



23rd NEAFC Annual Meeting, London, 8-12 November 2004

Information resources with regard to vulnerable deep-sea habitats

By WWF
(Observer NGO)

Background

This submission provides additional information related to draft agenda item 14 and it is intended to assist NEAFC in protecting vulnerable deep-sea features such as seamount and cold-water coral communities.

In the context of the EC funded research programme “OceAnic Seamounts – an Integrated Study” (OASIS), WWF produced the report “Seamounts of the North-East Atlantic”. Contents and Executive Summary of the seamount report are included in the **Annex** to this submission. Hardcopies of the full report will be made available at the annual meeting. An electronic version can be downloaded from <http://www.wwfneap.org>

In addition, WWF provides the colour brochure “Cold-water corals, fragile havens in the deep”. The brochure cover is included in the **Annex**. Hardcopies of the entire publication will be made available at the annual meeting. An electronic version can be downloaded from <http://www.wwfneap.org>

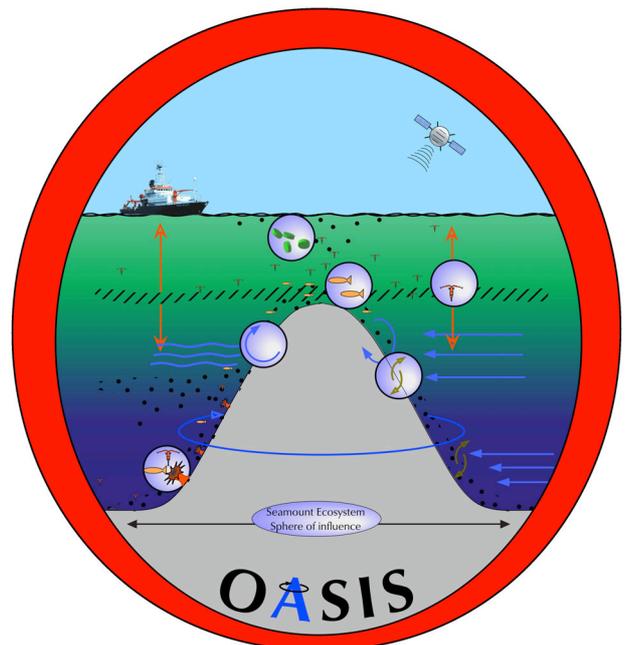
Reference is further made to the new report “Cold-water coral reefs. Out of sight – no longer out of mind” by UNEP, the United Kingdom, Ireland, Norway and WWF which is available at <http://www.unep-wcmc.org>

Action requested

NEAFC is invited to take note of WWF’s information resources and consider them when discussing mechanisms to protect vulnerable deep-sea habitats.



Seamounts of the North-East Atlantic



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Preface

Although there are tens of thousands of seamounts spread throughout the world's oceans, these undersea features are still little-known environments with regard to their biodiversity, their ecology and the short and long-term effects of human impacts. However, it has become clear in recent years that seamounts host very special ecosystems which are at risk from intensive exploitation of their natural resources.

Most studies on seamounts have been conducted in the Pacific. Although some North East Atlantic seamounts were studied already in the 1970s, the knowledge base is very limited and information is scattered through various disciplines, and many scientific results are unpublished. The EU-funded OASIS project (Oceanic Seamounts: An Integrated Study) aims to provide a holistic, integrated assessment of seamount ecology in the NE Atlantic using two sites as case studies. It is the first NE Atlantic seamount survey integrating physical, biogeochemical and biological studies and applying the scientific knowledge to develop possible options for sustainable management.

This report is one of the first products of the OASIS project and seeks to establish a baseline of published information on seamounts in the North East Atlantic by 2002, including a summary of management activities and legal issues. Although some geological information is included, the report focusses mainly on oceanographic and ecological aspects. It is envisaged to update the report in 2005, reflecting the project results and other ongoing research activities in the North Atlantic.

Dr. Bernd Christiansen
OASIS project coordinator

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Executive Summary

Seamounts are generally isolated, typically cone shaped undersea mountains rising relatively steeply at least several hundred meters from the surrounding deep sea floor.

