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The future of ICES in the 21st century

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ICES is now at a pivotal point as it approaches its Centenary and embarks upon a new century. With its many strengths and almost 100 years of diverse achievements, ICES nonetheless will face major challenges in the coming decades. This paper sketches some alternative scenarios for ICES in the 21st century. Although ICES survived major geopolitical upheavals in the 20th century, geopolitical change, in particular the potential further enlargement of the European Union to include Norway and possibly Iceland, is perhaps the greatest threat to the future of ICES in the coming decades. ICES could 1) survive in its present form, but stagnate; 2) disappear; or 3) survive and thrive. In order to survive and thrive, ICES must build on its existing strengths and grow to become a more holistic marine science organization, with a broad focus on marine ecosystems, including living resources, and their relation to humanity.

Keywords: ecosystem, fisheries management, geopolitical change, marine science, multidisciplinary, technological.

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Introduction

The American poet, Carl Sandberg, once wrote: "Nothing happens unless first a dream."

At the 1999 Statutory Meeting in Stockholm and at the 2000 Symposium on "100 Years of Science under ICES" in Helsinki (this volume), we heard a great deal about the dream of those scientists from Scandinavian countries and elsewhere whose far-sightedness convinced their governments to support the initial five-year experiment in international cooperative marine research that later became the International Council for the Exploration of the Sea. They had a dream of what was needed and the determination to pursue it.

At the Helsinki Symposium, we heard about the evolution and history of ICES and a great deal about the diverse accomplishments of ICES and its scientists over the past century. I will not dwell here on the nature and impact of these accomplishments, but clearly as you can see from this volume, these accomplishments are numerous and the impacts far-reaching.

ICES is now at a pivotal point in its history, as it rapidly approaches the Centenary celebration and embarks upon a new century. It is time to take stock, to reflect on where we are and where we might be going in the decades ahead.

Predicting the future – a futile task

Attempting to forecast the evolution of ICES over the next 100 years would, in my view, be a futile task. What I will address is the future of ICES in the coming decades.

History is replete with examples of attempts to forecast the future, most of which fall far from the mark (Kahn and Wiener, 1967). The pace of technological change in the latter half of the 20th century confounded even the experts. In the winter of 2000, a group of computer consultants called Net Tech met in Irvine, California, USA, to predict the next 100 years of technology. They saw a future where:

> The Internet will begin thinking. Fuel cells will replace internal combustion engines. AIDS will be relegated to the history books. "Cybots", computer program servants loyal as dogs, will fetch everything you need in cyberspace. (*The Ottawa Citizen*, 3 April 2000)

They predicted a world where everyone is linked by the global nervous system that the Internet will become, and human beings would not be the only intelligent life out there on the Web. After much debate, the group agreed that the computer viruses and worms that foul up your computer today will evolve into entities with lives of their own.

And these are only examples drawn from high technology. The recent mapping of the human genome offers great opportunities and significant peril for humanity if abused (*Nature*, 29 June 2000). Who can foretell the implications 100 years from now? Yet many try (Cetron and Davies, 1997; Griffiths, 1999; Kaku, 1997).

Because of the astoundingly rapid pace of change, forecasting the future is a notoriously tricky business. There is enormous room for error. If you go back 30 or 40 years, depending on the visionary, the year 2000 was supposed to include moon bases, flying cars, meals-in-a-pill, and nuclear wars with killer mutants on the one hand and, on the other hand, global government with peace and goodwill around the earth.

One hundred years ago telephones were on the cutting edge, radio was a year away, and television was science fiction. Twenty-five years ago almost no one had an answering machine or a video cassette recorder, let alone cellular telephones in everyone's pocket. In 1990, no one surfed the World Wide Web, and today it is an everyday occurrence for many millions of people.

And so far, I have only discussed examples of technological change. What about geopolitical change? Who, in 1980, would have predicted the dissolution of the Soviet Union by 1990 and the reunification of Germany virtually overnight?

Given this context, I approach the subject of the future of ICES gingerly. Frankly speaking, we have little idea of what the world will look like 100 years from now, or the place of ICES in it. Indeed, we cannot even forecast with reasonable certainty whether ICES, as we know it, will exist 100 years from now.

