



United Nations  
Educational, Scientific and  
Cultural Organization

# UNESCO Science

for Peace and Sustainable Development



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UNESCO Science

for Peace and Sustainable Development

# Foreword



Without science there can be little progress towards sustainable development. The pursuit of knowledge and understanding through science will arm us to find solutions to the increasingly acute economic, social and environmental challenges facing humanity today. In an increasingly connected world

this is true for both developed and developing countries. Science, responding to the need to develop greener societies, underpins economic growth and employment, assists us in managing the environment and equips us with the knowledge to ensure equitable social progress.

UNESCO, since 1945, has promoted the advancement of science and its applications to develop knowledge and capacity, key to economic and social progress, the basis of peace and sustainable development. In particular, UNESCO within the context of its intergovernmental mandate and universal membership has focused its work in science on issues of global concern requiring multinational collaboration such as in the fields of freshwater resource management, ocean health, climate change, renewable energy, natural disaster reduction, biodiversity loss, and capacity building in science, technology and innovation. Science to build peace and to respond to international development goals, gender equality in science and the needs of Africa are of key concern.

Our work in science, including that of the Intergovernmental Oceanographic Commission (IOC), covers two broad areas – promoting science, technology and innovation and using science to manage the environment in a sustainable way including the ocean, freshwater, and the Earth's natural resources, ecosystems and biodiversity. To build a sustainable

future, our programmes also focus on engineering and renewable energy as well as protecting communities through using scientific knowledge for natural disaster reduction and through promoting science education. The contribution of indigenous knowledge systems to helping us build a sustainable future is also taken into account.

The United Nations Conference on Sustainable Development (Rio + 20, June 2012) signalled the continued commitment of the international community to sustainable development. At the same time the key role of UNESCO in the United Nations in promoting science to achieve sustainable development was clearly recognized. The world is facing multiple challenges which require multi-faceted solutions provided by interdisciplinary science. UNESCO is well placed to contribute to addressing these challenges by drawing on a broad range of basic, social and human, environmental and applied sciences set in the cross-sectoral context of UNESCO's mandate in education, science, culture and communication.

This short brochure will give you a snapshot of UNESCO's current work in science and will, I hope incite you to join us in making the future peaceful based on sustainable development.

A handwritten signature in black ink, appearing to read 'Flavia Schlegel'.

Flavia Schlegel  
Assistant Director-General  
for Natural Sciences, UNESCO



Covering over two-thirds of our blue planet, the ocean makes it habitable. It is at the origin of all life on Earth and affects each of our lives: it is the source of our freshwater —most rain comes from the ocean— and of half the oxygen we breathe; it also influences our climate and weather. Our ocean provides food, medicine, and mineral and energy resources. It supports a multitude of life forms and shapes the Earth's characteristics. As such, the ocean and its resources are an important part of our common cultural heritage.

The importance of the ocean is not matched by our knowledge. Since its foundation in 1960, the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) has been promoting international cooperation in order to generate knowledge about the nature and resources of the ocean and coastal areas and to apply that knowledge to management, sustainable development, marine environmental protection, and decision-making processes. The IOC is the only United Nations organization with a specific mandate on global ocean science, observations, data exchange and services, such as global tsunami warning systems.

But IOC-UNESCO's role goes much further: it strives to improve our relationship with the ocean through the development and dissemination of scientific knowledge and by educating the general public on the importance of the

ocean. In summary, the Commission is a global awareness platform that helps to protect the world's ocean, and thus, our own well-being.



A handwritten signature in blue ink, appearing to read 'V. Ryabinin'.

Vladimir Ryabinin  
Executive Secretary and Assistant Director-General  
Intergovernmental Oceanographic Commission of UNESCO

# CONTENTS

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Science  
to Empower  
Society

9

Science to  
Manage  
Freshwater

21

Science and  
Services for  
the Ocean and  
Coasts

27

Science to  
Manage  
the Earth,  
Ecosystems  
and Biodiversity

35

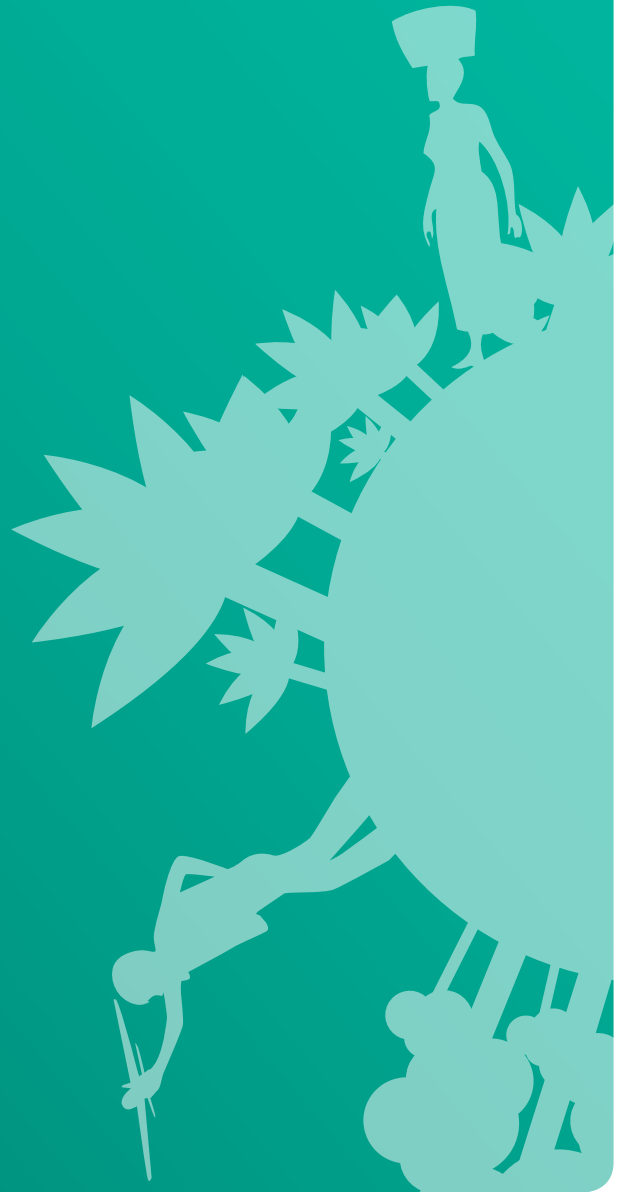
Science to  
Build Safe,  
Inclusive and  
Prosperous  
Communities

