# An expert approach to global change

Leading NorMER scientists **Nils Chr. Stenseth** (Chair), **Carl Folke** (co-Chair), and **Philippe Cury** (Centre Advisory Panel Chair) discuss a new coordinated strategy for managing the impact of global changes on Nordic marine life, using Atlantic cod as an example of the challenges ahead



**What is the primary focus of The Nordic Centre for Research on Marine Ecosystems and Resources under Climate Change (NorMER)?**

CF: In this research-based programme, we are using the Atlantic cod as an example of ecological, economic and social interactions and interdependencies. The cod represent challenges spanning climate change, eutrophication and overfishing, and insights gained will be useful for other fisheries. For example, in the Baltic Sea, focusing on managing the cod alone will only be successful as an incidental effect. A broader approach takes into account the dynamics of cod and its prey species – the sprat – as well as eutrophication and the role of ocean currents in cod recruitment.

**Marine ecosystems are under pressure from both anthropogenic climate change and high exploitation rates. What are the key challenges that fisheries managers and scientists face as a result of this?**

NCS: Managers and scientists each face different sets of interlinked and non-exclusive challenges.

For managers, a few of these include: identifying and fixing weaknesses of current governance of resources; improving knowledge of the biological, environmental and economic drivers affecting fish stocks; and integration of scientific and management approaches. Scientists must: improve links between statistical and mechanistic approaches to improve predictions of climate change effects; broaden the scope of studies through increased interdisciplinary efforts; and develop more effective training programmes for young researchers that are relevant beyond the academic sphere. The overall challenge is to realise that these tasks are truly interlinked, and in order to move forward, they must be overcome together.

**How does NorMER's programme differ from the traditional isolated in-depth studies and provide a vision for the future of science?**

CF: It is truly interdisciplinary in terms of the overall shared vision and focus. We draw on specialist knowledge and the interests of the researchers predominantly in biology and economics, but also other political sciences engaged with governance to provide depth, always in the context of the broader picture and challenge. It represents basic interdisciplinary science for improved understanding and with results and insights generated that will help inspire and guide management of marine ecosystems.

**In what ways does the interdisciplinary and collaborative approach of the project lead to a stronger Nordic position on leading scientific endeavours in both Europe and globally?**

PC: It is obvious that science is not an isolated process, but requires groups to work together on challenging topics. This is how leading scientific groups works today; there is no other real way to conduct high quality science in our fields with the aim to answer broad and difficult questions regarding the future of marine resources.

**What impact do you expect the research project to have on industry and policy managers and how do you aim to ensure that marine ecosystem management policies are updated to sustain healthy fisheries?**

CF: As in the other Nordic areas, in the Baltic Sea region there are strong links between the NorMER programme and governments at national levels, but also regionally and locally through interactions with fishermen, municipalities and other actors. At the Stockholm Resilience Centre we host the Baltic Nest Institute that feeds understanding into the Helsinki Commission on Baltic Sea Environment Protection (HELCOM), the body coordinating all nations on marine issues of the Baltic Sea and its catchment. NorMER has in general strong links to both policy and decision making.

**How will the research conducted as part of NorMER be extended to other marine ecosystems?**

PC: In both its structure and organisation NorMER will serve as an example for many other countries to organise their research around a key topic regarding a renewable or valuable resource. This initiative can also serve as a demonstration for organising an ecosystem approach to fisheries in many other world ecosystems.

**Do you have any broader observations on changing attitudes in this field of research?**

CF: As a general observation, there is currently an overall shift in perspective from conserving the environment or focussing on single resources towards recognition that economic and social development ultimately depends on the capacity of the biosphere and its ecosystems to be sustained. This calls for improved stewardship of ecosystems and the services they generate for human wellbeing. NorMER will contribute to this shift.

