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TACKLING CLIMATE CHANGE IMPACTS ON EU FISHERIES



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The scientific foundations of fisheries management and climate impacts studies, were laid during the first half of the 20th century. The North Atlantic experienced a warm period from the mid 1920s to the 1960s, which caused a radical change in the distribution and productivity of fish species and of marine ecosystems in northern seas. A particularly striking, but not unique example was the cod stock at Greenland, which extended its range northward by over 1000 km, with landings increasing from a few hundred tons to several hundred-thousand tons, before declining again under the stress of overfishing and colder conditions.

The ocean climate and population processes which caused such radical changes are now fairly well understood, but the lessons, which are very relevant today, are ignored in much of our fisheries management. Two interrelated consequences of changes in ocean climate are:

• **Increases and declines in the productivity of fish stocks.** Fisheries which had been able to sustain a certain level of fishing are no longer able to do so if their productivity declines due to reduced growth, reproductive output and survival. This is why the Canadian cod and other stocks collapsed. On the positive side, the fisheries for red mullet and sea bass around the British Isles are recent examples of stocks whose productivity has increased.

• **Shifting geographic distribution of fish and marine ecosystems.** Management systems which do not allow for such changes may not only fail to achieve their objectives but also stand in the way of more effective measures. Quota systems and marine protected areas are vulnerable to distribution shifts.

Fisheries management can adapt in a number of ways to deal with the additional

risks and uncertainties imposed by climate change. Fishing communities have traditionally coped with variability in their fisheries resource base and it is helpful to retain **adaptive flexibility** in society, industry and management (alternative livelihoods, different gears and species). Where regulations, such as harvest control rules are used they must be **robust** to climate induced uncertainties and also **responsive** so that they adjust as the evidence of change accumulates.

Contrary to what some in the fishing industry might like to believe, the impact of climate change makes it more, not less urgent to reduce the level of fishing and increase stock biomasses for two reasons. First - fish stocks are more sensitive to the effects of climate when their age and geographic structure is reduced by fishing, so building up stock sizes and protecting populations throughout the area of distribution helps to make the fisheries more resilient. Second - increased stock sizes allow the same amount of fish to be caught with less fuel consumption and thus mitigates global CO₂ emissions.

Science has a major role to play. The assumption that our measures of sustainable productivity (e.g. MSY) and our reference points (e.g. B_{pa}, F_{pa}) will remain constant is clearly untenable. How should they be adapted or replaced? There is already evidence of declining ocean (and lake) primary production, probably due to a decrease in the rate of nutrient cycling from deep water. Can we improve our ability to predict further changes and their consequences for the rest of the marine food chain? What will the effect of increased ocean acidity be? Possibly of greatest immediate concern in a European context is the declining salinity of the Baltic due to increased precipitation and reduced inflow from the Skagerrak. What is the likelihood that this trend will continue and how should we take this into account in managing the fisheries? Greenland is again experiencing rapid increases in the populations of subarctic species, such as cod. Will these changes continue and how can we minimise the resultant disruption to the fisheries, which now rely on shrimp and agree on the catch allocation of migratory species, such as cod, which are shared with Iceland?

Dealing with the risk and uncertainties of future climate is already a mainstream activity in insurance, tourism, agriculture, water supply, housing, health care etc. It is time to apply the lessons to the management of fisheries and marine ecosystems.

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Edited by Thomas Binet and Indrani Lutchman of IEEP

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Furthering implementation of the CFP

Indrani Lutchman
Editor, IEEP

The last six months has been a very busy period in terms of EU fisheries policy. The Commission is clearly focussing on some targets relating to the ecosystem-based approach to management but also options for effort control as well as strengthening measures against illegal fishing. In addition, the recent launch of the Maritime Policy will contribute to the broadening of EU fisheries management in 2008.

The fisheries management challenge

In June 2007, the Commission issued its annual policy statement (COM(2007) 295) on fishing opportunities for 2008 in the Northeast Atlantic Ocean and the Baltic Sea. In it, the Commission supports the development of more long term management plans, revision of successful plans to ensure sustained benefits and closer collaboration with stakeholders and regular consultations to ensure improvements to the current management system are implemented and effective. This approach was adopted by the Commission in its proposal for fishing opportunities in the Baltic Sea for 2008 (COM (2007) 492). This proposal was adopted by the Council in October 2007. The Commission has made two further proposals yet to be adopted by the Council. The

first is for the Black Sea (COM (2007) 734) and the second relates to fixing fishing opportunities and for certain fish stocks in Community waters and, for Community vessels, in waters where catch limitations are required for 2008 (COM (2007) 759).

