# one planet one ocean

## Sustainable development of oceans and coasts:

*a commitment of 129 States*

Intergovernmental Oceanographic Commision
of UNESCO

*For bibliographic purposes, this document should be cited as follows:*

One Planet, One Ocean – Sustainable Development of Oceans and Coasts:
a Commitment of 129 States at Johannesburg 2002
IOC Information documents series No. 1172, UNESCO 2002
(available in Arabic, Chinese, English, French, Russian and Spanish)

*Printed in 2002*
by the United Nations Educational, Scientific and Cultural Organization
7, place de Fontenoy, 75352 Paris 07 SP

UNESCO 2002
Printed in France

(SC-2002/WS/24)

# Sustainable development

## and the Intergovernmental Oceanographic Commission of UNESCO

A document for the World
Summit on Sustainable Development
Johannesburg, 26 August - 4 September 2002

# foreword

History may recognise the year 1992 as an important milestone in the evolution of the human race on the planet. It was the year that governments assembled at Rio de Janeiro, for the United Nations Conference on Environment and Development (UNCED), to begin the discussion on how to reconcile the demands of the present with the hopes for the future. It was an early round in a continuing debate in which there will be many more points of view to be heard and many more demands to be addressed. The Conference produced an important document, Agenda 21, which has since served as a standard against which progress can be measured. Ten years later, in Johannesburg, 2002, governments are again meeting at the World Summit on Sustainable Development (WSSD), to look at achievements and failures, and to take action on future policies and programmes.

Chapter 17 of Agenda 21, deals specifically with the ocean. The ocean deserves a special place when speaking of sustaining the environment in which we live and of the resources needed to develop the well being of all peoples. The ocean is unique in occupying the greatest portion of the planet's surface. The ocean is necessary for the air we breathe, the water we drink, the food we eat and the climate in which we live. The ocean is both a global commons and a global responsibility.

No country has the necessary resources to study and monitor the whole ocean and all countries should have the capacity to address at least their own near shore areas. In addition, in 1994, the UN Convention on the Law of the Sea came into force, recognising the concept of the common heritage of mankind, but also bestowing on coastal States jurisdiction of the sea, over living and non-living resources, out to 200 nautical miles, and for seabed resources, potentially even further. The promise of future offshore wealth is tempered by the onerous undertaking to manage and protect these waters. This is particularly difficult for the developing world.

Relatively, little is known of the ocean environment. It is complex and inaccessible. It is difficult and expensive to study. It is complicated by national and international jurisdictions, regional and global agreements and conflicting priorities. It is also an essential part of the planetary environment, on which we all depend, and collectively governments must do more to address their responsibilities in ocean stewardship.

This document is complementary to the Declaration from the IOC Member States to the WSSD. It describes what the Intergovernmental Oceanographic Commission, of UNESCO, has accomplished since UNCED and what it will be attempting in the next decade. The IOC is a flagship programme of UNESCO and an important partner in UNESCO's unifying theme of sustainable development. The text has been deliberately written to address sustainable development in the oceans in terms understandable to a broad audience, not necessarily familiar to the IOC or even with marine science. It touches upon ocean sectors, not under the responsibility of the IOC, but for which the input of ocean science and services is essential.


global agreement
common heritage
conflicting priorities
ocean stewardship


coastal areas
better knowledge
support of research
living and non-living resources

The world oceans and their adjacent seas, and the living and non-living resources they contain, are a necessary element for the survival of life as we now know it. The sustainability of the air we breathe, the water we drink, the food we eat and the climate in which we live is dependent upon the oceans.

The oceans also provide for the cultural, social and economic well being of people. It is the oceans that make life on earth uniquely sustainable within the solar system. Sustainable development is highly dependent on the wise management of the oceans and coasts based on scientific knowledge.

Governments must work together. The collective effort of all States is required to resolve global issues. Government co-operation at global and regional levels is necessary. We need strong global and regional institutions to support this, and to bring science and policy makers together. The countries whose economies and social structures depend on the ocean must be able to address local problems. For this it is essential that we build the capacity of all countries.

Governments placed the protection and preservation of the oceans and their resources at a high level of priority in Agenda 21 of UNCED.

As the sole UN organization specialised in ocean science and services, the Intergovernmental Oceanographic Commission of UNESCO has many notable achievements over the last decade in support of UNCED:

- support of research into ocean climate and long-term weather variations in co-operation with the World Climate Research Program which allows early forecasting of El Niño events, such as happened in 1997/98;
- the Global Ocean Observing System (GOOS) has been initiated in concert with companion UN agencies and ICSU, with an initial focus on the open ocean and a fast developing parallel focus on monitoring and forecasting in coastal seas;
- improved systems for exchange and availability of ocean data and information;
- a programme on Integrated Coastal Area Management is focusing attention on many of the high priority environmental problems in coastal areas;
- better knowledge of ocean features, processes and the impacts of human actions on the state of the marine environment;
- strengthened regional mechanisms in ocean sciences and in the capacity of developing countries in marine research and services;

# declaration

## by the Intergovernmental Oceanographic Commission of UNESCO to the World Summit on Sustainable Development

- leadership of the UN 1998 International Year of the Ocean;
- substantial contribution to the UN Ocean Informal Consultative Process.

Much has been achieved. Much remains to be done over the coming years. The Intergovernmental Oceanographic Commission affirms its will to:

- act as a focal point to encourage interactions in marine science and observations across relevant bodies of the UN system and other organizations;
- further develop partnership in capacity building in marine science and services at regional and national levels, particularly with developing countries and taking also into account the African Process;
- develop GOOS as an operational system;
- promote the development and implementation of programmes on Integrated Coastal Area Management;
- participate fully in the necessary assessment of the global ocean environment, and periodic reporting on the state of the oceans;
- promote the use of scientific knowledge for management decisions and policy making and facilitate access to this knowledge;
- work to increase public awareness of the importance of the oceans and coasts for sustainable development and the future of humanity.

The Member States of the Intergovernmental Oceanographic Commission ask that the WSSD reaffirm the importance of the oceans for sustainable development; promotes the IOC as the key marine science body of the UN; and encourages governments and funding organizations to provide the resources necessary to implement IOC priorities, including support for IOC activities for marine science capacity building in developing countries.



# contents

*"The oceans are a global commons and as such require an integrated approach by governments."*
Extract from an IOC message to the Commission on Sustainable Development (CSD 7)

# 1 Introduction to the IOC

## 1.1 – The context

The World Ocean represents a unique global commons and a vital life support system for humanity in the twenty-first century. It is arguably the most bountiful and yet the most threatened natural resource of the planet.

The interaction of the ocean with the atmosphere, on time scales from days to millennia, is a major determinant of the world's weather, climate, air quality and freshwater supply. The ocean provides the primary mode of transportation of natural resources and manufactured goods between nations and is crucial to economy and trade. The full extent of its living and non-living resources is as yet undetermined.

Three quarters of the earth's surface consists of ocean, a large portion outside national jurisdiction and thus part of a global commons. The very size of the ocean belies its vulnerability. On the other hand, the value of its benefit to the global community belies the extent to which it has yet to be properly observed and understood.

Since 1992 there have been significant changes in the political and legal regime relating to the oceans. In 1994, the long awaited UN Convention on the Law of the Sea came into force. A great deal of attention has been focused on the extension of national jurisdiction that the Convention recognizes with respect to coastal States. Much less has been paid to other articles, such as those dealing with responsibilities for the marine environment, capacity building and intergovernmental co-operation.

In 1995, governments agreed on a global plan of action, backed up by national plans, to address the protection of the marine environment from the wastes generated on land. The Washington Agreement recognizes the pollution problems caused by the agricultural and industrial wastes that flow into the sea in rivers and those that are discharged directly into coastal waters.

The United Nations declared 1998 as the International Year of the Ocean, which promoted many activities from local to global levels, from school programmes to national action and to important international and intergovernmental initiatives. Part of this impetus fuelled action at the UN General Assembly, which accepted a recommendation from the Commission on Sustainable Devel-

opment to adopt an informal consultative process that would give more visibility to ocean issues at the highest level of the United Nations. This process has been in place since 1999. Concurrently, the Secretary General has called for greater co-operation amongst the UN organizations dealing with the ocean.

