United Nations Educational, Scientific and Cultural Organization

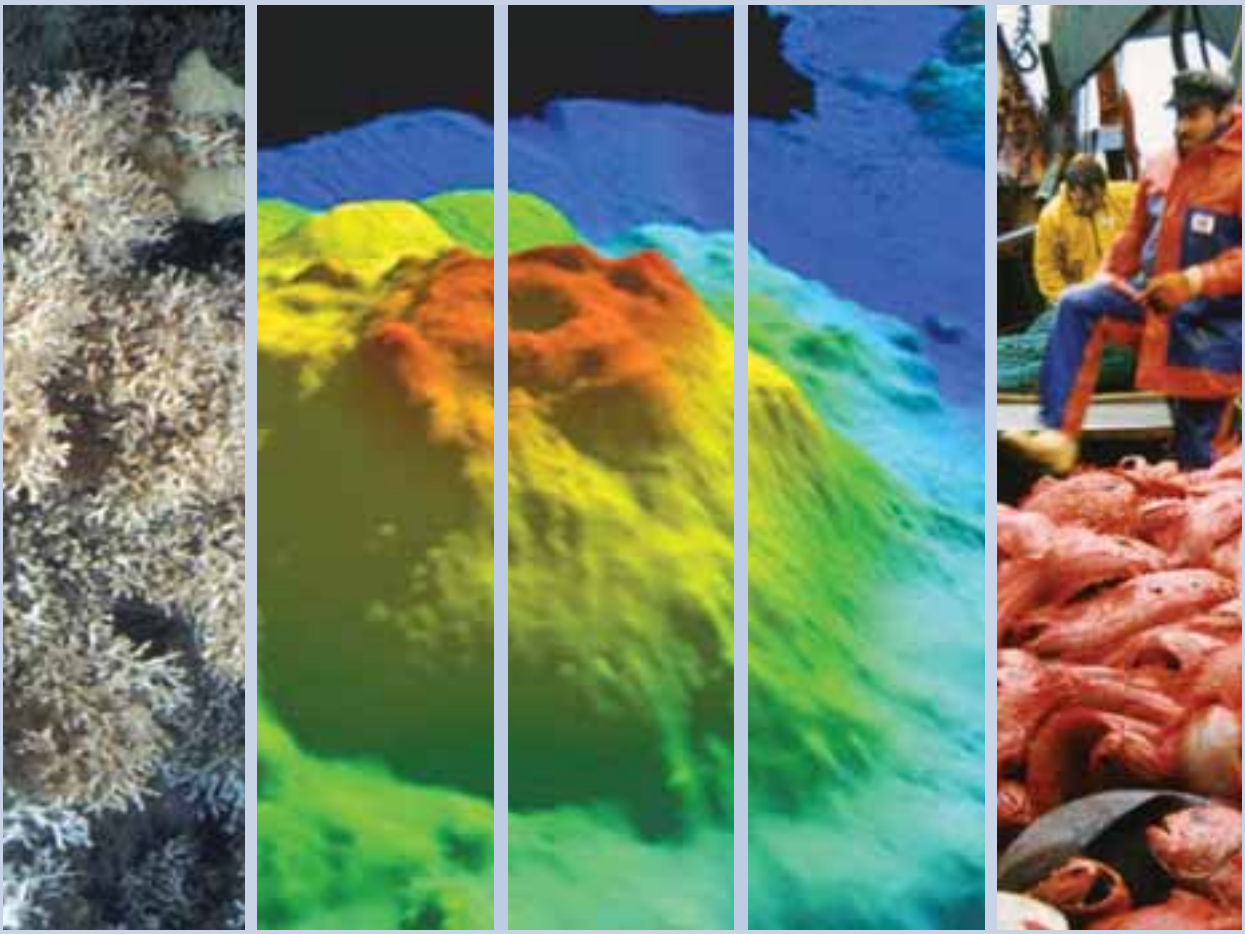
Intergovernmental Oceanographic Commission