The latter proposal will be considered by the December Council meeting and is likely to be more controversial despite the new schedule for decision-making which was adopted in 2006 ((COM (2006)246)). The reason being that despite the commitment to long-term planning and the improved schedule for stakeholder consultation in the run up to the Council meetings on TACs and quotas, ICES and STECF continue to underline the overall poor state of many fish resources in Community waters and the fact that most stocks are exploited at levels exceeding their maximum potential yield. Cod stocks in particular are exploited at levels corresponding to a very high risk of reproductive failure. In recent years, effort limitations have been introduced in some fisheries to reinforce catch limitations, and multi-annual recovery plans have been introduced for some stocks to establish annual catch limitations within a framework of achieving sustainability through gradual reduction of fishing mortality but it is argued that this approach is not effective.

The ongoing argument about whether it would be more effective to achieve sustainable fishing by control capacity or effort is likely to reappear, if even briefly as the Court of Auditor's report (2007) raises the question of whether the Commission should have changed its policy from controlling fishing capacity control to fishing effort. However, as the Commission pointed out in response to the CoA report, whilst they acknowledge that overcapacity is still a major contributor to overfishing, it is unlikely to return to the old regime of micro-managing fishing capacity. That approach in the decade prior to the CFP reform in 2002 proved largely unsuccessful. While this may be true, the Commission must keep monitoring the effects of overcapacity and reflect on the means for effective effort limitation that would move us closer to sustainable and environmental targets.

On the fast track

New policies to address discards

The need to address by-catch and discards was identified by the Commission as an important objective in 2002. In 2003, the Council adopted conclusions inviting the Commission to explore ways to resolve the problem. However, very few projects materialised or demonstrated good results.

● POLICY COHERENCE AT STAKE

In November, following the blocking of ports and oil depots by French fishers in north-western France in protest at diesel fuel costs, French president Nicolas Sarkozy has promised a 21 millions euros program per trimester to durably compensate the rise in oil price for fishers. This will first take the form of social tax exemptions, before the implementation of a long-term fuel subsidies program. He also proposed a plan to modernize the fishing fleet, including more fuel-efficient diesel engines, and to study a mechanism to offset diesel costs against fish prices. But Commissioner Borg opposed those propositions that subsidies were not the way to go, saying that subsidising the industry permanently is certainly not the way forward, and arguing that seeking more energy efficient gear, more energy efficient engines would be more beneficial.

This follows the adoption by the Commission this summer of the Regulation¹ about de minimis aid, a State Aid that may be granted to fishing operators by Member States without prior notification to the Commission. The new Regulation, which will apply only to the fisheries sector, will therefore increase the de minimis aid ceiling ten fold from €3,000 to €30,000 per three-year period, per beneficiary. Although aids for increase in fishing capacity are banished, subsidies for reducing operational costs (e.g. fuel costs) can be provided and therefore may cause an increase in fishing effort. Indeed, this hidden subsidy is likely to lead to harmful environmental and socioeconomic consequences: increased fishing pressure on overfished fish stocks; increased bycatch and disrupt ecosystems; increased carbon dioxide emission and marine pollution; loss in revenue and negative resource rent of fishing firm in the medium and long term; distortion of competition and delay of restructuring of the European fishing fleet². Despite the pressure from environmental stakeholders to exclude cost-reducing subsidies from this aid, the Regulation still authorise such financial transfers.

This paradoxical behaviour from the Commission highlights the need for increased coherence within the European Union with regard to maintaining the fishing economy while bringing sustainable exploitation of marine resources. It has been a recurring concern for the last decade and those confusing signals from the Commission have to be urgently reorganised toward one coherent and clearly oriented message followed by actions consistent with this message.

