



RIO+20
United Nations
Conference on
Sustainable
Development

United Nations
Educational, Scientific and
Cultural Organization



Healthy Ocean, Healthy People

Knowing our Ocean • Protecting our Marine Treasures • Empowering Ocean Citizens

“The true richness of the ocean, inexhaustible source of inspiration and serenity, is impalpable.” - Jacques-Yves Cousteau

Acknowledgements

This publication was made possible thanks to the generous support of the Government of Denmark.



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Special thanks to Joe Bunni for allowing us to use his exceptional photos.

Download a copy from <http://www.unesco.org/new/en/rioplus20/>

Credits cover: © Joe Bunni; © UNESCO Yvette Lee; © tgross

Printed by ADM/CLD on certified paper supporting responsible use of forest resources.



ADM/CLD awarded eco-friendly printer label in 2010.

BSP/2012/WS/4REV

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Printed in France

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Why a healthy ocean matters for humanity

Covering more than two-thirds of the Earth's surface, the ocean is at the origins of life on Earth and makes the Earth habitable for people. It also provides us with a vital source of nourishment, especially to people in the world's poorest nations. Many depend on fish for their primary source of protein; fisheries and aquaculture support the livelihoods of about 540 million people (8% of the world's population) directly or indirectly.

Marine and coastal resources and industries also represent more than 5% of global GDP. The ocean provides benefits to economic sectors such as fisheries, energy, tourism, and transport/shipping, as well as 'non-market' benefits such as climate regulation, carbon sequestration, habitat and biodiversity, among many others.

The ocean also offers exciting opportunities for the development of new drugs to treat all sorts of human ailments. Products based on marine organisms have already found their way onto the market and are now being prescribed for patients that have asthma, tuberculosis and cancer. Other industries, such as

those that produce oil or paper, are also "bioprospecting" the deep sea with promising results. While there is no consensus on the financial benefits derived from worldwide sales of biotechnology-related products taken from all types of marine environments, these are estimated to represent a multi-billion dollar market.

The ocean also holds great promise for developing new types of renewable energy, particularly marine renewable energies. Considering that the ocean and seas cover 70% of the earth, this could potentially be a considerable source of renewable energy.

The ocean and its resources are also a part of our common heritage and an important part of many cultures, whose beliefs and practices are closely associated with the marine and coastal environment. The protection and valorization of these natural and cultural marine heritage sites can foster sustainable development, especially for developing countries and Small Island Developing States (SIDS).

The health of our ocean is at risk

All of these social, economic, cultural and environmental benefits and opportunities may be lost because the ocean is not being managed in a sustainable way. Scientific evidence shows that the impact of human

activities, including overfishing, illegal fishing, industrial and agricultural waste, Green House Gas emissions (GMG), and

40% of our global oceans are 'heavily affected' by human activities

coastal development are seriously affecting the health of our ocean. 40% of our global oceans are 'heavily affected' by human activities.

These changes are impairing the ocean's capacity to provide food, protect livelihoods, maintain clean water, recover from

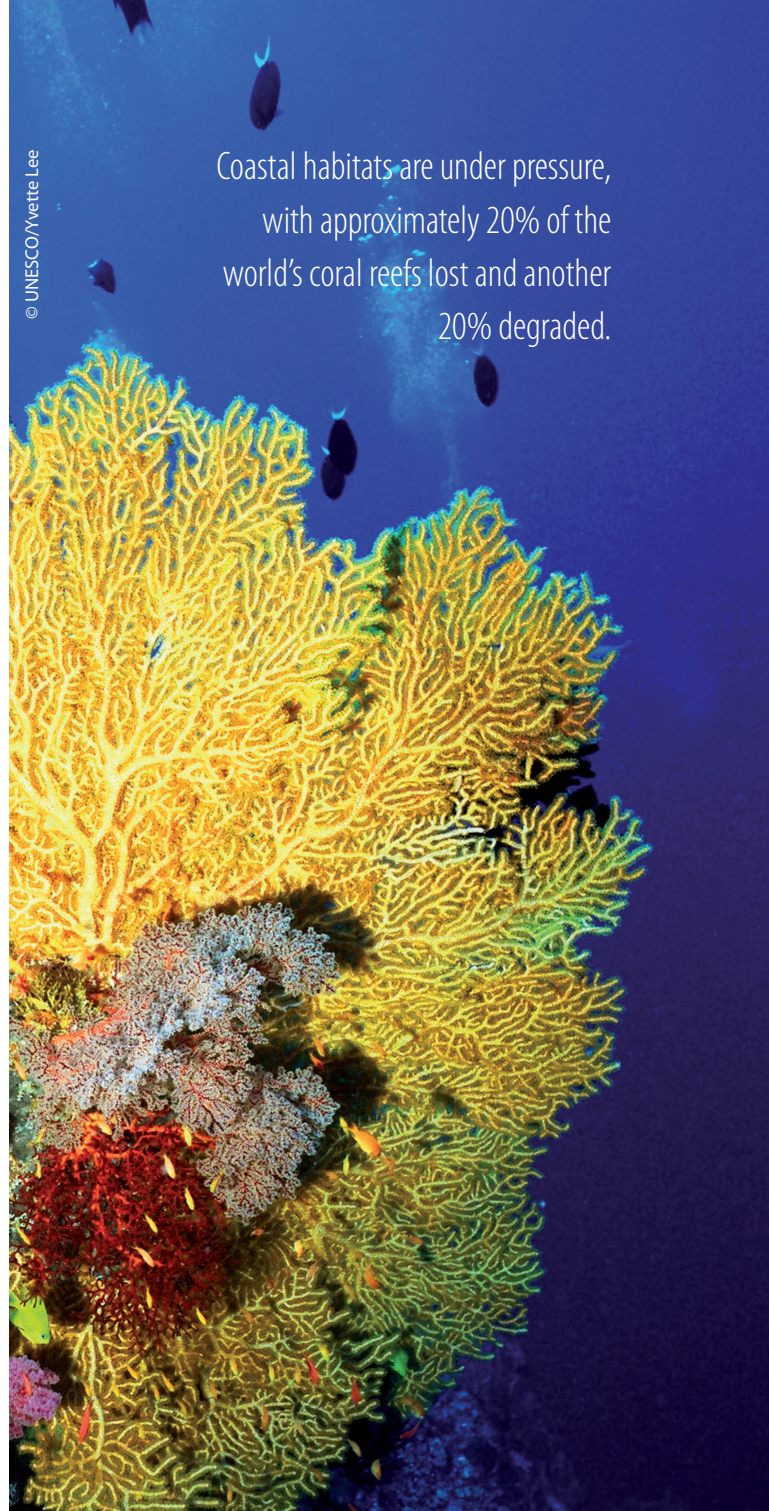
environmental stresses like severe storms and absorb carbon from the atmosphere. These factors endanger the survival of hundreds of millions of people and impede the efforts of the international community to achieve the Millennium Development Goals (MDGs). In addition, they may also result in increasing levels of poverty and conflict in many parts of the world.