Nonetheless, from our knowledge of where ICES is today, we can sketch some alternative scenarios for the future over the coming decades. I will sketch three broad alternative scenarios for the future of ICES, primarily to stimulate debate. These focus on the future of ICES as an entity rather than upon particular aspects of marine science. But first, some words about the current context for ICES.

The current context

ICES has evolved from a forum for international collaboration in marine science to an organization with a very visible and important advisory function, particularly with respect to fisheries management and, to a lesser extent, on marine environmental matters. ICES has grown into an intergovernmental organization where the development and coordination of marine science initiatives have become, in many respects, subservient to the powerful advisory role that ICES assumed in the second half of the 20th century. In Europe, ICES is recognized as the independent source of advice on the management of marine fisheries and, to a lesser extent, advice on marine environmental issues. Although ICES has environmental customers, it is still widely perceived as the international scientific body which provides advice on fisheries management primarily for the Northeast Atlantic.

Recently, pressure has been growing for the provision of advice that integrates fisheries and environmental perspectives, advice based on an ecosystem approach.

We heard a great deal at the Helsinki Symposium on the advances in science over the past 100 years (this volume) and the scientific challenges we face in the years ahead. Over the past several years, ICES has restructured its Statutory Meeting so that it now holds Annual Science Conferences where there is a greater focus on science than on the business of the organization. The scientific themes are frequently multidisciplinary in nature. The science committees were also restructured in the 1990s to foster a more integrated, multidisciplinary, ecosystem approach. This contrasts with the species orientation, on the fish side, for several decades prior to the 1990s. The Annual Science Conference format seems to have revitalized the science portion of the Annual Meeting and has attracted a great deal of interest over recent years.

The restructured science committees are still finding their way, with some having found firm footing sooner than the others. We need to review the way they are functioning and whether there are improvements which might help in assisting them to make a more valuable contribution to ICES.

On both the science and the advisory fronts, ICES is moving slowly but definitely towards a more integrated, multidisciplinary, ecosystem approach. At the 2000 Statutory Meeting in Bruges, Belgium, the Council adopted modifications to the advisory process to facilitate this, including the creation of an Advisory Committee on Ecosystem Issues.

At the 1999 Statutory Meeting in Stockholm, ICES adopted an initial Strategic Plan: "Towards the 21st Century", as a basis for consultation (ICES, 2000). That document pointed out that, although fisheries have been a central theme of ICES since its inception, modern scientific thinking and developments on the socio-political front provide a much broader context for marine science. The emphasis in recent international conventions and agreements on the need for precautionary and ecosystem approaches to management highlight the need for ICES not only to broaden its scientific base through the further evolution of its science program, but also to enhance its capability to provide scientific advice on an integrated, ecosystem-oriented basis.

The Council, in 1999, adopted a Mission Statement as follows:

> To lead the way by mobilizing scientific assets to advance the capacity to understand and advise on the effects of human activity and natural change on marine ecosystems.

That Mission Statement recognizes that advice is needed on the effects of human activities on marine ecosystems, as well as on the implications of changes that

occur naturally. The need for broader advice heightens the need to advance our capacity to understand the effects of human activity and natural change on marine ecosystems. Growing societal pressure for sustainable use of living resources and the conservation of biodiversity, the protection of the environment, and for understanding the impacts on climate change, emphasize the need for more comprehensive understanding and advice.

While many people's eyes glaze over when one talks about vision and mission statements, the 1999 Mission Statement is noteworthy in terms of the evolution of ICES. Marine ecosystems are inclusive of fisheries, but are much broader and more complex. The emphasis on marine ecosystems does not diminish the importance of fisheries. Rather it recognizes the potential for building on the success ICES has long had as the leading science organization relative to fisheries and advice to keep pace with evolving societal needs for scientific information.

Geopolitical change and the potential impact on ICES

ICES must evolve to address these broader marine ecosystem issues if it is to survive and flourish in the 21st century. But there are other broader forces at play which will influence whether ICES thrives and prospers in the decades ahead. I refer specifically to geopolitical forces which could play a major role in shaping the evolution and, indeed, the fate of ICES.