Any task dealing with the ocean demands intergovernmental co-ordination. The Intergovernmental Oceanographic Commission of UNESCO is uniquely placed to play a pivotal role in many of the needed areas of action.

## 1.2 – The organization

The Intergovernmental Oceanographic Commission was established under the auspices of UNESCO in 1960 to provide the Member States of the United Nations with an essential mechanism for global co-operation in the study of the ocean and for co-ordinating ocean science amongst the UN Agencies. The IOC has its own Statutes, Member States (currently 129), Executive Council and elections. It operates with an annual budget of US$6 million.

In simple terms, 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 co-ordination of national programmes. An essential part of all IOC activities is the facilitation and support of the efforts of developing countries to participate effectively, and on an equal basis, in marine issues. The IOC also provides a focus for other UN specialized organizations with regard to ocean science and service responsibilities.

*"The purpose of the Commission is to promote international co-operation and to co-ordinate programmes in research, services and capacity building, in order to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and the decision making processes of its Member States."*

Article 2 , IOC Statutes - November, 1999

## 1.3 – The future

The governments of the world have advanced sustainable development principles over the last ten years. The increasing population and demand for resources will continue and pressure on marine and coastal environments will not abate. Governmental action will be required to address regional and global issues. The knowledge required for the wise management of marine resources and the information necessary to apply that management will arise mainly from the collective wisdom of governments working together. Accurate and co-ordinated reports of the state of the ocean and coastal waters can only be achieved through governmental action.

The IOC has been faced with increasing demands in the past and there is no sign that this trend will diminish in the next ten years. The global ocean observations encouraged in Agenda 21 have been implemented and will continue to be expanded. The IOC objectives for promoting open sharing and exchange of ocean data, for increasing our understanding of the oceans and for improving coastal management and marine environmental quality will continue to be pursued. The IOC is committed to increase the capacity and capability of all countries to participate in these advances.

# 2 Integrated coastal area management

## 2.1 – Managing coastal environments

In 1997 the IOC established a programme specifically directed at the management of coastal environment and coastal activities. The action was a direct reflection of the high priority given by governments to coastal issues and further amplified by the new management responsibilities within extended offshore jurisdictions.

The range of issues within the vulnerable coastal areas of the world is enormous. Co-operative efforts must also recognize the sensitivity of national jurisdictions and the many other regional and international organizations carrying out specific responsibilities. The IOC programme has therefore focused on building the capacity to tackle the problems of monitoring changes in the coastal environment, of sharing and accessing information, of bringing together the different sciences involved and using these to develop ways of managing coastal activities in a sustainable way.

The shallow coastal waters are an important part of the marine ecology, providing food and habitat to a large part of the commercial fish stocks and a home for the growing mariculture industry. Threats to the ocean environment will also be first evident on its margins and therefore monitoring these waters should be a priority. The ocean observing system being managed by the IOC has recognized the value of coastal observations, both for their value in monitoring change and for the resulting information upon which day-to-day coastal management can rely.

In the exercise of their jurisdiction within their coastal areas and adjacent seas, coastal States share many of the same problems, have the same regional priorities and a need to understand the common global processes that affect their shores and environments. The intergovernmental Washington Agreement relates to the control of marine pollution from land-based activities. Other needed areas to address are coastal habitat loss, the protection of coral reefs, the monitoring of coastal health, the availability of information and effective coastal management mechanisms.

## 2.2 – Coastal protection

The ocean interaction with the coastline is not always beneficial. In some areas coastal erosion is a severe problem, in others the converse problem of keeping ports and navigational channels free from sedimentation is more prevalent. Safety of life and property from storm waves and surges and from the more rare but devastating tsunamis is also of high priority in many coastal communities. The United Nations has sponsored a decade of study into mitigating the impact of natural disasters. The IOC has been involved in the forecasting and monitoring of natural catastrophes arising from ocean forces, especially because of the continued development of vulnerable coastal areas.

The IOC has a long-standing and successful programme in the Pacific Basin, which facilitates an intergovernmental programme to warn of, and mitigate the impact of, tsunamis. Although the programme has

been centred on the Pacific for many years, there is of course no special regional significance to this, beyond the proneness of the region to earthquakes and hence to potential tsunami generation. Much of the research into the movement of these waves is also applicable to storm surge propagation. Recently other regions have been requesting the IOC to pay more attention to the forecasting of tsunami and storm surges in their respective areas.

# 3 Marine environmental protection

## 3.1 – The health of the oceans

The fight against marine pollution has been a priority for the IOC from the very first years. Together with other UN organizations dealing with ocean issues, the IOC co-sponsored a group of experts to look at the science needed to combat marine pollution. The group has published a large number of learned documents, the best known of which has been the series on the "State of the Ocean". The latest, entitled *Sea of Troubles*, was recently released.

The IOC has co-ordinated research on marine contaminants, held workshops and training sessions and facilitated the transfer of knowledge and technology dealing with marine pollution.

Advances have been made on the problems of setting standards against which to measure contaminant levels. Conclusions have been reached on priorities for observational activities to understand and predict changes in the health of the ocean. Under the guidance of leading scientists, methodologies and sampling techniques have been agreed upon.

By far the largest proportion of marine pollution is contributed by land-based activities, a fact that has been recognized by governments in the signing of the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities in 1995. The IOC contributed to this effort and is now assisting with the assembly of information under the programme, particularly in the areas of nutrients and sediments. A number of regional marine environmental assessments are also being prepared under the Global Programme of Action, which has recently been the subject of an intergovernmental review.

*"Degradation of the marine environment can result from a wide range of sources. Land-based sources contribute 70 per cent of marine pollution, while maritime transport and dumping-at-sea activities contribute 10 per cent each. The contaminants that pose the greatest threat to the marine environment are, in variable order of importance and depending on differing national or regional situations, sewage, nutrients, synthetic organic compounds, sediments, litter and plastics, metals, radionuclides, oil/hydrocarbons and polycyclic aromatic hydrocarbons (PAHs). Many of the polluting substances originating from land-based sources are of particular concern to the marine environment since they exhibit at the same time toxicity, persistence and bioaccumulation in the food chain."*

Agenda 21: 17.18

# 4 Sustainable use and conservation of marine living resources

## 4.1 – A broader approach to fisheries management

Fisheries managers are generally being faced with depleted stocks of commercial fish. As traditional species diminish the fishing industry looks to new species to harvest. Management practices now look to an ecosystem approach that recognizes the interdependence of species and the need to understand the total environment. The IOC programme addressing living resources is consistent with this approach.

The IOC, in partnership with its advisory partners, is concerned with how the environment influences the productivity of commercially important fish stocks and how we can detect relevant changes. The anticipated outcome will be a framework to understand the role of the environment in fish stock fluctuations, and how measurements can be incorporated into management procedures, both regionally and globally.

Considering the importance of small pelagic fishes to the economies of many coastal developing States, the IOC has offered to host a synthesis/training office to consider the impact of climate change on these fish stocks.

Through a series of symposia, conferences and workshops, a total of 58 coastal countries in Africa, Asia, Latin America and Eastern Europe reached national and international agreements to proceed with the planning and implementation of projects aimed at the monitoring and assessment of large marine ecosystems. The Global Environment Facility has provided over $45m for these projects, with an additional $75m pending. It is recommended that the IOC Secretariat help foster collaboration between the GEF projects and fundamental large-scale marine research underway or planned in the same regions.

> *"Over the last decade, fisheries on the high seas have considerably expanded and currently represent approximately 5 per cent of total world landings. The provisions of the United Nations Convention on the Law of the Sea on the marine living resources of the high seas sets forth rights and obligations of States with respect to conservation and utilization of those resources"*
>
> Agenda 21: 17.44

## 4.2 – Stemming the harmful algal blooms

The IOC has programmes that assist in the resolution of coastal problems important to inshore fisheries. There has been a noticeable increase in the occurrence of harmful algal blooms, among which the so-called "red tides" is due to the presence of large quantities of minute but toxic marine plants that often cause the sea to appear red. These harmful blooms can lead to fish kills and render seafood dangerous to eat. The increase has been attributed to a variety of factors, such as rising water temperatures, increased pollution of coastal waters and the transfer

of new species. The cause may be any or all of these. To combat the effects, the IOC has set up centres to assist governments to detect and predict these occurrences, thus avoiding loss of life and protecting investments. The initiative has received accolades from many sources for its work on the identification and monitoring of toxic species. In addition, due to the global extent of the problem, the IOC has joined with international and intergovernmental partners to study the relation of these blooms to the ocean environment and marine life.