There are at least some 800 major seamounts in the North Atlantic, mostly occurring associated with the Arctic Mid-Ocean Ridge, the Mid-Atlantic Ridge (MAR), and the Greenland-Iceland/Iceland-Faeroe Rise, large features which dominate the topography of the seabed. However, there are also clusters of seamounts some distance from the MAR such as those along the south west of the Rockall Bank and west of Portugal on the Madeira-Tore Rise.

Water mass circulation is characterized by the warm North Atlantic Drift setting northeastwards, seasonal upwelling off southeastern Europe and North Africa, and cold deep water formation off Greenland which then prevails in the North Atlantic deep sea. At the Mid Atlantic Ridge, and in particular around the islands of the Azores, currents, water masses and species of different biogeographic origin meet and mix - shallow seamounts often acting as stepping stones for cross-Atlantic dispersal of species, including wide-ranging migratory species. Reproductive isolation between seamount and ridge systems may also lead to elevated numbers of endemic benthic species, however this cannot yet be confirmed based on the limited data available.

Because of their volcanic origin and steep slopes amplifying the prevailing currents, hard substrata are common on seamounts and may be formed into a terrain interrupted by faults, fissures, down-dropped blocks, canyons, caves and hummocks. Softer substrata may also be present and include biogenic sediments such as foraminiferan sands, lithogenic sediments transported from the continental margin, and authigenic sedimentation, principally from the precipitation of ferromanganese oxides

There is a paucity of information on the benthos, illustrated by the fact that a century of study has

resulted in the identification of just 596 invertebrate species from all seamounts explored up to the late 1980's. The enhanced currents that sweep around the seamounts and the exposed rock surfaces provide ideal conditions for suspension feeders, and it is these that often dominate the benthos. Cold water corals can be particularly abundant with gorgonian, scleractinian and antipatharian corals, some or all recorded from a number of seamounts at several hundred meters depth.

Studies of the pelagic communities above seamounts reveal qualitative and/or quantitative differences when compared to the surrounding water. The higher biomass of planktonic organisms over seamounts constitutes an important basis for the diet of fish, squid and top predators such as sharks, rays, tuna and swordfish. Small and large cetaceans, and turtles also aggregate at these biologically productive hydrographic features.

The fish communities found around seamounts have evolved a suite of morphological, ecological, life-history and physiological features that enable them to successfully exploit an environment with enhanced currents and greater flux of organic matter than much of the deep sea. Many are adapted for strong swimming performance, deep-bodied and with relatively high rates of metabolism and food intake. They may also be exceptionally long-lived with a slow growth rate. Some are also subject to extremely high recruitment variability, with successful recruitment occurring on approximately decadal time scales. Such species include the teleosts like orange roughy, oreos, pelagic armour head, and *Sebastes* spp., as well as various species of sharks and skates. Deep sea fish which form spawning aggregations on North East Atlantic seamounts include the orange roughy (*Hoplostethus atlanticus*), roundnose grenadier (*Coryphaenoides rupestris*) and oreosomatids – smooth oreo and black oreo (*Pseudocyttus maculatus* and *Alloctytus niger*).

The most significant threat in terms of geographic spread and scale of impact is commercial fishing. Commercially important species known to occur on seamounts in the NE Atlantic include tusk (*Brosme brosme*), blue ling (*Molva dipterygia*), morid cod (*Mora mora*), orange roughy (*Hoplostethus atlanticus*)

and the shovel nosed shark (*Deania calceus*). They have been the targets of intensive exploitation using longlines, mid-water trawls and bottom trawls that can operate at depths of more than 1500 m. The search for new locations and potentially marketable deep-water fish on seamounts is a continuous process, fuelled by the depletion of shallow water stocks and the unsustainability of exploitation of deep water stocks.