ICES survived major geopolitical upheavals in the 20th century, including two world wars which jeopardized its future, and emerged successfully. It survived the emergence of 200-mile Exclusive Economic Zones for fisheries in 1977, although it missed the opportunity to extend its advisory function to the entire North Atlantic. It has also survived, so far, the emergence and growth of the European Union (EU) as a world power and the absorption of many ICES Member Countries into the EU. In other fora, for example, international fisheries organizations such as the North-East Atlantic Fisheries Commission (NEAFC) and the Northwest Atlantic Fisheries Organization (NAFO), where it has jurisdiction over fisheries matters, the EU sits at the table as one member. In ICES, with its broader marine science mandate, the EU Member Countries, which are also members of ICES, have retained their status as Contracting Parties.

In the 1980s, the Commission of the European Economic Community (EEC) considered the establishment of its own machinery for the provision of scientific advice on fisheries management. But the Commission was persuaded on the merits of receiving its scientific advice on fisheries management matters from an independent, politically neutral body, namely ICES. Will this view persist if the EU continues to enlarge, as seems the case? Quite apart from the possible accession of various Eastern European countries, what happens if Norway and perhaps Iceland were at some point in the coming decades to join the EU? Sweden and Finland have already joined. Norway has already held two referenda, with narrow decisions in favor of not joining. If Norway, or Norway and Iceland, were to join the EU, this could leave Canada and the United States as virtually the only non-EU members of ICES at some point in the future. If this were to occur, what would be the implications for ICES? Would ICES, in its present form, survive?

Since virtually all of the advisory function focuses on the provision of scientific advice pertaining to the Northeast Atlantic and the Baltic, pressures to internalize these functions within an enlarged EU are virtually certain to occur. This is perhaps the greatest threat to the future of ICES, in its current form, in the first half of the 21st century. While it is uncertain how these events will unfold, geopolitical change will occur. The question is the extent and nature of the changes. The outcome could well shape the destiny of ICES in the 21st century.

Other factors

At the national level, there are other factors emerging which could also have a substantial impact on the further evolution of ICES. Over the past decade, budgetary restraint measures have, in many instances, reduced the number of personnel or the financial resources available for the conduct of marine science in Member Countries. This, in turn, has had a spill-over effect on the ability of national scientists to participate fully in ICES activities. A related development has been the move toward privatization or placing laboratories on a partially self-funding basis in some countries. In such instances, research managers have become contract managers with an increasing proportion of their time devoted to securing and managing such contractual arrangements. This, too, in some cases is impeding full participation in ICES activities, e.g., the difficulty in recruiting chairs for the Advisory Committee on Fishery Management. The priorities of individual laboratories must also be affected under these circumstances.

In many countries, the practical, tactical questions of fisheries management are tending to control science priorities to the extent of overwhelming the need for longer-term research necessary to provide the basis for more reliable scientific advice. A look around the table of Council Delegates in 2000 was sufficient to underline that fisheries is the dominant preoccupation of national administrators or laboratory directors when deciding who represents Member Countries on the Council. A broader perspective is needed if ICES is to survive and thrive.

Alternative scenarios for the future of ICES in the 21st century

Taking into account these factors, three major alternative scenarios are foreseen for ICES in the 21st century. There are obviously subsets, but the focus will be on these three, as follows:

a) ICES survives in its current form but stagnates;
b) ICES disappears sometime in the coming decades;
c) ICES survives and thrives.

Under the first "Survives-but-Stagnates" scenario, the Northeast Atlantic countries, whether inside or outside the EU, continue to see the need for an independent body to provide scientific advice on fisheries management. ICES continues its present program, but remains heavily focused on the generation and formulation of advice on fisheries, to the detriment of other aspects of its mandate. The "core science" program withers over time, except as seen necessary to support the advisory function. Environmental issues remain on the periphery. Ecosystem issues are addressed only to the extent that countries say, "How can we maintain our fisheries yet placate and keep the environmentalists at bay?" This scenario is a recipe for stagnation. Yet, some of the preliminary comments received on the Strategic Plan indicate that, without vigorous visionary leadership, ICES could be pushed in that direction over the coming decades.