CENSUS OF MARINE LIFE

NIWA Taihoro Nukurangi

agriculture, nature and food quality

Seamounts, deep-sea corals and fisheries

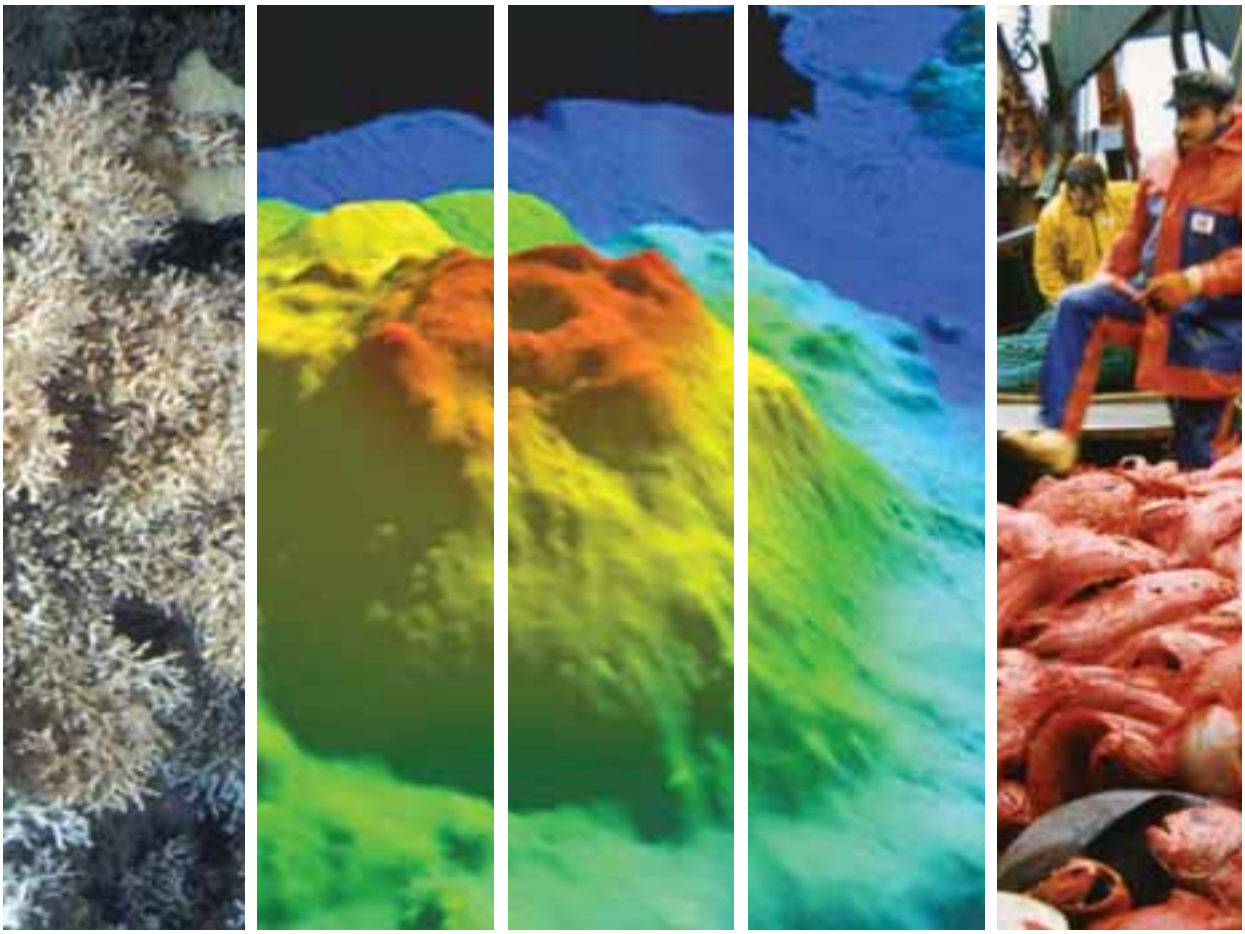


Census of Marine Life on Seamounts (CenSeam)
Data Analysis Working Group

UNEP WCMC

Regional Seas

Seamounts, deep-sea corals and fisheries



Vulnerability of deep-sea corals to fishing on seamounts beyond areas of national jurisdiction

