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Study of Research Needs for Sustainable Fisheries

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Summary

1 Background of the Study

The fourth North Sea Conference (4NSC) held in Esbjerg in 1995 and the Intermediate Ministerial Meeting on the Integration of Fisheries and Environmental Issues (IMM) held in Bergen in 1997 identified the need for particular research to support marine environmental protection and the sustainable development of fisheries. In support of these commitments, the German Federal Environmental Agency (Umweltbundesamt - UBA) commissioned Ecologic, the Institute for European Environmental Policy (IEEP, London) and Umweltstiftung WWF-Deutschland to provide an overview of the state of research on fisheries and the environment. In particular, the project was to identify specific areas where:

- a) research had been conducted but needed to be continued;
- b) research was considered necessary, but was currently not being undertaken; and
- c) adequate research findings already existed, and could be used to underpin concrete policy measures.

In order to meet these requirements, the project team carried out a literature survey during the period March to November 1999, assessing the state of research in twelve different areas, reflecting the research areas identified in Articles 12 to 15 of the IMM Statement of Conclusions (see section two of this summary for the different research areas).

In the course of the project, an expert workshop, entitled 'Marine Environmental Protection and Fisheries Research' was convened in Hamburg on 2-3 November 1999. The meeting was organised by the Federal Ministry for the Environment, Nature

Conservation and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit - BMU), the German Federal Environmental Agency (Umweltbundesamt - UBA) and the Federal Agency for Nature Conservation (Bundesamt für Naturschutz - BfN), in co-operation with the Federal Ministry of Food, Agriculture and Forestry (Bundesministerium für Ernährung, Landwirtschaft und Forsten - BML) and the Federal Research Centre for Fisheries (Bundesforschungsanstalt für Fischerei - BFAFi). The aim was to elaborate and refine the conclusions of the literature survey, and to identify future research priorities.

These research efforts culminated in the following overview report¹. The document is structured around three main parts: Part 1 presents the main findings of the study; Part II provides a list of key references and projects identified; and a summary of the Hamburg workshop is set out in an annex.

¹Piotrowski et al. 2000. Study of Research Needs for Sustainable Fisheries. Berlin: Ecologic.

Additional annexes include a glossary of German/English terminology used, an overview of the work of the International Council for Exploration of the Sea (ICES), as well as lists of Interview partners and research institutions contacted during the project.

The following section contains the main conclusions of the report, followed by the key findings, structured according to the research areas identified in the statement of conclusions of the IMM 1997 in Bergen

2 Conclusions of the Report

The results of this project underline not only the quantity of literature available in the field of fisheries and the environment, but also the groundbreaking nature of many initiatives undertaken. Research has contributed significantly to the state of knowledge across a wide range of issues directly relevant to the North Sea. Particular advances are noted in the areas of gear selectivity and the direct and indirect impacts of bottom trawling on the benthos. In many other areas, such as seabird/fisheries interactions and long term impacts of fishing on community structures, researchers in the North Sea States continue to be at the cutting edge of European fisheries research.

The findings of this report also reflect a substantial and growing commitment among research communities and funding bodies to addressing the many complex interactions between fisheries and the environment. This is evident from the activities of ICES which is increasingly occupied with questions on the direct and indirect impacts of fishing. In the last decade, ICES has established a series of working groups dedicated to environmental issues ranging from multi-species assessment to ecosystem impacts of fisheries. In 1998, it also took the step of integrating the precautionary approach in its management advice.

This shift in emphasis is driven by a number of factors, including the documented persistent decline in commercial North Sea fish stocks such as cod, herring, mackerel and mussels, and the growing public concern over marine mammal and seabird populations. The 1997 IMM was a direct response to these issues, and has undoubtedly helped focus on the variety of environmental impacts resulting from fishing, in a way that

goes beyond 'traditional' concerns over the state of single commercial fish stocks. Other policies and processes at international and EU level have also contributed to this new research agenda, including international agreements such as the ASCQBANS Agreement, the Wadden Sea Trilateral Agreement, and legislation adopted within the EU, notably the Habitats and Birds Directives.

The level of engagement of a growing group of non-governmental organisations has almost certainly fuelled interest in the environmental implications of North Sea fisheries. These groups have also been responsible for initiating new and innovative research, particularly on issues such as fishing-induced mortality of non-target species.

