



United Nations  
Educational, Scientific and  
Cultural Organization



**RIO+20**  
United Nations  
Conference on  
Sustainable  
Development



# From Green Economies to Green Societies

UNESCO's Commitment to Sustainable Development



## An opportunity not to be missed: The UN Conference on Sustainable Development (Rio+20), Rio de Janeiro, Brazil, 20-22 June 2012

Rio+20 offers the world a unique chance to advance the sustainable development agenda. The conference has three main objectives: to secure renewed political commitment to sustainable development, to assess progress and gaps in implementation of agreed commitments, and to address new and emerging challenges. The two themes of the Conference are a *green economy within the context of sustainable development and poverty eradication*, and the *institutional framework for sustainable development*.

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# **From Green Economies to Green Societies**

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## Foreword

### ■ Rio+20 must succeed

We must not miss the opportunity of the 2012 UN Conference on Sustainable Development to set a new agenda for a sustainable 21<sup>st</sup> century. In Rio, we must see where we stand, cast a cold eye on our successes and failures and draw a new roadmap for the future.

We are not starting from scratch. The principles we crafted in Agenda 21 at the Earth Summit twenty years ago in Rio remain salient. The context has changed. New challenges have emerged, along with new risks. These include increasing social disparities and inequity, population growth, climate change, the deterioration and pollution of the environment, the unsustainable use of freshwater and depletion of ocean resources, as well as increasing cases of natural and human-made disasters.

The poorest, most marginalised and vulnerable communities are hit hardest. They also suffer the most from a global crisis that has financial, energy, food and environmental dimensions. All of this has thrown into doubt the viability of current models of development.

### ■ We need a new way forward

We need an approach to development that starts with individual dignity, that is centred on human growth, and that provides convincing answers to the complex social, economic and environmental questions we face. We need new indicators to guide us and new measurements of progress. Sustainable growth must be inclusive, it must be socially equitable, and it must protect our ecosystems and climate. The mantra of 'grow today, clean up later' can no longer stand – for developed or developing countries. The time when we could put off difficult choices is over. There are no more shortcuts.

We must build inclusive, green societies and economies by investing in human development and social capital. New challenges require innovative solutions, which must harness also indigenous knowledge for sustainable development. These will be born from new ways of thinking and attitudes by people of all ages and from all walks of life. No society can afford to leave anyone aside. Green societies must allow women and men to contribute equally in leading and building a more sustainable future. We need a change of culture to tackle climate change.

UNESCO will bring to Rio+20 a vision for sustainable development that makes the most of the transformative power of education, the sciences, culture and media.

## ■ Education is our first motor

Education is one of the best weapons to fight poverty and inequality. Each year of additional schooling increases individual earnings by 10 percent. Fundamentally, education is about values. It crafts new ways to understand the world and to act. Education for Sustainable Development must foster the attitudes and behaviours necessary for a new culture of sustainability. It must be the channel for developing and transmitting new skills and knowledge. Technical and vocational education and training must provide the competences and tools necessary for green economies.

## ■ Science must drive the green transition

Science holds many of the answers to the complex questions we face. For this, science must be mobilized. We must help countries build capacity, develop national policies in science, technology and engineering, and create international networks. Green skills and technologies must be shared and transferred. Renewable energy is fundamental. Challenges today cut across the traditional boundaries of disciplines and stretch across the lifecycle of innovation -- from research to knowledge development and its application. Science, technology and innovation must drive our pursuit of more equitable and sustainable development.

## ■ Culture is an accelerator

New approaches to sustainable development will be effective only if they match the context. Culture must be built into development from the start -- not bolted on as an afterthought. The ultimate renewable energy, culture

is also a source of innovation. In 2009, culture generated jobs and income to a value of USD \$1.3 trillion. Cultural industries are growing -- but they need support to become more powerful levers for economic development, social cohesion, and environmental protection. This calls also for recognizing and making more of traditional knowledge systems and practices.

## ■ The green transition will need an information revolution

Green transformation will rely greatly on the role of the media to enable well-informed policy choices. For this, we must build the capacity of media professionals to investigate and report on issues related to sustainable development. We must support free, independent and pluralistic media to raise public awareness and to build solidarity.

## ■ A green future must be blue

Our ocean and its resources are deteriorating and depleting. Our ocean makes the earth habitable for people. With marine and coastal resources and industries representing more than 5% of global GDP, our ocean also provides significant social and economic benefits and plays an important role in poverty alleviation. To mitigate the rapid degradation of our ocean, Rio+20 must lay out a new vision for the governance of our ocean.

About 80 percent of the world's population lives today in areas lacking water security. By 2025, an estimated 60 percent of the world's population will live in water-stressed conditions, and a similar proportion will be without adequate sanitation. Rio +20 must provide new momentum to manage better the world's freshwater resources.



Nature must be nurtured, and biodiversity must be safeguarded. The demand for resources worldwide exceeds today the biological capacity of the Earth by an estimated 20 percent. We must conserve and use sustainably the earth's biodiversity and ecosystem services. This calls for sharper policy and better cooperation at the national and regional policies.

Rio+20 must be remembered as a turning point – the beginning of a global green transition. This is UNESCO's vision, and this guides all of our work to harness the

power of education, the sciences, culture, information and communication for a more sustainable future.

These are the stakes for Rio+20.

A handwritten signature in black ink, reading "Irina Bokova". The signature is written in a cursive, flowing style.

Irina Bokova

# Towards a sustainable world – UNESCO's roadmap

© NASA

**T**he UN Conference on Sustainable Development (Rio+20), to be held in Rio de Janeiro, Brazil, from 4-6 June 2012, offers an extraordinary and unique opportunity to reset the world on a sustainable development path.

Despite substantial improvements over the past 20 years in many key areas of sustainable development, the world is not on track to achieve the goals as aspired to in Agenda 21, adopted in Rio de Janeiro in 1992, and reiterated in subsequent world conferences, such as the World Summit on Sustainable Development held in Johannesburg in 2002. While there have been some achievements in implementing Agenda 21, including the implementation of the chapters on “Science for Sustainable Development” and on “Promoting Education, Public Awareness & Training”, for which UNESCO was designated as the lead agency, much still remains to be done.

Increasing disparities, inequalities and social inequity, growing deterioration of the environment and resources, as well as concurrent energy, food and financial crises, reflect the inadequacy of the world's current development paradigm. No development model which leaves a billion people in hunger, poverty and socially excluded will be sustainable.

Rio+20 must underpin a broader, longer-term process of redressing imbalances, a rethinking of priorities, and the necessary institutional reforms to bring about coherence in economic, environmental and social policies, which benefits all members of society.

Charting the way forward in a sustainable manner must start by recognizing that the world has changed in fundamental ways, with shifts in demographic growth, resource consumption, production patterns, climate change, and increasing natural and human-induced disasters. There has been much technological progress, from renewable



energy to new vehicles for social dialogue, such as social media. Achievements have been made in attaining a number of the Millenium Development Goals (MDGs) and Education for All (EFA) goals. All of this has profound implications for UNESCO and its activities.

## ■ **Building equitable, inclusive, green societies**

Clearly we need to break with 'business as usual'. Green economies are an important means to achieve what sustainable development ultimately aims at: the well-being of people while respecting the environment. Green economies alone are not enough. The complex and multifaceted challenges and risks of today and the future call for a response which addresses the social, economic and environmental issues facing the world today in an integrated and comprehensive manner, with new indicators to guide us. It calls for building green societies. Green societies must be fair, equitable and inclusive societies. They must foster innovative and creative solutions to today's global challenges. These will be born from new ways of thinking and attitudes by people of all ages and from all walks of life. No society can afford to leave anyone aside. Particular attention must be given to the needs of Africa. Equally, emphasis must be given to the empowerment of women, youth, and indigenous people in order to ensure inclusive participation in decision-making processes and their important contribution towards achieving sustainable development. The empowerment of marginalized groups must be based on the respect of human rights and supported by scaling up investment in human capital.