For further details see: http://ec.europa.eu/fisheries/cfp/market_policy/ecolabel/definition_en.htm

¹ http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_379/l_37920061228en00050010.pdf

² For further information about consequences of cost-reducing subsidies, see WWF report prepared by IEEP about fuel subsidies: http://assets.panda.org/downloads/wwf_fuel_subsidies_to_european_fisheries_070704_final_.pdf

By-catch and discards remain a problem for most fisheries. On 28 March 2007, the Commission adopted a Communication to the Council and the Parliament on a policy to reduce by-catch and discards in European Fisheries (COM (2007)136).

In this Communication the Commission presented issues for discussion and outlines possible policy approaches to reduce unwanted by-catch and progressively eliminate discards. The Communication is largely based on a Commission Staff Working Paper on Impact Assessment relating to different discard policy options (SEC (2007)381). Initial consultations with stakeholder bodies including the Regional Advisory Councils (RACs) and the Advisory Committee for Fisheries and Aquaculture (ACFA) were undertaken and their comments the Commission's Impact Assessment report which also considered the provisional estimations of discarding in various EU fisheries based on data from certain species, years and gears, at a meeting of experts under the auspices of STECF.

The impact assessment report presents three policy options and these have undergone an initial impact assessment. The first option is to take no specific actions but to continue fisheries management as it currently stands. The second is to take supplementary direct measures and adapt CFP instruments including real time closures and selective fishing gear and the third option would be to a) implement a discard ban as a stand-alone option or b) to implement a discard ban, supplemented with additional measures. The impact assessment study comes to the conclusion that whilst the best option will vary fishery by fishery, the most suitable one is generally that which consists of combining the discard ban with different measures intended to reduce economic and social costs of the discard ban and/or amplify the positive effects on discards. Interestingly the Commission concluded with a preferred option and presents this as a starting point for the wider debate which will form the basis of specific regulations however; it remains open to looking at the outcome of policies outside the EU and more comprehensive impact assessments of these options to ensure that the new Regulation is effective and appropriate.

Improving data reporting and control systems

As we end the year, the need for better and more accurate data remains critical. The Court of Auditors audited six of the most important European fishing states, namely Denmark, France, Italy, the Netherlands, Spain and the United Kingdom. A key issue that emerged was the level of misreporting and underreporting of fish catches detected and this raises questions about the impacts of these false declarations. Earlier this year, the Commission had already proposed further revisions to the Data Collection Regulation (DCR) which will be considered at

the December Fisheries Council meeting but along side this, there is a recognition the control and enforcement systems need to be tightened. The Commission is planning an overhaul of the CFP Control Regulation in 2008 which will seek to strengthen mechanisms to improve the accuracy and reliability of capture data at both the EU and Member State levels. This commitment to improving and harmonising fisheries and inspections across the EU and further strengthening the sanctions regimes in Member States will be important for fisheries inside EU waters and the EU's contribution to the global fight against IUU fishing. The EU has laid out an ambitious set of proposals for closing the net on IUU fish products and offenders (COM(2007) 602) which will rely on improved monitoring and enforcement systems.

Looking ahead

2008 is set to be an interesting year with the conclusion of the consultations on rights-based management (RBM) systems, IUU fishing and the submission and approval of national operations programmes (NOPs) of the EFF (see Box1) but equally important will be the further development and expansion of the EU's Maritime Policy (see Box2).

● AN INTEGRATED MARITIME POLICY FOR THE EU

On 10 October 2007 the European Commission published proposals for an EU Integrated Maritime Policy¹. This stressed the need for joined-up decision making to tackle them and deliver economic growth and has a number of elements:

Governance framework: The Commission has set up a maritime policy function to coordinate policy approaches. Policy making will include early identification of maritime issues in annual planning, consultation and use of impact assessments.

Tools for policy making: This will include a European network for maritime surveillance, including monitoring of fisheries, the environment, policing, immigration, etc, improving co-ordination between national agencies.

Maximising the sustainable use of the oceans and seas: This Commission identifies the importance of shipping and ports for the economy and will prepare a comprehensive maritime transport strategy for 2008-2018 as well as a new ports policy.

On environmental issues the proposed marine strategy Directive (MSD) is the principle tool, with some other proposed actions on air pollution and ship dismantling. The MSD is currently being debated by the Council and Parliament and it is expected to be adopted during 2008.

Fisheries management 'must take more into account the welfare of coastal communities' and that 'recovery of fish stocks will be energetically pursued'. The Commission stresses the importance of extraction at maximum sustainable yields by 2015. Specifically, it will take action to eliminate discards, destructive fishing practices and illegal, unreported and unregulated fisheries and promote 'environmentally safe aquaculture'.