# Adding depth to marine research

The **Nordic Centre for Research on Marine Ecosystems and Resources under Climate Change** offers a comprehensive, collaborative approach to studying the impact of human-driven changes on marine ecosystems across the Nordic region and beyond

**HUMAN MADE** environmental issues – including the impact of unsustainable fishing practices and numerous climate change drivers are at the top of the agenda for marine research and management in the Nordic region. Such challenges, by their very nature, must be dealt with collectively, but whilst a great deal of research activity already focuses on these topics, they are yet to be better coordinated as a whole. A new organisation has been formed to ensure that Nordic scientists can work collectively on a grand scale and join together to bring their findings to policy makers.

The Nordic Centre for Research on Marine Ecosystems and Resources under Climate Change (NorMER) is a new pan-Nordic collaborative project. The Centre aims to foster collaboration in the area of marine research between all Nordic research groups and several US institutions. The goal is to achieve a multidisciplinary strategy for research on the biological, ecological and management consequences of global climate change in marine ecosystems with a focus on the Nordic region.

## COD FOR STARTERS

The first target on NorMER's agenda is the Atlantic cod (*Gadus morhua*). In the 1990s many cod stocks collapsed and have still failed to recover, even with the cessation of fishing. The Atlantic cod remains on the IUCN Red List of Threatened Species. NorMER will coordinate research on the Atlantic cod before expanding into other fisheries. Through the process of collaboration, NorMER plans to utilise their assessment of climate change on Nordic marine ecosystems to build new tools for predicting the biological impact of climate change. This will result in a quantifiable forecasting of the impacts of climate change on employment, profits and harvesting. This foresight is essential to guide policy makers to ensure that marine ecosystems remain balanced and that our seas flourish into the future.

## ALL IN THE SAME BOAT

The key aim of the project is not just to convene Nordic marine experts, industry representatives and policy representatives annually, but to facilitate lasting interdisciplinary collaboration. This will be achieved by providing an ongoing framework for doctoral and postdoctoral students to work between partner institutions in placements that each last several months. It is hoped that the one species focus on the Atlantic cod will provide a focal point for scientists coming from all areas to combine their diverse expertise. This will establish a framework from which other areas of marine life can be studied on a comprehensive, structured, international basis. The organisation is driven by the key motives of addressing issues arising from climate change whilst maintaining a strong curiosity-driven scientific foundation. A united front will allow scientists to speak more loudly regarding the subjects that matter. Carl Folke, co-chair of NorMER, hints at further topics of interest: "Ocean acidification may be one of the largest challenges, strongly related to climate change. In a world with ecosystems and their dynamics shaped by humans, fisheries management and governance should expand the perspectives from single species management to stewardship of marine ecosystems of which the fisheries is part".

## LEADING CHANGE

The project provides a respected platform from which a cross-section of scientists can communicate to the public, politicians and industry. The much anticipated launch of NorMER last October included presentations from the Norwegian Minister of Research and the Minister for Higher Education, Tora Aaslund, as well as the Norwegian Secretary of State, Kristine Gramstad, and the rector of the University of Oslo, Ole Petter Ottersen, alongside internationally recognised scientists.

Nils Chr. Stenseth, the chair of NorMER, has made it a key role of his institute to identify and bridge the gaps in knowledge between scientific disciplines and then translate these efforts into outputs that are used to inform policy managers or the public. Stenseth is now focussed on contributing to an improved

# NorMER

## NORDIC CENTRE FOR RESEARCH ON MARINE ECOSYSTEMS AND RESOURCES UNDER CLIMATE CHANGE

### OBJECTIVES

A Nordic Centre of Excellence that brings together the expertise of leading research groups from all Nordic countries, and several North American institutions, to implement a collective and multidisciplinary research strategy to explore the biological, economic and management consequences of global climate change on fisheries resources throughout the Nordic Region.

### KEY COLLABORATORS

**Nils Chr. Stenseth**, University of Oslo • **Carl Folke**, Stockholm University • **Thomas Kiørboe**, Technical University of Denmark • **Erik Bonsdorff**, Åbo Akademy University • **Øyvind Fiksen**, University of Bergen • **Eyðfinn Magnussen**, University of the Faroe Islands • **Guðrún Marteinsdóttir**, University of Iceland • **Marko Lindroos**, University of Helsinki • **Markus Meier**, Swedish Meteorological and Hydrological Institute • **Helle Siegstad**, Greenland Institute of Natural Resources

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**NILS CHR. STENSETH** is Professor and Founding Chair of the Centre for Ecological and Evolutionary Synthesis (CEES; www.cees.uio.no) in the Department of Biology, University of Oslo and Chief Scientist II at the Institute of Marine Research in Bergen. He is Chair of the project.