Since the adoption of Agenda 21, sustainable development has remained elusive for many African countries. Poverty remains a major challenge and most countries have not benefited fully from the opportunities of globalization, further exacerbating the continent's marginalization.

To develop inclusive, green societies, greater support is needed to assist African efforts for peace, democracy, good governance, respect for human rights and fundamental freedoms, including the right to development and gender equality. Supporting human and institutional capacity-building at the regional, subregional and national levels, consistent with national policies, programmes and nationally-owned and led strategies for poverty reduction and sustainable development will be critical to this endeavor. Support is also needed in developing and implementing science, technology and innovation policies for sustainable development; developing related research and development capacities; developing and implementing holistic education policies and programmes to achieve the EFA and MDG goals; and leveraging the power of culture and communication and information for sustainable development.

Women make up a majority of the world's poor and adult illiterates. When they are marginalized in all policy and decision-making processes at national, regional and global levels, when half of humanity is left on the margins, it is impossible to tap into the full potential of humankind to address issues of sustainable development which concern us all. A key instrument to change this situation is to invest in women's and girls' education to lift them out of poverty and to give them equal opportunities to engage in all development processes as full and active citizens.

## ■ **Education – the foundation for green societies**

Green societies are educated societies in all of its dimensions. Investing in education is crucial for achieving sustainable development, poverty eradication, equity and inclusiveness. Education holds the key to productivity and sustainable growth, improves health and nutrition, income, and livelihoods, creating a condition for achieving all of the

MDGs and the EFA goals. No country has ever climbed the human development ladder without steady investment in education.

A second critical factor is the quality of education. Years of schooling alone do not guarantee that students will receive an education relevant for their lives and careers. Quality – that is the content of the education provided, the excellence of teachers, actual attainments and achievements – matters as much as quantity. There is a positive feedback loop between education and innovation as a prime mover of sustainable growth in green economies, where innovation, green skills and the capacity to cope with change will be significant drivers of each economic sector. Education is a sound investment; quality education is a smart investment for building inclusive, green societies.

### ■ Educating for a sustainable future

Education for Sustainable Development (ESD) is a particularly important dimension of quality education. It provides people at all levels of education, but in particular youth, with the skills, competencies and knowledge needed to impart values indispensable for behavior and practices conducive to sustainable development, and for multicultural and multi-ethnic societies aspiring to democratic citizenship. It is fundamental for preparing young people for green jobs, for adapting to a changing physical environment, and for changing unsustainable consumption and production patterns. ESD must be strengthened and promoted at all levels and in all educational settings throughout life. This calls for mainstreaming education for sustainable development comprehensively into relevant national education policies and practices. It equally calls for developing effective mechanisms to link green growth labour market objectives to educational programmes, particularly through technical and vocational education and training. It entails reforming formal, informal and non-

formal education systems so as to prepare young men and women for a green labour market and to retrain the existing workforce.

### ■ Mobilizing science for green transformations

To develop innovative, green solutions to address the climate, food and energy crises facing the world today, science, technology, research and development capacities for sustainable development must be strengthened. An estimated 2.5 million engineers and technicians will be needed in sub-Saharan Africa alone to achieve improved access to clean water and sanitation. This demonstrates the need to strengthen science education, stem brain drain, and encourage more young men and women to go into scientific disciplines. Open Access to scientific information is a prerequisite for generating knowledge for sustainable development. Scientific evidence and ethical principles should inform behaviours, policy action and governance decisions to strengthen sustainable development agendas. Climate science must be a key factor in designing informed policy responses to mitigate and adapt to climate change and for disaster preparedness and resilience.

### ■ A green future must be blue: the role of oceans and freshwater

Our ocean provides significant social and economic benefits and plays an important role in poverty alleviation, and is at the core of global systems that make earth habitable for people. To mitigate the rapid degradation of the ocean, there is a need for integrated scientific, evidence-based policy-making that cuts across several domains in order to connect the environmental, social and economic aspects of ocean governance.

Securing access to safe drinking water (MDG 7) for all and wisely managing this resource is a high priority on the

sustainable development agenda and has a multiplier effect on achieving all other EFA goals and MDGs. Expanding safe drinking water and sanitation services would drastically cut the loss of life from water-related illnesses and free up scarce resources in developing countries. Upgrading water supply and sanitation services can also improve education, allowing more girls to attend school instead of spending hours each day collecting water, underlining the close linkage between education and health-related MDGs. It would also save million of work days. The overall economic loss in Africa alone due to lack of access to safe water and basic sanitation is estimated at \$28.4 billion a year or around 5% of GDP. To address this issue will require strengthening education, training, capacity-building and awareness raising efforts on the sustainable management of freshwater resources. It will also require enhancing the knowledge base necessary for informed decision-making processes in relation to water management and consumption, and developing sustainability policies which address global risks, including those associated with water, in an integrated and coordinated manner.

### ■ **Conserving biodiversity for life**

Biodiversity is crucial for reducing poverty and promoting sustainable development, in view of the basic goods and ecosystem services it provides. More than 1.3 billion people depend on biodiversity and on basic ecosystems goods and services for their livelihoods. UNESCO Biosphere Reserves are ideal places for testing and demonstrating innovative approaches to sustainable development that reconcile the conservation of biological and cultural diversity, and economic and social development. They also contribute to the transition to green economies by experimenting with green development options, building also on indigenous knowledge for sustainable development, such as sustainable tourism and training for green jobs. The economic value of

biodiversity and ecosystem services must be factored into green economy policies and approaches.

### ■ **Mitigating and coping with climate change**

Global environmental change has profound social and human dimensions. A holistic approach, which takes scientific, educational, socio-cultural and ethical dimensions into account, is therefore crucial in successfully addressing climate change. Migration linked to climate change needs to be better understood and the knowledge generated has to be translated into appropriate social policies. Specific attention should be paid to the situation of vulnerable groups, as climate change has been shown to affect human beings differently, according to their gender or socio-economic status. All parts of society need to be encouraged to take concerted action in order to mitigate and adapt to climate change.

### ■ **Disaster preparedness to support countries in post-conflict and post-disaster situations**

The frequency of natural disasters has increased fivefold since the 1970s. This increase can partly be attributed to climate change, unsustainable development and extremes of weather. Ever larger populations are at risk, mostly in developing countries. Scarcity of natural resources, and difficult living situations, brought upon by these disasters can lead to conflict.

Conflicts undermine the prospects for boosting sustainable economic growth, reducing poverty and achieving the Internationally Agreed Development Goals (IADGs). Sustainable development cannot be achieved without peace. As such, priority must be given to promoting a culture of peace and non-violence, and advocating for tolerance and mutual understanding. This involves education; scientific

cooperation; emphasis on the role of cultural diversity, intercultural dialogue and heritage in all its forms; and a focus on the role of media. This will involve activities to address disrupted or dysfunctional educational, cultural or media services in post-conflict and post-disaster situations. When supporting post-conflict recovery and reconstruction processes, special attention must be given to the root causes of conflict and to encouraging national dialogue and reconciliation efforts, so as to mitigate the risk of a relapse back into conflict. More support is also needed for disaster prevention and increased disaster preparedness, including for early warning systems and forecasting, dissemination of mitigation measures and proper information, education and public awareness.

### ■ **Culture - a driver for effective sustainable development**

Systematically integrating cultural specificities in the conception, measurement, and practice of development is imperative as it ensures the involvement of the local population and a desirable outcome of development efforts. Cultural industries alone account for more than 7% of global GDP. Sustainable tourism, cultural as well as creative industries, and heritage-based urban revitalization are powerful economic subsectors that generate green employment, stimulate local development, and foster creativity. Local and indigenous knowledge systems and environmental management practices provide valuable insight and tools for tackling ecological challenges, preventing biodiversity loss, reducing land degradation, and mitigating the effects of climate change. In the transition to green societies, dialogue and tolerance will be key for mutual understanding and the building of bridges among nations and countries, leading to a culture of peace, which is a prerequisite for sustainable development. In that context, we must make the most of the world's cultural diversity, as it fosters development and social cohesion.