Building a knowledge and innovation base for the maritime policy: This stresses the importance of sound science for maritime policy.

Delivering the highest quality of life in coastal regions: This will promote tourism, development of remote areas, etc to assist outermost regions and islands.

Promoting Europe's leadership in international maritime affairs: This will use existing policies as well as new promotion strategy.

Raising the visibility of maritime Europe: The Commission will propose an annual European Maritime Day and a European Atlas of the Seas.

¹ http://ec.europa.eu/maritimeaffairs/pdf/EN_IMP_communication_draft_COM_575.pdf

European action on climate change and the mitigation potential in shipping

Joana Chiavari and Jason Anderson from IEEP provide an update of EU concerns for climate change from both mitigation and adaptation perspectives. They focus here on maritime transport and fisheries.



Source: www.polarview.org

The United Nations Framework Convention on Climate Change (UNFCCC) binds signatories to avoid 'dangerous anthropogenic interference with the climate,' but does not specify how this translates to firm goals. The European Union, through various statements by the Council, the Commission and the Parliament, has arrived at a working interpretation of seeing the world avoid global warming exceeding 2°C above pre-industrial levels. This is universally recognised to represent a tough (though achievable) target, requiring very large reduction in emissions – globally, about 50 percent below 1990 levels by 2050.

Europe's ambitions to see the world agree large emissions cuts for the future means that it will need to take the leadership in achieving reductions itself. This starts with meeting its reduction commitments under the Kyoto Protocol (8% below 1990 levels for the EU-15 and for all of new Member States except Poland and Hungary, which are minus 6%). The most recent data¹ indicate that EU-27 emissions fell 0.7 per cent between 2004 and 2005, after three years of increases. Projections to 2010 show that the EU-15 can achieve an 11.4 percent aggregate reduction including Kyoto credits, while EU-12 emission may be 20 percent below 1990 levels in 2010. Several important caveats are attached to these figures,

¹ European Environment Agency, 'Greenhouse gas emission trends and projections in Europe 2007: tracking progress towards Kyoto targets', EEA Report No 5/2007.

however, including reality matching the projections, the continued availability of external Kyoto 'flexible mechanism' credits, and, importantly the goodwill of over-achieving countries to keep their excess available to under-achievers within the EU (which is not at all a foregone conclusion). Although much of the emphasis of the discussions about climate change in relation to marine environments and fisheries focuses on its impacts, there is clearly a mitigation role for these sectors, primarily in shipping. Although greenhouse gases emissions from shipping per amount of transport work are relatively low compared to other modes, in absolute terms greenhouse emissions from maritime transport are significant. In addition, greenhouse gas emissions from sea shipping are rising due to the increase in the global trading of goods².

At a global level, shipping is estimated to have emitted between 428 and 913 Mtonnes of CO₂ in 2001, the most recent year for which figures are available (CE Delft et al., 2006)³. This means that CO₂ emissions from maritime transport account for 1.8% to 3.5% of global CO₂ emissions. However, fuel originating greenhouse gases from shipping are not currently subject to any policy measures.

The CO₂ emissions of fishing vessels account for a relatively small proportion (around 2.5%) of total CO₂ emissions of shipping (Entec, 2002)⁴. But the infrastructure that supports modern fisheries on a large scale basis is increasingly complex, resulting in greenhouse gas emissions through (i) diesel consumption by ships, and (ii) the use of hydrofluorocarbons-based systems in onboard refrigeration.

A number of studies report that in the past decades fuel efficiency has not been among

² An expert report commissioned by the European Commission published in December 2006 reports that over 90% of the EU external trade and some 43% of its internal trade occur by sea.

³ CE Delft, Germanischer Lloyd, MARINTEK, Det Norske Veritas, "Greenhouse Gas Emissions for Shipping and Implementation of the Marine Sulphur Directive", December 2006

⁴ Entec UK Limited, "Quantification of emissions from ships associated with ships movements between ports in the European Community; Final Report", July 2002 – This study for DG ENV quantifies the CO₂ emissions of vessels in the EMEP region, including the North Sea, Irish Sea, English Channel, Baltic Sea, Black Sea and Mediterranean.

the prime design requirements for shipping, probably due to the low fuel prices, which have a clear influence on fuel efficiency of new ships. It appears that the priority has been placed in building faster vessels, which use more fuel to cover the same distance than slower vessels. This trend is likely to be reversed in the future due to skyrocketing fuel costs, although there is no data to corroborate this hypothesis.