45

The Wider  
Horizon:  
Science,  
Society and a  
Sustainable  
Future

51

# Science to Empower Society

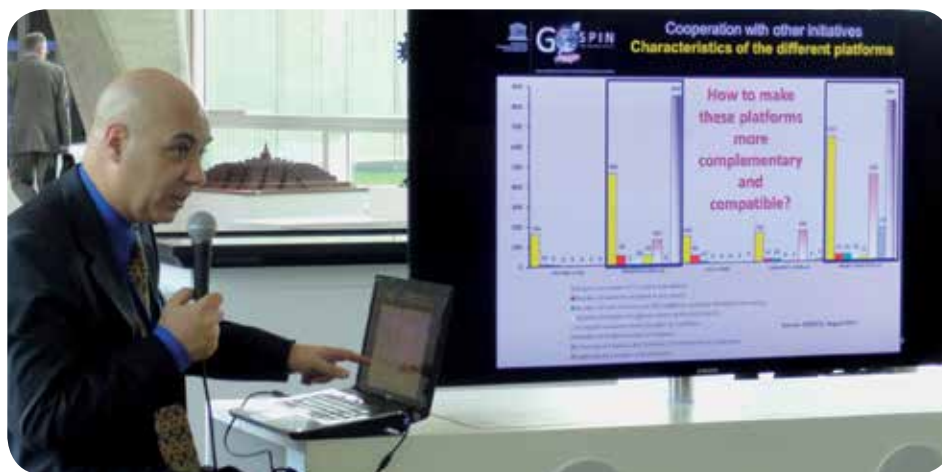


## Science, Technology and Innovation policy and assessment

Investment in science, technology and innovation (STI) is an important driver of economic growth and social development. UNESCO works to assist countries to invest in STI, to develop national science policies, to reform their science systems and to build capacity to monitor and evaluate performance through STI indicators. Many countries have benefited from UNESCO's assistance including over twenty in Africa. Every five years, the *UNESCO Science Report* monitors the state of the support system for STI around the world and analyses emerging trends.

In 2011, UNESCO launched the Science, Technology and Innovation Global Assessment Programme (STIGAP) to widen the scope of standard STI assessment, to take into account county-specific contexts including the social dimension, and emerging knowledge on the relationship between technological progress and sustainable development.

The Science Policy Information Network (SPIN), a web-based information system presenting up-to-date and comprehensive information on STI policies and best practices was developed by UNESCO in the Latin America and the Caribbean region. UNESCO plans to develop GO-SPIN into a global platform and observatory to support STIGAP





Science governance refers to the structures and policy mechanisms which ensure that scientific knowledge is advanced and taken into account at all levels of governmental decision-making. It implies dialogue, participation and mobilization of all stakeholders in the decision-making process. The World Conference on Science (WCS) in 1999 launched a still on-going debate on the interface between science, knowledge and society and is followed up every two years, since 2003, in Budapest by the World Science Forum (WSF). The 2013 WSF took place in Brazil following the United Nations Conference on Sustainable Development (Rio+20). Following the WCS, UNESCO launched the Science Policy Fora initiative in 2003 to promote quality policy dialogue on the role of scientific knowledge in today's global society. Within this context, the Inter-Parliamentary S&T Forum was also launched by UNESCO and partners in 2003 to strengthen the role of legislation in promoting and addressing science.

World Science Forum,  
Budapest, Hungary,  
November 2009



## Innovation

Science and technology are powerful drivers of industrial, economic and social development. Innovation is key to translating scientific knowledge into useful products, services and employment. University-industry linkages are vital to this process. UNESCO's University-Industry-Science Partnership (UNISPAR) programme aims to improve the quality of universities in developing countries and to encourage them to participate in the industrialization of their countries.

In May 2012, the International Research and Training Centre for Science and Technology Strategy under the auspices of UNESCO was inaugurated in Shanghai, China. The Director-General Irina Bokova signed the official agreement with Mr. Wan Gang, the Chinese Minister of Science and Technology, representing the Chinese Government.



© Ministry of Science and Technology (MOST), Government of China

Today, UNESCO fosters the development, management and governance of science and technology parks, managed by specialized professionals bringing together scientific research, business and governmental organizations in a single physical location to promote and showcase technology, innovation, incubation, exchanges, training, and market development. UNESCO's works in close cooperation with the international professional organizations in this field. These include the World Technopolis Association and the International Association of Science Parks.

The International Basic Sciences Programme (IBSP), an international multidisciplinary programme was established to strengthen UNESCO Member States' capacities in the basic sciences and science education. The Programme supports projects in mathematics, physics, chemistry and the life sciences and their interdisciplinary areas. Since 2005 some 40 projects have been launched through the IBSP. It also promotes public-private partnerships, North-South and South-South collaboration and fosters international cooperation through scientific networks with major region-specific actions, and centres of excellence such as SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East).



©UNESCO/Pilar Chiang-Joo

Global Microscience  
experiments during the  
World Teachers' Day  
celebration at UNESCO,  
5 October 2011

## Building Scientific Capacity: The Abdus Salam International Centre for Theoretical Physics (ICTP)

ICTP, located in Trieste, Italy, fosters research and capacity building in pure and applied physics, as well as mathematics, to advance scientific expertise and better working conditions for scientists in developing countries. It is jointly operated by UNESCO, IAEA and Italy with a high degree of intellectual and functional freedom.



©ICTP

The Leonardo da Vinci  
Building, ICTP Campus,  
Trieste, Italy

For more than 50 years, ICTP has provided an international forum for scientific dialogue through its short and long-term education and training programmes, assisting scientists at every stage of their careers, from young researchers looking to round out their educational experience to seasoned researchers staying abreast with current developments in their fields.