### ■ **The media – building awareness for green policy priorities**

Well-informed and professional media form an essential platform for debate, discourse and knowledge-sharing; facilitate governance and accountability; create awareness about issues and shape public policy and opinion in favour of sustainable, green societies and economies. Strengthening the institutional and professional capacity of media and ensuring their safety and protection from life threatening dangers and commercial pressures is essential for investigative journalistic reports to flourish and for consistent public awareness and engagement on sustainability issues. In this regard, ICTs, and in particular broadband technology, hold enormous potential.

### ■ **Improving governance for sustainable development**

A more coherent institutional framework at global, regional and national levels must be established. Good governance for sustainable development requires adequate frameworks especially at local and regional levels, which include all stakeholders, including civil society, youth, public and private partners, academia and marginalized groups. At the global level, there should be a clear recognition of well established mandates, experience and comparative advantages of UN organizations and related operational, technical and normative programmes.

### ■ **A call to action**

The complex and multifaceted challenges of our times call for an urgent and holistic response. An in-depth rethinking of development in all its dimensions is imperative. The future needs green economies. The future needs green societies.

By their very nature, education, the sciences, culture, information and communication have the power to induce and support the necessary transformational changes towards sustainable development and green societies. In this sense, UNESCO is committed to a human rights-based approach to development, especially at the country level. It will continue to leverage these capacities for developing an inclusive, sustainable development agenda for Rio+20 and beyond. This report provides concrete examples of UNESCO's work at global, regional and national levels to achieve this grand objective.

# Educating for a sustainable future

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Education is a pillar of sustainable development. The societies of tomorrow will be shaped by the skills and knowledge acquired today.

**S**ustainable development cannot be achieved by technological solutions, political regulation or financial instruments alone. Achieving sustainable development requires a change in the way we think and act, and consequently a transition to sustainable lifestyles, consumption and production patterns. Only education and learning at all levels and in all social contexts can bring about this critical change. Education is a fundamental lever of change contributing to poverty eradication, sustainable development, equity and inclusiveness. It is also a means of realising broader social, economic, political and cultural benefits. It empowers all people of all ages with the knowledge, skills and confidence they need to shape a better future.

Education is a pillar of sustainable development. The societies of tomorrow will be shaped by the skills and knowledge acquired today.

UNESCO has promoted **Education for All (EFA)** as a fundamental right for over six decades, working towards the improvement of the quality of education and stimulating innovation and policy dialogue. The Organization coordinates global Education for All efforts and is the lead agency for the United Nations Literacy Decade (2003-2012), as well as the United Nations Decade of Education for Sustainable Development (2005-2014).

In green societies, education needs to be grounded on the values of peace, non-discrimination, equality, justice, non-violence, tolerance and respect for human dignity. Quality education must be based on a human rights-based approach so that human rights are implemented throughout the whole education system and in all learning environments.

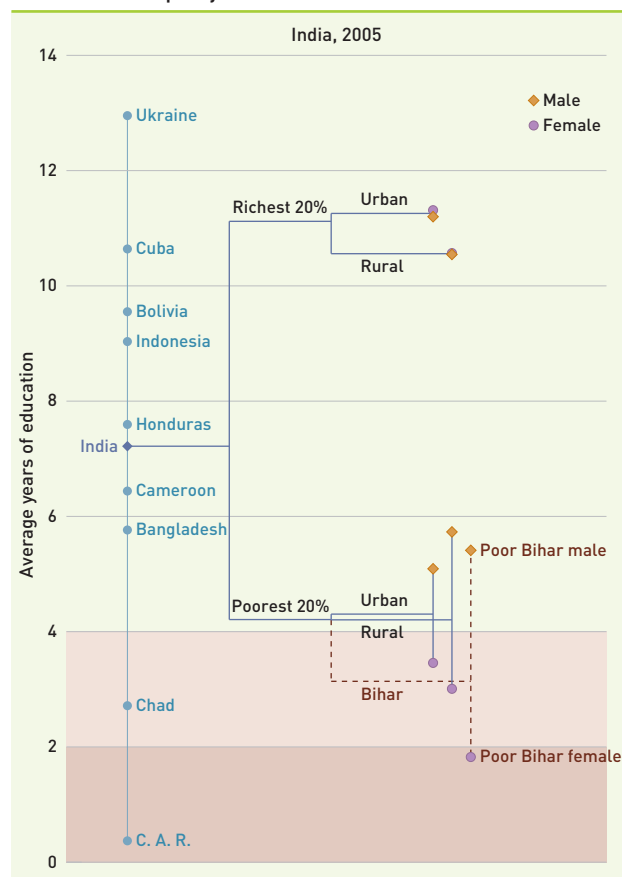


**The Education for All (EFA)** goals adopted in Dakar by 164 governments in 2000 aim at providing education for all by 2015. As the lead agency of EFA, UNESCO promotes policy dialogue and facilitates the mobilization of funding in order to sustain political commitment to EFA and to accelerate progress towards the 2015 targets. Recent progress towards the EFA goals includes<sup>1</sup>:

- An additional 52 million children enrolled in primary school from 1999 to 2008. The number of children out of school was halved in South and West Asia. In sub-Saharan Africa, enrolment ratios rose by one-third despite a large increase in the primary school age population.
- Gender parity in primary enrolment has improved significantly in the regions that started the decade with the greatest gender gaps.

However, exclusion and inequalities linked to wealth, gender, ethnicity, language, location and disability are holding back progress (see figure on the right).

**The education inequality tree**



Average number of years of education of the population age 17-22 by wealth, gender, location, and other selected drivers of marginalization, latest available year. India's wealth divides in education are among the largest in the world – and they are reinforced by regional and gender disparities. While the richest 20% average over eleven years in school, the poorest have an average education expectancy that places them just above the four year 'education poverty line'. Poor rural females are well below that line. Averaging three years in education, they are in a position comparable to the national average for Chad. The average poor rural woman aged 17 to 22 in Bihar averages fewer than two years in education.<sup>2</sup>

<sup>1</sup> Education for All Global Monitoring Report, UNESCO 2011.

<sup>2</sup> Education for All, Global Monitoring Report, UNESCO 2010.

Girls are disproportionately affected by these trends. Thus far, 69 countries have failed to achieve gender parity in primary school enrolment, and in twenty-six countries 3.6 million girls are missing from primary school<sup>3</sup>.

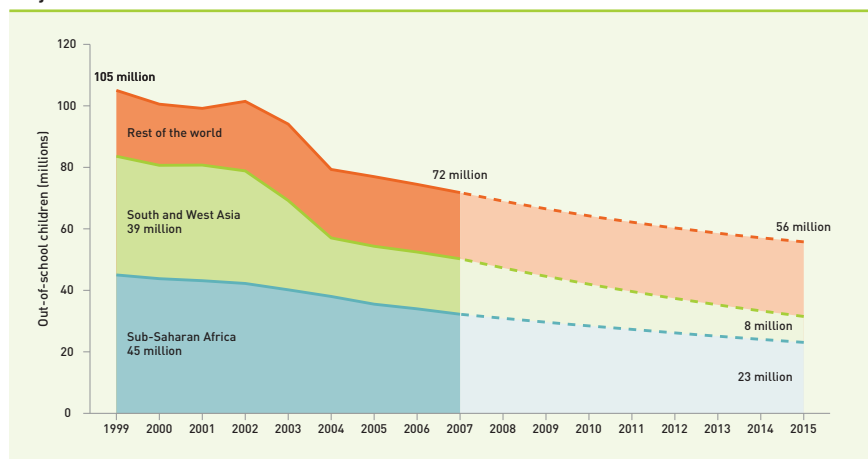


Through its recently launched **Global Partnership for Girls' and Women's Education**, UNESCO is joining forces with Hillary Clinton, U.S. Secretary of State, and Ban Ki-moon, Secretary-General of the United Nations, to step up efforts to reduce female drop-out rates in the transition from primary to secondary education and to support women's literacy programmes in Africa and Asia.