Maritime transport is a global industry and as such should ideally be dealt with at a global level. However, this appears unlikely given the lack of support for effective action among Member States of the International Maritime Organisation (IMO).

IMO has developed an Interim Guidelines for Voluntary Ship CO₂ Emission Indexing for Use in Trials, which expresses a ship's CO₂-efficiency in terms of CO₂ emissions per unit of transport work in tonne-km. However, application of this indexing related to a market based option (trading of emissions rights) is still an issue requiring further discussion within IMO, and few proposals have as yet been made.

The European Commission stated in 2002 that unless concrete measures were forthcoming from the IMO by 2003 then the EU would consider taking unilateral action. Commission officials have subsequently indicated that a proposal for the incorporation of shipping in the EU Emissions Trading Scheme is likely to occur.

The inclusion of the maritime transport in the EU ETS is supported by an expert report published in December 2006 by the European Commission. The report suggests that inclusion would be technically feasible and is likely to be more cost effective than alternative EU instruments considered. Ship operators calling at EU ports could be required to surrender allowances for the CO₂ emissions associated with their voyage.

However, the evidence for the effectiveness of the measure is at an early stage, and considerable further work is required to assess the overall cost effectiveness, and the relative impacts of different design options.

Research developments on climate change and the marine environment

Since 1980, Europe has been warmer than any time during the last 2000 years, with a stronger temperature increase at northern than southern latitudes. According to Katja Philippart, chair of a ESF-Marine Board working group on the impacts of climate change on the European marine and coastal environment, every sea in Europe has already shown alterations due to this recent climate change.

Climate change appears to be speeding up. The sea ice is melting faster than predicted earlier, implying that the Arctic will be ice-free during summer within a few decades from now. This will change local productivity and affect species that depend on this habitat, such as ringed seals and polar bears. Northward movement of marine organisms will result in a shift from Arctic to Atlantic species in the more northern seas and from temperate to more subtropical species in southern waters. Increased river runoff and subsequent freshening of the Baltic Sea will lead to shifts from marine to more brackish and even freshwater species. Temperature-induced loss of endemic species from enclosed systems, such as the Mediterranean and Black Sea, will enhance the introduction of non-native organisms. These shifts in biodiversity will inevitably result in changes in ecosystem functioning and services.

While on-going national and international actions to curtail and reduce greenhouse gas emissions are essential, the levels of greenhouse gases currently in the atmosphere, and their impact, are likely to persist for several decades. On-going and increased efforts to mitigate climate change through reduction in greenhouse gases are therefore crucial. Although we can foresee some patterns of change, marine food webs are often too complex to make “good-enough” predictions to provide for adequate management of our seas.

What we would need here is, first and for all, a European integrated monitoring network to keep track of basin-wide the variations and trends in the abiotic and biotic environment. Data on primary productivity are lacking for most waters, and the knowledge on the status of other trophic levels is often incomplete or outdated. To fill these gaps in knowledge, we should find a way to make better use of new technologies such as automated measurements, satellite images and remote sensing techniques.

In addition, we have to acknowledge that biodiversity, ecosystem functioning and ecosystem services all come down

to species. This implies that we should encourage the painstaking work to identify marine organisms to species level. To be able to tell if a species is already present before it actually settles, we should incorporate the larval and post-larval stages as well. Recently developed techniques, such as chemical tracking and molecular tools, can be of great help to determine the sources and sinks of marine benthic organisms with pelagic life stages, and the subsequent connectivity between our seas.



Source: © EUR-OCEANS

Evaluation of the impact of on-going climate change on the European marine and coastal environment requires regional and local “fit-to-purpose” modeling exercises. These models should incorporate key processes of marine ecosystems (e.g., nutrient recycling, primary production, recruitment, and timing of life-cycle events) and sensitivities and adaptation capabilities of the key species within

this environment. Methods to quantify the uncertainty of climate change projections should be improved.

