on the philosophy of stock recovery and of recovery plans (von Dorrien). Under which conditions does this approach need adaptation? In this case, is prevention better than cure?
- But then, when environmental information is available, the uptake by the advisory boards seems slow as Rogers concluded. However, the fact that the information is first used to improve on the description of the ecosystem, and that its incorporation in the ultimate management advice is hardly practiced yet,

should perhaps not be surprising. Possibly the format and pretreatment of such information should be more geared to its ultimate use.

- Finally there are organizational and administrative aspects to consider as well. Monitoring and detecting change requires a smoothly organized database, but Leppanen pointed at serious shortcomings here referring the experiences of HELCOM with ICES in this respect.

Certainly, when management seeks for better ways to respond to changes in the ecosystem that translate into persistent developments in the fish stocks, it needs initiatives from their side as well. Enserink said that “Politicians sometimes run faster than managers”. Hopefully this implies that those politicians and managers articulate their information requirements in the light of environmental change. However, considering the gap between high level objectives and the actions necessary to fulfill these, this does not seem too likely. Science should pick up the messages from management and policy that contributes effectively to the development of management strategies from both the scientific and governmental side.* Finally, the need to include biodiversity considerations in advice, such as articulated in the Convention on Biological Diversity, has been ignored. Rice, in his talk, emphatically stressed the short-sightedness of ignoring the decisions made at high level policy meetings, which are not necessarily based on solid scientific reasoning, but are binding due to the fact that our governments have committed themselves to the process.

The discussion highlighted the discrepancy between the scientific discussion on the necessity for well-founded forecasting and prediction, but also the need to simplify the management of fish stocks at a political level. We know, for example, that to achieve the current management objectives, we have to reduce fishing pressure. MSY, with all its’ scientific drawbacks, is here to stay and should be seen as being politically expedient and a soft political target, not necessarily a scientific one.

To conclude, for ICES to continue to advise in a changing world the following should be taken into consideration:

- Improved dialogue, at all levels, between policy, management and science to look for common objectives and indicators. Forward thinking in larger time windows is necessary.
- Inclusion of ecosystem considerations into the assessment process – first look at a number of case studies, then more generally.
- The robustness of decision rules and targets to change (driven either by climate or tropho-dynamics) should be studied
- To deal with variances and trends in a more systematic manner and to share such information with a wider public, in this way enlarging transparency in biological advice and decision-making.
- To evaluate various types of management strategies, including adaptive management with its set of possible indicators, for their quality in tackling various types of environmental change.