UNEP WCMC

Regional Seas

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DISCLAIMER

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URL: www.unep-wcmc.org/resources/publications/ UNEP_WCMC_bio_series/
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CENSUS OF MARINE LIFE AND CENSEAM

The Census of Marine Life (CoML) is an international science research programme with the goal of assessing and explaining the diversity, distribution and abundance of marine life – past, present and future. It involves researchers in more than 70 countries working on a range of poorly understood habitats. In 2005 a CoML field project was established to research and sample seamounts (Stocks et al. 2004; censeam.niwa.co.nz). This project, termed CenSeam (a Global Census of Marine Life on Seamounts), provides a framework to integrate, guide and expand seamount research efforts on a global scale. It has established a 'seamount researcher network of almost 200 people around the world, and is collating existing seamount information and expanding a database of seamount biodiversity. Its Steering Committee comprises people who are at the forefront of seamount research, and can therefore contribute a wealth of knowledge and experience to issues of seamount biodiversity, fisheries and conservation.

One of the key themes of CenSeam is to assess the impacts of fisheries on seamounts, and to this end, it has established a Data Analysis Working Group (DAWG) that includes people with a wide range of expertise on seamount datasets and analysis and modelling techniques.

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Supporting organizations

UNEP's Regional Seas Programme aims to address the accelerating degradation of the world's oceans and coastal areas through the sustainable management and use of the marine and coastal environment, by engaging neighbouring countries in comprehensive and specific actions to protect their shared marine environment.

The UNEP World Conservation Monitoring Centre (UNEP-WCMC) is the biodiversity assessment and policy implementation arm of the United Nations Environmental Programme (UNEP), the world's foremost intergovernmental environment 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 programmes of action.

The Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO) provides Member States of the United Nations with an essential mechanism for global cooperation in the study of the ocean. The IOC assists governments to address their individual and collective ocean and coastal problems through the sharing of knowledge, information and technology and through the coordination of national programmes.

agriculture, nature and food quality

Department of Nature, Ministry of Agriculture, Nature and Food Quality, Netherlands.

The Census of Marine Life (CoML) is a global network of researchers in more than 70 nations engaged in a ten-year initiative to assess and explain the diversity, distribution and abundance of marine life in the oceans – past, present and future.

The National Institute of Water and Atmospheric Research (NIWA) is a research organization based in New Zealand, and is an independent provider of environmental research and consultancy services.

Foreword

'How inappropriate to call this planet Earth, when it is quite clearly Ocean'

attributed to Arthur C Clarke

A look at a map of the world shows how true this statement is. Approximately two-thirds of our planet is covered by the oceans. The volume of living space provided by the seas is 168 times larger than that of terrestrial habitats and harbours more than 90 per cent of the planet's living biomass.

The way most world maps depict the oceans is deceiving: while the land is shown in great detail with colours ranging from greens, yellows and browns, the sea is nearly always indicated in subtle shades of pale blue. This belies the true structure of the seafloor, which is as complex and varied as that of the continents – or even more so. Some of the largest geological features on Earth are found on the bottom of the oceans. The mid-ocean ridge system spans around 64 000 km, four times longer than the Andes, the Rocky Mountains and the Himalayas combined. The largest ocean trench dwarfs the Grand Canyon, and is deep enough for Mount Everest to fit in with room to spare.

Only in the last decades, advanced technology has revealed that there are also countless smaller features – seamounts – arising in every shape and form from the sea floor of the deep sea, often in marine areas beyond national jurisdiction. Observations with submersibles and remote controlled cameras have documented that seamounts provide habitat for a large variety of marine animals and unique ecosystems, many of which are still to be discovered and described. However, the same observations also provided alarming evidence that seamount habitats are increasingly threatened by human activities, especially from the rapid increase of deep-sea fishing.