### 4.3 – Monitoring coral reefs

Coral reefs form one of the most beautiful and fragile habitats in the world. Concern over the health of these natural wonders has been growing in recent years and a programme to monitor changes is in place. The most significant threat continues to be from elevated sea surface temperature, which causes coral to whiten and die, the so-called "bleaching" effect. A status report in 1998 documented massive bleaching, particularly in the Indian Ocean and Southeast and East Asia, with major shifts noted in the marine life composition on many reefs. Two years later the situation was still declining, with an estimated loss of 11% of the world's reefs, and a further 16% not fully functional. There is evidence that some recovery has occurred in parts of the Indian Ocean and East Asia, but it may be years before it will be known if the reefs will fully recover.

The monitoring of corals is important as the degradation of coral reefs affects local economies as well as marine life. Many coastal communities depend on the healthy corals for their livelihood, through such activities as coral harvesting, fishing and tourism. Understanding human communities and their social and economic conditions and motivations, associated with reef use, is becoming a major focus within the coral reef monitoring community. In 2000 the monitoring network assisted with the publication of a "Socio-economic Manual for Coral Reef Management". The manual is intended to help reef managers understand and conduct baseline socio-economic assessments of coral reef stakeholders, which will complement the marine information already being collected. Training courses, using this manual have been conducted in South Asia and East Africa, and are being planned for Southeast Asia and the Caribbean. Support from national funding agencies has allowed training to be conducted in socio-economic monitoring techniques, and enabled several demonstration sites to be established. Regional co-operation is being encouraged to address common issues.

# 5 Acquiring knowledge and information to predict and manage changes in the marine environment

## 5.1 – The ocean and global warming

The ocean plays a major role in the shaping of the earth's climate. One of the important ways it does so is by storing carbon, an element essential to life and an important player in global warming. Human activities, such as the burning of oil and gas or the conversion of forests into farmland, release about 6-7,000,000,000 metric tons of carbon into the atmosphere every year in the form of carbon dioxide. The increase of carbon dioxide, and smaller quantities of other gases in the atmosphere, is contributing to the "greenhouse" effect that prevents heat escaping into space. Only about half of the carbon released remains in the atmosphere. The rest ends up in the ocean or in plants and soil on land. However, the ocean contains about 50 times more carbon dioxide than either the air or the land. It is important to know what happens to the carbon in the ocean. Will the ability of the ocean to absorb excesses of carbon dioxide in the atmosphere continue, or is there a limit to this capacity?

In order to tackle the question of what happens to the carbon in the ocean a major effort, involving many countries, was mounted over a ten-year period. The IOC was one of the organizations assisting with the massive observational and research effort required. Most of the carbon in the ocean is stored in the deep waters and in sediments on the sea floor. How, and how quickly, it is removed from the surface is important to what happens in the atmosphere. One route is through a process scientists call "the biological pump". The small plants that live at the ocean surface use the carbon dioxide to grow, then the organisms that feed on them

*"The marine environment is vulnerable and sensitive to climate and atmospheric changes. Rational use and development of coastal areas, all seas and marine resources, as well as conservation of the marine environment, requires the ability to determine the present state of these systems and to predict future conditions. The high degree of uncertainty in present information inhibits effective management and limits the ability to make predictions and assess environmental change. Systematic collection of data on marine environmental parameters will be needed to apply integrated management approaches and to predict effects of global climate change and of atmospheric phenomena, such as ozone depletion, on living marine resources and the marine environment. In order to determine the role of the oceans and all seas in driving global systems and to predict natural and human-induced changes in marine and coastal environments, the mechanisms to collect, synthesize and disseminate information from research and systematic observation activities need to be restructured and reinforced considerably."*

Agenda 21: 17.96

produce particles as they die or excrete material. During the time it takes for the material to sink to the ocean, it may be eaten or decomposed by bacteria in the deep waters.

Thanks to these efforts we now have a much clearer idea of how the ocean contributes to the processes affecting global warming. We know that the disciplines of geology, chemistry, biology and physics all have to be combined to understand the global processes involved. Scientists from different countries co-operated with cruises, moorings, satellite sensors and research facilities to tackle the questions posed. We have learned that less than 1% of the carbon, taken in by plants at the sea surface, is finally trapped in the sediments on the sea floor. We also know the reasons for the dramatic changes in the productivity of the ocean surface waters and the role of the nutrients and trace elements that fuel this growth.

One of the goals of the ten-year research effort was to use the knowledge gained from field studies to generate computer models to predict changes well into the future. Models expand the application of information into much greater time and spatial scales than can be covered by actual measurements. The next challenge will be for governments to use the knowledge gained in support of sound policies for protecting the environment and sustaining human resources.

## 5.2 – The ocean and climate change

The IOC has been engaged in climate related studies for well over a decade. The programmes range from reducing scientific uncertainty about the measurement and understanding of long-term changes in the ocean, to the analysis of ocean sediments to understand the origin and history of similar changes in the past. Strategic research into the impact of these changes on the ocean and its ecosystem yields results of more immediate use in mitigation and prevention of harmful effects. The role of the ocean in world climate is not a passive one and climate change will not be fully understood until that role is defined. The IOC is co-operating with governments and other United Nation organizations in intergovernmental agreements, such as the Framework Convention on Climate Change.

*5.2.1 A massive experiment to study ocean circulation*

For the past many years the study of the role of the oceans in climate change has been a priority for the IOC. The Commission has joined with the World Meteorological Organization and others to sponsor a world climate research programme and of course paid particular attention to the ocean studies related to climate. Even without a research fleet of its own, the Commission can facilitate the efforts of its Member States in co-ordinated global programmes directed at common objectives. One of these co-operative programmes was the largest oceanographic research venture ever conducted. The data collection phase lasted from 1987 to 1997. The aim was to understand the circulation of the world ocean. It took the combined efforts of research ships, moored and drifting buoys, satellites and many research and analytical laboratories from nearly 30 countries, to collect all the information required. Throughout the time of the experiment, the ocean was criss-crossed by research ships following predetermined courses designed to yield the maximum information about ocean currents. An international project office co-

ordinated the research and data flow. Scientists are now tackling the next phase, which consists of analysing the data and developing computer models to explain the results.

*5.2.2 Sea level rise*

One serious consequence of global warming is the threat of sea levels increasing due to the thermal expansion of the water and contributions from melting glaciers. Although the amount of this rise over the next 100 years is still a matter of debate, even a one-meter increase in sea level could threaten the existence of some small island countries or the inhabitants of low lying coastal lands. Measuring variations in sea level, from the rise and fall of the tide to the gradual rise of sea level over decades, is an activity vitally important to the shipping industry and to coastal engineers. The IOC co-ordinates a system of international networks for reporting regional and global sea levels. In addition to the observational and archival data activities, the programme offers training courses, develops methodology and shares technological advances to improve the universal availability of this important information.

## 5.3 – The ocean and weather variations

The search for answers for interactions between the atmosphere and the ocean does not stop with climate. Following this massive experiment, the IOC and its partners are looking at a continuation of more detailed research to look at the relationship between the ocean and weather variation, leading to far more accurate long-term predictions of weather. The results will be of great economic value to agriculture, forestry, living and non-living resources industries and governments. The development of reliable predictions involving the oceans will require a network of regular observations from both the ocean surface and the depths below. Automated floats are now being deployed that will travel with the ocean currents, making observations and rising at regular intervals to the surface to broadcast information via satellite to receiving centres. Over the next few years it is planned that the number of such buoys, all deployed by co-operating IOC Member States, will reach 3,000. This amount of ocean data will allow scientists to develop computer models of the world ocean never before possible.