ICTP:  
building  
scientific  
capacity in the  
developing  
world



© UN Photo/Eskinder Debebe

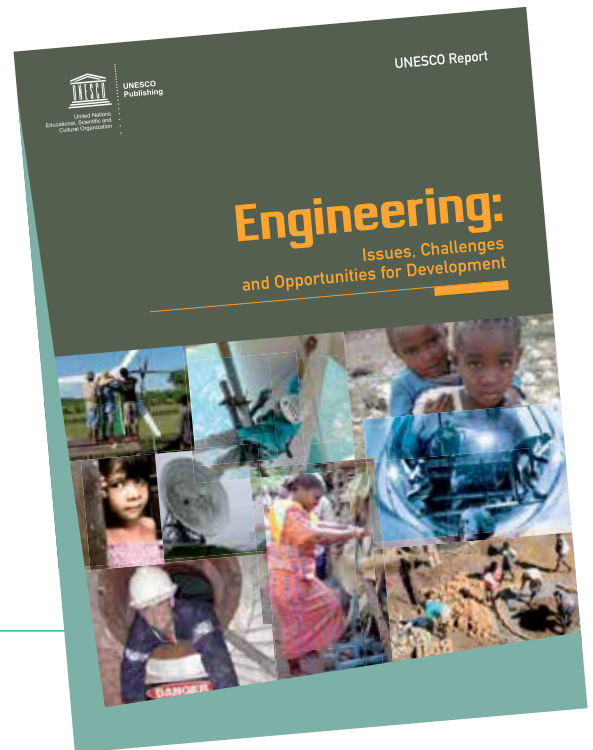
Global energy needs in the context of sustainable development and climate change require urgent and comprehensive action at all levels. Sustainable energy for all is critical for human progress – health, education, security, job generation, and economic competitiveness. UNESCO through its programme in the field of renewable and alternative energy efficiency promotes the development of energy policies, capacity building, the sharing of scientific knowledge and best practices, and supports model pilot initiatives providing technical assistance as needed. The UNESCO Global Renewable Energy Education and Training (GREET) Programme fosters capacity building, in particular in Africa. It also promotes cooperation between countries of the North and South with support from UNESCO-sponsored centers and institutes. UNESCO is a member of UN-Energy and contributes to UN energy policy coordination and related activities.

A nomadic Mongolian family using solar energy for their domestic energy supply.

## Engineering

Engineering, the application of science and technology to create useful products and services, is a powerful driver of social and economic development. It is vital in addressing basic human needs such as health, agriculture, drinking water, industry, building, energy, transport, disaster prevention and poverty eradication. There is increasing concern about declining enrolment in engineering studies which will compromise the achievement of sustainable development. Through the UNESCO Engineering Initiative, UNESCO aims to encourage students to study engineering, particularly young women and men in developing countries, to modernize engineering curricula to include interdisciplinary science and to apply engineering solutions to satisfy basic needs as defined by the international development goals.

It is vital in addressing basic human needs such as health, agriculture, drinking water, industry, building, energy, transport, disaster prevention and poverty eradication.



Science must respond to societal needs and global challenges. To do so effectively, public understanding of, and citizen participation in, science needs to be improved. UNESCO rewards and gives recognition to outstanding research in areas such as environmental conservation, biosphere reserve management, freshwater, health and life sciences, prizes for young scientists, women in science and for the popularization of science. UNESCO supports Member States in developing science centres, museums, exhibitions and publications. The quarterly newsletter *A World of Science* provides scientists and the general public with a regular overview of the latest news and events in science in the context of UNESCO's work.



© UNESCO/Yostan Nur

Celebration of the 60th Anniversary of UNESCO Kalinga Prize for the Popularization of Science, India



© UNESCO/ Rovant Sigamoney

Students participating in the launch of the Global Water Experiment during the Big Splash in Cape Town, South Africa during the World Water Day (22 March 2011)

In a world increasingly shaped by science, technology and innovation, science education, including mathematics, is critical to the future employability of many young people. It also helps to create scientifically literate citizens armed to make informed personal and political choices. In collaboration with partners, UNESCO promotes science education through the Global Programme on Microscience Experiments distributing microscience hands-on experimental kits in developing countries, to the setting up of high-quality on-line science courses (with Nature Publishing), and through leading and participating actively in International Years such as the International Year of Chemistry (IYC). During the IYC, UNESCO with partners, led a global experiment 'Water, A Chemical Solution' where over 125 000 students around the world uploaded their results on water quality onto a dedicated website. Many UNESCO science programmes have a specific educational component.