The number of children out of school is falling too slowly. 67 million children were still out of school globally during the school year ending in 2009.<sup>4</sup>

**Projected number of out-of-school children to 2015<sup>5</sup>**



Access to universal quality education for all must be ensured, with particular attention given to educating girls and women. To adequately address the remaining challenges, an international framework must be developed that facilitates the promotion of basic education beyond the target date of the MDGs and the EFA goals in 2015.

3 Education for All Global Monitoring Report, UNESCO, 2011.

4 UNESCO Institute for Statistics, 2011.

5 UNESCO Institute for Statistics, 2010.

In green societies, education needs to be grounded on the values of peace, non-discrimination, equality, justice, non-violence, tolerance and respect for human dignity. Quality education must be based on a human rights-based approach so that human rights are implemented throughout the whole education system and in all learning environments.

**Education for Sustainable Development (ESD)** is education for the future, for everyone everywhere. ESD enables everyone to acquire the values, competencies, skills and knowledge that are necessary to shape sustainable development. It is essential to ensure a successful transition to green societies and economies. This calls for a re-orientation of current formal and non-formal education at all levels: sustainable development-related themes need to be taught extensively and learners have to acquire critical thinking skills. ESD creates active and ecologically responsible citizens and consumers who are prepared to address the complex global and local challenges facing the world today, such as climate change. As the UNESCO World Conference on ESD in 2009 in Bonn (Germany) concluded, ESD is a critical component for ensuring quality education.



Education for Sustainable Development (ESD) is education for the future, for everyone everywhere.

The principal objective of the UN Decade of Education for Sustainable Development (DESD, 2005-2014) is to integrate this fundamental education concept into all areas of education and learning.

As the lead agency for DESD, and building upon its cross-sectoral and interdisciplinary expertise, UNESCO supports its Member States in integrating ESD into their national development plans and curricula, with a particular focus on climate change, biodiversity and disaster risk reduction. The *National Outline for Medium and Long-term Education Reform on Development (2010-2020)*, for example, is China's first strategic document on educational development that places considerable emphasis on ESD.

In 2008, 79 out of the 97 countries that responded to UNESCO's Monitoring and Evaluation questionnaire on DESD reported having a national ESD coordination body. These national coordination bodies are responsible for coordinating national ESD implementation, often through multi-stakeholder cooperation.

In the lead-up to the end of the DESD, it will be crucial for UNESCO, its Member States, and other stakeholders to work towards ensuring that the promotion of ESD continues beyond 2014. The major end of Decade conference, to be organized by UNESCO and the Government of Japan in 2014, will provide an important milestone in this regard.

UNESCO's *ESD Lens* provides the basis for policy-makers, administrators and practitioners to review national policies and curricula to integrate ESD. It contains different kinds of review tools, that can be used by different stakeholders in the educational planning and implementation process.



### ESD and Teacher Education in the Andean Region

After assessing the ESD and teacher education needs in Bolivia, Colombia, Ecuador, Peru and Venezuela, and proposing a set of indicators for the incorporation of ESD into teacher education programmes, UNESCO organized the first Andean Forum on ESD and teacher education in May 2011. As a result, the Andean Network on Teacher Education and ESD was established and will serve as a space for dialogue between experts in ESD, ministries of education and teacher education programmes. Moreover, an Interactive Resource Centre on ESD and Teacher Education is now on-line: [www.formadoreds.org](http://www.formadoreds.org).

### Educating Young Consumers



One of the most significant manifestations of the challenges for sustainable development resides in the need for responsible consumption. As more than 1,218 million people are between the ages of 15 and 24,<sup>6</sup> the sustainable consumption habits that young people adopt can play a major role in efforts to change wasteful lifestyles. UNEP and UNESCO launched the joint YouthXchange (YXC) initiative to promote alternative behaviour and lifestyles leading to sustainable consumption patterns. YXC supports knowledge-building and sharing through training workshops and joint projects among youth in different countries and cultures. The YXC training toolkit is available in 25 languages. At the local level, the implementation of YXC is carried out through a large network of dedicated partners. [www.youthexchange.net](http://www.youthexchange.net)



A YouthXchange Guidebook on Green Skills and Lifestyles is under preparation.

<sup>6</sup> UN Department of Economic and Social Affairs, Population Division (2009) World Population Prospects, The 2008 revision, New York, UN.



© UNESCO Almaty GREEN PACK Training Workshop, Bishkek, Kyrgyzstan

### University Twinning and Networking Programme (UNITWIN) for Sustainable Development

To advance research, training and programme development on sustainable development issues, UNESCO is building university networks and encouraging inter-university cooperation and the transfer of knowledge across borders through its University Twinning and Networking Programme (UNITWIN). The UNESCO-UNU Network on Global Economics and Sustainable Development coordinated by the Colegio do Brasil, Rio de Janeiro, for example, involves more than 60 higher education institutions worldwide in developing systematic studies on the process of globalization and its relationship with regional and national realities.

### The UNESCO Associated Schools Project Network (ASPnet) at the forefront of ESD

UNESCO's Associated Schools Project Network (ASPnet) is a global network counting more than 9,000 educational institutions in 180 countries. ASPnet plays an important role in pilot-testing, developing and implementing ESD methods and exchanging examples of best practices. Current regional initiatives include Baltic Sea and Blue Danube River Projects (environment and intercultural learning), the Sandwatch Project (protection of coastal areas), and the Great Volga River Route Project (World Heritage education and ESD).



© UNESCO/Livia Saldari

UNESCO, in cooperation with international public and private partners, prepared, tested and disseminated a **Multi-Media Green Pack** on environmental protection and sustainable development issues among secondary school teachers in Kazakhstan, Tajikistan and Kyrgyzstan. Trainings for teachers of selected pilot schools were conducted and the multi-media materials are now being delivered on a regular basis in schools.



## ■ TVET: Making Green Jobs Accessible for All

The transition to green economies requires well trained professionals who are able to address and cope with major social and economic transformations.

Technical and vocational education and training (TVET) helps learners to acquire the skills, knowledge and attitudes needed to enter the world of work and to develop professional careers.

TVET provides adaptive and innovative responses to the different challenges of sustainable development. It provides the skills needed to green occupations and to adapt to climate change.

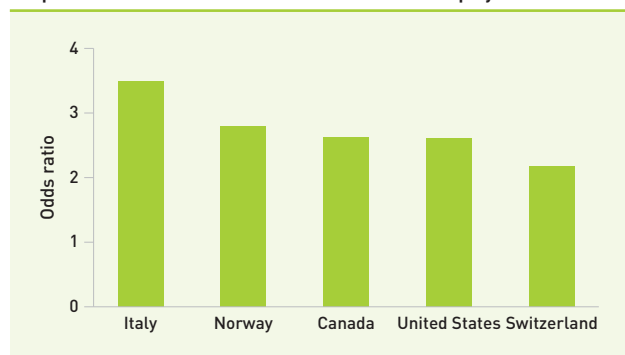
TVET is also an important part of poverty alleviation strategies. Entrepreneurship skills for TVET graduates can provide income generating opportunities by encouraging the establishment of new enterprises and self-employment directly or indirectly related to green economies.

The **third International Congress on Technical and Vocational Education and Training (TIC-TVET)**, Shanghai, 2012 will provide a unique global platform for knowledge-sharing, reflection and debate on the changing landscape of TVET and the wider skills development systems. The discussions will address questions such as: What role can various forms of TVET play in contributing to local, national and enterprise systems of innovation and sustainable development? What roles can TVET play in response to climate change and other environmental challenges, and how can it help individuals and communities to adapt? What are the implications for TVET provision?

