



United Nations  
Educational, Scientific and  
Cultural Organization

Natural  
Sciences  
Sector

# UNESCO science

## for Sustainable Development

## OCEANS

*One planet, one ocean*

**THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION OF UNESCO WORKS TO FACILITATE INTERNATIONAL COOPERATION AND COORDINATION OF PROGRAMMES IN MARINE OBSERVATIONS AND RESEARCH, CONSERVATION AND PROTECTION OF THE MARINE ENVIRONMENT, HAZARD MITIGATION, AND CAPACITY BUILDING.**

### Background and description

UNESCO's Intergovernmental Oceanographic Commission (IOC) promotes international cooperation and coordinates programmes in marine research, services, observation systems, hazard mitigation, and capacity development in order to understand and effectively manage the resources of the ocean and coastal areas. By applying this knowledge, the Commission aims to improve the governance, management, institutional capacity, and decision-making processes of its Member States with respect to marine resources and climate variability and to foster sustainable development of the marine environment, in particular in developing countries.

In 2010 the IOC celebrates its 50th anniversary. Beginning with the International Indian Ocean Expedition in 1960, the Commission has coordinated and promoted programmes and activities in ocean observations, ocean science, and reduction of marine hazards.

IOC coordinates ocean observation and monitoring through the Global Ocean Observing System (GOOS) which aims to develop a unified network providing information and data exchange on the physical, chemical, and biological aspects of the ocean. Governments, industry, scientists, and the public use this information to act on marine issues.

IOC's work in ocean observation and science contributes to building the knowledge base of the science of climate change. IOC sponsors the World Climate Research Programme (WCRP) and the IOC's GOOS serves as the ocean component of the Global Climate Observing System (GCOS), which supports the Intergovernmental Panel on Climate Change (IPCC). UNESCO-IOC is co-convenor with the World Meteorological Organization of the World Climate Change Conference which aims to systematically make the existing knowledge on climate science available to a wide variety of potential users.

IOC also coordinates and fosters the establishment of regional intergovernmental coordinating tsunami warning and mitigation systems in the Pacific and Indian Oceans, in the North East Atlantic, Mediterranean and Caribbean seas.



### MAIN PROGRAMMES AND ACTIVITIES

#### 1. Protecting People from Marine Hazards, Including Tsunamis

After forty years of experience coordinating the Pacific Tsunami Warning System (PTWS), UNESCO-IOC is leading a global effort to establish ocean-based tsunami warning systems as part of an overall multi-hazard disaster reduction strategy. The IOC Tsunami Unit works with Member States, together with other UN agencies and NGOs, to build sustainable tsunami early warning systems. The Unit's mission is to ensure appropriate design and development of tsunami warning systems and to ultimately provide adequate protection at local, regional, and global scales.

Following the undersea earthquake on 26 December 2004 and the subsequent strongest tsunami in living memory, IOC took the lead in coordinating activities and immediate action to establish a Tsunami Warning System (TWS) in the Indian Ocean. The response included the establishment of an interim Tsunami Warning System while the interim Tsunami Advisory Information is provided through the Pacific Tsunami Warning Center in Hawaii and the Japan Meteorological Agency (JMA).

The IOC aids and advises policy makers and managers in the reduction of risks from tsunamis, storm surges and other coastal hazards by focusing on implementing adaptation measures to strengthen the resilience of vulnerable coastal communities, their infrastructure and service-providing ecosystems.

### 2. Ocean Observing Systems

Monitoring and observing the global oceans requires an international effort and broad cooperation. The IOC manages the Global Ocean Observing System to provide a coordinated approach to deployment of observation technologies, rapid and universal dissemination of data flows and delivery of marine information to inform and aid marine management and decision makers and to increase the appreciation of the general public of our changeable oceans. The Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) is an intergovernmental body of technical experts that provides a mechanism for international coordination of oceanographic and marine meteorological systems. JCOMM provides observing capabilities, data management, and services that combine the expertise, technology and capacity building capabilities of the meteorological and oceanographic communities. The International Oceanographic Data and Information Exchange (IODE) programme enhances the IOC marine research and management programmes by facilitating the exploitation, development, and exchange of oceanographic data and information between participating Member States. The IODE works to narrow the "digital divide" by training marine information specialists and improving data system capacity in developing states, with an emphasis on Africa.

### 3. Managing a Changing Environment

Whether caused by increasing greenhouse gases, coastal pollution, overfishing, coastal development or increasing population pressure, the world's ocean, coasts and marine ecosystems are undergoing great changes. The IOC works with developed and developing countries to monitor and document changes to aid design of adaptation and mitigation strategies.

The IOC supports the UN regular process of reviewing the state of the marine

environment, including socio-economic aspects. Keeping the world's ocean and seas under continuing review by integrating existing information from different disciplines will help to improve the responses from national governments and the international community to the unprecedented environmental changes occurring now.

Marine ecosystem-based management requires a new generation of spatial planning tools to empower marine managers to implement best policies. Marine spatial planning is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that have been specified through a political process.

The importance of the oceans to global climate change cannot be underestimated. The GOOS contributes directly to the UN Framework for Climate Change Convention as the ocean component of the Global Climate Observation System. IOC science programmes support many studies of the impacts of climate change, including the International Ocean Carbon Coordination Project (IOCCP). The surface ocean currently absorbs almost one-third of the CO<sub>2</sub> that is emitted to the atmosphere from human activities, including fossil fuel combustion, deforestation, and cement production. The IOCCP coordinates continuous monitoring and research of the effects of increasing CO<sub>2</sub> levels on the future acidity of the oceans, the effects of acidification on calcifying organisms and coral growth rates, and the changing climate effects on atmosphere/ocean exchange of CO<sub>2</sub>.

The direct results of human activities on the ocean and through climate change are causing the blue part of this blue planet to warm, and lose oxygen. IOC ocean science focuses on the impact of acidification from increasing CO<sub>2</sub> in the ocean, studies the prevalence of coral bleaching due to sea temperature rise, the changes occurring in marine biodiversity, and the proliferation of harmful algae along the coast. Assessing the extent of ocean changes is the first step in helping to determine what management decisions need action.

### 4. Capacity Development

IOC develops leadership capacity, including fund-raising, team building, and decision-making skills for directors of marine and coastal sciences institutes to strengthen scientific, legal and institutional structures. Much regard is given to Africa as well as tropical and small island developing states where livelihoods depend heavily on marine resources.

The IOC Capacity Development programmes is empowering developing countries to sustainably use their coastal and marine resources by encouraging 'self-driven' capacity-development. The risks of not immediately building relevant capacity in marine management and research will result in greater risk of destruction from ocean hazards, irreversible damage to ocean resources, and loss of sources of wealth for future generations. The rate of degradation and loss of life-sustaining ocean resources is accelerating, and one of the great challenges of this century is to develop capacity rapidly enough to protect and preserve these resources. The IOC's "self-driven" capacity-building approach aims to reduce the continuous dependence on aid by empowering countries to address their own problems through science-based strategies.

IOC has successfully developed a unique network with the most talented scientists across the world and with research institutes in all regions, and is playing an essential role in addressing the critically urgent issues related to the protection and sustainable development of the ocean and coasts.

#### FOR FURTHER INFORMATION CONTACT:

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