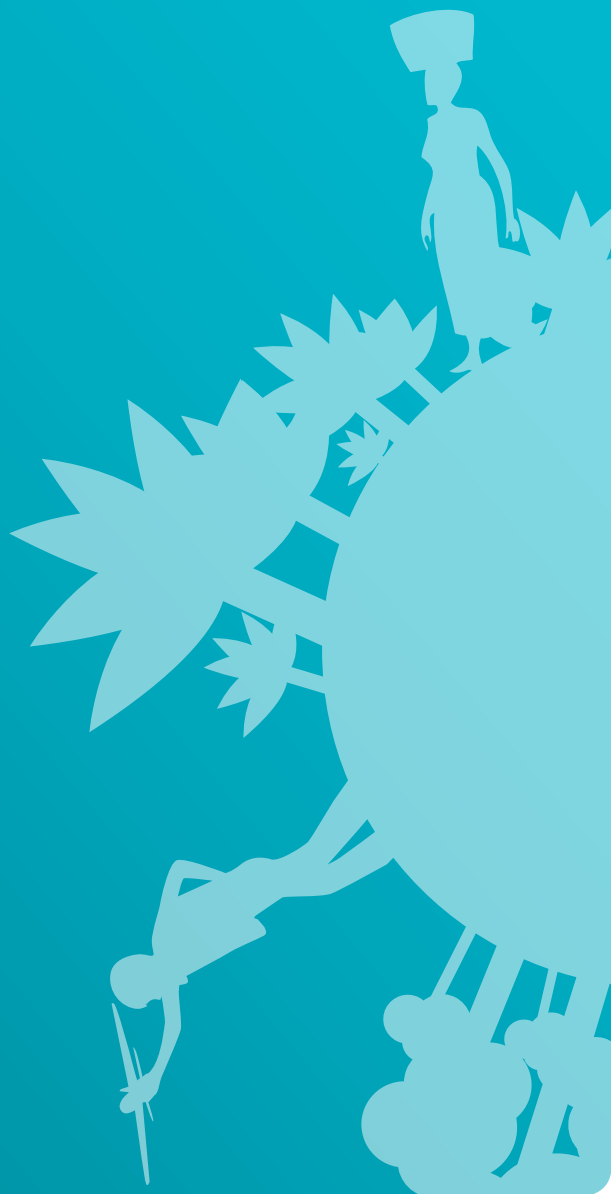


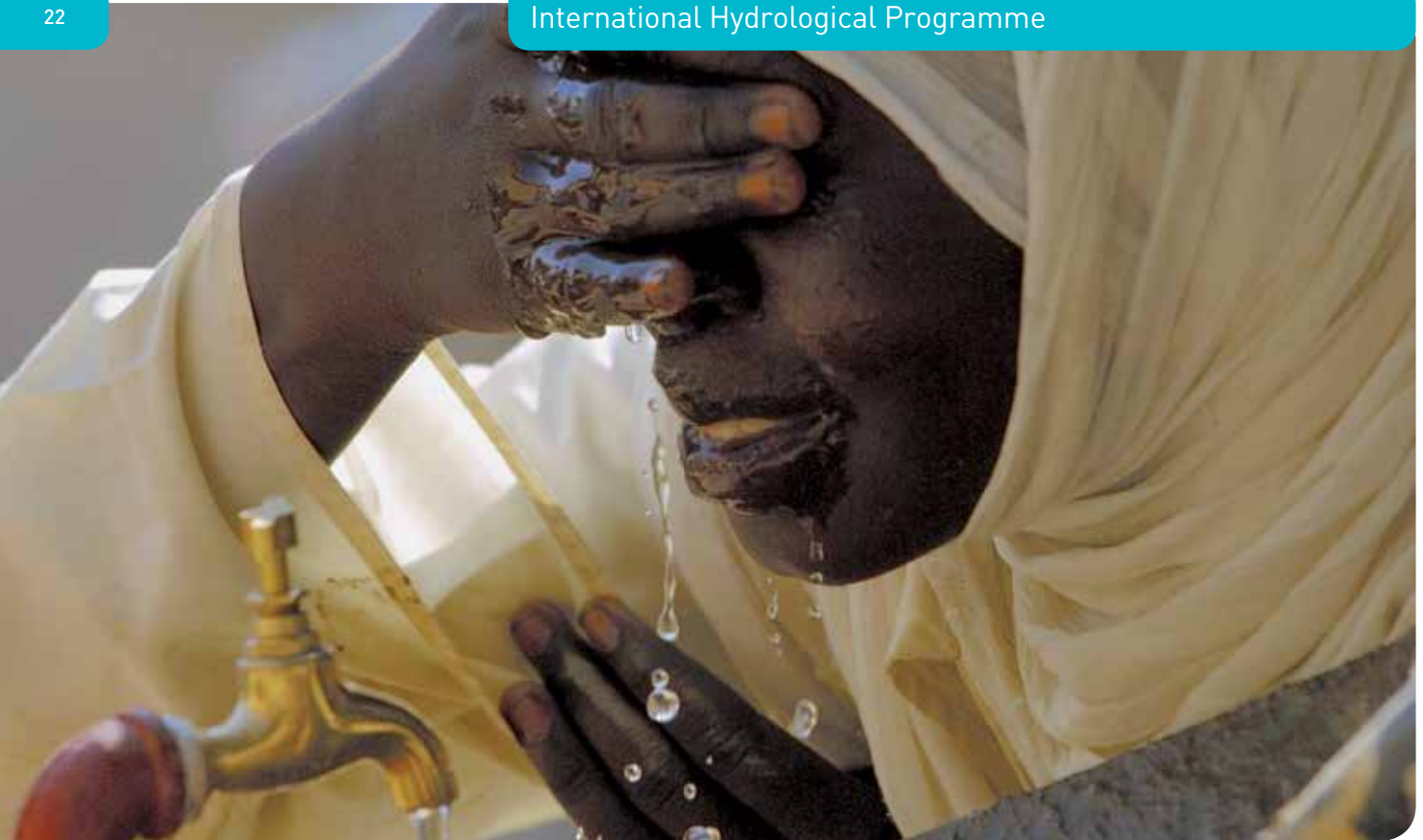
Science for sustainable development and societies must benefit from the talents and perspectives of both women and men. However, reaching gender equality in science remains a challenge. In fact, although the number of female scientists today has increased, women are still under-represented in science due to a complex set of factors including the loss of opportunity during women's child-bearing years. Thus the world is depriving itself of the full potential of half of humanity to bring the power of science to address sustainable development challenges. UNESCO has been a pioneer in this field. Notably, the UNESCO-L'OREAL Partnership "For Women in Science", the UNITWIN/UNESCO Chairs Programme and activities in the basic and engineering sciences place special emphasis on supporting women scientists, in particular young women scientists. Since 1998, the L'Oréal-UNESCO Awards have recognised 77 laureates, exceptional women who have made great advances in scientific research. Two of them have gone on to receive the Nobel Prize. To date, Fellowships have been granted to more than 1,652 women, permitting them to pursue their research in institutions at home or abroad. For the past 15 years, UNESCO and the L'Oréal Corporate Foundation have supported 1729 women researchers from 108 countries around the world who contribute to moving science forward.



L'Oréal-UNESCO  
Laureates 2011

# Science to Manage Freshwater





© UN Photo/Evan Schneider

UNESCO's International Hydrological Programme (IHP), established in 1975, works on a variety of themes in freshwater science: groundwater, urban water, water quality, flow regimes and data-sharing, integrated water resource management, river basins, ecohydrology, water in arid regions, water and climate change, floods, drought, sedimentation, glaciers and water education. Water Dependencies: Systems under Stress and Societal Responses is the theme of IHP's seventh six-year phase (2008-2013). The only intergovernmental scientific programme in freshwater science in the UN system devoted to water research, water resources management, education and capacity building, IHP works towards meeting the UN Millennium Development Goals on environmental sustainability, water supply, sanitation, food security and poverty alleviation.

The World Water Assessment Programme (WWAP) is a UNESCO-led UN programme involving around 30 UN agencies. It produces the triennial World Water Development Report (WWDR), which provides an authoritative picture of the state, use and management of the world's freshwater resources, key for decision-makers. The most recent WWDR 4, *Managing Water under Risk and Uncertainty*, was launched at the Sixth World Water Forum in Marseille, France in March 2012. Previous Reports include: WWDR 1-2003, *Water, a Shared Responsibility*; WWDR 2-2006, *Water for People, Water for Life*; and WWDR 3-2009, *Water in a Changing World*. Starting from 2014, the WWDR will be issued annually. WWAP also produces case studies, scenarios, thematic side publications and regional assessments on water resources.



## IHE UNESCO Institute for Water Education

The UNESCO-IHE Institute for Water Education, in Delft, The Netherlands, has been an integral part of UNESCO since 2003. Since its inception in 1957, it has trained over 14,500 water professionals from over 160 countries in particular from developing countries and countries in transition. It delivers fully-accredited M.Sc. and Ph.D. degrees in collaboration with Dutch universities and professional training in water, the environment and infrastructure. It also provides policy and advisory services worldwide. The IHE is funded exclusively from extrabudgetary sources.