The second "ICES-Disappears" scenario is largely connected to the geopolitical changes unfolding in Europe. A greatly enlarged European Union could well decide that it should absorb the peer-review functions of fisheries science and the generation of scientific advice on fisheries. If Norway and possibly even Iceland were to join the EU, this could be seen as a viable option by EU administrators. Canada and the United States would go their own way and develop alternative arrangements. While this might suit the needs for fisheries advice in the short term, it would prove extremely short-sighted in the long term because the value-added of ICES as a North Atlantic-wide body for the development of marine science would be lost. While this alternative may seem far-fetched today, it is a realistic possibility over the coming decades.

Under the third "ICES-Survives-and-Thrives" scenario, ICES builds on its existing strengths and grows to become an international marine science organization with a broad focus on marine ecosystems, including living resources and their relation to humanity.

Building on its first century, ICES has the opportunity to grow and play, in partnership with other organizations, a leading role in a global network of scientists studying and advising on marine ecosystems. Already, scientists from more than 50 countries participate in some ICES symposia, e.g., the 1999 Montpellier Symposium on the "Ecosystem Effects of Fishing".

Marine ecosystem issues are becoming of increasing concern to society globally. In the modern era of globalization and virtual networks, how does ICES transcend geopolitical constraints to reach out to the broader global community of marine scientists? United Nations (UN) bodies with a global mandate already exist, e.g., the Food and Agriculture Organization (FAO) concerned with fisheries matters and the Intergovernmental Oceanographic Commission (IOC) with oceanographic matters.

IOC, housed within UNESCO, has revised statutes adopted by the General Conference of UNESCO in 1999 which give it a broader remit than its name suggests. The new statutes define the purpose of the IOC (Article 2) as follows:

> 1. The purpose of the Commission is to promote international cooperation and to coordinate programmes in research, services and capacity-building, in order to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and the decision-making processes of its Member States.

Although IOC has this broader remit and has had, for some time, a program on Ocean Science in Relation to Living Resources (OSLR), this has been mainly focused on harmful algal blooms, an issue of concern to many IOC Member States, particularly many of the developing countries. Its Living Resources program, apart from that, is largely inactive. Its Ocean Science Program is currently under review and new initiatives could emerge. At the present time, the IOC is largely preoccupied with the development of a Global Ocean Observing System (GOOS), an ambitious undertaking. GOOS has several modules (including one on Living Resources), but these are currently being merged into Coastal GOOS and Climate GOOS. While involved in a wide range of activities, the chief preoccupation within IOC is the relation between the oceans and climate. IOC has a very close working relationship with the World Meteorological Organization (WMO).

Although its revised statutes would clearly give it the scope, it is difficult to see IOC emerging as a major force in this arena within the foreseeable future. FAO, which has a long history of collaboration with ICES in the marine aspects, is focused on fisheries or factors which impact on fisheries.

Non-governmental bodies such as the Scientific Committee on Oceanic Research (SCOR) can fill part of the marine ecosystem niche. How can ICES transcend its status as a regional body in a sea of global UN bodies? Established now by international convention as an intergovernmental organization of contracting parties with a focus on the North Atlantic and adjacent seas, the ICES challenge is how to attract even more effectively the participation of scientists from countries outside the ICES geographic ambit and how to reach out more

effectively to scientists in universities and non-governmental laboratories both within ICES Member Countries and beyond.

As described by Helen Rozwadowski (2002), ICES has considered, but never embraced, involvement in the Mediterranean, even though the Mediterranean is clearly an adjacent sea. In recent years, scientists from Greece, the South Pacific (Australia and New Zealand), South Africa, and South America (Chile and Argentina) have participated regularly in ICES Annual Science Conferences. Scientists from many other countries outside the ICES geographic ambit participate in our symposia. This indicates the potential, on the science side, to involve a wider community of scientists than the geographic focus of ICES would suggest.