While many of these organisations have had the ability to steer or to commission research, the EU has clearly played a pivotal role as a major source of research funding. With its substantial budgetary resources, the EU has been able to influence the direction of fisheries research, with the environment now being a key theme. The Fifth Framework Programme on Research and Technological Development, covering the period 1998 to 2002, places an even greater emphasis on this issue and can be expected to support new research in many of the areas covered by this report, including more consistent research on social and economic aspects of fisheries management.

An Emerging Research Agenda

Although the body of knowledge about the North Sea and its ecological resources is substantial, compared to the enormous complexity of the systems involved, it is still relatively poor, and as research improves knowledge in one area, new and challenging questions continue to present themselves in others. There is consequently a continuing need for targeted research to improve our understanding of the marine ecosystem, as well as of social and economic issues associated with the fisheries sector. In the future, it is hoped that such knowledge will form the basis of integrated sustainable fisheries management.

The identification of priorities for future research will be heavily influenced by the specific interests and political objectives that are identified, as well as by continuing budgetary constraints. Overall, research priorities still reflect the objective of maximising the sustainable yield of commercial fish stocks while permitting substantial impacts on the marine ecosystem. Comparably little attention is given to the preservation of the natural structures of the marine ecosystem particularly in terms of the number and distribution of species, or to the morphology of the sea basin. A major challenge for research will be to shift the balance in favour of research on the indirect impacts of fishing on the marine ecosystem, for example, the long term impacts of fishing on species composition and community structure. The designation of undisturbed areas for research purposes will likely be a critical step in this direction.

If research is truly to go beyond maximum sustainable yield objectives, then the key challenge must be to move away from research on single species assessments and local ecosystems, and towards more integrated research. This would allow the anthropogenic impacts and risks on the marine ecosystem to be assessed and presented to policy-makers in a more meaningful way. Knowledge of ecosystem processes and interactions need to be strengthened, in order for fisheries policies to be developed on the basis of an ecosystem approach. In practice this calls for the identification of a number of key characteristics and reference points that may serve as indicators for ecosystem change. Where information is insufficient, action will need to be

based on the precautionary approach. While research an extensive modelling of ecosystem interactions should remain a long term priority in the short term, funds may be better allocated to research an other issues.

There are also a number of more specific challenges facing the research agenda, not least the need to consider other aspects of the fisheries sector, beyond the commercial capture sector alone. This includes recreational fishing which assuming growing significance in some areas and for some species. The direct and indirect impacts of aquaculture is also curiously neglected in discussions an fisheries and environment in the North Sea, despite its growing significance for fisheries and fisheries communities.

Strengthening Multi-Disciplinary Research

It is clear that the fisheries and environment debate is still largely conceived within a natural science framework. Compared to the contribution of ICES over the last century, social and economic sciences have contributed very little to the discussions of fisheries management thus far.

The emphasis on biological assessment is not surprising given that the main management tools - TACs, technical measures and even fleet reduction programmes, are currently underpinned by biological advice. Nevertheless, there is a growing acceptance of the fact that environmental problems associated with fisheries are rooted in societal structures and behaviour. New research concerned with improving selectivity of fishing gear highlights the potential for changing the behaviour of fishermen as an efficient means of improving selectivity, in some cases yielding significant environmental benefits in the short to medium term. It is also important that short and long-term socio-economic impacts of new technologies are assessed, and that mitigating measures are introduced where appropriate.

Widespread research is needed to address the effectiveness of different regulatory systems and institutional structures for fisheries management, as well as the role of the post-harvesting sector, for example, marketing and processing. The impacts an fishing of market liberalisation and globalisation clearly need to be among the priorities. There are also significant opportunities for further exploration and development of the role of downstream activities in delivering environmental, economic and social benefits at the local level. Additional funding should be provided to pilot such schemes which, in turn, could support more extensive research in this area.

The importance of adopting a more multi-disciplinary approach to fisheries and the environment is now gaining broader acceptance within ICES and elsewhere in the scientific community. It is also reflected in the approach adopted under the EC's new Fifth Framework Research Programme. Practical changes have been less forthcoming, however, and may be difficult to achieve without same level of institutional restructuring in favour of the social sciences.

Monitoring and Reporting

The quality of fisheries management advice is dependent an the Information available to fisheries managers. However, requests for Information from ICES and other bodies such 05 the European Commission are not being fully met. ICES in particular has expressed its concern about the quality of catch and fishing effort data from most of the important

fisheries in the ICES area, due to underreporting or misreporting. The state of available social and economic data is worse still.