It has  
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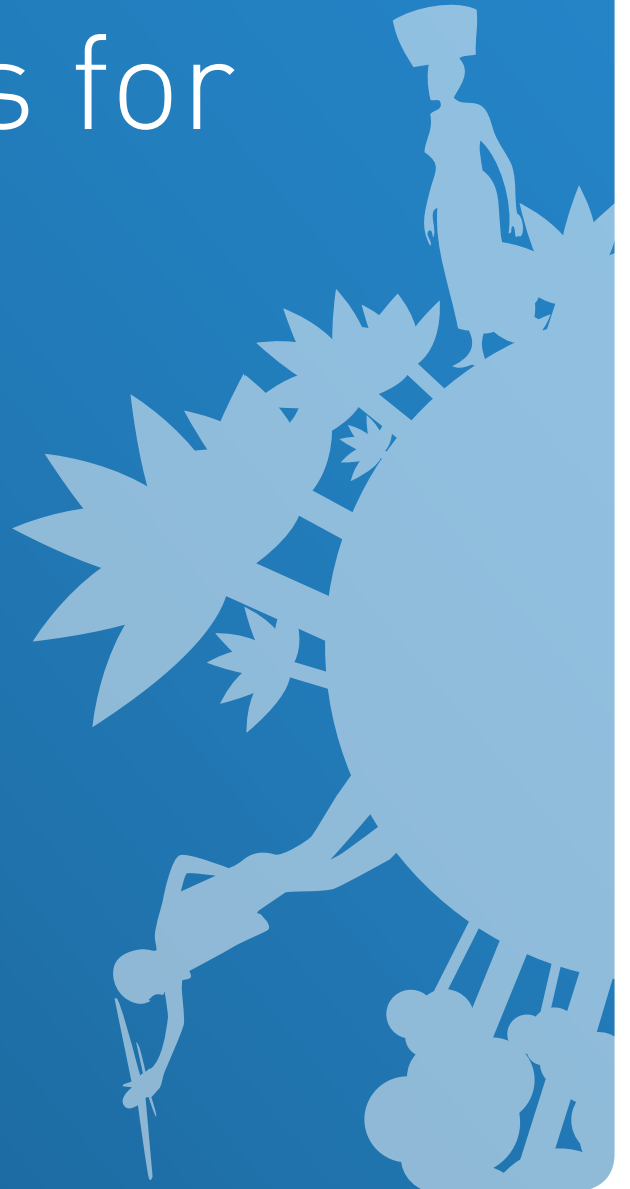


© UN Photo/WFP/Amjad Jamal

Over 20 research centres around the world in the field of freshwater are affiliated with UNESCO. All major regions are represented: Asia and the Pacific, Africa, Latin America and the Caribbean, the Arab States, Europe and North America. UNESCO can draw upon the expertise of all these centres to respond to requests from its Member States for assistance in such specializations as water hazards and risk management, management of water in urban areas, in arid regions and in zones reliant on glaciers.

Pakistan where the expertise of the UNESCO affiliated Center ICHARM came into play to help cope with the floods

# Science and Services for the Ocean and Coasts





© Paul Mauricio

The ocean covers over 71% of the Earth, is vital in the regulation of our climate, and provides an extensive range of useful products and services to humanity including food, transport and recreational activities. Only 1% of marine ecosystems are protected compared to 10% of protected areas on land.

IOC assists governments to address their individual and collective ocean and coastal management needs, through the sharing of knowledge, information and technology and through the international co-ordination of programmes in ocean and coastal research, observations and services, and building capacity in the management of the marine environment. The IOC also provides a focus for other UN specialized organizations with regard to ocean science and services. IOC currently has 145 Member States and is the only UN body specialized in ocean science and services.

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\*The Intergovernmental Oceanographic Commission (IOC) was established as a body with functional autonomy within UNESCO, by resolution 2.31 adopted by the General Conference (Nov.-Dec.1960), in conformity with the recommendation of the Intergovernmental Conference on Oceanographic Research (Copenhagen July 1960).





© UN Photo/Evan Schneider

Destruction of the Indonesian coast, between Banda Aceh and Meulaboh, caused by Indian Ocean tsunami in 2005.

IOC has four main Objectives:

- **Prevention and Reduction of the Impacts of Marine Hazards:** The IOC aids and advises policy makers and managers in the reduction of risks from tsunamis, storm surges, Harmful Algal Blooms (HABs) and other coastal hazards. After close to fifty 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. In this context, IOC coordinates and fosters the establishment of regional intergovernmental tsunami warning and mitigation systems in the Pacific and Indian Oceans, in the Caribbean, and in the North East Atlantic and Mediterranean and connected seas;
- **Mitigation of the Impacts of and Adaptation to Climate Change and Variability:** Whether caused by increasing greenhouse gases, coastal pollution, overfishing, coastal development or increasing population pressure, the

© UNESCO/Yoslan Nur



world's ocean, coasts and marine ecosystems are undergoing great changes. The IOC works with developed and developing countries to monitor and document changes in order to aid in the design of adaptation and mitigation strategies. To do so, IOC coordinates the Global Ocean Observing System (GOOS) which monitors the physical, chemical and biological aspects and changes in the world's ocean. This unified network permits the design of adaptation and mitigation strategies and provides information and data for governments, industry, scientists and the general public.

The direct results of human activities on the ocean and through climate change are causing the blue part of this blue planet to warm, rise, and lose oxygen. IOC focuses on the impact of acidification from increasing CO<sub>2</sub> levels 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 which management decisions need action.