The growing significance of sustainability is having major implications for business and industry. Many companies are now reporting on their social and environmental records. Many new green industries and green employment opportunities are being created. This includes eco-tourism, environmental monitoring, sustainable community development, eco-design, recycling, the development

of alternative energy sources, waste water treatment and reuse. All these emerging sectors require skilled workers who have a knowledge of – and commitment to – sustainability, along with the required technical knowledge.

**People with low skills face an increased risk of unemployment<sup>7</sup>**



Note: The figure shows the ratio between individuals who scored at level 1-2 and levels 3-5 of the probability of being inactive for more than six months compared to being employed for twelve months. For example, in Italy an individual who scored at level 1 or 2 is 3.5 times more likely to be inactive compared to an individual who scored at level 3 or higher.

Technical and vocational education and training (TVET) helps learners to acquire the skills, knowledge and attitudes needed to enter the world of work and to develop professional careers.

<sup>7</sup> UNESCO Global Monitoring Report 2011, based on Statistics Canada and OECD, 2005.



Unemployment, poverty and social exclusion can be considered as the most severe consequences of the failure of skills development policies to respond to socio-economic demands.

TVET can contribute to the competitiveness of green sectors by providing enterprises with the workforce that has relevant and needed skills.

TVET can contribute to the competitiveness of green sectors by providing enterprises with the workforce that has relevant and needed skills. In order to do so, technical and vocational education and training need to be reoriented to prepare learners for green economies.

UNESCO is working on an international review of skills formation for green development that will map policies and produce tool kits for curricula and teacher training development related to green skills. The organization is currently developing international guidelines for green skills.

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**TVETipedia.org** is an online portal for the exchange of information on technical and vocational education and training (TVET) developed by UNESCO's International Centre for Technical and Vocational Education and Training (UNEVOC). It is the place to find general information on TVET, examples of good practices, and TVET projects.

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### Building Green Skills in the Water and Sanitation Sector

Many countries are experiencing serious skills shortages within the water and sanitation sector. To address this, UNESCO-UNEVOC is fostering South-South and North-South cooperation to: reorient TVET towards ESD; assimilate innovative and applied technologies in the water sector for TVET; and formulate policy directives and strategies for building national capacities in reorienting towards Green TVET and Water ESD.



## ■ Lifelong Learning for the Future of our Planet

Lifelong learning is essential for equipping citizens of all ages with the necessary knowledge, skills and attitudes to enable them to participate in green societies.

The promotion of literacy remains a huge challenge: in 2011, approximately 793 million adults (15+ years) remain without access to literacy, two-thirds of them women.<sup>8</sup> Thus, one in six adults lives their life without access to educational opportunities and with no way of using services that depend on literacy: health, administration, banking, internet, etc. Independent access to information is severely restricted – a serious impediment to creating green societies.

To address this global challenge, UNESCO is supporting action at international, regional and national levels within the overall framework of the United Nations Literacy Decade (2003-2012). UNESCO's work in literacy includes advocacy, standard-setting and benchmarking, dissemination of effective practices, and policy and programme advice and support.

### The UNESCO Institute for Lifelong Learning:

- advocates for literacy, non-formal education and adult and lifelong learning;
- conducts action-oriented and policy driven research;
- provides technical assistance to Member States in formulating their policies in literacy; non-formal education and adult and lifelong learning;
- establishes partnerships and networks of policy-makers, experts and practitioners.



The **Literacy Initiative for Empowerment (LIFE)** is a ten-year (2006-2015) strategic framework coordinated by UNESCO's Institute for Lifelong Learning (UIL) in Hamburg, Germany, through which responsible key actors collectively accelerate literacy efforts in 35 countries where illiteracy is a critical challenge. For example, through LIFE, the Indonesian Ministry of Education is working to raise the number of literates and to empower them economically, socio-culturally and environmentally with life skills in the framework of ESD. Different literacy programmes are being implemented, which focus on 142 districts where illiteracy rates are above 5 percent, and on women and indigenous communities.

8 UNESCO Institute for Statistics, 2011.



### Literacy, Land and Women's Rights

The Women Land Rights Project assists poor women in Malawi to acquire ownership of land, and promotes their economic independence and food security. By acquiring literacy skills and participating in briefing circles, Malawian women are learning to challenge discriminatory practices and gain confidence to change power relations on land issues. The Coalition of Women Farmers in Malawi received the Honourable Mention of the UNESCO Confucius Prize for Literacy in 2010.<sup>9</sup>

Green societies must be healthy societies. The **Global Initiative on Education and HIV & AIDS (EDUCAIDS)** is a UNAIDS initiative led by UNESCO. EDUCAIDS supports countries to mobilize their education sectors to formulate and implement effective responses to AIDS and HIV. The two main aims of the initiative are to prevent the spread of HIV through education and to protect education systems from the effects of the epidemic.

9 UNESCO, *The power of women's literacy*, 2010.

### DID YOU KNOW?

- ▶ Another 1.9 million teachers will be needed by 2015 to achieve universal primary education, more than half of them in sub-Saharan Africa.<sup>10</sup>
- ▶ Each year of additional schooling increases individual earnings by 10%, empowering women and men to lift themselves out of poverty.<sup>11</sup>
- ▶ The quality of education remains very low in many countries. Millions of children are emerging from primary school with very low reading, writing and numeracy skills.<sup>12</sup>
- ▶ Many children drop out of school before completing a full primary cycle. In Sub-Saharan Africa alone, 10 million children drop out of primary school every year.<sup>13</sup>



10 *Education for All Global Monitoring Report*, UNESCO, 2011.

11 *Education for All Global Monitoring Report*, UNESCO, 2010.

12 *Education for All Global Monitoring Report*, UNESCO, 2011.

13 *ibid.*

# Mobilizing science for green transformations

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Green societies have to be knowledge societies. In order to identify emerging and fast-evolving environmental challenges green societies need to have the capacity to imagine innovative solutions, generate new knowledge and deliver real-world change.

In green societies, the full potential of science needs to be harnessed through the natural and social sciences, technology and innovation capacity development, including at universities and research centres.

Scientific evidence and ethical principles should inform behaviours, policy action and governance decisions to strengthen sustainable development agendas. Mobilizing scientific knowledge is also about creating and accessing green jobs.

The availability of internationally comparative data and statistics can reduce uncertainty on sustainable

development challenges of a cross-national dimension in relation to such elements as freshwater and clean air. Through its dedicated international programmes and structures, UNESCO provides policy-relevant, timely and reliable scientific information, data and statistics in such fields as oceans, freshwater, biodiversity and ecosystems, science and technology, for the benefit of its Member States.

**In green societies, the full potential of science needs to be harnessed through the natural and social sciences, technology and innovation capacity development, including at universities and research centres.**

## ■ Adapting Science, Technology and Innovation (STI) Policies to Address the Challenges of Sustainable Development

Science, Technology and Innovation (STI) are increasingly driven by global challenges that they are expected to address. This opens up the space for new forms of governance and participation in decision-making related to science and technology. For example, recognizing the need for a more inclusive science-policy-society dialogue, UNESCO supports inter-parliamentarian fora at regional and global levels on STI for Development, bringing together scientists and policy-makers to discuss critical STI issues.

Science policies are structural, transversal policies that create the basis for people-centered development. UNESCO assists its Member States in formulating their STI policies, strategies and plans and in reforming their science and research systems. This is done by providing guidelines and methodologies, technical advice and guidance on the formulation, implementation and monitoring of STI policies, together with a review of policies and plans concerning national S&T activities.



© UNESCO, The Albanian National Strategy on STI 2009-2015 was elaborated with UNESCO's support, within the framework of the One UN. The Strategy plans, inter alia, to develop a National Technology Programme in order to develop applied research activities with a social and economic impact.