The trend of biodiversity loss is accelerating on a global scale. Coastal habitats are under pressure, with approximately 20% of the world's coral reefs lost and another 20% degraded. Mangroves have been reduced from 30% to 50% of their historical cover, impacting biodiversity, habitat for inshore fisheries, and carbon sequestration potential. 29% of seagrass habitats are estimated to have disappeared since the late eighteen hundreds. Over 80% of the world's 232 marine eco-regions reported the presence of invasive species, which is the second most significant cause of biodiversity loss on a global scale. Marine bio-invasion rates have also risen.

Land-based sources account for approximately 80% of marine pollution, globally. Excessive nutrients from sewage outfalls and agricultural runoff have contributed to a rise in the number of dead zones (hypoxic or anoxic areas), from 49 in the 1960s to over 400 in 2008, resulting in the collapse of some eco-systems. Nowadays, more than 245,000 square kilometres are affected, equivalent to the size of the United Kingdom. Risks of major oil spills have increased as technology permits more deep sea drilling. In addition to land based and marine pollution, plastic materials and other litter are also affecting the health of our oceans. Light, resistant plastics float in the ocean, releasing contaminants as they break down into toxic micro-particles that animals mistake for food. Fish and birds choke on these particles, get sick and often die. They also become entangled in larger debris.

© UNESCO/Vette Lee

Coastal habitats are under pressure,
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Sea-level rise from climate change is projected to lead to coastal erosion and flooding, resulting in the loss of habitat and livelihood for millions of people, particularly those living in Small Island Developing States (SIDS). According to the Intergovernmental Panel on Climate Change (IPCC), many millions more people are projected to be affected by floods every year due to sea-level rise by the 2080s.

GHG emissions are increasing the acidity of the ocean. The ocean absorbs more than 26% of the carbon dioxide that is emitted

If we continue business as usual, the ocean could become 150% more acidic by 2100

into the atmosphere from human activities. This results in increased acidity (lowered pH) of the ocean, leading to a reduction in the availability of calcium for plankton and shellfish species, threatening their very survival. Since many of these organisms serve as the base

of much of the marine food chain, the potential impact of acidification on entire ecosystems could be catastrophic. If we continue business as usual, the ocean could become 150% more acidic by 2100.

How can we sustainably manage our ocean?

To mitigate the continued degradation of the ocean and its marine treasures and to restore and sustain its critical market and ecosystem services, a transition must be made towards blueing the green economy. Blueing the green economy - that is developing sustainable economic activities which generate jobs and assist in poverty alleviation while at the same time embracing integrated environmental management and adapting to and mitigating climate change and other existing and emerging issues – is one of the major challenges of our time, and the only viable path to achieving a sustainable future.

Key dimensions of a blue-green economy include the development of blue carbon markets, protection and restoration of ocean ecosystems, greater use of renewable energy from the ocean, recycling of major ocean pollutants, and changing our current fisheries and aquaculture management regimes.

Optimal economic and social benefits can be derived from a healthy ocean whilst protecting the environment in the long-term by adopting the dimensions of a green economy and changing institutional frameworks accordingly. Conversely, recent studies estimate that the cost of inaction represents the difference between a 'low emissions, low climate impacts' future and a 'high emissions, high climate impacts' future. This cost could reach a total of US\$ 322.5 billion in 2050 and US\$ 1.3 trillion in 2100.

To transition to a blue-green economy, we must develop a new relationship with our ocean where we endeavor to live with the ocean and from the ocean in a sustainable way. To make this transition will require greater scientific research and cooperation as well as observation and monitoring systems, including early warning systems, to gain a better understanding of this complex system. Reliable scientific information and data must inform decision-making processes so as to develop

sound policies for the sustainable management of our ocean. Indigenous knowledge about the ocean and its resources must also contribute to this process.

Only education, complemented by greater public awareness through the media, can change our unsustainable consumption and production patterns. It provides people at all levels of education, but in particular youth, with the knowledge and skills needed to sustainably manage our ocean and its resources.

As the values, beliefs and knowledge that shape the relationship that people have with the ocean are influenced by culture, this important aspect must also be taken into account in all policies and decision-making processes relating to the sustainable management of our ocean. Appropriate tools and mechanisms are also needed to protect and conserve marine and coastal resources for future generations, whether natural, cultural or aesthetic. Each and every person from all parts of the globe

must be empowered to protect this rich common heritage, which is vital for achieving the future we want.