As knowledge is acquired on the role of the ocean in weather and climate prediction, the results should be automatically be folded into the regional and global forecasting and prediction networks and models. The IOC clearly has an important role to play in this process in collaboration with the meteorological community.

*5.3.1 The El Niño and similar events*

In the last decade the term El Niño has become widely known and associated with dramatic swings in regional weather patterns, affecting the economy as well as the life and health of a great many people around the world. The occurrences of El Niño are a direct result of the interaction of the atmosphere and ocean over the tropical Pacific Ocean. Over the past many years, governments have been co-operating in programmes to understand and predict these occurrences. Member States are now contributing an operational network of monitoring stations, replacing the original research observational system. The monitoring system is part of the global observation programme established by the IOC. Through the obser-

vations and the analysis of the data, governments will now receive warnings of impending El Niño episodes months in advance of weather changes. Governments can use this information to take action to mitigate the impact of potential droughts, floods, and extreme climatic conditions, on agriculture, water usage, fisheries management and many other weather and climate dependent activities. Arrays of moored buoys are also being deployed in other oceans, complementing observations from satellites, research ships and other sensors. The operation of these warning systems is expensive and several countries have volunteered to share the cost. The intergovernmental programme allows the results from the contribution of individual governments to be shared by all and intergovernmental co-operation also allows issues of access and operation to be addressed. For example, despite the global benefit from this programme, vandalism and theft of equipment from the buoys still represent a significant problem.

Scientists know that other major interactions between ocean and atmosphere, like El Niño, impact on global weather patterns and need to be studied. It is the ocean that provides the greatest reservoir of heat for the atmosphere and without the inclusion of the ocean into the predictive models, long-term forecasting of weather is impossible. The IOC has formed a joint Technical Commission with the World Meteorological Organization, supporting multidisciplinary science and observational programmes that address the role of the ocean and atmosphere. Once these processes have been studied and understood, seasonal predictions of extreme temperature events, floods and drought could become commonplace.

## 5.4 – Ocean observations

There have been few programmes that have attracted the attention that has been given to the development of a global ocean observing system. It has achieved high priority within the IOC, because of the breadth of its uses, not only in climate, as described in the preceding section, but also in living resources, ocean health and coastal management. It has been successful within the IOC, because the programme is dependent upon intergovernmental co-operation and also because of the obvious need for such a system to underpin all aspects of ocean science and services. The importance of the system was recognized in Rio in 1992 and has made great progress. Over the last ten years, multidisciplinary teams of experts have worked to identify the types of data required globally, together with the respective sampling strategies and collection methodologies. A remarkable scientific consensus has emerged that is directing the observation programme for climate change and marine pollution. Implementation of these programmes has begun. Similar studies are underway to address the information needs for coastal zone management and for living resources.

It is accepted that the development of a truly global system will take many years to achieve. The system development has been planned to build on existing capabilities and networks and to develop in regional areas where specific priorities can be identified and resolved. Countries in many of the marginal sea areas around the world have already adopted regional observing systems to respond to regional needs and priorities. The IOC has engaged economists to provide advice of costs and benefits of various data collection activities to demonstrate the use-

fulness of these systems. The global programme will co-operate with these regional initiatives and with national governments to investigate technologies and methodologies, to improve the effectiveness and efficiency of ocean measurement and monitoring systems. Programmes will build capacity and capabilities in developing countries in order for them to contribute and benefit. The greatest advances and the largest benefits are still to come. Special efforts will be required to gather observations from remote areas, such as the polar oceans, essential for a complete understanding of the global system.

The global environment is a continuum and needs to be addressed as such. A global monitoring programme for the oceans cannot operate successfully in isolation or independently of similar programmes observing other parts of the environment. The ocean observing system is co-ordinated with other observing systems in other agencies and organizations. It is the ocean component of the climate observing system hosted by the World Meteorological Organization and as such receives visibility in intergovernmental negotiations on climate change and greenhouse gas emissions. The IOC sponsors joint expert panels, with the other global monitoring systems for the land and atmosphere, on the management of data and the use of satellite information. The growing contribution from earth observation satellites to ocean monitoring is recognized through an IOC partnership arrangement with a committee of agencies and organizations operating space borne vehicles. The oceans have been one of the themes studied by the committee, which is co-ordinating and planning the use of satellites for earth observation, to ensure the usefulness and continuity of future missions.

It is often difficult to separate the mandate of the IOC to deal with the ocean surface from that of the marine weather related requirements of the meteorological community. The IOC and the World Meteorological Organization have co-ordinated their activities in this field for many years, but have recently undertaken a major strengthening of this co-operation through the establishment of a joint Technical Commission. This commission will combine the long-standing expertise of the weather services in providing up to the minute forecasts with the knowledge and information from ocean sources that will improve the accuracy and breadth of predictions.

Ocean observations themselves are evolving from the traditional and laborious measurements from research vessels to continuous data from automated instruments. Up until now, there has been insufficient data from the sea surface and below, to be able to generate computer models capable of giving an accurate and continuous picture of what is happening. A bold new project is taking place that will entail the contribution of 3,000 floats that will continuously cycle throughout the ocean depths, periodically surfacing to send their collected data through satellites to a data centre. This project will demonstrate the feasibility of forecasting ocean processes. The future will see the provision of up to the minute ocean information services, using data from all types of observations whether these originate from research vessels, from automated moored or drifting buoys, from satellites or from any other source.

### 5.5 – Ocean data and information

One of the earliest activities of the IOC was the programme established forty years ago to facilitate the exchange of oceanographic

data and to meet data management needs. The resulting data system forms a global network of national ocean data centres, some of which act as regional or global centres for specific tasks. Representatives attending data planning meetings are usually Directors or experts from these national centres giving the deliberations substance and guaranteeing the implementation of decisions made. The number of such centres is approaching seventy, which is a high proportion of the active Member States of the IOC. The system provides worldwide access to millions of ocean measurements and observations and the IOC has been responsible for the development of most of the international formats and standards necessary to facilitate their exchange and use. Technical assistance for marine data management and information services is in high demand as most ocean management and policy issues are based on the availability of adequate data. Full and open sharing of a wide range of data sets for ocean programmes, for the benefit of all countries, is a basic objective for the IOC. An intergovernmental working group is in the process of developing a new set of principles and a policy for oceanographic data exchange that can be adopted by all Member States. Understanding past changes in the ocean is essential to the prediction of future events. Scientists need access to data collected in years gone by, but many of these old and valuable data sets are stored on paper records and lying forgotten on office shelves. The IOC launched a programme to recover lost and misplaced files, resulting in an impressive increase in the number of data profiles available.

The IOC data programme was originally established to handle archived ocean data. In the early days of oceanography, all data was hand collected and taken to the laboratory to be calibrated and quality checked before becoming available for exchange. This meant that the data handled by the system could be many years old. The IOC established a new programme to handle the growing requirement for data being transmitted immediately or within a relatively short time of being taken. Over the years, the distinction between the real time and archived data has diminished. End-to-end management of data from observation, through quality control to final archive and use, will eventually be the norm for all types of data. At present it has become a reality for ocean temperature and salinity measurements and these continuously revised data sets are now available through the IOC system to scientists and institutions around the world.

The programme has recognized the emergence of the information age. Many ocean data centres now use the Internet to provide direct access to their data and information holdings. In addition to these electronic libraries, the IOC has developed or supported several modern information tools. For example a website and an electronic global directory providing information on thousands of marine and freshwater professionals; a system to guide users to where data can be found and a comprehensive inventory of thousands of ocean related websites. The objective is to maintain the IOC data system as the world authority for ocean data standards and to move forward with the information age.

The data exchange programme has always paid close attention to capacity building activities. In Africa, for example, partnerships

between governments and donor agencies have allowed the development of networks of ocean data and information exchange centres in 20 countries. These centres can then promote themselves at the national level to provide valuable data and information services to their governments, industry and the general public.