The effects of fishing on seamount fishstocks are difficult to distinguish from the effects of deep-sea fisheries in general because catch statistics are pooled for relatively large areas. There is also extensive incomplete reporting of deep water catches and landings from international waters. In most cases fishing has taken place before there is a reasonable understanding of the biology of the species being targeted, and in the absence of formal stock assessments or quotas. The result has been over-exploitation and major crashes in the different stocks, *i.e.* of orange roughy and blue ling. Another cause for concern is the high rate of discards of ecologically vulnerable deep sea species associated with deep water fishery in general, with one ton of fish discarded for every ton of fish landed.

Fishing activity is also known to have had a massive impact on the benthos of seamounts in other areas of the world ocean. However, for the North East Atlantic data on impacts are missing due to lack of scientific studies.

Next to demersal fisheries, which have rapidly driven some deep-sea fish stocks to commercial extinction and depleted previously abundant fishing grounds, the use of longlines, driftnets and purse seines are known to have taken many thousands of seabirds, cetaceans, and turtles between them as “incidental catch”. Recreational fishing, while not as widespread in these environments, adds to pressure on the biodiversity on some of the shallower offshore banks and reefs where top predators such as sharks are targeted.

Other threats, though less imminent, are pollution-associated high contamination levels of top predators, threats associated with the dumping of litter, deliberate

discharge of oily and chemical wastes, accidental spills, leakage from sunken ships, noise pollution and, possibly, from the exchange of large volumes of ballast water. More localised threats include those associated with the deep-sea disposal of wastes, mineral extraction and bio-prospecting.

The habitat and associated species on seamounts have been identified as being particularly vulnerable, and there have been calls for measures, such as the establishment of Marine Protected Areas, to safeguard the biodiversity of these features and their associated wildlife, and to provide opportunities to learn more about them.

In recent years, several political initiatives are seeking to address the conflict between human impact and conservation requirements on a global, North East Atlantic regional and national level:

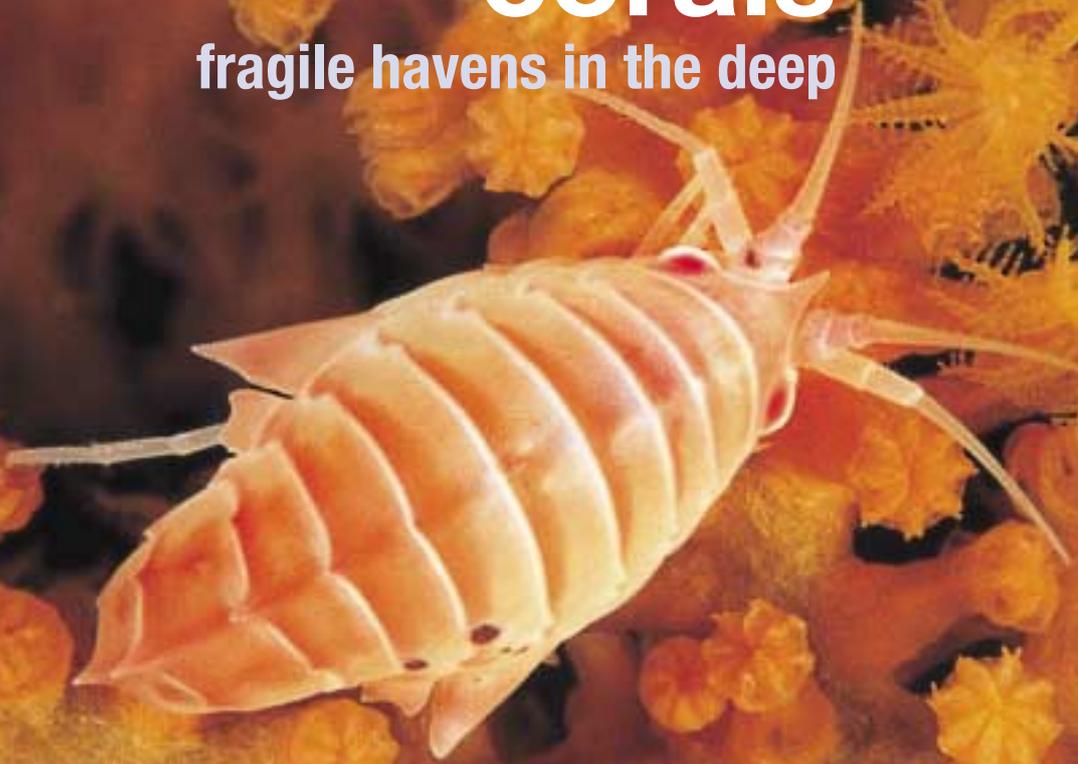
- The UN General Assembly called for urgent coordinated action to integrate and improve the management of seamounts and other underwater features in 2002,
- The need for conservation action in the high seas, *i.e.* by establishing high seas Marine Protected Areas is recognized by various fora (*i.e.* the Convention on Biodiversity)
- The OSPAR Ministerial Meeting agreed in 2003 on a regional priority list of species and habitats, including seamounts, for developing conservation action.
- The European Union Natura 2000 network of protected areas will include seamounts, selected as reef-like habitats under EU Habitats Directive Annex I. The first seamount protected is in Azores (Portugal) waters.