UNESCO is working to make the most of the transformative power of education, the sciences, culture and the media to advocate for the sustainable management of our ocean in the lead up to Rio+20 and beyond. The Organization's work in this area focuses on:

- ➔ Building the ocean knowledge base through science observation, data collection and capacity building for sustainable ocean management;
- ➔ Protecting, valuing and sustainably managing our marine treasures for future generations;
- ➔ Transmitting the values, knowledge and skills needed to promote global ocean stewardship through quality education, training and capacity building, and by promoting greater public awareness through the media.

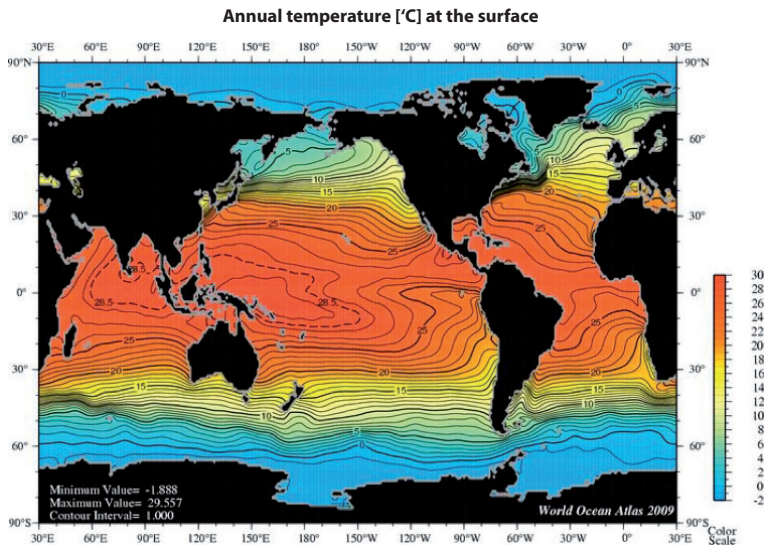
Knowing our ocean

How can science and technology be at the service of coastal nations to manage ocean and coastal resources sustainably, protect their coastal populations, and maintain ecosystem services? Much of the ocean remains unexplored and many ocean characteristics are still unknown, although knowledge is the first step toward sustainable use of the ocean. We cannot protect and preserve what we do not know.

This section stresses the importance of science and observation for the sustainable management of the ocean. It focuses on

the importance of observing systems, data collection and monitoring. It provides information on how science and early warning systems can help coastal communities become more resilient to the impacts of climate change and coastal hazards, as well as the important role of science in decision-making processes. It also focuses on the role of indigenous knowledge in developing appropriate sustainable ocean management responses. It furthermore examines ocean and freshwater linkages, particularly in developing strategies to cope with the sea/land interface.

Building the ocean knowledge base: science observation and data collection for ocean management



© World Ocean Atlas 2009

To sustainably manage our ocean, we must know more about this complex system and how it contributes to the well-being of society. This requires continuous scientific observation and data collection to effectively monitor the state of the physical ocean and its living resources. This information is provided by ocean observation networks of hundreds of higher education institutions, national oceanographic institutions, navigational authorities and meteorological service centers. Satellites, research ships, floating and moored buoys, and autonomous sampling robots continuously feed raw data on the state of the ocean to hundreds of ocean data centers and to the oceanography researchers and marine managers who depend upon these information streams to assess the health of the ocean. Twenty years ago at the UN Conference on Environment and Development (UNCED), the scientific community recognized the need for international coordination of this vast enterprise to improve the quality of services, increase efficiency and

provide international access to the global treasure trove of ocean information. The Global Ocean Observing System (GOOS) - co-sponsored by UNESCO's Intergovernmental Oceanographic Commission (IOC), the World Meteorological Organization (WMO), the United Nations Environment Programme (UNEP) and the International Council for Science (ICSU) - has served this role for 20 years, acting on behalf of the United Nations Framework Convention on Climate Change (UNFCCC) as the ocean component of the Global Climate Observing System and providing the foundation of data for the future UN Global Marine Assessments. GOOS and IOC encourage an open and free access data policy for these systems to leverage and utilize the several billion dollar global expenditure in marine observations.

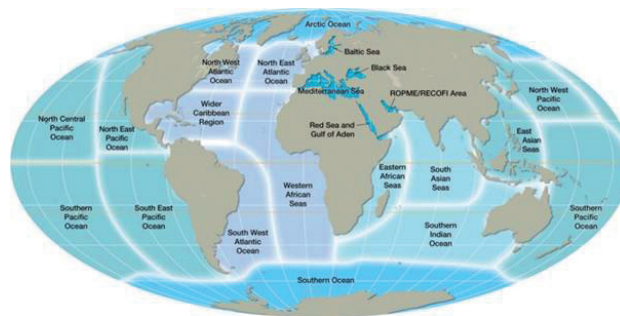
While GOOS has transformed oceanographic science and understanding of climate systems and variability, its objectives for a minimally effective ocean observing system are only 62% complete. While the need for ocean observations is growing, support for the system has been waning in recent years. More financial and political support for GOOS by individual nations and the international community is needed to develop a complete, sustainable, climate, ocean and marine ecosystem observation system. In addition, greater capacity building support is needed so that developing countries may share in the value of GOOS.

Science - the key for effective decision-making

Both Agenda 21, adopted in 1992, and the 2002 World Summit on Sustainable Development have recognized the role of Integrated Coastal Area Management (ICAM) as a process for managing coastal and marine resources in an inter-sectoral, adaptive, and sustainable way. As the demand for increased collaboration amongst social and natural sciences became more obvious, the establishment of an international platform that would keep track of the advancement of the ICAM-related fields, provide technical assistance to scientists and coastal managers alike, and foster the development of interdisciplinary scientific approaches and projects, became necessary. As a result, since 1997, UNESCO-IOC has been supporting its Member States in their efforts to establish integrated coastal management plans based on sound science and technical capabilities for coastal management. A number of regional project interventions are being conducted throughout the world, from the coast of West Africa, where UNESCO-IOC is helping countries to implement coastal adaptation measures, to the shores of the South-East Pacific, where support is provided for the development of national coastal atlases to assist decision-makers.