# 6 Stengthening international and regional co-operation and co-ordination

## 6.1 – Regional bodies of the IOC

> *"It is recognized that the role of international co-operation is to support and supplement national efforts. Implementation of strategies and activities under the programme areas relative to marine and coastal areas and seas requires effective institutional arrangements at national, subregional, regional and global levels, as appropriate".*
>
> Agenda 21: 17.115

The role of the regional bodies is twofold, to facilitate participation of regional Member States in the IOC global programmes, and to address the identified regional programme priorities of the Member States. The IOC has six major regional bodies with regional programme responsibilities in the geographic areas of the Western Pacific, the Caribbean, the Indian Ocean and the Western Indian Ocean, the Eastern Atlantic and the Black Sea.

In addition, the IOC has specific programmes or encourages initiatives in other regions – the Southeast Pacific, Southwest Atlantic, the Mediterranean Sea, the Red Sea/Gulf of Aden and the Caspian Sea. The strain on IOC resources to maintain these regional programmes has been substantial.

The implementation of IOC programmes through the collective efforts of its Member States has always been a central theme for the IOC. A complementary belief has been that more effective and efficient use of funds can be obtained through a regional approach. These twin approaches will continue, although the benefits arising from having a regional office are often offset by financial concerns and the additional demands placed on the central secretariat. The IOC will address ways of obtaining additional support to generate and improve the regional programmes and benefits.

A substantial part of the capacity building activities is implemented in the regions. The IOC is working towards articulating the collective needs of regional Member States, so that the priorities reflect the real regional needs. There is now sufficient indigenous capacity in several regions to identify priorities, programmes and projects. It is to be hoped that, with this direction, and with mutual co-operation amongst the regional countries themselves, a greater flow of resources for marine sciences will be precipitated from the donor community.
For many regional activities, the basic requirement is for shared knowledge and information that is reliable and upon which decisions can be made. The IOC will work to provide

assistance in ocean science and information to assist other regional agreements such as the conventions, protocols and partner programmes of the UN Environment Programme's Regional Seas Action Plan.

## 6.2 – Partnership with UNESCO and other organizations

One of the closer relationships for the IOC is with the other science activities of UNESCO, which include programmes in geology, hydrology, ecology and the social sciences. These UNESCO programmes and the IOC have co-operated in discussions of joint multidisciplinary and issue-oriented initiatives. The Chair of the IOC and the Chairs of the other science programmes now meet biannually, to develop a joint statement that is delivered to the General Conference of UNESCO. The statement provides an opportunity for the programmes to make a collective review of science within UNESCO and to suggest actions for consideration of UNESCO Member States. The latest statement led UNESCO to decide to develop sustainability as a unifying theme.

The IOC has been designated the focal point for several co-operative arrangements related to the oceans. It provides the secretariat of an inter-secretariat committee on scientific programmes related to oceanography. This is a long-standing co-operative arrangement that has languished in recent years, but has the potential to increase the interaction between the different elements of the United Nations that deal with ocean activities. A current inter-secretariat sub-committee on oceans and coastal areas, for which the IOC provides both the secretariat and chair, has been charged with the function of task manager for the ocean actions under Agenda 21 reporting to the UN Commission on Sustainable Development on the follow-up activities. This is a visible and responsible role for the IOC, and carries a heavy workload. The responsibilities relate to both the UN General Assembly and the new informal consultation on oceans and to the 2002 World Summit on Sustainable Development. The IOC has a real role to play in the stated aim of the General Assembly to achieve co-ordination amongst the UN organizations concerned with ocean issues, especially with regard to ocean science and observations.

Partnerships are absolutely essential to the work of the IOC. They are an effective way to avoid overlap and to increase the capacity of the organization. The many United Nations specialised agencies dealing with the ocean are obvious partners for joint programmes, but other national, regional and international organizations are also involved in co-operative arrangements. The types of arrangements vary enormously, including joint advisory bodies, bilateral and multilateral co-ordinating bodies, memoranda of understanding, inter-secretariat bodies, interagency arrangements, co-sponsorship and co-operative programmes and even technical responsibilities under the Law of the Sea.

The IOC has signed Memoranda of Understanding with many non-governmental organizations dealing with the oceans. These may cover co-operative activities for individual projects, for short or extended programmes or for continuing co-operation on matters of advice and mutual collaboration. Arrangements are also made, where necessary with research institutes, laboratories or even with government departments and agencies, where these are mutually beneficial to the IOC programme and the partner concerned.

Of course each co-operative arrangement demands a certain level of support from the Secretariat.

### 6.3 – The Law of the Sea and other intergovernmental conventions and agreements

Intergovernmental negotiations can only successfully proceed when the basic understanding of the subject under discussion is shared and accepted. Once implemented, there will be an ongoing need for knowledge and information as agreements and conventions typically include provisions for auditing subsequent actions and procedures for settlement of disputes when there is an actual or perceived transgression. For the international oceans, the need for intergovernmental agreements and conventions is fundamental and the concurrent requirement for basic knowledge and information essential.

In 1994, the UN Convention on the Law of the Sea came into force. The IOC is recognized in the Law of the Sea Articles as a "competent international organization". Although the negotiated text has been in existence for many years, the responsibilities given and implied for the IOC are still new and are subject to continued debate within its governing bodies. The Law of the Sea Articles cover fishing, shipping, seabed mining and other activities and responsibilities for ratifying countries in a very general way and provide the framework within which more detailed conventions and protocols will evolve as necessary. The IOC will be particularly concerned with the Articles on marine pollution, capacity building and on the conduct of marine scientific research in the exclusive economic zones of coastal States, in conformity with UNCLOS.

In addition to the Law of the Sea, the IOC has to address its responsibilities for marine knowledge and information to many other conventions. The IOC, for example, has a part to play in the measurement and description of climate change under the Framework Convention on Climate Change and also in the negotiations on carbon tax credits if the ocean is considered for carbon dioxide disposal in the future. The Convention on Biological Diversity is another important agreement for sustaining the genetic pool of the planet. It has been postulated that marine species make up the largest proportion of the world total. The truth is that not enough is known, especially from the deep ocean, to justify that statement. Certainly, the deep ocean is yielding species of life not even contemplated a few decades ago. The IOC is co-operating on a census of marine life project.

Regional and global agreements, relating to the ocean, number in the hundreds. All require some degree of marine science, data and information and therefore are a concern to the IOC.

### 6.4 – 1998 - The International Year of the Ocean

*"The United Nations has declared 1998 the International Year of the Ocean as a celebration of this source of life and civilization. But this international year is also a reminder of the need to protect this most precious of resources, an affirmation of our commitment to the rights of future generations, for whom we hold our planet – and its life-sustaining oceans – in trust."*

Federico Mayor, Director-General of UNESCO (1987-1999)

The international year gave the world an opportunity to consider, and to celebrate, the ocean and what it means to our existence, our daily lives, our politics, our economies and our culture. All of these aspects were addressed during the year and the IOC played a leading role in many national, international and intergovernmental activities. Government representatives from over eighty countries signed an Ocean Charter, endorsed by the IOC that recognized the importance of the ocean and the need for co-operative action to address ocean issues. These principles were further supported by a resolution of the Francophonie countries in New York the following year. A personalized version of the charter "My Ocean Charter" was produced in over 20 languages and signed by millions of citizens around the world.

The international year also generated important statements on the oceans from both intergovernmental bodies and high-level international gatherings. These statements helped to promote the action taken at the United Nations General Assembly for additional consultations and debate on ocean issues.

After the publications, youth and community events, conferences, Ocean Expo and all the many activities that took place in 1998, it is important to realize that the international year was only a catalyst for attention. The IOC recognizes that the momentum and interest gained during the year needs to be sustained and developed in schools, in communities and in the halls of government, in order for the ocean objectives to be satisfied.

# 7 Ocean economic forces

All activities in the marine area will derive benefits from possessing adequate ocean knowledge and information. Results include improved management and performance, informed laws and regulation, increased safety and efficiency, better environmental protection and sustainable resource use. The IOC contributes both directly and indirectly to the achievements of these benefits.

## 7.1 – Maritime Shipping

Ninety percent of world trade is transported by sea. The world merchant fleet exceeds 85,000 ships and the value of seaborne trade and shipping is over $155 billion annually. Trade by sea is increasing, with a demand for faster and more efficient cargo transport. In the coastal zone, there is a demand for more and faster short-sea transport for both vehicles and passengers and the concurrent port and harbour demands. The increasing use of the ocean for transport, the development of larger and faster ships, greater competitiveness and zero tolerance for negative environmental impacts, places enormous pressure on the marine transportation system to improve efficiency, while maintaining or improving safety margins.