Methods and experiences gained with the management of human activities at seamount Marine Protected Areas in other parts of the world are compiled in the final chapter.



Cold-water corals

fragile havens in the deep



WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- promoting the reduction of pollution and wasteful consumption.

WWF's Global Marine Programme is the world's largest marine conservation programme, active in more than 50 countries around the world. WWF aims to restore the balance in the use of the oceans, and to secure a healthy marine environment for future generations.

WWF's Global Marine Programme has two targets:

- Within a generation, we aim to stop overfishing and ensure that all exploitation of fish populations comes from healthy and well-managed fisheries.
- WWF is also working to establish networks of well-managed and ecologically-representative marine protected areas covering at least 10% of the world's oceans, including the high seas.

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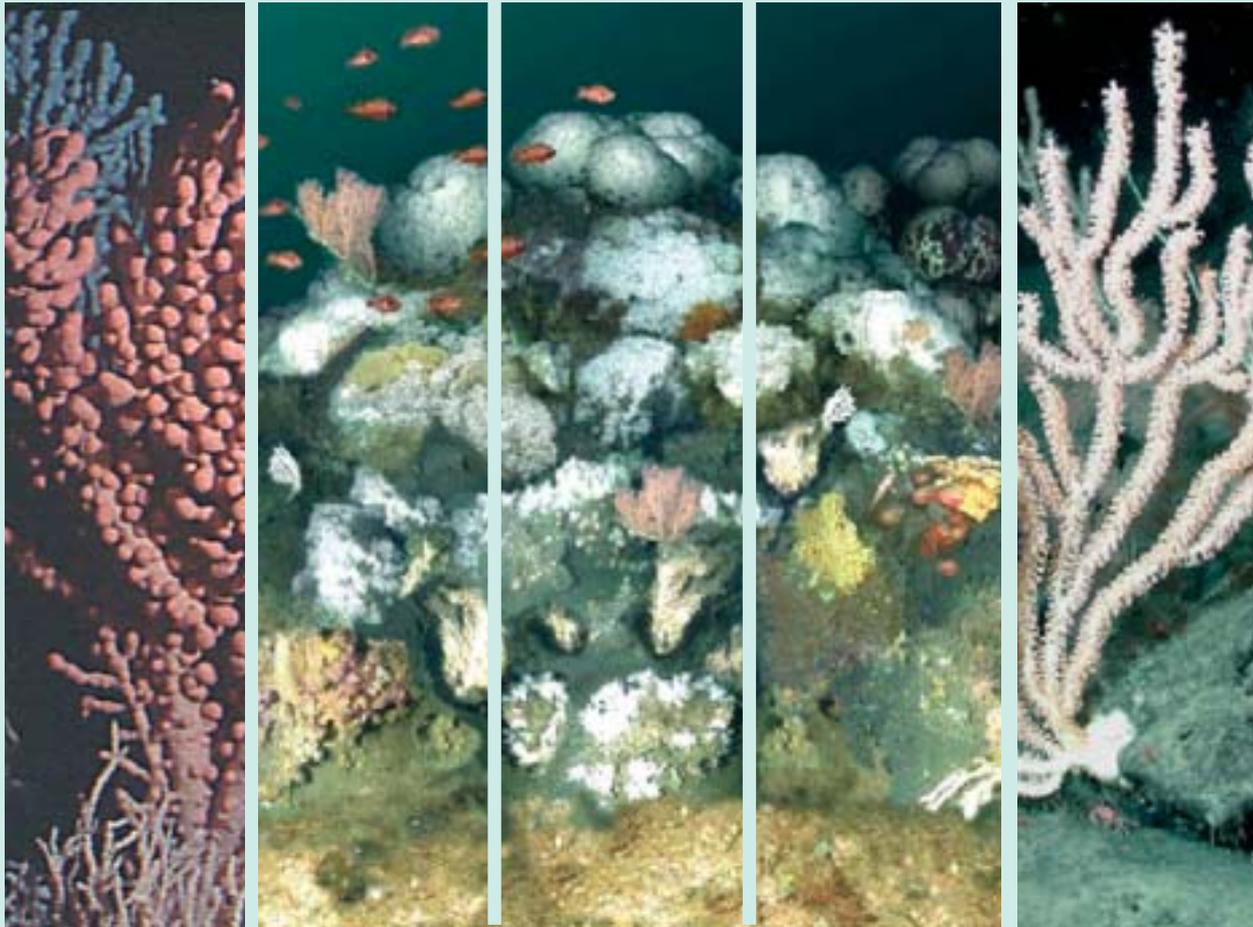
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for a living planet®