Beyond the management of coastal areas, UNESCO-IOC has been instrumental in developing the marine spatial planning concept which provides an effective tool for extending management plans to a country's Exclusive Economic Zone (EEZ) limits, hence allowing for allocation of marine space and human activities usage whilst considering the capacity of marine ecosystems to sustain such economic development. It is through the application of these types of multi-scale management tools that the sustainable management of coasts and the ocean will become a reality.

Contributing to the World Ocean Assessment



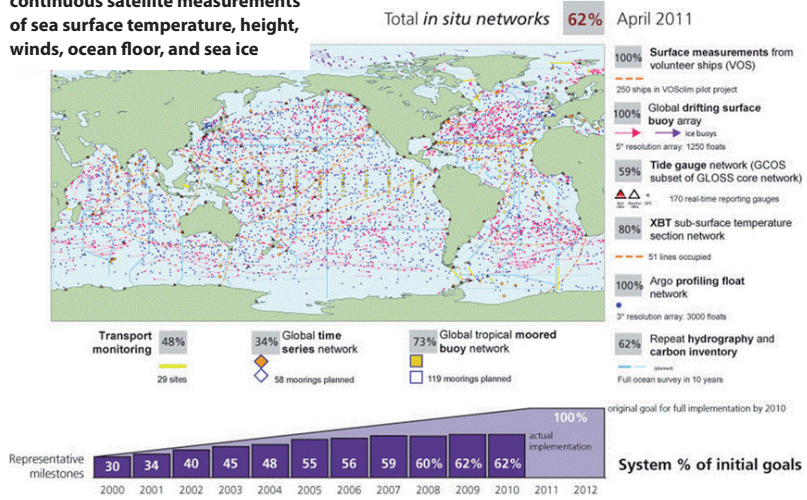
Assessment of Assessment Regions
© UNEP/GRID-Arendal, 2009

Is the wealth generated by marine industries increasing or decreasing? Is the condition of global marine ecosystems improving or declining? What is the overall state of the global marine environment? How can we measure the state of the ocean at a global scale in a meaningful way?

These questions were posed in 2002, when Heads of State gathered in Johannesburg for the World Summit on Sustainable Development. They decided to commence a Regular Process to review the ocean's condition every five years. It was noted that a large number of marine environmental assessments are already carried out by countries, regional authorities and international organizations. Consequently, it was decided that the best approach was to take advantage of them as much as possible. A key decision was to include social and economic aspects within the scope of the Regular Process, which has the full title 'Global Reporting and Assessment of the State of the Marine Environment including Socio-economic Aspects'.

In 2006, a start-up phase was initiated to review over 500 existing marine environmental assessments from around the world. This was led by UNESCO-IOC and UNEP. In 2010, the UN General Assembly appointed 25 experts representing as many nations to carry out the first cycle of the Regular Process between 2010 and 2014. The immediate tasks for the Group of Experts included preparing a draft outline for the First Global Integrated Marine Assessment and to design a process for drafting and reviewing it. Producing the Assessment will be a major undertaking that will have to involve many marine experts from around the world in order to succeed. UNESCO-IOC will provide scientific and technical support to the preparation of the World Ocean Assessment through its programmes, secretariats and networks.

continuous satellite measurements of sea surface temperature, height, winds, ocean floor, and sea ice



The global distribution of the in situ networks of GOOS
© JECOMM

Facilitating open access to scientific data

Climate change studies and related policy advice would be impossible without professional data management carried out in the 80 national oceanographic data centres (NODCs) of UNESCO-IOC's International Oceanographic Data and Information Exchange (IODE) programme. Since 1961, IODE has promoted the professional management as well as free and open exchange of oceanographic data, but it remains a challenge to find a balance between individual or national

interests, such as intellectual property rights and national defence, and those of the global community. The volume of data collected and the number of platforms used to collect data is increasing every year. With today's technology, anyone can make data or information available over the Internet. However, quality assurance or provenance cannot always be ascertained. It is therefore necessary, more than ever, to organize oceanographic data and information management at the global level, with globally agreed standards and practices and to make these data available quickly and easily and with qualified quality. Poor quality data will lead to poor policy advice and thus to poor decision-making.

Reducing the vulnerability of coastal communities through ocean observation and services

Since 1965, UNESCO-IOC has provided intergovernmental coordination for the Pacific Tsunami Warning System. Following the 26 December 2004 tsunami in the Indian Ocean, IOC was given the mandate by its Member States to also provide intergovernmental coordination for the development of tsunami warning systems in the Indian Ocean, the Caribbean and the North-East Atlantic, Mediterranean and connected seas. Following six years of intergovernmental coordination and development, the Indian Ocean System was inaugurated by the Director-General of UNESCO on 12 October 2011, when Australia, India and Indonesia started as Regional Tsunami Service Providers. Similar systems are yet to become operational in the two other regions.

The tsunami warning systems rely on real-time monitoring networks of seismometers for detection of earthquakes and sea level measuring stations for verification or cancellation of a possible tsunami wave. UNESCO-IOC holds specific responsibility for coordinating the global network of sea level gauges through its Global Sea Level Observing System (GLOSS) programme. Sea level observations are used for several other purposes than tsunami monitoring and warning. For example, sustained sea level observations are used to: underpin assessment of regional long-term sea level rise due to climate change, coastal zone management and adaptation.