**CARL FOLKE** is Professor and Science Director of the Stockholm Resilience Centre at Stockholm University and Director of the Beijer Institute of Ecological Economics. He is co-Chair of the project.

**PHILIPPE CURY** is a senior scientist at IRD, Director of the CRH based in Sète, France (www.umr-eme.org) and the scientific coordinator of the Eur-Oceans Consortium (www.eur-oceans.eu). He is Chair of the Centre Advisory Panel.

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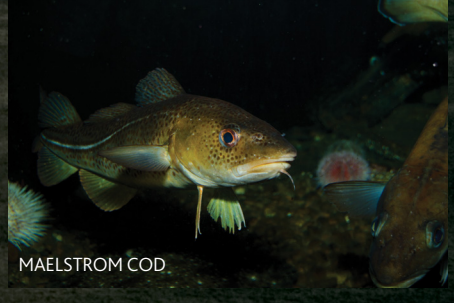
management of marine resources through solid basic science, and hopes to see NorMER become a tool to drive further problem-solving research through the combination of a series of curiosity-driven individual PhD and postdoctoral research projects, integrating ecology, evolution and economics. According to Stenseth, NorMER aims to lead the Nordic region forward based on 'EEEE' principles. The centre aims to provide a framework for integrating Ecological Sciences, Evolutionary Sciences, Economic Sciences and Excellence in Interdisciplinary Sciences. The focus on these principles shall enable NorMER to guide a new generation of marine experts with the skills, knowledge and resources to achieve real influence: "We want to evaluate the effects of climate variability on Nordic marine ecosystems with a strong scientific programme, while training a new generation of young researchers with the skills to link between science, industry and policy managers," Stenseth highlights.

### BIG FISH

The NorMER board is composed of research leaders, all of whom have a high profile in the marine world as indicated by their distinguished extensive record of publications in high impact journals. NorMER has already appointed eight doctoral researchers and four postdoctoral researchers and will soon add nine additional doctoral students and four further postdoctoral student. All doctoral students will be overseen by the board to ensure they receive appropriate training; the relevant principal investigator handles the details of each project, but decisions regarding problems or overall research direction are to be made by a vote from the board.



MAELSTROM COD

Since its inception last year, NorMER has achieved an impressive level of funding for its first five years. The total budget now stands at NOK 74 million, with NOK 35 million contributed by NordForsk and approximately NOK 39 million contributed by the participating groups, which include research teams at the University of Oslo, the Stockholm Resilience Centre in Sweden, Åbo Adakemi University in Finland, the University of Helsinki in Finland, the Swedish Meteorological and Hydrological Institute in Sweden, Marine Academic Research in Iceland, the University of Faroe Islands, the Greenland Institute of Natural Resources, the University of Bergen in Norway, and the Technical University of Denmark.

### ON THE SAME WAVELENGTH

The coalition of researchers that evolve through NorMER will emerge as a whole that is greater than the sum of its parts. This will provide NorMER with the ability to achieve lasting influence and to put theory into practice. NorMER could indeed contribute to building scenarios for the coming Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). The challenges that this presents are summed up well by Philippe Cury, Chair of the Scientific Centre Advisory Panel: "This will require scientists to bring together all of their expertise in order to predict what the marine ecosystems will be in 20 to 50 years in a global climate change context. This requires structured, integrated scientific groups such as NorMER". The urgent focus on Atlantic cod underlines the importance of acting swiftly, collectively and decisively. The stewardship of the seas is the responsibility of all of us and if we do not act now to establish change in the correct direction we may soon see the extinction of portions of marine life that reside in the bedrock of our ecosystem. Due to the co-dependent nature of ecosystems, this project tackles an issue that affects us all and the lives of all our children. For this reason, it is a matter of the utmost significance.