Cold-water coral reefs



Out of sight – no longer out of mind

André Freiwald, Jan Helge Fosså, Anthony Grehan,
Tony Koslow and J. Murray Roberts





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Out of sight – no longer out of mind

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THE UNEP WORLD CONSERVATION MONITORING CENTRE is the biodiversity assessment and policy implementation arm of the United Nations Environment Programme (UNEP), the world's foremost intergovernmental environmental organization. UNEP-WCMC aims to help decision makers recognize the value of biodiversity to people everywhere, and to apply this knowledge to all that they do. The Centre's challenge is to transform complex data into policy-relevant information, to build tools and systems for analysis and integration, and to support the needs of nations and the international community as they engage in joint programmes of action.

UNEP-WCMC provides objective, scientifically rigorous products and services that include ecosystem assessments, support for implementation of environmental agreements, regional and global biodiversity information, research on environmental threats and impacts, and development of future scenarios for the living world.

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Messages

'The planet's life-support systems are the source of stability for all peoples, all nations. Cold-water coral reefs are emerging as a new piece in this vital web of life which now requires our urgent attention.'

Klaus Toepfer, Executive Director, UNEP

'Cold-water coral reefs form a remarkable and truly valuable ecosystem off our coasts which our nations must work together to protect.'

Minister Martin Cullen, Department of the Environment, Heritage and Local Government, Ireland

'Cold-water coral reefs are vitally important ecosystems, with immense biodiversity value; a treasure that must be preserved for future generations. The UK has secured a permanent ban on bottom trawling over *Lophelia pertusa* cold-water coral reefs in the Darwin Mounds through action at European Community level. However, further international cooperation is needed to conserve vulnerable marine ecosystems in areas beyond national jurisdiction.'

Elliot Morley, Minister for Environment and Agri-Environment, Defra, United Kingdom

'These reefs are underwater oases, biological treasures and important habitats for fish. It is amazing that such major new discoveries can still be made. The reefs are slow growing and extremely fragile, and must, as a matter of urgency, be protected from further damage.'

Børge Brende, Minister of the Environment, Norway

'At last, advanced science and world leaders recognize that the oceans' resources are finite and now require thoughtful stewardship and intelligent management. We call upon government and industry leaders to take urgent action to conserve the spectacular and unique ecosystems of cold-water coral reefs.'