UNESCO-IOC also works with the World Meteorological Organization (WMO) to bring together marine meteorological and oceanographic communities under the umbrella of the WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) to respond to interdisciplinary requirements for meteorological and ocean observations, data



Tsunami, Japan 2011
© Mainichi Shinbun, UNESCO

management and service products. The primary objective of marine forecast and warning programmes is to enhance safety at sea, based on expanded requirements for data and services. Other applications focus, in particular, on the reduction of the vulnerability of coastal communities through marine forecasts and warning.

The JCOMM in situ Observing Platform Support Centre (JCOMMOPS) provides essential data and tools and a centralized information and technical support facility, required for coordinating and integrating many of the existing operational ocean observing networks. Among these, Argo is an array of over 3,500 free-drifting profiling floats that measures the temperature and salinity of the upper 2,000m of the ocean, allowing continuous monitoring of the temperature, salinity, and velocity of the upper ocean. Argo builds on existing observation networks. All data are relayed and made publicly available within hours after collection.

At the core of these applications are observational data sets and predicted products for both the oceans and the overlying atmosphere. However, there are still gaps in the detection and observation networks. Long-term sustainability of the warning



UNESCO experts measuring the change of height in the coastline after the earthquake, Bío Bío Region, Chile. © UNESCO Santiago.

systems depends on multiple uses of the detection networks. Ensuring that nations have access to the necessary information for adaptation planning is dependent on continued progress in the implementation of observing systems. Countries need to commit to closing detection gaps in the observing systems.

Reducing coastal pollution/nutrients through science

The health of our ocean is significantly impacted by the very large increases in the levels of nutrients, such as nitrogen and phosphorous originating from human activity, agricultural runoff, wastewater, and the burning of fossil fuels. Impacts include hypoxia (or oxygen depletion), loss of biodiversity, and reduction of fish stocks. The problems are set to increase, notably in coastal waters, in severity and scope in the light of increased food and energy production and coastal urbanization. There is a need for countries and their stakeholders to shift towards sustainable production and use of nutrients if key development goals, such as food and energy security are to be achieved

sustainably. The role of UNESCO-IOC is to provide the knowledge base for improved coastal and ocean management. UNESCO-IOC focuses on linking nutrient sources to coastal ecosystem effects and management. A key component of UNESCO-IOC's implementation strategy is active engagement in a 'Global Partnership on Nutrient Management' with governments, intergovernmental organizations, and non-governmental organizations.

The number of wild fish caught is decreasing while human dependence on food resources from the sea is increasing. Aquaculture or sea-farming is therefore expanding rapidly. Natural or anthropogenic induced occurrences of toxic microalgae and algal blooms threaten aquaculture development, traditional fisheries of shellfish, livelihood, businesses, public health, tourism and sustainable development in the coastal zone. The marine environment may be severely damaged by widespread mass mortalities, hypoxia/dead zones, due to mass occurrences of phytoplankton. UNESCO-IOC has provided the lead in this field for two decades, providing a global framework for training in monitoring and management and for setting research priorities. Knowledge and data is shared through regional networks of scientists and practitioners. UNESCO-IOC works in close partnership with Member States and other organizations to provide services and training opportunities in these areas.

Promoting scientific research for biodiversity conservation in the deep-sea and the high seas

Deep-sea research today is equally important to both pure and applied research, since the discovery of new species not only nurtures basic knowledge but is also likely to lead to the identification of new chemicals, which in turn tend to lead to new applications and new economic markets. The technology

to explore the deep sea is not accessible to the majority of countries nor are there any legal and policy frameworks regulating access to deep seabed genetic resources. Only specialized research institutions in a handful of developed countries have the technology required.

For the time being, living resources found in the deep seabed in international waters are in a kind of 'no man's land'. This is because the current legal and policy regimes under relevant international legal instruments, and especially the United Nations Convention on the Law of the Sea (UNCLOS) and the Convention on Biological Diversity, do not specifically deal with the conservation and sustainable and equitable use of the biodiversity of the deep seabed. The time has come to fill in the important legal and policy gaps described above. The United Nations General Assembly offers hope in this regard. The General Assembly has set up an Open-Ended Informal Working Group on Marine Biodiversity in Areas beyond National Jurisdiction. The Group has been tasked to design and coordinate expert work aimed at identifying elements of a possible agreement specifically dealing with access to and conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction, under UNCLOS.

IOC also houses the Ocean Biogeographical Information System (OBIS), which is the legacy of the Census of Marine Life (CoML) that was concluded in 2010. OBIS provides an essential contribution to the mapping of deep-sea biodiversity and helps to identify measures for their conservation and sustainable use. OBIS currently hosts over 30 million geo-referenced distribution records for over 100,000 different marine species extracted from nearly 1,000 individual data sets.

Managing coastal aquifers

The Mediterranean Sea Large Marine Ecosystem is under increasing threat due to uncontrolled coastal development, population expansion, increasing coastal tourism, unregulated and unsustainable fishing, over-extraction of freshwater and pollution. In the Mediterranean coastal zone, coastal aquifers represent generally available and secure water supplies that are being increasingly threatened by depletion by over-extraction and quality degradation caused by contamination. In addition, coastal aquifers play an important role in regulating the contents of nutrients, pesticides and other types of pollution from land activities that discharge into the sea. Under the Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution, the Protocol on Integrated Coastal Zone Management (ICZM) that entered into force on 24 March 2011 directly addresses this issue in Article 9. This article requests countries "to monitor coastal aquifers and dynamic areas of contact or interface between fresh and salt water, which may be adversely affected by the extraction of groundwater or by discharges into the natural environment". In 2009, the Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem (MedPartnership) - co-funded by the Global Environment Facility (GEF) and led by UNEP/MAP and the World Bank - was established to serve as a catalyst in leveraging policy/legal/institutional reforms as well as additional investments to reverse the degradation of this large, damaged marine ecosystem, and its contributing freshwater basins, habitats and coastal aquifers.