Transportation is not environmentally neutral. Maritime ports are located at the interface between the land and the sea and are in contact with important habitats, which are strategic components of the natural environment - the seabed, estuarine waters, mud flats and wetlands. The issues of emissions,

discharges of bilge water and tank washings, exotic species in ballast water and other environmental problems have to be agreed amongst governments and supported by science and monitoring activities. The activities of the IOC contribute both directly and indirectly to the resolution of these problems.

### 7.2 – Offshore energy

Oil and gas production now takes place in water depths approaching 2,000 metres, in locations exposed to extreme weather and ocean conditions in the tropics and in the polar oceans. The activities necessary to provide reliable meteorological and oceanographic environmental information in support of these activities must be planned and undertaken well in advance of drilling operations. Although concern is growing in governments over global warming, it is unlikely that the use of hydrocarbon fuels will diminish appreciably in the foreseeable future. Intergovernmental programmes assist in building the capacity of all countries to manage resources wisely, in the transfer of knowledge and technology and in the adoption of uniform standards and methods for environmental protection.

The ocean figures prominently in energy policies, in addition to the use of offshore hydrocarbons. In terms of renewable energy, harnessing energy from other ocean sources will continue to grow slowly. Related energy topics include the capability of marine disposal of excess carbon dioxide, or the possibility of increasing the ability of the ocean to absorb the gas by promoting increased plankton growth in the surface layers. The IOC is keeping the research developments in this area under continuing review.

### 7.3 – Ocean mapping

Ocean mapping is a programme that has been very successful at minimal cost to the IOC. It is carried out in partnership with the International Hydrographic Organization. Producing maps and charts of the seabed is very expensive, but the demand for charts, in early years almost solely in support of marine transportation, led to the intergovernmental programme. The expertise founded in navigation charts was extended into deeper waters as interest in the deep ocean developed. The mapping of the sea floor assumed wider importance as interests developed in the laying of communication cables, the siting of platforms and pipelines, in the study of ocean currents and in marine geology. Today, the requirement for countries to submit jurisdiction claims over seabed resources under the Law of the Sea, has added a new dimension and impetus to mapping requirements.

Technological advances have also added to the usefulness and priority for ocean maps. Multi-beam acoustic systems, specially equipped vessels and even satellite readings of the sea surface have transformed the availability of data. Data management handling techniques have allowed the new data to be analysed and displayed in ways that have generated more users and demands.

Accurate mapping and positioning is a prerequisite for scientific and observational activities. Recent advances into electronic mapping and satellite positioning, initially adopted for navigation, are being rapidly assumed into the ocean science community. Many of the technological advances are beyond the capacity of developing coastal States and the need for intergovernmental assistance and the sharing of technology will

continue to influence the area of ocean mapping for many decades.

### 7.4 – Recreation and tourism

The growth of the recreation and tourist industry has been a welcome surprise to many countries. In some, this industry has surpassed many of the traditional industries in importance. A sustainable tourist industry is dependent upon the health of the environment upon which it is built. Activities such as whale watching, scuba diving, eco-tourism and bathing require the attention of both the industry itself and the governmental regime under which they operate. Governments and industry will need to ensure the quality of the environment is protected and the ecology is not threatened. The IOC has programmes in coastal management, in the protection of the marine environment, in monitoring and in the sharing of knowledge and information that can address these issues in the coming years.

### 7.5 – New industries

Fifty years ago the mining of nodules from the sea floor, rich in manganese and other desired metals, seemed to be the greatest source of new wealth the ocean had to offer. That promise has not yet developed as the cost and availability of the terrestrial sources of these minerals have lessened the economic opportunity. There are however, many other potential ocean benefits that are presently being exploited or are under research. Desalinisation plants are now supplying some countries with the greater part of their freshwater needs. Genetic materials from marine species are the subject of intense research by the pharmaceutical and biochemical engineering industries. Ocean space is becoming a commodity for aquaculture, for engineering structures such as airports and for wind farms. Presently these uses of the ocean surface are close to shore, but the technology exists for engineering structures that can survive offshore conditions if economic returns are justified.

Governmental and industrial spending on marine research and observations, which will be needed to keep abreast of new developments and their associated activities, is presently insufficient. The IOC can assist governments to keep a watching brief on new technologies and can facilitate the development of environmental standards and regulations when required.

## 8 Addressing the needs of developing countries

From its early days, the IOC has retained its priority for training, education and mutual assistance in its programmes. The regular budget and resources of the IOC are not adequate to carry the burden of large-scale capacity building activities. On the other hand, seed money has always been found to assist in providing training courses and published materials to enable the greater participation of developing countries in the IOC programmes.

Occasionally, a Member State will provide funds to assist in an IOC managed programme in a developing country or region that will enable a greater degree of assistance to be given than would otherwise be possible. All the programmes of the IOC have a capacity building component and a new management structure, which will assist in the co-ordination of expertise and the sharing of experiences amongst the various activities. Plans are being made to find ways of increasing the access of marine programmes to international and national funding sources so that capacity building in the area can be extended and strengthened. As yet the ocean area has not attracted the direct support of international funds in the same way, for example, as the climate activities.

Several successful capacity building activities have been carried out in regions all over the world. The regular budget of the IOC is supplemented by roughly the same amount of funding from voluntary contributions from its Member States. Occasionally a national funding agency will work with the IOC to make possible an extended national or regional programme of capacity building in support of ocean science, information services or management.

Within its own limited funding for capacity building, the IOC concentrates on the provision of essential training workshops, preparation of manuals and guidance materials and the support of participants from developing countries at IOC technical meetings and conferences. They make impressive numbers, for example during the international year of the ocean; the IOC supported 59 training courses, 12 workshops and 13 educational events with a total number of 1,600 participants from over 100 countries. Unfortunately, the effort is still far too small to be significant The IOC is looking for sustainable capacity building, with continuing results. Donor partners are required and recipient countries need to commit their own priorities, expertise and governance. Regional countries should combine their resources to help each other to be mutually efficient and effective. The relationship between donor and receiving country should be a partnership with common goals of ocean management and stewardship.

*"The need to address the growing imbalance between the have and have-not countries is fundamental to a sustainable future for the world community on two major fronts. Firstly, there can be no hope of achieving and preserving a peaceful future unless there is a better balance of quality and dignity of life than we have at present. Secondly, there is no way that the present critical global environmental issues can be addressed unless all governments are able to co-operate in joint solutions…"*

Extract from the IOC Global Ocean Observing System document on Capacity Building Principles

# 9 Concluding thoughts

The objective of this document is to emphasise the importance of the ocean to a sustainable world order. The ocean, as it now exists, sustains the planetary environment in which we thrive and we need to understand how robust or fragile that relationship is. It has sustained marine living resources and their habitats for millennia and now we must exercise care and stewardship to ensure we do not destroy that sustainability through our ignorance of the marine environment and its ecology. The ocean sustains the economies and trade that are essential to our growth and development and we must learn how to enjoy this benefit without compromising its other values. There are other undeveloped or unknown resources in the ocean, both living and non-living, and the management of these new riches must also be careful and precautionary. We will inevitably encroach on the very space of the ocean. Our populations are already developing the desirable coastal lands for residences and industry. A sustainable marine ecology needs its vulnerable marginal habitats protected. We have also to continue to monitor and manage the wastes of our society, agriculture and commerce that flow from our activities into the rivers and into the sea.

Governments have the largest role to play. Governments act on behalf of their people as a whole. The ocean is a huge responsibility and will need a collective intergovernmental wisdom and commitment to sustain its benefits into the future. All countries should be well equipped to manage the marine waters and resources under their own jurisdiction, as well as to contribute and adequately participate in global action.

Therefore, let the final point be to emphasise the need for sustainable capacity building programmes: true partnerships between recipient and donor countries that are built upon the priorities and commitment of the former and the knowledge, technology and resources of the latter.