How does ICES position itself to survive and flourish in the 21st century as geopolitical change in Europe potentially threatens its traditional base? One possibility might involve associate membership in ICES for countries from outside the North Atlantic region. Such associate membership could be a hybrid between full membership of the Contracting Parties and observer status. Associate Members might wish to participate fully in the marine science aspects of ICES, but would not seek nor receive advice.

On the surface, it is simple to ignore impending geopolitical change until the need for change becomes compelling. On the other hand, under such circumstances, change could swallow ICES rather than see ICES adapting proactively. If ICES buries its head in the sand, when it raises its head to survey the surrounding seascape, it may rapidly find itself decapitated.

Future ICES participation in global marine science programs

To position itself to flourish in the 21st century, ICES needs to develop a more proactive policy regarding leadership and participation in global marine science programs. ICES has, of course, been involved in major international oceanographic programs in recent decades. But is it destined to be a bit player? The recent example of ICES participation in GLOBEC (Global Ocean Ecosystem Dynamics) illustrates both the potential advantages of such involvement, but also the limitations under which ICES currently operates which impede fully effective participation in such initiatives. ICES recently played a key role in developing a proposal to the Global Environment Facility (GEF) for a major Baltic Regional Sea initiative in partnership with the Helsinki Commission (HELCOM) and the International Baltic Sea Fishery Commission (IBSFC). ICES should learn from and build on the GLOBEC experience and forge a more proactive stance for ICES as an international organization with scientific interests which exceed the geographic span of the North Atlantic. ICES needs a new policy for the new century regarding its involvement in global marine science programs. More effective mechanisms for such involvement and for a more visible global role for ICES are needed. This is essential if ICES is to flourish rather than stagnate or perish in the 21st century.

Conclusion

ICES has many strengths on which to build. It has had a clear focus; it has a broad network of exceptionally capable marine scientists who collaborate in the advancement of knowledge and the provision of scientific advice. It has a well-established framework in international collaboration. It has a reputation for good science and credible advice regionally and a global reputation as a leader in fisheries science and other aspects of marine science. It is at the forefront in developing approaches to tackling the major challenges of understanding and providing integrated advice on marine ecosystems. Given these factors, some might argue that only incremental change is necessary to meet emerging needs. With ICES having survived major geopolitical upheavals in the 20th century, it may seem, on the surface, to be well positioned to survive geopolitical change in this new century. It is tempting, but potentially misleading, to assume that because ICES survived those previous convulsions, it will necessarily survive the kind of unrest which appears probable in the coming decades.

Let us not forget that change can come swiftly and change can radically transform everything in its path. Witness the unforeseen and rapid demise of the Soviet Union at the end of the 1980s, just a decade ago, with consequences which are still being felt and whose full effects cannot even now be accurately foreseen.

Given the strengths of ICES, some will argue that it should "stick to its knitting" and continue to do the things it does well, while hoping that major upheaval does not come along and sweep it away into the dustbin of history. That, in my view, would be a short-sighted approach.

ICES has the opportunity to grow and play a leading role, in partnership with other organizations, in a global network of scientists involved in studying and advising on marine ecosystems and living marine resources. This opportunity will dissipate if ICES does not seize it.

The founders of ICES had a dream. It is up to us, their successors, to build on that dream and take it further. As we look back with pride and laud the achievements of the first century of ICES, we must also look forward, assess the future even though it can only be dimly seen, and take action to prepare ICES for the changes that will confront it in its second century.

If ICES stands still, it will ultimately perish. It is a truism today in business that the only constant is change. ICES has adapted successfully to change in the past. It must prepare itself to adapt proactively to future change

which, while it cannot be accurately foreseen, could radically affect the future of ICES. We must rise above the particular problems of the day to embrace the vision of ICES as more than a regional body focused primarily on the Northeast Atlantic and embrace instead a vision of ICES, in collaboration with other organizations, as part of a global community of marine scientists with a common interest in marine ecosystems and in advancing the capacity to understand and to advise on the effects of human activity and natural change on marine ecosystems.

Like our predecessors at the beginning of the 20th century, we too must dream and reach for the stars, with our feet firmly grounded in the legacy of the first 100 years of ICES. That way lies success and a continued, prosperous future for ICES.

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