UNESCO's International Hydrological Programme (IHP) is implementing the sub-component on Management of Coastal Aquifers and Groundwater of the MedPartnership. In the framework of this sub-component, two activities are being implemented to assist countries in the development of solution-oriented ICZM plans for coastal zones, with special attention to

the integration of the surface waters, groundwater and aquifers, and biodiversity management. The two demonstration pilots are in the Buna/Bojana coastal area (shared by Albania and Montenegro) and in the Reghaïa coastal area in Algeria.

Mobilizing indigenous knowledge to sustainably manage our ocean

The great majority of the world's fishers are artisanal. Their knowledge of the places and seasons to fish, how to navigate high seas or reef-strewn shores and return home safely, is honed by their first-hand experiences and passed down from generation to generation. In many fishing cultures, this indigenous knowledge encompasses social norms and rules about how to fish 'right'. For example, almost every fisheries conservation measure that exists today was already in use centuries ago in the Pacific islands. Recognizing and building upon the intimate knowledge possessed by fishing communities about adapting to and caring for changing ocean resources is an essential first step towards sustainable ocean management that can be implemented by communities for communities.

An Indigenous Knowledge *wiki* for the People of Marovo Lagoon

"Those who cannot name the good things of sea and land, cannot benefit from them nor will they know how to look after them well" - so say the people of Marovo Lagoon, Solomon Islands. Based on more than 1,200 Marovo words, UNESCO's Local and Indigenous Knowledge Systems (LINKS) programme is working with remote rural schools to develop a Marovo-language wiki rooted in indigenous knowledge of the ocean, reef, lagoon and rainforest. Students, teachers and community members make the wiki come alive by uploading and sharing new knowledge entries, photos and drawings through an extended Wi-Fi network connecting schools that can only be reached by dugout canoe. This Open Education Resource reinforces vernacular language and provides meaningful local content, while helping young Solomon Islanders master today's information technologies.



Master canoe-builders at work
© Doug Nakashima

Knowing Our Ocean – Traditional Wayfaring Knowledge

"If my ancestors can take on the biggest ocean in the world, I can take on the whole world", says Cook Islands student Kaiki Tarangi. Feeling the pulse of ocean swells to locate islands beyond the horizon or following sea-going birds back home, these are the age-old talents of Pacific wayfaring people. The interactive learning resource *"The Canoe is the People"* captures the words and knowledge of master canoe-builders and navigators in 77 videos, 11 animated diagrams and innumerable stories, maps and accounts, to convey to Pacific youth the power of their traditional knowledge of the ocean environment. Teacher manuals and student workbooks to guide classroom use of the resource are being developed by UNESCO's LINKS programme.

What ocean scientists, water experts, indigenous groups, and policy makers can do to save our ocean

- Strengthen the Global Ocean Observing System (GOOS).
- Ensure that sufficient resources are allocated to the preparation of the 1st World Ocean Assessment Report.
- Promote the participation of scientists and experts, including on indigenous knowledge, from all regions of the world and particularly developing nations.
- Make the results of the 1st Global Assessment widely available to decision-makers, civil society and the private sector.
- Ensure that ocean data and information are made available freely and openly at the national as well as international level as an essential element of ocean research and management.
- Promote multi- and inter-disciplinary research and related exchange of data and information.
- Ensure ocean data and information management training at the national and international level.
- Develop integrated and science-based conservation and management policies where they do not exist and strengthen them where they exist.
- Document and educate citizens on the importance of a healthy marine environment for economic vitality, and human welfare.
- Make scientific information about the status of coastal areas and resources available to the public in a clear and simple form.
- Get involved as an active stakeholder in your local coastal planning programmes.
- Promote protected marine and coastal areas.
- Implement policies to reduce CO2 emissions. This can include greening transportation, developing renewable energy, etc.
- Strengthen research and data collection to provide global, national and regional forecasts and to identify 'point of no return' tipping points.
- Recognize the role of indigenous knowledge and customary management in marine biodiversity conservation and sustainable use.
- Bring indigenous knowledge-holders and scientists together to co-produce new knowledge addressing complex ocean challenges.
- Develop sewage and wastewater treatment to fight against land based marine pollution.



Protecting our marine treasures



Phoenix Islands Protected Area (Kiribati), one of the world's largest marine protected areas
© Cat Holloway

How can we better preserve the natural and cultural heritage of the ocean and coasts and the essential services they provide to society? Appropriate tools and mechanisms are needed to protect and conserve marine and coastal resources for future generations, whether natural, cultural or aesthetic. This section focuses on the importance of Marine Protected Areas (MPAs) and ongoing efforts to identify and

protect some of the richest marine environments, consolidate coastal ecosystems, and develop new relationships between people and the ocean so that we can continue to appreciate the beauty and the bounty of our seas. Forty-five marine areas are currently inscribed on UNESCO's World Heritage List for their exceptional natural features. Together, they cover 1/3 of the total surface of all MPAs on the planet and they include five of the world's largest MPA's. The ocean also contains numerous sites, such as ancient shipwrecks, that are of great importance, both culturally and economically, for coastal communities and for humanity at large, which must be protected.