- Safeguarding the Health of Ocean Ecosystems to improve responses to the unprecedented environmental changes now occurring and to promote ocean health via marine sciences. The IOC supports the UN World Ocean Assessment, that is the 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

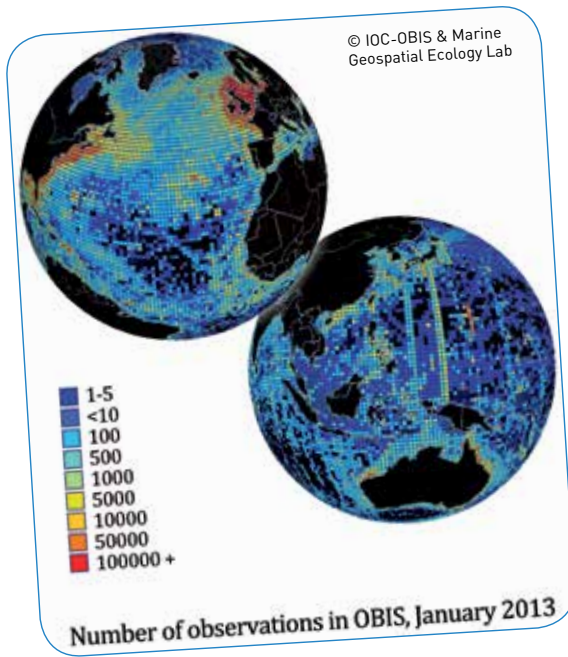


© Joe Bunni

different disciplines will help to improve the responses from national governments and the international community to the unprecedented environmental changes now occurring.

Monitoring and observing the global ocean 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 ocean. 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.

- Promoting best management procedures and policies based on the best science: 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 International Oceanographic Data and Information Exchange programme (IODE) enhances the IOC marine research and management programmes by facilitating the exploitation, development, and exchange of oceanographic data and information among 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.

The Ocean Biogeographic Information System (OBIS) coordinates and manages the global marine biodiversity knowledge base, which provides an integrated view on the past and current diversity, abundance and distribution of life in the oceans. Hundreds of institutions and scientists around the globe contribute to OBIS. The information portal holds data from bacteria to whales, from the equator to the poles and from the surface to the deepest ocean trenches and is used around the globe for planning ocean conservation policies, and identifying biodiversity hotspots and global trends in species distribution. In particular, OBIS contributes to 2 of the 20 UN biodiversity

targets: a sustainable management of our marine living resources, and the protection of at least 10% of coastal and marine areas by 2020. As such, it provides data for the identification of Ecologically or Biologically Significant Marine Areas as part of the Convention on Biological Diversity and collaborates with the UN Food and Agriculture Organisation for the identification of Vulnerable Marine Ecosystems. Being the largest global access point for marine biodiversity data and through its integration with physical and chemical data, OBIS is well placed to provide expertise, data and information for environmental and climate change impact studies as well as for global reporting and assessments on the state of marine biodiversity. The OBIS project office is now hosted by the IOC Project Office for IODE in Oostende, Belgium.

- **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 programme 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 and coastal 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 a unique worldwide network of key marine scientists and research institutes. It is an important partner in the United Nations Secretary General's Oceans' Compact, "Healthy Oceans for Prosperity", which was launched on 12 August 2012, during Expo 2012, The Living Ocean and Coast, in Yeosu, Republic of Korea. From its inception, UNESCO through its IOC, has provided key contributions to the formulation of the Compact and is expected to play a key role in its implementation.



© INAHINA: Instituto Nacional de Hidrografia e Navegação (Mozambique)

# Science to Manage the Earth, Ecosystems and Biodiversity



## Earth sciences: The International Geosciences Programme

The earth sciences and the history of the Earth are essential to understanding current global change, to helping us sustain the Earth, and to giving countries the capacity to manage their mineral resources. The International Geosciences Programme (IGCP) promotes international collaboration in the geosciences with special emphasis on projects and geoscientists from developing countries. It promotes projects with a clear societal orientation for sustainable development, including natural disaster mitigation, medical geology and mineral and groundwater resource extraction. Since its inception in 1972 more than 340 international cooperation projects on the Earth's geology in about 150 countries have contributed to building knowledge on geological resources and processes and to creating networks of geoscientists.

It promotes projects with a clear societal orientation for sustainable development, including natural disaster mitigation, medical geology and mineral and groundwater resource extraction.





© Denis Vidalie / Massif des Bauges Global Geopark, France

Geoparks, part of the Global Network of Geoparks (GGN), are areas of outstanding geological heritage of international significance which can be used to promote awareness of and address important environmental and societal challenges. From the geological record we can increase our understanding of geological hazards such as volcanoes, tsunamis, and earthquakes, and gain insights on current climate change through studying how climate changed throughout the geological record. Local societies can benefit through activities such as green tourism contributing to sustainable development and transboundary Global Geoparks help build a culture of peace. UNESCO supports the GGN which currently counts 90 Global Geoparks in 26 countries.



## Earth Science Education Initiative in Africa

Lack of national capacity in the earth sciences is a major factor hindering people in African countries from benefitting from their rich mineral resources and from effectively managing natural resources such as groundwater, vital in efforts to achieve sustainable development. UNESCO launched the Earth Sciences Initiative in Africa to respond to this need during the International Year of Planet Earth in 2008. The Initiative aims to support young African earth scientists. Through participatory regional workshops, the current status and needs of earth science education in Africa was assessed and existing centres of excellence identified. Training in earth resource mapping and preparation of earth system science curricula in secondary schools were identified as areas where UNESCO can assist.

Earth Initiative workshop,  
Senegal, 2009



© UNESCO/ Sarah GAINES



© Anne-Lise Hering

Human beings are an integral part of the Earth's biosphere. Since 1972, the MAB Programme has been concerned with the interface between human activity and the rest of the biosphere, or the relationship between humans and nature. Through the World Network of Biosphere Reserves (WNBR), 610 biosphere reserves in 117 countries (2013), designated by national authorities, site-specific examples of how humans live with nature in a sustainable way are highlighted and promoted. Biosphere reserves demonstrate ways to safeguard natural ecosystems and biodiversity through science, education and participatory approaches while at the same time promoting innovative economic development that is environmentally sustainable and socially and culturally appropriate. MAB focuses on specific ecosystems in biosphere reserves including mountains, drylands, tropical forests, urban systems, wetlands, and marine, island and coastal ecosystems. Biosphere reserves are increasingly used as pilot sites for testing mitigation and adaptation to climate change, green economies and as sites for collaboration with other international innovative environmental initiatives.

## Biodiversity Initiative

© UN Photo/Kibae Park



Biodiversity loss, along with climate change, is one of the great global challenges of our time. The causes of biodiversity loss can be direct or more complex due to economic, social and cultural factors. The UNESCO Biodiversity Initiative (UBI) launched in 2011 aims to bring UNESCO's knowledge and networks in the areas of education, the natural, social and human sciences, culture and communication to enrich the international policy response to the biodiversity crisis. It federates UNESCO's work on biodiversity across disciplines. This multidisciplinary UNESCO perspective to the biodiversity crisis will contribute to the recently established Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) in which UNESCO participates. IPBES aims to provide accurate, impartial and up-to-date science to inform policy decisions and biodiversity conventions just as the Intergovernmental Panel on Climate Change (IPCC) provides for the climate change conventions.