The situation is partly explained by inadequate institutional capacity to gather and exchange data systematically. The timely submission of data collected by national monitoring programmes is also important. The use of these data in designing new models which are more realistic, taking into account all the key parameters related to a true ecosystem approach, is a top priority. Attempts to realign fisheries management towards an ecosystem approach can only be expected to raise awareness of these problems. It is also likely to add pressure for adoption of more effective means of collecting and disseminating data.

Data that is collected is used to underpin fishing policies and measures aimed at bringing fishing activity within the limits of the specific stock or the broader ecosystem. However, the effectiveness of future policies can only be evaluated if there is adequate information on how policies have performed in the past, including their social and economic effects. It is therefore considered vital that information on the state of stocks or the marine environment is accompanied by detailed information on national fisheries policies and socio-economic change.

In light of both existing and expected needs, there is a strong argument for creating an integrated fisheries monitoring system to bring together all existing reporting requirements within one instrument, or at least to ensure coordination between different instruments. The aim would be to simplify reporting, to standardise information that is submitted and to ensure that it is presented in ways that are more accessible to fisheries managers and the general public. The Commission's 1999 proposal to establish a framework for monitoring and reporting fisheries data is welcomed and should be followed up by detailed requirements covering the range of data needs identified in this report.

Maximising the North Sea's Research Potential

Compared to other regions in Europe, the North Sea States appear to be well equipped in terms of their research capacity. The quality of research has been strengthened by a collaborative and integrated network that has evolved among the main research institutions in the North Sea region (MRAG 1998).

Nevertheless, the demands placed on many institutes is contributing to structural or resource problems. Access to EU funding can be expected to alleviate some of these difficulties, but will also create additional demands in the process of securing and executing large multi-national projects and surveys. There are consequently calls for increased national fisheries/environmental research funds. Importantly, however, critical decisions will need to be made to ensure that future research is focused and that it can produce policy relevant information and advice, particularly in support of an ecosystem approach to fisheries management.

2.1 Recommendations According to Research Areas

2.1.1 Selectivity of Fishing Gear with Respect to Fish

- There has been considerable progress on technical aspects of gear selectivity. However, increased attention should be given to pelagic and other fisheries showing particular bycatch problems;
- There is a need for better linkage of research on gear technology with information, advice and support and work to encourage the adoption of new technology, for example;
- Additional research is also needed on the behaviour of fish during the catch-process, as a means of reducing bycatch;
- Classification systems and environmental impact assessments of fishing gear should be developed; and
- The possibilities of introducing BAT for fishing gear should be explored.

2.1.2 Reduction of Mortality Rates of Birds, Mammals and Benthic Organisms

- The state of knowledge on fishing induced mortality rates of non-target species, especially birds, marine mammals, benthic invertebrates and elasmobranchs should be increased. In the meantime, some species require urgent protection using short-term non-technical measures, such as reducing fishing effort in certain areas, at least until alternative technical approaches have proven effective.
- Research should consider the factors influencing mortality rates, including gear types, the way in which gears are used, and patterns of behaviour of specific species or populations.
- On the basis of available and future knowledge, consideration should be given to the establishment of permanent, seasonal or temporary fishery closures as a more effective strategy for dealing with areas/fisheries showing particularly high mortality rates.
- Adoption of bycatch reduction strategies and targets should be encouraged, in the first instance by increasing awareness of the options for using technologies or practices that reduce mortality. This may include cases where mortality reduction may directly benefit the industry (i.e. win-win scenarios).

2.1.3 Investigation of the Ecological and Economic Effects of and the Practicability of Applying a Discard Ban

- The poor state of knowledge of discard levels remains a major obstacle to assessing their ecological impacts. Additional research should be targeted in particular at midwater and benthic species but also on mammals like harbour porpoises and seals.
- Significant additional research is needed to assess the social and economic effects of instituting discard bans, although ongoing research in this issue should make an important contribution.

2.1.4 Enlargement of Knowledge on the State of Fish Stocks and the

Populations of other Biota

- For most commercial species, there is thought to be sufficient knowledge about the state of populations to protect the species, recognising the uncertainties inherent in their assessment.
- There is support for continuing research on reference points that are part of the precautionary approach. However, these points need to be modified to reflect multispecies interactions.
- The information base on non-target species needs to be improved, also as a precursor to the adoption of the ecosystem approach.
- There is a need for additional monitoring of trends in non-target fish species, especially more vulnerable and threatened species such as several elasmobranch species.