**Note**: *This brief document has deliberately stayed away from the useful, but often bewildering, acronyms and specialised language that is standard in many intergovernmental documents. For those readers who wish to identify IOC activities, a list of acronyms for most of the major programmes, partners and joint ventures is given in the Appendix. Separate sheets describing the IOC programmes in more detail are also appended*

ACRONYMS OF SOME OF THE MAJOR IOC AND
RELATED PROGRAMMES THAT RELATE TO THE ABOVE TEXT

| | |
|---|---|
| ABE-LOS | Advisory Body of Experts on the Law of the Sea (IOC) |
| ACC | Administrative Committee on Co-ordination (Partner) |
| ACC-SOCA | Sub-Committee on Oceans and Coastal Areas (IOC et al.) |
| ACOPS | Advisory Committee on Protection of the Seas (Partner) |
| AOSB | Arctic Ocean Science Board (Partner) |
| Argo | Array for Real-time Geostrophic Oceanography (IOC/WMO) |
| ASFA | Aquatic Sciences and Fisheries Abstracts (IOC et al.) |
| BSRC | Black Sea Regional Committee (IOC) |
| CBD | Convention on Biological Diversity (UN, 1992) |
| CEOS | Committee on Earth Observation Satellites (Partner) |
| CGOM | Consultative Group on Ocean Mapping (IOC) |
| C-GOOS | Coastal Module Panel of GOOS (IOC) |
| CLIVAR | Climate Variability and Predictability (WCRP) |
| COP | Conference of the Parties |
| CPPS | Permanent Commission for the South Pacific (Partner) |
| CSI | Unit of Coastal Regions and Small Islands (UNESCO) |
| DBCP | Data Buoy Co-operation Panel (IOC/WMO) |
| DOALOS | Division for Ocean Affairs and the Law of the Sea (UN) |
| DOSS-2 | Ad hoc Study Group on IOC Developments, Operations, Structure and Statutes (IOC) |
| FAO | Food and Agriculture Organization (UN) |
| FCCC | Framework Convention on the Climate Change (Kyoto, 1997) (Partner) |
| GCOS | Global Climate Observing System (WMO/IOC/FAO) |
| GCRMN | Global Coral Reef Monitoring Network (Partner) |
| GEBCO | General Bathymetric Chart of the Oceans (IOC-IHO) |
| GEF | The Global Environmental Facility (World Bank-UNEP-UNDP) (Partner) |
| GEOHAB | Global Ecology and Oceanography of Harmful Algal Blooms (IOC/SCOR) |
| GESAG | Expert Scientific Advisory Group (IOC) |
| GIPME | Global Investigation of Pollution in the Marine Environment (IOC-UNEP) |
| GLOBEC | Global Ocean Ecosystem Dynamics (IOC et al.) |
| GLOSS | Global Sea-Level Observing System (IOC) |
| GODAE | Global Ocean Data Assimilation Experiment (IOC/WMO) |
| GOOS | Global Ocean Observing System (IOC-WMO-UNEP-ICSU) |

# Appendix

| | |
|---|---|
| GOOS | Global Observing System (Partner) |
| GOSSP | Global Observing Systems Space Panel (Partner) |
| GPO | GOOS Project Office (IOC) |
| GSC | GOOS Steering Committee (IOC) |
| GTOS | Global Terrestrial Observing System (Partner) |
| GTS | Global Communication System (Partner) |
| GTSPP | Global Temperature and Salinity Profile Programme (IOC) |
| HOTO | Health of the Ocean (IOC) |
| IABP | International Arctic Buoy Programme (IOC/WMO) |
| IASC | International Arctic Sciences Committee (Partner) |
| ICAM | Integrated Coastal Area Management Programme (IOC) |
| ICES | International Council for the Exploration of the Sea (Partner) |
| ICG-ITSU | International Co-ordination Group for the Tsunami Warning System in the Pacific (IOC) |
| ICSEM | International Commission for the Scientific Exploration of the Mediterranean Sea (Partner) |
| ICSU | International Council for Science [previously: International Council of Scientific Unions] (Partner) |
| IDNDR | International Decade for Natural Disaster Reduction (Partner) |
| IGBP | International Geosphere-Biosphere Programme (ICSU) (Partner) |
| I-GOOS | Intergovernmental Committee for GOOS (IOC-WMO-UNEP) |
| IGOS | Integrated Global Observing Strategy (Partner) |
| IGOSS | Integrated Global Ocean Services System (IOC/WMO) |
| IHO | International Hydrographic Organization (Partner) |
| IHP | International Hydrological Programme (UNESCO) (Partner) |
| IMO | International Maritime Organization (Partner) |
| IOCARIBE | Sub-Commission for the Caribbean and Adjacent Regions (IOC) |
| IOCARIBE-GOOS | IOCARIBE Regional GOOS (IOC) |
| IOCCG | International Ocean Colour Co-ordinating Group (Partner) |
| IOCEA | Regional Committee for the Central Eastern Atlantic (IOC) |
| IOCINCWIO | Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean (IOC) |
| IOCINDIO | Regional Committee for the Central Indian Ocean (IOC) |
| IODE | Committee for International Oceanographic Data and Information Exchange (IOC) |
| IOI | International Ocean Institute (Partner) |
| IPHAB | Intergovernmental Panel on Harmful Algal Blooms (IOC) |
| ITSU | International Co-ordination Group for the Tsunami Warning System in the Pacific (IOC) |

| | |
|---|---|
| IUGG | International Union of Geodesy and Geophysics (Partner) |
| IYO | International Year of the Ocean – 1998 (IOC) |
| JCOMM | Joint IOC-WMO Technical Commission for Oceanography and Marine Meteorology (IOC/WMO) |
| J-DIMP | Joint Data and Information Management Panel (IOC et al.) |
| JGOFS | Joint Global Ocean Flux Study (Partner) |
| LOICZ | Land-Ocean Interaction in the Coastal Zone (Partner) |
| MAB | Man and the Biosphere Programme (UNESCO) (Partner) |
| MEDI | Marine Environmental Data Information Referral Service (IOC) |
| MEL | Marine Environmental Laboratory (Partner) |
| MIM | Marine Information Management (IOC) |
| MOST | Management of Social Transformation (UNESCO) (Partner) |
| NEAR-GOOS | North-East Asian Regional GOOS (IOC) |
| ODINAFRICA | Ocean Data and Information Network for Africa (IOC) |
| ODINEA | Ocean Data and Information Network for Eastern Africa (IOC) |
| OOPC | Ocean Observations Panel for Climate (IOC) |
| OSLR | Ocean Science in Relation to Living Resources (IOC) |
| OSNLR | Ocean Science in Relation to Non-Living Resources (IOC) |
| PICES | North Pacific Marine Science Organization (Partner) |
| PIRATA | Pilot Research Moored Array in the Tropical Atlantic (Partner) |
| POEM | Physical Oceanography of the Eastern Mediterranean (Partner) |
| POGO | Partnership for Observing the Global Oceans (Partner) |
| RECOSCIX | Regional Co-operation in Scientific Information Exchange (IOC) |
| SAHFOS | Sir Alister Hardy Foundation for Ocean Science (Partner) |
| SCOPE | Scientific Committee on Problems of the Environment (Partner) |
| SCOR | Scientific Committee on Oceanic Research (Partner) |
| SEA-GOOS | South-East Asian GOOS (IOC) |
| SOLAS | International Convention for the Safety of Life at Sea (Partner) |
| SOOP | Ship-of-Opportunity Programme (IOC) |
| START | Global Change System for Analysis, Research and Training (Partner) |
| TEMA | Training, Education and Mutual Assistance (IOC) |
| TOGA | Tropical Ocean and Global Atmosphere (IOC et al.) |
| UN CSD | UN Commission on Sustainable Development (Partner) |
| UNCLOS | UN Convention on the Law of the Sea (Partner) |
| UNDP | United Nations Development Programme (Partner) |
| UNEP | United Nations Environment Programme (Partner) |

| | |
|---|---|
| UNESCO | United Nations Educational, Scientific and Cultural Organization (Partner) |
| UNIDO | United Nations Industrial Development Organization (Partner) |
| WCRP | World Climate Research Programme (Partner) |
| WDC | World Data Centre (Partner) |
| WESTPAC | Regional Sub-Commission for the Western Pacific (IOC) |
| WHO | World Health Organization (Partner) |
| WMO | World Meteorological Organization (Partner) |
| WOCE | World Ocean Circulation Experiment (Partner) |
| WWW | World Weather Watch (Partner) |

## INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (of UNESCO)

### Member States of the Commission (129)

| | | |
|---|---|---|
| AFGHANISTAN | (11 March | 1991) |
| ALBANIA | (26 January | 1993) |
| ALGERIA | (Jul. 1964/Nov. | 1965) |
| ANGOLA | (26 October | 1982) |
| * ARGENTINA | (Before November | 1961) |
| * AUSTRALIA | (Before November | 1961) |
| AUSTRIA | (Oct. 1962/Jun. | 1964) |
| AZERBAIJAN | (27 January | 1998) |
| BAHAMAS | (29 January | 1979) |
| BANGLADESH | (29 October | 1982) |
| BARBADOS | (18 December | 1985) |
| * BELGIUM | (Before November | 1961) |
| BELIZE | (22 September | 1995) |
| BENIN | (23 October | 1986) |
| * BRAZIL | (Before November | 1961) |
| BULGARIA | (Oct. 1967/Dec. | 1969) |
| CAMEROON | (Nov. 1971/Nov. | 1973) |
| * CANADA | (Before November | 1961) |
| CAPE VERDE | (20 August | 1984) |
| * CHILE | (Before November | 1961) |
| * CHINA | (Before November | 1961) |
| * COLOMBIA | (Oct. 1967/Dec. | 1969) |
| COMOROS | (08 February | 2000) |
| CONGO | (Nov. 1961/Sep. | 1962) |
| * COSTA RICA | (28 February | 1975) |
| CÔTE D'IVOIRE | (Before November | 1961) |
| CROATIA | (24 December | 1992) |
| * CUBA | (Before November | 1961) |
| CYPRUS | (05 December | 1977) |
| DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA | (31 October | 1978) |
| DENMARK | (Before November | 1961) |
| DOMINICA | (21 September | 1999) |
| DOMINICAN REPUBLIC | (Before November | 1961) |
| ECUADOR | (Before November | 1961) |
| * EGYPT | (Oct. 1969/Nov. | 1971) |
| EL SALVADOR | (16 February | 1993) |
| ERITREA | (12 November | 1993) |
| ESTONIA | (10 March | 1992) |
| ETHIOPIA | (05 March | 1976) |
| FIJI | (09 July | 1974) |
| * FINLAND | (Before November | 1961) |
| * FRANCE | (Before November | 1961) |
| GABON | (26 October | 1977) |
| GAMBIA | (30 August | 1985) |
| GEORGIA | (09 July | 1993) |
| * GERMANY | (Before November | 1961) |
| * GHANA | (Before November | 1961) |
| GREECE | (Oct. 1962/Jun. | 1964) |
| GUATEMALA | (Dec. 1965/Oct. | 1967) |
| GUINEA | (01 May | 1982) |
| GUINEA-BISSAU | (26 January | 1984) |
| GUYANA | (20 July | 1977) |
| HAITI | (23 March | 1976) |
| ICELAND | (Oct. 1962/Jun. | 1964) |
| * INDIA | (Before November | 1961) |
| * INDONESIA | (Oct. 1962/Jun. | 1964) |
| * IRAN, Islamic Republic of | (03 June | 1975) |
| IRAQ | (Oct. 1969/Nov. | 1971) |
| IRELAND | (07 November | 1978) |
| ISRAEL | (Before November | 1961) |
| * ITALY | (Before November | 1961) |
| * JAMAICA | (Oct. 1967/Dec. | 1969) |
| * JAPAN | (Before November | 1961) |
| JORDAN | (06 April | 1975) |
| * KENYA | (Nov. 1971/Nov. | 1973) |
| KUWAIT | (13 November | 1974) |
| LEBANON | (Oct. 1962/Jun. | 1964) |
| LIBYAN ARAB JAMAHIRIYA | (11 March | 1974) |
| MADAGASCAR | (Dec. 1965/Oct. | 1967) |
| MALAYSIA | (Jul. 1964/Nov. | 1965) |
| MALDIVES | (20 May | 1987) |
| MALTA | (Oct. 1969/Nov. | 1971) |
| MAURITANIA | (Before November | 1961) |
| MAURITIUS | (Oct. 1969/Nov. | 1971) |
| * MEXICO | (Before November | 1961) |
| MONACO | (Before November | 1961) |
| * MOROCCO | (Before November | 1961) |
| * MOZAMBIQUE | (08 April | 1981) |
| MYANMAR | (07 June | 1988) |
| NAMIBIA | (25 April | 2001) |
| NETHERLANDS | (Before November | 1961) |
| NEW ZEALAND | (Nov. 1961/Sep. | 1962) |
| NICARAGUA | (17 November | 1977) |
| * NIGERIA | (Nov. 1971/Nov. | 1973) |
| NORWAY | (Before November | 1961) |
| OMAN | (16 November | 1982) |
| PAKISTAN | (Before November | 1961) |
| PANAMA | (Oct. 1967/Sep. | 1969) |
| * PERU | (Dec. 1965/Oct. | 1967) |
| * PHILIPPINES | (Oct. 62/Jun. | 1964) |
| POLAND | (Before November | 1961) |
| * PORTUGAL | (Oct. 1969/Nov. | 1971) |
| QATAR | (20 July | 1976) |
| * REPUBLIC OF KOREA | (Before November | 1961) |
| ROMANIA | (Before November | 1961) |
| * RUSSIAN FEDERATION | (Before Nov. | 1961) |
| SAINT LUCIA | (14 September | 1992) |
| SAMOA | (10 April | 1978) |
| SAUDI ARABIA | (14 June | 1978) |
| * SENEGAL | (Oct. 1967/Sep. | 1969) |
| SEYCHELLES | (27 February | 1979) |
| SIERRA LEONE | (19 April | 1974) |
| SINGAPORE | (Dec. 1965/Oct. | 1967) |
| SLOVENIA | (16 June | 1994) |
| SOLOMON ISLANDS | (11 May | 1982) |
| SOMALIA | (10 July | 1974) |
| * SOUTH AFRICA | (Oct. 1967/Sep. | 1969) |
| * SPAIN | (Before Nov. | 1961) |
| SRI LANKA | (Jun. 76/Jan. | 1977) |
| SUDAN | (26 August | 1974) |
| SURINAM | (21 January | 1977) |
| SWEDEN | (Jul. 1964/Nov. | 1965) |
| SWITZERLAND | (Before Nov. | 1961) |
| SYRIAN ARAB REPUBLIC | (Oct.1969/Nov. | 1971) |
| THAILAND | (Before Nov. | 1961) |
| TOGO | (22 October | 1975) |
| TONGA | (03 January | 1974) |
| TRINIDAD & TOBAGO | (Oct. 1967/Sep. | 1969) |
| TUNISIA | (Before Nov. | 1961) |
| * TURKEY | (Nov. 1961/Sep. | 1962) |
| * UKRAINE | (Nov. 1961/Sep. | 1962) |
| UNITED ARAB EMIRATES | (02 June | 1976) |
| * UNITED KINGDOM OF GREAT BRITAIN & NORTHERN IRELAND | (Before Nov. | 1961) |
| * UNITED REPUBLIC OF TANZANIA | (Oct. 1967/Sep. | 1969) |
| * UNITED STATES OF AMERICA | (Before Nov. | 1961) |
| URUGUAY | (Before Nov. | 1961) |
| VENEZUELA | (Oct. 1962/Jun. | 1964) |
| * VIET NAM | (Before Nov. | 1961) |
| YEMEN | (22 May | 1960) |

*Members of the executive council are indicated with an asterisk **

**Intergovernmental Oceanographic Commission (IOC)**

United Nations Educational, Scientific and Cultural Organization
1, rue Miollis
75732 Paris Cedex 15, France
Tel: +33 1 45 68 10 10
Fax: +33 1 45 68 58 12
Website: http://ioc.unesco.org