UNESCO is working with more than 20 African countries who have requested assistance in reviewing and formulating their national STI policy, as part of its efforts to support the implementation of Africa's Consolidated Plan of Action for Science and Technology. Governments have full ownership of the process and are responsible for ensuring that the recommendations of the reviewed policy are integrated into the countries' national development strategies with appropriate mechanisms for monitoring and evaluation.

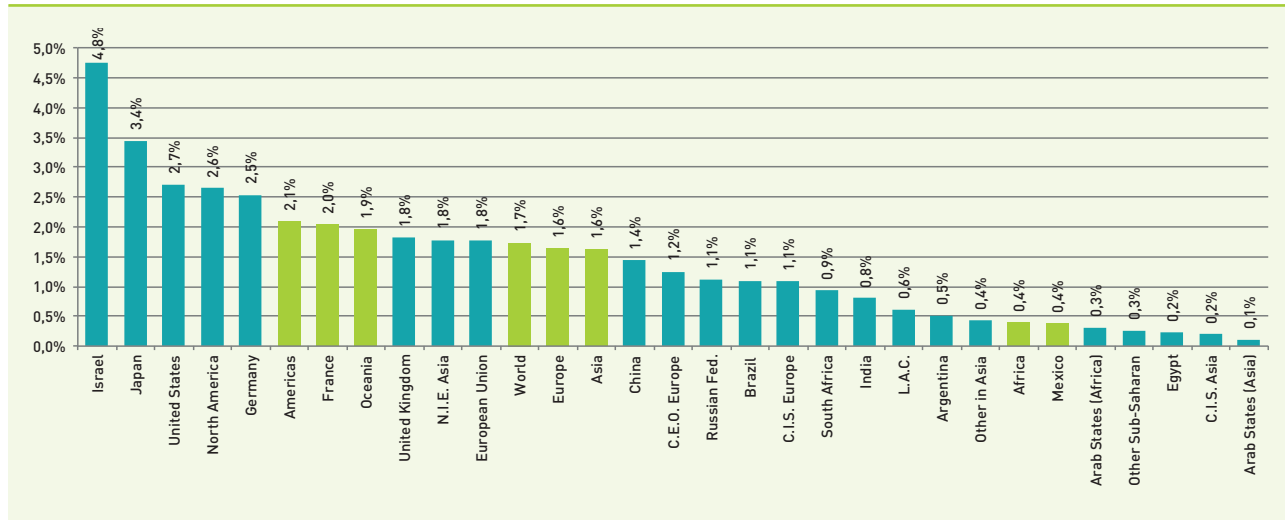


UNESCO, through its UNESCO Institute of Statistics (UIS) and the African Union (AU), held four sub-regional training courses on STI policy formulation and the use of S&T indicators and statistics in evidence-based policy-making (to date, some 250 policymakers were trained). These workshops are aimed at increasing the number of countries in Africa that regularly compile S&T statistics and indicators, and promoting the use of this data in evidence-based policy-making.

Science policies are structural, transversal policies that create the basis for people-centered development.



## Which regions are most R&D intensive?



Gross domestic expenditure on R&D (GERD) as a percentage of GDP by principal regions/countries, 2007 or latest year available<sup>14</sup>

UNESCO is launching a new initiative, the **Science, Technology and Innovation Global Assessment Programme (STIGAP)**. STIGAP will monitor, analyze and identify existing indicators and reporting systems to illustrate the development of STI in the form of a global assessment with a direct connection to the UNESCO's mission: science for peace, for sustainable development and for inclusiveness.

Sustainable solutions, whether at the global, regional or country level, require creativity, new advances in scientific knowledge, discoveries and innovation.

Innovation geared towards sustainable development has the potential to promote economic growth, create green jobs and boost social development while at the same time contributing to environmental conservation.

In this endeavor, science and technology parks, closely related to universities, can be strong engines of innovation and green economic growth.

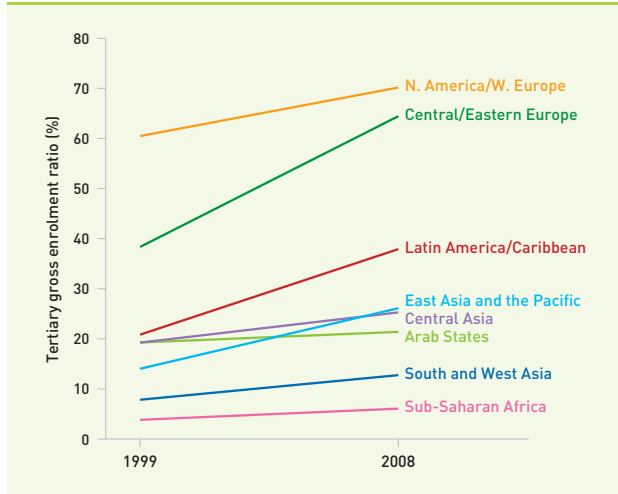
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UNESCO is actively promoting the interaction between science, technology, innovation and economic development through its **University-Industry Science Partnership (UNISPAR) Programme**. The programme focuses on capacity-building and technical assistance in the governance of science and technology parks. It also promotes stronger partnerships and linkages between universities and industry to foster innovation and transfer of knowledge.

<sup>14</sup> UNESCO Institute for Statistics, 2010.



### Gross enrolment ratio in tertiary education, by region, 1999 and 2008



Regional gaps in tertiary enrolment rates are widening. Large and widening disparities and opportunities for tertiary education will inevitably reinforce the already extreme wealth disparity between countries.<sup>15</sup>

Tertiary education systems play a critical role in developing the knowledge intensive skills and innovation on which future productivity, job creation and competitiveness depend in a globalized world.

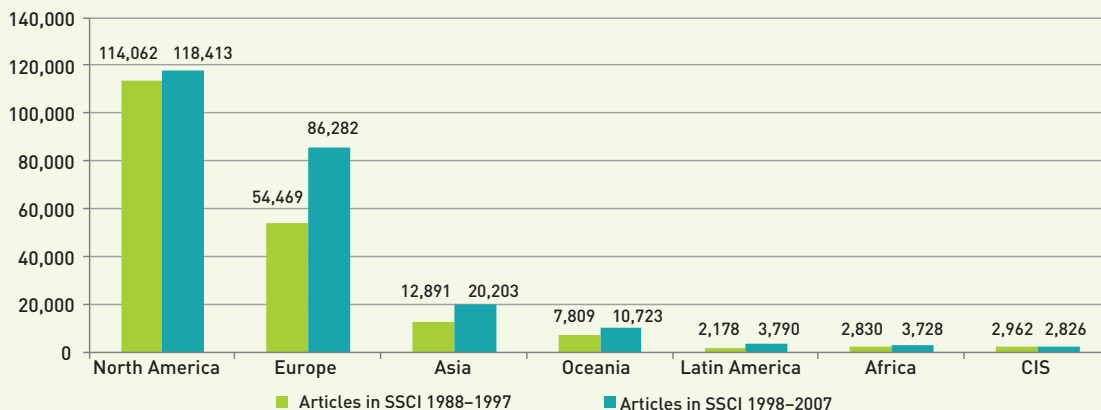
In the transition to green societies and economies, science, technology and innovation (STI) are part of the 'soft power' that countries seek to acquire in order to advance sustainable development and their position in the world arena.

Existing institutional frameworks for STI should be improved and strengthened at national, regional and international levels to address the challenges of sustainable development, social inclusion and social sustainability.



15 Education for All Global Monitoring Report, UNESCO, 2011.

## Production in the social sciences by region.<sup>16</sup>



### **UNESCO Science Report 2010 highlights a growing emphasis on sustainability and green technologies worldwide**

The *UNESCO Science Report 2010* has identified such a trend, even in parts of the world not generally characterized by a large STI effort, including in the Arab region and in sub-Saharan Africa. For example, Morocco began the construction of an industrial park for clean energy in 2010 and Sudan inaugurated its first biofuel plant in 2009.