Dr Claude Martin, Director General, WWF International

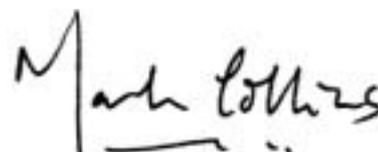
Foreword

Only in the last 20 years has the sea given up one of its deepest secrets. Far beneath the sunlit surface corals thrive, close relatives of the species found along tropical shores and familiar to scuba divers the world over, but adapted to cold, dark, deep water. Found in all the world's oceans, almost from pole to pole, they form physical structures, even reefs that rival in size and complexity those in warmer, shallower waters. These cold-water reefs are usually far beyond the reach of divers and require specialized submersible vehicles to collect samples, to photograph and study the ecology of the corals themselves and the dazzling array of animals that depend upon them.

Undoubtedly this is why cold-water corals have been outside our consciousness for so long. Remote from the daily lives of most people, only a few scientists have studied them, and we are grateful to the five leading members of this community for their efforts in preparing this report on 'Cold-water coral reefs'. Through their

work and that of others we now know that cold-water coral reefs are important and ancient reservoirs of marine biodiversity and are essential nursery habitats for many commercially important fish species. We are also now aware that these reefs are within the reach of one of the most destructive human activities in deep waters, bottom trawling, and so are at serious risk.

The gaps in knowledge are also brought to our attention by this report. We do not yet know how much coral reef covers the deep ocean floor, or even where reefs occur outside a few well-studied locations. While we do understand the threats to cold-water reefs, policy makers do not yet have all the necessary regulatory tools to protect them. I therefore welcome the recommendations made by the authors. As a result of their work, cold-water corals – for so long out of sight – will no longer be out of mind.



Mark Collins
Director
UNEP-WCMC

Executive summary

Over the last few decades the exploration of deep-water environments using new technologies has revealed insights into parts of our planet that challenge conventional wisdom. Coral reefs, once thought to be restricted to warm shallow waters in tropical and subtropical regions, have been found in dark, cold, nutrient-rich waters off the coasts of 41 countries so far. They occur in fjords, along the edge of the continental shelf and around offshore submarine banks and seamounts in almost all the world's oceans and seas. To date, most studies have been carried out in high latitudes, where cold-water reefs occur at depths of hundreds of metres to just 40 metres. However, cold-water corals are increasingly being observed in the tropics, where they thrive at greater depths.