Saving our Crown Jewels

Out of 6,000 marine protected areas worldwide, 45 have today the highest internationally recognized status for conservation; they are listed on the UNESCO World Heritage List. These 45 sites are the Crown Jewels of our ocean, selected through

a rigorous multi-year inscription process and constantly monitored to ensure these special treasures are preserved so future generations can continue to enjoy them. The sites are held accountable for their conservation actions through an almost universally ratified UNESCO World Heritage Convention - successfully preventing them from being mere paper parks like so many others. These 45 sites cover one third of all marine protected areas on the planet. UNESCO's World Heritage Centre works daily to connect the managers of these exceptional places, pooling their experiences and sharing their success stories. The marine World Heritage site managers network has set an ambitious goal on the premise that *"if we can't save these 45 Crown Jewels, what hope is there for the rest of the ocean?"*

Preserving submerged archaeological sites

The ocean holds a vast cultural heritage that is of great importance to coastal communities and the regions beyond. It is estimated that three million ancient shipwrecks lie on the ocean floor. 20,000 Neolithic sites are located in the waters around Scandinavia alone and more than 150 ancient cities are submerged in the Mediterranean, while thousands more are to be found in other regions. Their protection and valorization can foster scientific research, education, and sustainable development. Every USD invested in protecting heritage increases the economic activity around the site by a factor of between 1.2 to 8, depending on its significance and estimated value. This is of special importance for States bordering the ocean, particularly Small Island Developing States (SIDS), which can greatly enhance their tourist attractiveness through the valorization of their submerged archaeological sites.

Currently, these submerged sites, especially ancient shipwrecks, are under threat of pillage and commercial exploitation. They are also impacted by industrial activities and natural erosion. UNESCO, through its Convention on the Protection of the

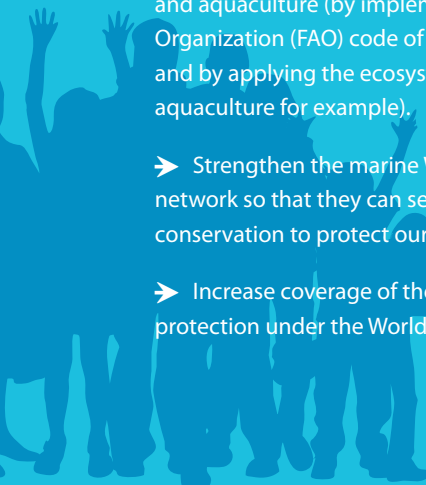
Underwater Cultural Heritage, builds capacities and provides legal guidance and operational assistance to safeguard the precious heritage of humanity lying on the ocean floor.

Examples of countries with a rich underwater heritage that have constructed major museums, which have contributed to sustainable development include:

- the Vasa shipwreck museum in Sweden, which is visited by 1 million visitors a year and is one of the country's most important museums;
- and the Bodrum museum in the Bodrum Castle of The Knights of St. John in Turkey. When excavations of the Uluburun wreck started in 1959, Bodrum had approximately 5,000 inhabitants. Through the valorisation of the wreck in the Bodrum castle, tourism has increased. The castle is now the second most visited museum in Turkey.



What policy planners and decision-makers can do to save our ocean

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- Develop coastal management plans and marine spatial planning, including marine protected areas.
 - Increase efforts to develop more sustainable fisheries and aquaculture (by implementing the Food and Agriculture Organization (FAO) code of conduct for responsible fisheries and by applying the ecosystem approach to fisheries and aquaculture for example).
 - Strengthen the marine World Heritage site managers network so that they can serve as drivers for ocean conservation to protect our 45 Crown Jewels.
 - Increase coverage of the most iconic ocean places for protection under the World Heritage Convention.
 - All States should ratify the UNESCO Convention on the Protection of the Underwater Cultural Heritage and take measures to protect their submerged archaeological sites in accordance with it.
 - Develop or adopt models for the legal protection of natural and cultural heritage located in regions beyond national jurisdiction. This can be done, for instance, through a cooperation model as proposed by the UNESCO Convention on the Protection of the Underwater Cultural Heritage.

Empowering global ocean citizens

How do we empower ocean citizens and society? Effective ocean stewardship requires the participation of all members of society in defining a common ocean future and in promoting behavioural change towards the ocean. The ocean is our common heritage and it is important to not only raise awareness about the problems our ocean is facing today, but to also empower people to protect our ocean. This final section provides information on how to promote ocean awareness and advocacy through education, the media and capacity building.

Educating for global ocean stewardship

It is crucial that people are informed and aware of the importance of the ocean to our lives, so that they can grow up caring and protecting our ocean. Education for all and at all levels should therefore focus on enhancing awareness of the state of our ocean and on action-oriented responses, including through the use of the media. Learners should be involved in hands-on experiences such as adopting coastline areas, beach

clean-up campaigns, and efforts to save endangered species and their habitats. Information and education need to lead to action in everyday life.

UNESCO, as the lead agency for the UN Decade of Education for Sustainable Development (2005-2014), is working to teach, inspire and empower people to value and protect our ocean. The Organization's work in this area focuses on teaching people about the value of a healthy ocean and its important role in human well-being; inspiring people to learn more about this unique environment; and empowering people, youth in particular, with the knowledge and skills they need to sustainably manage our ocean.

Education for Sustainable Development (ESD) offers a response to ocean-related challenges through education which empowers learners to respect, protect and maintain the ocean and its biodiversity, now and in the future. It highlights the links between the ocean, biodiversity and sustainable development and helps to develop - through understanding the impact of unsustainable consumption and production patterns - the abilities, skills, values and attitudes needed to identify and change behaviour that threatens marine biodiversity. ESD, with a focus on the ocean, stimulates worldwide awareness of the marine environment and enhances political attention and action. It also gives a human face to marine environment issues, empowers people to become active agents of sustainable and equitable development, promotes an understanding that communities are pivotal to changing attitudes towards marine environment issues, and advocates for partnerships which will ensure that all people enjoy a safer and more prosperous future.