## Training forest managers in Africa: Regional post-graduate Training School for the Integrated Management of the Tropical Forests (ERAIFT)

To build capacity in Africa to manage tropical forests from a holistic ecosystem approach, in 1999 UNESCO launched the Regional post-graduate Training School for the Integrated Management of the Tropical Forests (ERAIFT) in Kinshasa, Democratic Republic of Congo. Every year, ERAIFT trains around 30 specialists from 18 francophone and lusophone countries to apply the ecosystem approach to forest management in Africa with a focus on sustainable use and improved livelihoods for local communities. It offers courses at Masters and PhD level (28 PhD currently supported by the school). So far, 109 students (106 Master and 3 PhD) from 17 African countries have graduated. In 2013, ERAIFT will also train specialists coming from English-speaking countries in Africa and Asia (Vietnam and Indonesia).



© ERAIFT

ERAIFT  
trains around  
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lusophone countries  
per year to apply the  
ecosystem approach to  
forest management  
in Africa



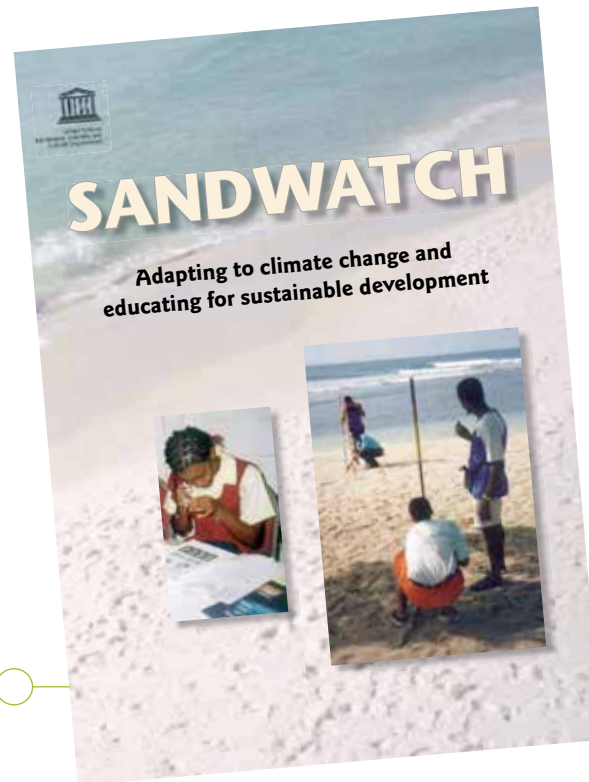
© GeoEye/USGS

The Pyramids of Giza,  
Cairo, Egypt

Remote sensing and space technology are highly useful techniques to monitor environmental change. UNESCO through its 'Open Initiative' works through a unique network of space agencies, research institutions and the private sector to help preserve natural and cultural World Heritage sites and biosphere reserves. By using satellite imagery, the Open Initiative programme provides an innovative way to observe threats to the sites, understand their impact and elaborate mitigation strategies. The programme also includes capacity-building activities to facilitate access by developing countries to space technology. For example, the Democratic Republic of Congo benefited from UNESCO's Open Initiative by assessing satellite images of forest areas which helped develop conservation management plans for the threatened gorilla.

Small Islands Developing States (SIDS), around forty UNESCO Member States, face unprecedented challenges and are particularly at risk due to their geographical isolation and economic vulnerability. Through its SIDS Platform, UNESCO assists these Member States with their specific sustainable development challenges, such as climate change mitigation and adaptation, environmental conservation, coastal area management, disaster preparedness, and science and technology education. Sandwatch, a UNESCO-sponsored volunteer network involving students and local communities working to enhance their beach environments, is just one initiative to promote sustainable development in SIDS.

Sandwatch,  
a UNESCO-  
sponsored volunteer  
network involving  
students and local  
communities





© UNESCO Almaty Office

Climate change is one of the defining issues of our time. Over 30 UNESCO programmes in the sciences, education, culture and communication contribute to creating knowledge, educating and communicating about climate change, and to understanding the ethical implications for present and future generations. The UNESCO Climate Change Initiative federates UNESCO's work and joins it with that of other UN bodies and aims to help Member States to mitigate and adapt to climate change, to educate for sustainable development in the context of climate change, to assess the risks of natural disasters due to climate change, and to monitor the effects of climate change on World Heritage sites and biosphere reserves.

# Science to Build Safe, Inclusive and Prosperous Communities







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The number of disasters resulting from natural hazards is increasing with global change including climate change. UNESCO promotes international, regional and national platforms and networks for the assessment, monitoring and mitigation of natural hazards and establishes early warning systems, notably for tsunamis, drought, floods and geo-hazards. UNESCO advises on disaster prevention through programmes on disaster risk reduction targeting national policies, the strengthening of human and institutional capacities, the promotion of education for disaster preparedness and prevention, the retrofitting of school buildings and climate change adaptation. UNESCO aims to protect schools and heritage sites from disasters by building a culture of disaster resilience, including from gender equality and youth perspectives. UNESCO advises on post-disaster assessment, response and recovery, supporting Post Disaster Needs Assessment exercises and implementing projects immediately after a disaster.

Indigenous peoples have accumulated extensive knowledge about natural systems and the environment from their long and intimate contact with nature. The value of indigenous knowledge is increasingly being recognized, for example in the field of climate change adaptation. The UNESCO Local and Indigenous Knowledge Systems (LINKS) programme acts to support the inclusion of local and indigenous knowledge in science education, biodiversity conservation and climate change adaptation. Guided by the 2007 UN Declaration on the Rights of Indigenous Peoples, UNESCO is also engaging with indigenous communities to elaborate a UNESCO-wide policy to ensure that all its programmes address the specific needs and rights of indigenous people.



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Indigenous Wayuu children inside a classroom in the village of Pessuapa, Colombia near the border with Venezuela.

On 21 May 2012, Irina Bokova, Director-General of UNESCO, visited SESAME, an intergovernmental centre of excellence in Jordan that was set up to build a science base in the Middle East and neighbouring countries and to promote a spirit of solidarity and a culture of peace in the region.