Clean energy research and sustainability have become a priority for many of the world's major economies. For instance, *China's Eleventh Five-Year Plan* to 2010 imposes the mandatory objective of reducing energy consumption per unit of GDP by 20% and emissions of major pollutants by 10%.

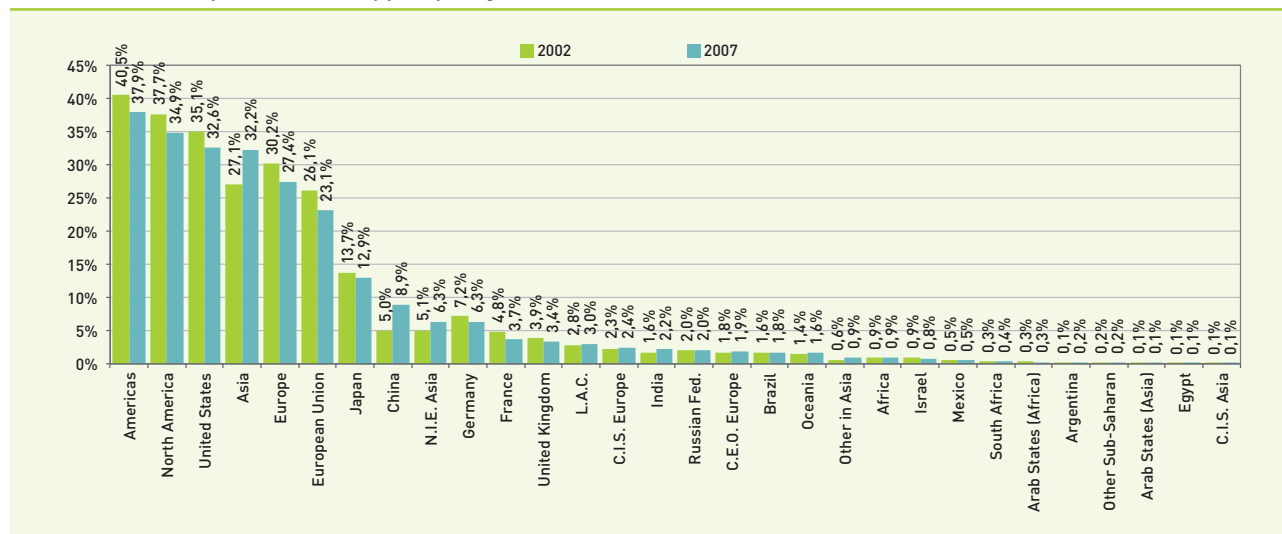
STI policies are increasingly reflecting concerns about climate change. For example, in Cuba, disaster monitoring and mitigation are emerging as one of the R&D priorities, in anticipation of stronger hurricanes, droughts, coral bleaching and flooding.

The priority accorded to clean energy and climate research is having repercussions on S&T fields upstream, such as space science and technology. Driven by concerns about climate change and environmental degradation, many developing countries are attempting to more closely monitor their territory than before, with the aid of satellites.

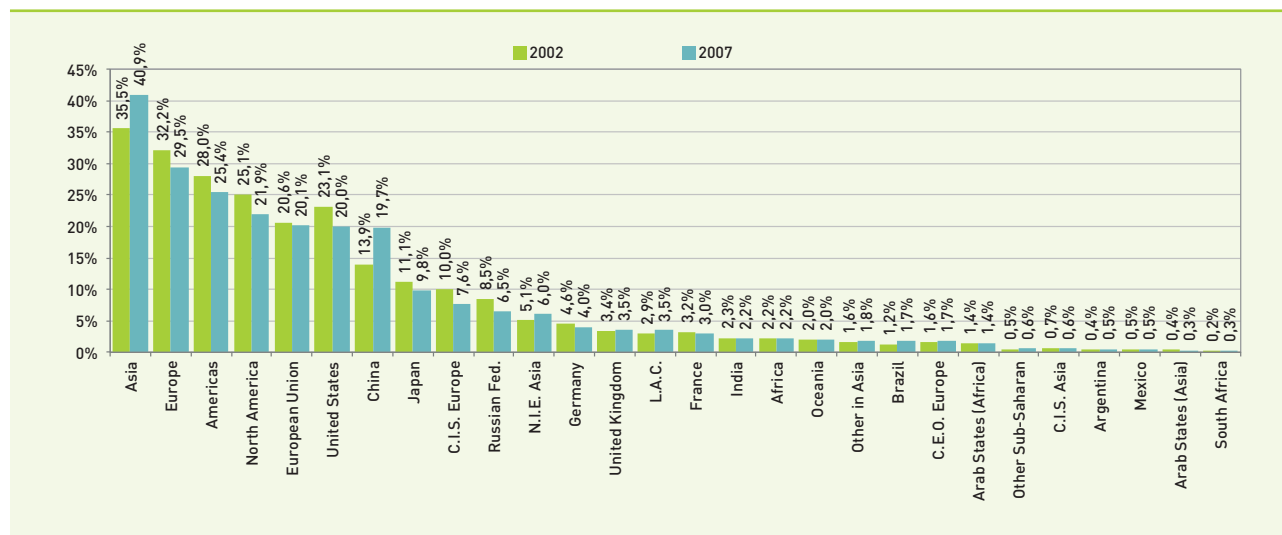
In the transition to green societies and economies, science, technology and innovation (STI) are part of the 'soft power' that countries seek to acquire in order to advance sustainable development and their position in the world arena.

<sup>16</sup> UNESCO World Social Sciences Report 2010.

Shares of world R&D expenditure (GERD) by principal regions/countries, 2002 and 2007 (%)<sup>17</sup>



Where are the researchers located? Human resources in R&D<sup>18</sup>



17 UNESCO Institute for Statistics, 2010.

18 UNESCO Institute for Statistics, estimates for 2010.

## ■ Safeguarding the Future of Green Societies: Building Capacities in Natural Sciences and Engineering

Today's world calls for resolute science and technology-based international actions to combat poverty, pandemic and emerging diseases and to promote science education so that every citizen can lead a meaningful life in increasingly knowledge-based societies. Sustainable development and the future of the planet depend on the world's ability to co-operate in the acquisition, sharing and application of knowledge to improve the quality of life for all, in harmonious coexistence with the environment. Capacity-building in the basic sciences and engineering, their interconnection with the needs of society, and equal access for women and men to scientific and engineering education are essential components of a science-based response to national, regional and global challenges.

UNESCO promotes capacity-building in basic sciences and engineering with the aim of enhancing human resources development; increasing education for green technologies, including renewable energy and energy efficiency; and leveraging the transfer of scientific knowledge, thus bridging the knowledge gap between developed and developing countries. This is implemented through UNESCO's various programmes and networks in such fields as basic and engineering sciences, ecological and earth sciences, water and ocean sciences. This includes UNESCO's International Centre for Theoretical Physics (ICTP), the UNESCO-IHE Institute for Water Education, its vast network of Category 2 Centers created under UNESCO's auspices, and over 200 UNESCO University Chairs.

### Green technologies in UNESCO: Biotechnology for Sustainable Development.

Biotechnology has the potential to provide the means to address some of the pressing issues of global concern by contributing to ensuring a safe environment through bio-conservation and remediation methodologies, research for health, as well as for food production and security. This is particularly important in mitigating the effects of climate change on the environment, and thus on sustained food production, and on addressing re-emerging diseases and newly emerging pandemics. Through its International Basic Sciences Programme (IBSP), UNESCO is building the institutional capacity of developing countries to conduct high-level biotechnology research on sustainable development priorities and to promote green chemistry.

“Education in and about chemistry is critical in addressing challenges such as global climate change, in providing sustainable sources of clean water, food and energy and in maintaining a wholesome environment for the well-being of all people.” *UN Resolution on the International Year of Chemistry 2011*



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Biotechnology applications in India through a UNESCO-IBSP supported research project involving Indian and German researchers.