Analyses of regional resilience and sensitivity of the seas of Europe towards climate-related environmental changes will help to understand the possibilities and limits of management measures. In parallel, we need to know which possibilities we have to mitigate or adapt to the effects of climate change, e.g., by controlled outflow of rivers (supplying nutrients and silt) into the open sea. Last but not least, we need to develop adaptive management strategies which make full and fast use of new information to address the inevitable consequences of climate change for the biodiversity of our marine waters.

Katja Philippart is marine ecologist at the NIOZ Royal Institute for Sea Research, Texel, The Netherlands. Contact: katja@nioz.nl. For more information, see Philippart, C.J.M., R. Anadón, R. Danovaro, J.W. Dippner, K.F. Drinkwater, S.J. Hawkins, T. Oguz, G. O’Sullivan, and P.C. Reid (2007) Impacts of Climate Change on European Marine and Coastal Environment. ESF - Marine Board Position Paper 9, 112 pp. Available from: (website ESF-MB). ESF Contact: Niamh Connolly (nconnolly@esf.org)

Apart from acting as a source of independent information on fisheries, and the environment, El Anzueto aims to present different perspectives on the issues, and thereby encourage discussion and debate among the various player. If you wish to respond to material included in this or the previous issue, we would be happy to hear from you.

Using MPA to build resilience to climate change

By Callum Roberts, Professor of Marine Conservation at the University of York

Climate is changing in the sea just as surely as it is on land. Much attention has been focussed on the importance of maintaining the variety of life in order to provide resilience against future environmental change and shocks. Too little has yet been given to the need to also protect the quantity of life. To sustain viable populations through times of change, more is better. Larger populations are more likely to persist through adversity. More is also better when it comes to maintaining ecosystem processes. Many of these processes are central to the integrity of ecological communities

as well as providing services we value, such as fish and shellfish to eat, water purification and carbon sequestration.

The problem is that exploitation has not been kind to the marine environment. Today, there is only one kilogram of fish left in European seas for every ten there were in 1900. Spin back further in time, and the quantity in 1800 was probably at least twice that of 1900. Oysters have been reduced by more than 99% since the Middle Ages. Such losses greatly lessen throughout measures of ecological processes: the amount of sediment sifted, the amount of biomass transferred to higher trophic levels

to be caught, or the amount of water filtered, for example.

Marine reserves that are off limits to exploitation are vital tools in efforts to rebuild the quantity of life, as well as preserving its variety. Reserves in diverse regions of the world, including Europe, have increased fish and shellfish abundance by 3 to 10 times within their borders, occasionally more. Extensive networks of reserves, covering areas of the order of 30% of the sea, can play a pivotal role in rebuilding the resilience marine systems so badly need to cope with the challenges of a changing world. When complemented by better stewardship in the rest of the sea, reserves will help ensure that marine ecosystems remain healthy and fisheries prosperous long into the future.

Callum Roberts is author of *The Unnatural History of the Sea*, an account of how fishing has changed the world oceans that was named one of the Best 10 Books of 2007 by The Washington Post. www.york.ac.uk/res/unnatural-history-of-the-sea

Towards an ecological coherent network of MPAs in the Baltic Sea

Hanna Paulomäki, Helsinki Commission

In 1994, the Baltic Marine Environment Protection Commission, HELCOM, decided to establish a network of coastal and marine Baltic Sea Protected Areas (BSPAs) to comprehensively protect species, habitats and nature types of the marine and coastal ecosystems of the Baltic Sea area. Since 1994 the network has grown from 62 to today's 86 designated BSPAs. HELCOM has also identified important sites as candidates for future expansion of the BSPA network.

In 2003 HELCOM initiated a regional implementation of the Ecosystem Approach calling for cross-sectoral measures to restore and protect key ecological functions of our environment. The decision also reaffirmed the commitment to establish an ecologically coherent network of well managed marine protected areas (MPAs) by 2010. To fulfil these agreements HELCOM has since 2003 developed a tailor-made regional implementation of the Ecosystem Approach, the Baltic Sea Action Plan that

was adopted in November 2007. The Action Plan aims at restoring good status of the Baltic marine environment by 2021 and is in line with the proposed European Marine Strategy Directive as well as other international commitments.