The United Nations General Assembly has repeatedly called upon States and international organizations to urgently take action to address destructive practices, such as bottom trawling, and their adverse impacts on the marine biodiversity and vulnerable ecosystems, especially cold-water corals on seamounts.

This report, compiled by an international group of leading experts working under the Census of Marine Life programme, responds to these calls. It provides a fascinating insight into what we know about seamounts, deep-sea corals and fisheries, and uses the latest facts and figures to predict the existence and vulnerability of seamount communities in areas for which we have no or only insufficient information.

The deep waters and high seas are the Earth's final frontiers for exploration. Conservation, management and sustainable use of the resources they provide are among the most critical and pressing ocean issues today.

Seamounts and their associated ecosystems are important and precious for life in the oceans, and for humankind. We hope that this report provides inspiration to take concerted action to prevent their further degradation, before it is too late.

Veerle Vandeweerd, *Head,*
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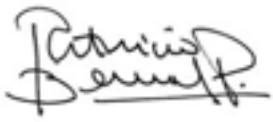

Patricio Bernal, *Executive Secretary,*
Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO)

Executive summary

The oceans cover 361 million square kilometres, almost three-quarters (71 per cent) of the surface of the Earth. The overwhelming majority (95 per cent) of the ocean area is deeper than 130 m, and nearly two-thirds (64 per cent) are located in areas beyond national jurisdiction. Recent advances in science and technology have provided an unprecedented insight into the deep sea, the largest realm on Earth and the final frontier for exploration. Satellite and shipborne remote sensors have charted the sea floor, revealing a complexity of morphological features such as trenches, ridges and seamounts which rival those on land. Submersibles and remotely operated vehicles have documented rich and diverse ecosystems and communities, which has changed how we view life in the oceans.

The same advances in technology have also documented the increasing footprint of human activities in the remote and little-known waters and sea floor of the deep and high seas. A large number of video observations have not only documented the rich biodiversity of deep-sea ecosystems such as cold-water coral reefs, but also gathered evidence that many of these biological communities had been impacted or destroyed by human activities, especially by fishing such as bottom trawling. In light of the concerns raised by the scientific community, the UN General Assembly has discussed vulnerable marine ecosystems and biodiversity in areas beyond national jurisdiction at its sessions over the last four years (2003-2006), and called, *inter alia,* 'for urgent consideration of ways to integrate and improve, on a scientific basis, the management of risks to the marine biodiversity of seamounts, cold-water coral reefs and certain other underwater features'.

This report, produced by the Data Analysis Working Group of the global census of marine life on seamounts

on seamounts and identifies the seamounts on which they are most likely to occur globally;

3. compares the predicted distribution of stony corals on seamounts with that of deep-water fishing on seamounts worldwide;
4. qualitatively assesses the vulnerability of communities living on seamounts to putative impacts by deep-water fishing activities;
5. highlights critical information gaps in the development of risk assessments to seamount biota globally.

SEAMOUNT CHARACTERISTICS AND DISTRIBUTION

A seamount is an elevation of the seabed with a summit of limited extent that does not reach the surface. Seamounts are prominent and ubiquitous geological features, which occur most commonly in chains or clusters, often along the mid-ocean ridges, or arise as isolated features from the sea floor. Generally volcanic in origin, seamounts are often conical in shape when young, becoming less regular with geological time as a result of erosion. Seamounts often have a complex topography of terraces, canyons, pinnacles, crevices and craters – telltale signs of the geological processes which formed them and of the scouring over time by the currents which flow around and over them.

As seamounts protrude into the water column, they are subject to, and interact with, the water currents surrounding them. Seamounts can modify major currents, increasing the velocity of water masses that pass around them. This often leads to complex vortices and current patterns that can erode the seamount sediments and expose hard substrata. The effects of seamounts on the surrounding water masses can include the formation of 'Taylor' caps or columns, whereby a rotating body of water is retained over the summit