## Science and peace building



Establishing a culture of peace and sustainable development are at the heart of UNESCO's mandate. Established in 2001 as a follow up to the World Conference on Science organized by UNESCO and ICSU, World Science Day for Peace and Development (WSD) is celebrated worldwide every year on 10 November. The day offers an opportunity to highlight the contribution science makes to achieving sustainable development and enhancing the prospects for peace. WSD has generated projects fostering scientific cooperation between scientists living in regions marred by conflict. International scientific cooperation is promoted through international projects such as SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East), and through programmes on the management of transboundary biosphere reserves and transboundary water resources, as well as Water for Peace programmes such as From Potential Conflict to Cooperation Potential (PCCP).

UNESCO's science programmes focus particularly on Africa. Examples include providing assistance to African countries in the formulation of science, technology and innovation policies, with support to African scientific networks such as the African Network of Scientific and Technological Institutions (ANSTI) and the African Inter-parliamentary Forum on Science, Technology and Innovation. The Man and the Biosphere programme supports environmental conservation and sustainable development through the African biosphere reserves network (AfriMab) and the Regional Post-graduate Training School for Integrated Management of Tropical Forests and Lands (ERAIFT) in Kinshasa, Democratic Republic of Congo. UNESCO's water networks are particularly active in Africa in the field of groundwater mapping and integrated water resource management in disaster situations, while UNESCO's earth sciences programmes aim to build capacity in African countries to manage their natural resources. UNESCO's Intergovernmental Oceanographic Commission provides assistance to African countries in data exchange on marine issues.



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Participants to the Science, Technology and Innovation indicators workshop in Mombasa, Kenya, 2009

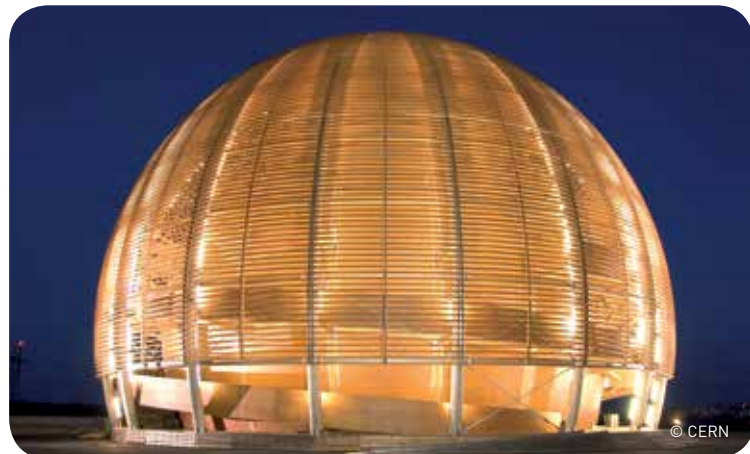
# The Wider Horizon: Science, Society and a Sustainable Future



## Networks and partners

UNESCO is both at the heart, and linked to extensive scientific networks. Through its universal membership, UNESCO has access to national authorities dealing with science. Through its international scientific programmes on the ocean, freshwater, the ecological and earth sciences and the basic sciences, UNESCO has access to a vast network of thousands of scientists specialized in fields which span the entire scientific spectrum. Through over 40 UNESCO-sponsored and UNESCO-affiliated scientific institutes, the Organization has access to the best science in several disciplines ranging from the water sciences to biotechnology. Around 200 Chairs in the fields of basic and engineering sciences, ecological and earth sciences, water and the ocean sciences are part of the UNESCO Chairs and University Twinning programme. Important partners include the International Council for Science (ICSU), the International Association of Hydrologists (IAH), the World Federation of Engineering Organizations (WFEO) and many more. Partners from the private sector include l'Oréal for the 'For Women in Science' programme. UNESCO collaborates with the European Organization for Nuclear Research (CERN), founded under its auspices 58 years ago, to reinforce scientific capacities in Europe. UNESCO also collaborates extensively with other UN agencies both on the international stage and in individual countries.

The Globe of Science  
and Innovation, CERN





© UN Photo/Maria Elisa Franco

Sustainable development is built on the economic, social and environmental pillars. Although economic aspects are crucial, social, cultural and educational factors must also be taken into account. Science must respond to the needs of society. The social sciences have a vital role to play in understanding global change and in establishing the basis for sustainable development, as do the basic and environmental sciences. Together, they combine to form the DNA of the sustainability-driven science that is needed today. UNESCO's leading role in science in the UN is strengthened not only by being anchored in the multidisciplinary mandate of UNESCO, including the social sciences, education and culture all pivotal to sustainable development, but also by the range of UNESCO's activities spanning science, technology and innovation and the full range of the environmental sciences with respect to freshwater, the ocean, terrestrial ecosystems and biodiversity and the earth sciences.

## UNESCO Science across the world

UNESCO implements its programmes through the Secretariat at its Headquarters in Paris, and through its network of 57 Field Offices in the world's five major regions: Asia and the Pacific, Africa, Latin America and the Caribbean, the Arab States and Europe and North America. UNESCO National Commissions also advance the programmatic goals of UNESCO including in science. They are set up by their respective governments for the purpose of associating their governmental and non-governmental bodies in education, sciences, culture and communication with the work of the Organization. Presently, there are 198 National Commissions for UNESCO.

UNESCO Headquarters,  
Paris, France





## Engaging in the international effort to mobilize science for sustainable development



© UN Photo/Eskinder Debebe

Today's global challenges require global responses whether defining a new model for sustainable economic growth or responding to climate change, environmental degradation and biodiversity loss. UNESCO is fully engaged with the international community in facing these challenges. The UN Secretary-General has requested that UNESCO take a leading role in the UN by hosting its Scientific Advisory Board, specifically focused on how science can contribute to sustainable development. UNESCO is a partner in the Future Earth Initiative, a new ten-year international interdisciplinary research initiative which will develop the knowledge to respond to global change and support the transformation towards global sustainability. UNESCO is also part of the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) which aims to link biodiversity science to policy to inform decision-making to conserve biodiversity. UNESCO is actively participating with the international community in helping to define the post-2015 development agenda.

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UNESCO, since 1945, has promoted the advancement of science and its applications to develop knowledge and capacity, key to economic and social progress and the basis for peace and sustainable development. Within the context of its intergovernmental mandate and universal membership it has focused its work in science on issues of global concern requiring multinational collaboration such as in the fields of freshwater resource management, ocean health, natural disaster reduction, biodiversity loss, and capacity building in science, technology and innovation. Science, to build peace and to respond to international development goals, continues to be of key concern.