Achieving the four strategic goals of the Action Plan (1. Baltic Sea unaffected by eutrophication; 2. Baltic Sea life undisturbed by hazardous substances; 3. Favourable conservation status of the Baltic Sea biodiversity; 4. Maritime activities in the Baltic Sea carried out in an environmentally friendly way) will also mitigate adverse impacts of climate change by enhancing the overall resiliency and adaptive capacity of the Baltic Sea environment. Recent HELCOM assessment highlights that global climate change will have a significant impact on the Baltic Sea ecosystem over the coming decades. As the Action Plan aims to restore good status, instead of e.g. achieving a specific level of pollution abatement, this



Map of the Baltic detailing implemented MPAs (dark green), proposed MPAs (light green) and identified off-shore sites (yellow). Source: HELCOM 2007

ensures that the impacts of climate change are taken into account within the work of HELCOM. The further development of an ecologically coherent network

of Baltic Sea Protected Areas is one important tool in this process.

For further information please visit <http://www.helcom.fi>

Climate change and the North Sea cod fisheries



Source: IFREMER

Dr. Nova Mieszkowska and Dr Martin Genner from the Marine Biological Association of the UK present the issue of cod in the North Sea with regard to climate change.

The marine climate of the North East Atlantic is warming faster than the global average rate. Annual sea surface temperatures in coastal European waters have increased by up to 1.0°C since the 1980s, with winter sea temperatures increasing at a greater rate than summer temperatures. Global climate models have forecast further warming of 0.5 to 1.0°C in coastal European seas during the 21st century, and regional models predicting even greater rises of up to 4.0°C in UK waters.

Disentangling the effects of climate change and fisheries on fish stocks is problematic. The responses of fish to the interacting effects of climate change and fishing pressure are not sufficiently understood to allow exact separation of their respective effects. Sustained high levels of fisheries landings by European fleets has

led to a decline of many commercial fish stocks in the North East Atlantic, and climate change may in some cases lead to further decline. There is a general consensus that species' distributions will shift polewards in response to the current period of climate warming. But biological responses are likely to be diverse and will also vary depending on whether the species are cold water in origin (e.g. Atlantic cod, haddock, Atlantic herring) or warm water (e.g. red mullet, hake, black seabream).

The Atlantic cod (*Gadus morhua*) is a predatory, demersal, cold-water species of high economic importance. Climate has an underlying influence on stock size of most cod populations in the North East Atlantic via the direct effects of environmental temperature on growth and survival, and indirect

effects via the timing, location, magnitude and size of zooplankton production and hence larval food. Moreover, mismatch between larval release and food supply is more likely at low stock densities and in warmer climatic periods. Thus climate change may increase the risk of poor recruitment when spawning stock biomass is low. Cod have been seen to respond positively to cooler climatic conditions, as typified by the 'gadoid outburst' in the North Sea between the late 1960s and early 1970s when high cod recruitment led to a series of strong year classes despite increased fishing mortality. By contrast, increasing environmental temperatures have had detrimental effect on North Sea cod stocks. From 1988 to the present decade, annual recruitment of North Sea cod has been low compared to the three previous decades, with 1997 and 1998 the poorest on record.

But the main driver of the decline in cod stocks in the North Sea is undoubtedly commercial fishing. Cod has been overexploited in the North Sea since the late 1960s and stocks have now declined below safe biological thresholds. Catches of cod during the last four decades have been on average 200,000 tonnes per year and have consisted predominantly of young, largely immature fish under 3 years old. The current rate of decline is very steep and beyond maximum sustainable yield, making the risk of complete collapse extremely likely. Theory suggests that when cod populations decline to low abundances through size-

selective fishing they are more vulnerable to other factors such as climate change. This is because systematic removal of the older more fecund year classes simultaneously removes a buffer against interannual recruitment variability.

Overfishing coupled with poor recruitment in warmer climatic conditions are together endangering the long-term sustainability of cod stocks in the North Sea. Temperature effects need to be factored into cod stock assessments and management to reduce the risk of catastrophic stock collapses, such as those seen in the North West Atlantic. Adaptive management should focus on fishing and climate change interactions, given that it is predicted that climate change mitigation will not reduce the rate of warming over the next century. Fishing remains the main pressure on commercial fish stocks. It appears climate change makes matters worse for overfished cold-water species. Thus a precautionary approach is especially required for cold-water species at their range limits in European coastal seas.