2.1.5 Investigation of the Possible Effects of Hazardous Substances

- North Sea pollution is an important factor that might affect fish stocks and the marine ecosystem. However, evidence found so far demonstrates only limited effects on fish stocks, compared to more widespread impacts caused by fishing.
- Pollution related issues should be addressed in the appropriate national, EC and international fora, in order to build an experience and expertise already available.
- Future research efforts in this area should be targeted at the effects of substances such as endocrine disruptors which may affect fish and non-fish populations.

2.1.6 Investigation of Undisturbed Areas

- There is a clear need for the designation of undisturbed areas to enable more extensive research on the effects of fishing on the benthic ecosystem, and to protect at least parts of the benthic habitat against the effects of fishing.
- Research findings should be used to support further policy recommendations, particularly the more widespread use of protected areas for fisheries and nature conservation.
- Additional attention needs to be given to the design of permanent closures so as to support social and economic, as well as ecological objectives

2.1.7 Studies to Elucidate the Effects of Different Fisheries on the Ecosystems, especially of Beam Trawling and Industrial Fisheries;

- Studies have shown that some fishing methods, such as beamtrawling, have long-term impacts on the ecosystems. Assessing the aggregate impact on the ecosystem of these and other fisheries will continue to be a key challenge and no short-term results can be expected.
- A key requirement for conducting research, particularly on the benthic ecosystem, is the long-term existence of relatively large undisturbed areas.

- Monitoring mechanisms should be developed to assess fishing effort on a suitable scale, and including activities of smaller vessels. Current efforts to make the use of black boxes obligatory in the EU should therefore be supported.

2.1.8 Research Necessary for the Development of an Ecosystem Approach

- Basic concepts of the ecosystem approach still need further clarification. In the short-term direct management advice can not be expected to be based on a comprehensive ecosystem approach.
- Nevertheless, as a first step the integration of results from on-going research on North Sea commercial fish stocks and other parameters such as oceanographic and climatic conditions would be beneficial.
- There is also a clear need for more directed research on assessments of non-target species and their interrelationships with commercial fisheries and fishing activities.
- However, based on the CCAMLR approach, it is reasonable to expect that components of an ecosystem approach can be applied without necessarily defining ecosystem reference points. The precautionary catch limits presented in ICES management advice could be modified to include theoretical requirements of dependent species particularly in critical areas of the North Sea.

2.1.9 Exploration of Incentives to Encourage Support for Fisheries and Environmental Protection

- More extensive work is needed to explore the use of economic instruments, including property rights and financial incentives, to encourage more responsible fisheries practices.
- Projects should explore the use of market based instruments as a means of supporting low impact fisheries production, for example, using local or regional eco-labels as a marketing tool
- The specific issue of financial incentives and payments needs to be explored through detailed study of ongoing or new pilot projects, in order to inform future policy in this area.

2.1.10 Exploration of Means of Encouraging Producers, Middlemen and Consumers to Introduce Measures Aimed at Ensuring Sustainable Use of Fish Stocks

- Social and economic research should be extended to give more weight to the influences of the post-harvesting sector on fish consumption and fishing practice. This should include influences such as globalisation and market liberalisation.
- Research and development on the post-harvesting sector should go beyond large scale eco-labelling initiatives aimed at influencing consumer choice. In particular, research should be directed towards increasing the responsibility of processors and retailers.

- Opportunities to develop local labelling schemes or niche markets need to be explored further, in order to support sustainable traditional products and local economies

2.1.11 Investigation of Socio-Economic Effects of Alternative Options for Regulatory Regimes

- There is a need for a co-ordinated, multi-disciplinary approach to research on how best to deliver ecologically sound fishing, while maximising social and economic objectives.
- Research should consider differential impacts that regulatory systems and instruments have on the social and economic sustainability of fisheries. This should include analysis of the impact of market based instruments and economic incentives on fisheries dependent regions.
- Research needs to address the challenge of designing institutional frameworks appropriate for an ecosystem approach to fisheries management, particularly one based on co-management, subsidiarity and regionalisation.
- Coverage of socio-economic studies should be extended equally to inshore and offshore sectors - rather than the inshore sector being the subject of social studies and the offshore sector the subject of economic studies. They should also extend more systematically to activities of the post-harvesting, aquaculture and recreational sectors.

2.1.12 Introduction and Maintenance of Scientific Sampling Programmes to Monitor Discard Levels

- Systematic and comprehensive quantification of discards remains a major challenge in the North Sea. Programmes tend to focus on a distinct North Sea fisheries, with no overall co-ordination to ensure comprehensive coverage or consistent presentation of results.
- The proposed EC framework for collecting and managing data should help address many of the existing shortcomings. Sufficient priority will need to be given to data relating to discards, however.