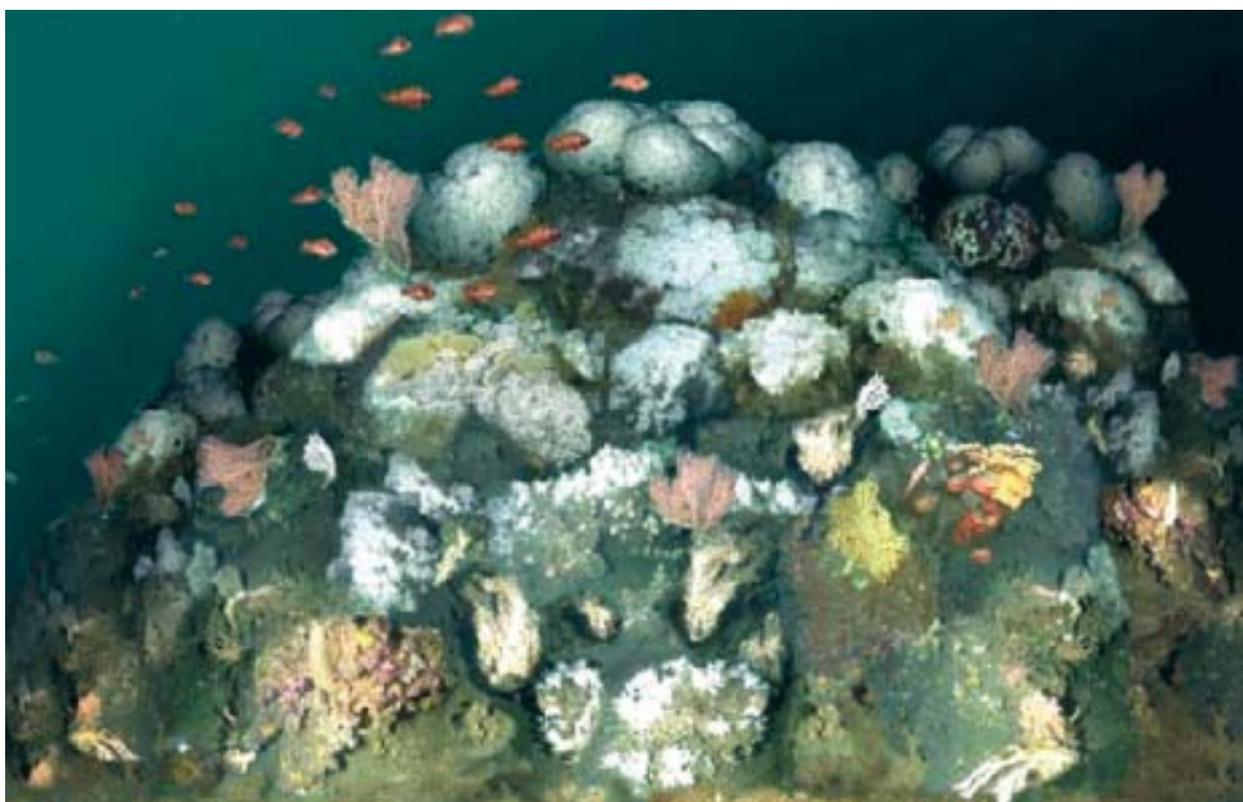
Reef-building and habitat-forming corals in cold waters are derived from several systematic groups. The most important of these are the colonial stony corals (Scleractinia), true soft corals (Octocorallia), black corals (Antipatharia) and calcifying lace corals (Hydrozoa). Several species of these groups create reefs and three-dimensional, forest-like structures on the sea floor, comparable to their warm-water cousins in size and com-

plexity. These cold-water reefs and structures act like islands in the normally flat, featureless and muddy surroundings and harbour a distinct and rich ecosystem, providing niches and nursery grounds for a variety of species, including commercial fish species.

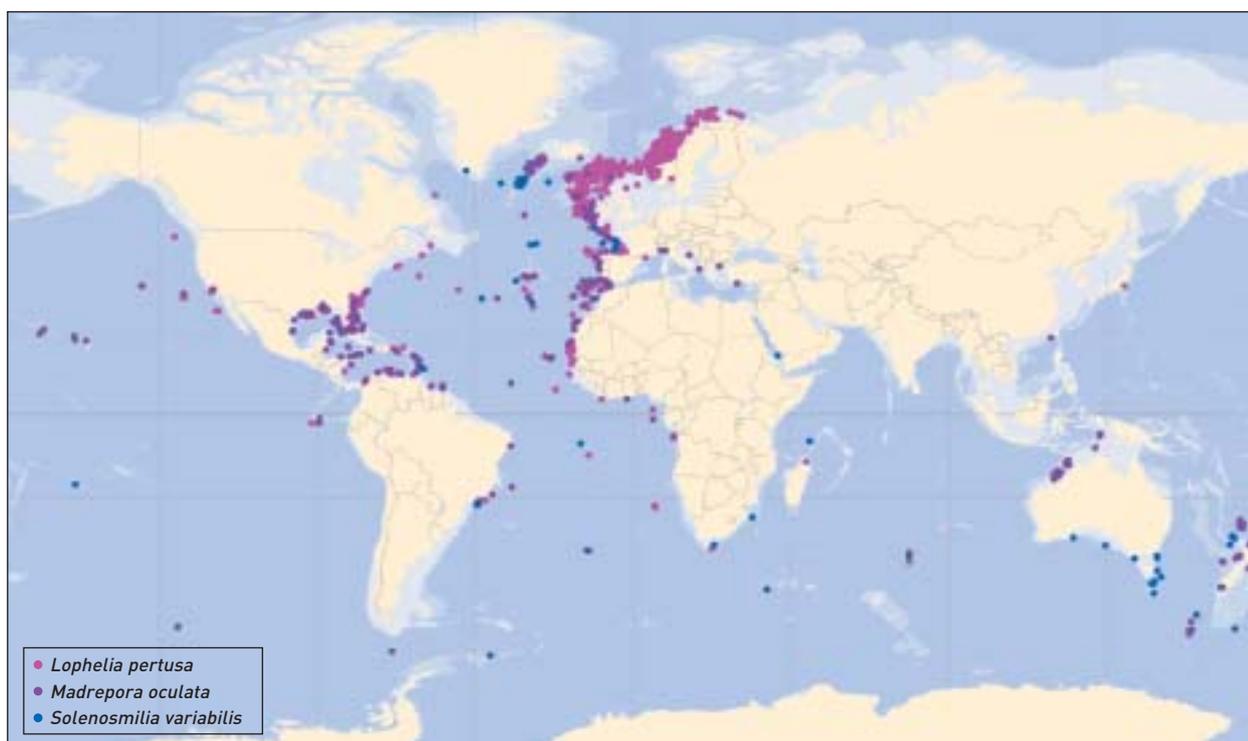
Cold-water coral ecosystems are long lived, slow growing and fragile, which makes them especially vulnerable to physical damage. Regardless of the depth at which these reefs occur, the impact of human activities is evident in almost every survey undertaken. Bottom fisheries, especially using trawls and heavy gear, have already destroyed or scarred several reefs, and represent one of the major threats to cold-water corals. Other documented and potential sources of impact are hydrocarbon and mineral exploration and production, cable and pipeline placement, repair and dumping.