Dr. Nova Mieszkowska is a Postdoctoral Research Associate and Dr Martin Genner is a Great Western Fellow, both from the Marine Biological Association of the UK, The Laboratory, Citadel Hill, Plymouth, PL1 2PB, UK. email: www.mba.ac.uk/marclim

Seabird action plan takes wing

By Dr Euan Dunn, BirdLife International



Pep Arcos, SEO/BirdLife

Balearic shearwater - listed as Critically Endangered (IUCN's highest category of extinction risk) and a victim of longline fishing in the Mediterranean

After years of failing to meet its own deadlines for action on the issue, the European Commission is now assessing the scientific information needed to develop a Community Plan of Action for reducing incidental catch of seabirds in longline fisheries, with a view to implementation by 2009. The current commitment is to an action plan for Community waters only, and does not extend to external waters where longline vessels flagged to EC Member States contribute to the bycatch of globally threatened albatross species. This impact beyond Community waters is a major concern of BirdLife International which for many years has been pushing (and continues to do so) the Commission to develop and propose a global – not just a domestic – plan, extending to the EC's engagement in Regional Fisheries Management Organisations (RFMOs). Despite the Commission's

more limited geographical ambitions for a seabird plan, BirdLife welcomes the decision to act, which persistent questions to Commissioner Borg by a number of MEPs also helped to bring about.

Getting to this point has been a slow-burning fuse. In 1999, reflecting the rapidly deteriorating status of albatross populations around the world (since then it's got much worse with now 19 out of 22 species threatened with extinction), the FAO developed an International Plan of Action (IPOA) to tackle seabird bycatch in longline fisheries and urged fishing nations to translate this into national plans. In response, the European Community presented a 'preliminary draft' proposal for a Community plan to the 2001 FAO Committee on Fisheries (COFI) but, despite repeated signals of intent, the

EC made no progress thereafter apart from its support for bycatch mitigation measures in CCAMLR (Convention for the Conservation of Antarctic Marine Living Resources) and some of the tuna commissions.

One of the most significant omissions was the failure to act on the Communication (COM(2002)186 Final) 'setting out a Community Action Plan to integrate environmental protection requirements into the CFP'. Here, addressing the FAO IPOAs on, respectively, Sharks and Seabirds, was listed as a 'priority measure' and a target set to 'propose legislation before end of 2003'. In this regard, it is worth noting that the Commission's workplan for 2007 included a review of this Communication but the review was dropped, apparently due to lack of staff capacity.

Having at last decided to act, the Commission has approached ICES and GFCM to provide advice on the interactions between longline fisheries and seabirds in EU waters, such assessment being the first stage of developing a FAO Plan of Action. BirdLife's own assessment has identified major impacts in Community Waters where there are significant longline fisheries by EC-flagged vessels in the Mediterranean, Madeira, Azores and west of Ireland. In the western Mediterranean, Cory's Shearwater *Calonectris diomedea* is being killed at an unsustainable rate in longline fisheries. Of even greater concern, however, is the Mediterranean bycatch of Balearic Shearwater *Puffinus mauretanicus*, listed by the World Conservation Union (IUCN) as Critically Endangered and threatened with extinction in a generation. Again, a recent study has indicated that over 50,000 Great Shearwaters *Puffinus gravis* are killed annually by Galician demersal longline vessels on the Gran Sol, west of Ireland. All these shearwater species are meant to be protected by the Birds Directive.

Elsewhere in the world's better-managed longline fisheries, the application of a suite of simple, inexpensive and easy-to-operate mitigation measures such as bird-scaring lines and line-weighting has virtually eliminated seabird bycatch, as in large areas of the CCAMLR regulated fishery. The EC has the power to achieve comparable best practice in Community Waters, and has an obligation to do so in pursuit of the ecosystem-based approach to which the CFP committed in 2002. A robust Community Plan of Action-Seabirds, translated into mandatory measures, would also be a fitting contribution to halting biodiversity loss by 2010.

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The Institute for European Environmental Policy (IEEP) is an independent body for the analysis and advancement of environmental policies in Europe. While a major focus of work is on the development, implementation and evaluation of the EU's environmental policy, IEEP has also been at the forefront of research and policy development in relation to the integration of environmental considerations into other policy sectors.

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