UNESCO Sandwatch Programme: Learning to measure a wave, Dominican Republic
© Maria Mercedes Brito Feliz

Students get active in protecting their marine and coastal environment

Through the use of simple methods employing everyday low-cost equipment, UNESCO's Sandwatch programme develops awareness among teachers, students and communities on the vulnerability of marine ecosystems and the need to use them wisely. An interactive, out-of-the-classroom science education programme, the Sandwatch methodology is outlined in a richly-illustrated manual available in English, French, Portuguese and Spanish - with additional languages under development.

Students undertake field studies at their local beach, observing and analyzing the coastal and marine environment: sand, water, fauna, flora, habitats, debris, litter and more. They measure erosion, accretion and a range of other characteristics. This exercise is repeated during a given period of time in a consistent manner, allowing for the collected data to be compiled, interpreted, shared and stored. Linking local efforts to global monitoring efforts, data collected by Sandwatch teams is made available through the global Sandwatch database, thus making a real contribution to global coastal and climate change monitoring.

UNESCO is also working with small island communities in designing and implementing projects to address issues related to the local marine and coastal environment and climate change, in particular through educational, awareness and networking activities, including:

- Interregional projects focused on sharing sustainable island living and development activities;
- Public understanding and awareness of climate change, environmental and sustainable island development issues through internet fora and field research under programmes such as Climate Frontlines;
- Youth-led sustainable development activities and best practices through the Youth Visioning for Island Living Initiative, for example, by promoting youth micro-enterprises, youth teaching their peers about eco-tourism and clean-up campaigns;
- Collaboration with the University Consortium of Small Island States - a UNESCO UNITWIN network - for combined inter-regional training courses, research in sustainable development and capacity building;
- Integration of coastal and beach sustainable development issues and management into science education, through the Sandwatch approach to Education for Sustainable Development.

Enhancing public awareness about ocean issues

Free, independent and pluralistic media is also important for raising awareness about the ocean, educating the general public, and catalysing civic participation in preserving oceanic resources. UNESCO's work in this regard includes building

the capacities of developing-country journalists to report more authoritatively on how ordinary people can become an integral part of sustainable development, reinforcing the need for treating the media as an inclusive platform for democratic discourse.

Encouraging 'self-driven' capacity-development through marine scientific research and transfer of technology

The lack of human and institutional capacity in ocean sciences, monitoring and management is a real barrier to developing nations, particularly Least Developed Countries and SIDS, in their efforts to achieve sustainable growth through the sustainable use of their coastal and marine resources. To address this issue, UNESCO's Intergovernmental Oceanographic Commission (IOC) is promoting capacity development programmes, which aim at empowering developing countries to sustainably use their coastal and marine resources by encouraging 'self-driven' capacity-development. 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 also developed several tools for the use of decision-makers, such as guidelines to implement Marine Spatial Planning or to reduce or manage the risk of tsunamis. A unique network has also been established by IOC with the most talented scientists across the world and with research institutes in all regions, which is working to address issues related to the protection and sustainable development of the ocean and coasts.

IOC also fosters international cooperation in marine scientific research to implement the relevant provisions of Part XIII of the United Nations Convention on the Law of the Sea (UNCLOS), and facilitates the transfer of marine technology as mandated

by Part XIV of the Convention based on the *IOC Criteria and Guidelines on the Transfer of Marine Technology* (2005). In this way, UNESCO-IOC plays a key role in supporting developing countries in the exploration, exploitation, conservation and management

of marine resources, the protection and preservation of the marine environment, marine scientific research, prevention of disasters and other activities, with a view to accelerating their social and economic development.

What teachers, students, the media, and the general public can do to save our ocean

➤ **Educate yourself about the ocean and marine life:**

All life on Earth is connected to the ocean and its inhabitants. The more you learn about the issues facing this vital system, the more you will want to help ensure its sustainable future—then share that knowledge to educate and inspire others.

➤ **Experience the ocean:** Take part in hands on experiences and outdoor activities in various places, such as zoos, aquariums, marine parks, and museums. Visit places on the coast or out at sea, to learn the importance of conservation and safeguarding spots crucial for the survival of marine species.

➤ **Help take care of our beaches:** Whether you enjoy diving, surfing, or relaxing on the beach, always clean up after yourself. Explore and appreciate the ocean without interfering with wildlife or removing rocks and coral. Encourage others to respect the marine environment. Participate in local beach cleanups, by removing as much litter as possible from both popular seaside places and sensitive marine reserves.

➤ **Make responsible, sustainable seafood choices:** Global fish populations are rapidly being depleted due to demand, loss of habitat, and unsustainable fishing practices.

When shopping or cooking, avoid increasing the demand for overexploited species by choosing more sustainable seafood.

➤ **Do not purchase items that exploit marine life:**

Some products contribute to the harming of fragile coral reefs and marine populations. Avoid purchasing items such as coral jewelry, tortoiseshell hair accessories (made from hawksbill turtles) and shark products.

➤ **Green your household:** Try to green your household and gardening chemical products, use them sparingly and wisely. Don't use fertilizers before it rains or pour oil or chemicals down the drain: they will just end up in the ocean!

➤ **Use fewer plastic products and refuse excess packaging:**

Plastics that end up in the ocean contribute to habitat destruction and kill tens of thousands of marine animals each year. To limit your impact, reduce your use of plastic products. Recycle them and replace them by reusable items (cloth bags, real mugs, cups and silverware, non-plastic bottles).

➤ **Promote coverage in the media and develop on-line social media campaigns** to raise awareness about ocean issues and to develop action-oriented responses.

“Even if you never have a chance to see or touch the ocean, the ocean touches you with every breath you take, every drop you drink, every bite you consume. Everyone, everywhere is inextricably connected to and utterly dependent upon the existence of the sea”

Sylvia Earle

“Green growth and sustainable development are predicated on the responsible management of the oceans’ resources and coastal areas.”

Irina Bokova, Director-General, UNESCO

<http://www.unesco.org/new/en/rioplus20/>