We are still only beginning to understand the principal ecological aspects of cold-water corals, including the environmental factors (temperature, salinity, nutrition) and biological processes (reproductive biology, molecular genetics, predation, parasitism and bioerosion) which regulate their life and distribution. It is

Fosså et al., 2000



A model of a cold-water reef



Global distribution of cold-water coral reefs: points on the map indicate observed reefs of varying size and stages of development, but not the actual area covered. The high density of reefs shown in the North Atlantic most probably reflects the intensity of research in this region. Further discoveries are expected worldwide, particularly in the deeper waters of subtropical and tropical regions

UNEP-WCMC, sourced from A. Freiwald, from various sources

evident that there are large gaps in our knowledge of cold-water coral reefs which need to be closed by further mapping and integrated, multidisciplinary research including modelling of distribution, geology, biology, ecology and the assessment of human impact.

However, already the scientific results and findings clearly demonstrate that cold-water coral ecosystems are important biodiversity hotspots and a biological resource with intrinsic and socio-economic value. In the light of the documented and potential threats, there is an urgent need to prevent further degradation of these vulnerable reefs.

Information campaigns and strategic programmes, largely driven by academia and non-governmental organizations have in recent years increased the awareness and recognition of the international community and stakeholders of the importance of protecting vulnerable marine ecosystems and biodiversity within and particularly beyond national boundaries.

At the time of preparing this report, the need to conserve, protect and manage cold-water coral reefs sustainably is being recognized by governments and major international fora/conventions. Cold-water coral reefs and

other high-seas habitats are starting to appear on political agendas and to influence political decision making. Various countries and regional bodies have adopted, or are in the process of establishing, regulations and measures for the protection and management of vulnerable deep-water habitats, including cold-water coral reefs. These range from the use of fisheries regulations to requirements for environmental impact assessments and the development of specific management plans and regulations, including protected areas.

In support of these emerging actions, the report concludes with a set of recommendations aimed at providing national and international policy makers and stakeholders from developed and developing countries with a 'toolbox' of options to be considered in the conservation, protection and sustainable management of cold-water corals within and beyond the limits of national jurisdiction. A total of 24 recommendations have been made (page 63) covering information management and research; improving monitoring and assessment; regulations and measures, including precautionary, preventative and interim measures; and international coordination and awareness.

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