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South African pupils measuring the pH of water using the UNESCO/IUPAC Global Experiment kits during the Big Splash project in Cape Town in March 2011. These kits can also be used to carry out the UNESCO Microscience experiments.

**The Global Chemistry Experiment – Water: A Chemical Solution** is a cornerstone activity of the UN International Year of Chemistry 2011 which provides students with an appreciation of chemical investigation, data collection and validation. The results submitted by the students are available online as an interactive global data map, demonstrating the value of international cooperation in science. With over 470 schools registered and more than 10,000 students participating worldwide, the Global Chemistry Experiment is truly the largest chemistry experiment ever made. [water.chemistry2011.org](http://water.chemistry2011.org)



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PhD Student in the field

### Introducing Innovations to Improve the Environment of the Aral Sea Basin.

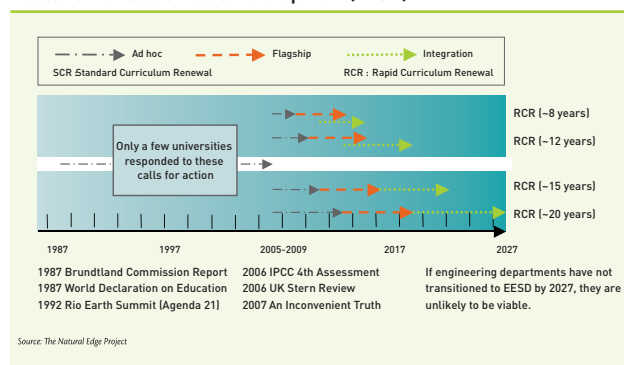
UNESCO is working to improve the economic efficiency and ecological sustainability of the agricultural sector in Uzbekistan through a joint project with the Center for Development Research (ZEF) at the University of Bonn, Germany. Through the project, sustainable solutions are being developed for the Aral Sea region with local and international stakeholders. The Organization is also working

to promote water-saving technologies and to introduce cash crops to help restore saline land in the Aral Sea basin.

## Engineering: an Untapped Opportunity for Sustainable Development

Engineering is of vital importance for developing green technology solutions needed to address the sustainable development challenges facing the world today. These include areas such as water supply and sanitation, waste management, recycling, energy efficiency and conservation, renewable energy, and mitigating and adapting to climate change. Engineering is also critical in poverty eradication, as it encompasses the part of the science, technology and innovation (STI) spectrum in which the results of research are translated into concrete products and services that can benefit communities and create jobs for young people.

### Options for undertaking curriculum renewal towards Engineering Education for Sustainable Development (EESD)<sup>19</sup>

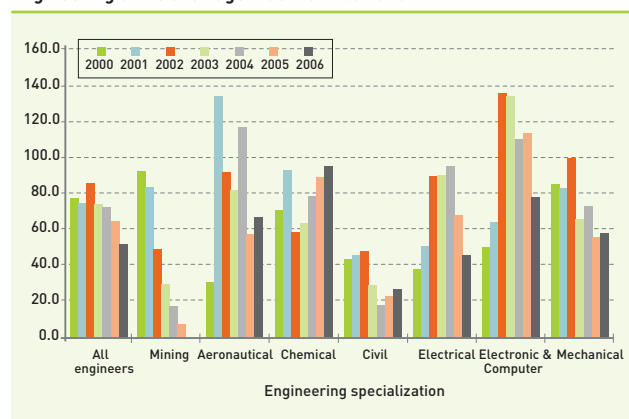


Despite historical trend of slow progress towards EESD, university departments face a 'time lag dilemma' where existing programmes and curriculum renewal might not keep up with regulations, markets and institutional requirements that are shifting as a result of emerging twenty-first century challenges.

<sup>19</sup> UNESCO, *Engineering: Issues, Challenges and Opportunities for Development*, UNESCO, Paris, 2010.

An estimated 2.5 million new engineers and technicians will be needed in sub-Saharan Africa alone if that region is to achieve the Millennium Development Goal of improved access to clean water and sanitation.<sup>20</sup> Switching to green low-carbon economies and responding to the demands of sustainable production and consumption will require substantial investment. It will also require the development of specialized capacities in critical areas, such as energy, food security, freshwater and oceans.

**Engineering skills shortage index for Australia.<sup>21</sup>**



To address this gap, UNESCO is promoting engineering education and capacity-building, as well as engineering applications and innovation to reduce poverty, promote sustainable development, and mitigate and adapt to climate change. UNESCO's Engineering Initiative focuses on applications of engineering for sustainable development, and prioritizes



capacity-building, particularly in Africa. Elements of this initiative include:

- Strengthening engineering at universities, including enhancing research capacities, supporting curricular innovation, and forging better interactions with industry;
- Enhancing UNESCO's focus on engineering in its science policy work for the benefit of Member States;
- Catalysing new South-South and North-South-South partnerships for engineering capacity-building; and
- Strengthening efforts in mobilizing popular support and understanding of engineering, including attracting youth to the field, with a focus on women and girls.

## ■ Earth Sciences for Sustainable Development

Changes in the Earth's climate and of life on Earth are preserved in the rock record. Ice and dust records, terrestrial and ocean sediments, and sequences of fossil plant and animal assemblages all provide parts of this record. Important lessons can be learned about present-day environmental challenges through the strengthening of Earth sciences.

UNESCO's International Geosciences Programme (IGCP) promotes collaborative projects with a special emphasis on the benefit provided to society, capacity-building and the advancement and sharing of knowledge between developed and developing nations. Through the *Global Change: evidence from the Geologic Record* project, IGCP is helping to refine climate change models by providing high resolution paleo-climate data from the fossil record. Better models will improve the world's resilience to climate change. In addition, earth scientists are undertaking research to better understand geohazards and to contribute to risk management and mitigation policies associated

<sup>20</sup> Ibid.

<sup>21</sup> Ibid., based on data from Engineers Australia.



with geohazards through the IGCP project *Geohazards: mitigating the risks*. The IGCP thematic working group *Earth Resources: Sustaining our Society* carries out research on minerals, hydrocarbons, geothermal energy, and water.

UNESCO also called a first-ever expert meeting on geo-engineering to explore its potential for mitigating climate change. One such measure discussed was ocean seeding with metals or minerals to increase carbon sequestration. A policy brief for government decision-makers resulted from the meeting, explaining the science and status of geo-engineering and its potential risks and value in the mitigation of climate change.

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UNESCO has developed an **Earth Science Education Initiative in Africa** as a legacy of the International Year of Planet Earth (2008). The overall intention of this Initiative is to support the development of the next generation of earth scientists in Africa who are equipped with the necessary tools, networks and perspectives to apply sound science to solving and benefiting from the challenges and opportunities of sustainable development.

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The UNESCO supported **Global Geopark Network** helps to promote a better understanding of the evolution and resources of our planet among decision makers and the general public through visits to Geoparks. Geoparks are geologically significant sites with well-developed education, research and management plans, now numbering 87 sites in 27 countries. Based on the demand of Member States, the network is expanding into the African continent. The parks bring a strong stimulus to local communities in developing sustainable local tourist industries.

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Science education and scientific knowledge empower girls and women to participate in the economic, social and political life of their communities.



### Strengthening Research Capacity for Sustainable Development: Glaciers Mass Balance Monitoring

Research on glacier mass balance and their response to climate change is one of the main means of assessing environmental change. To strengthen the capacity of researchers in this area, UNESCO, UNDP and the National Institute of Geography trained young specialists from Central Asian countries on the methods of glaciological monitoring used to determine the parameters of glacier mass balance during a sub-regional training organized in 2011 in Almaty.

### Enhancing Scientific Cooperation for Sustainable Development

To build green economies and societies, the scientific and technological differences existing between developed and developing countries and between the North and the South must be bridged. Researchers and scientists, particularly from developing countries, must also be provided with the opportunity to benefit and contribute to advances in science for sustainable development.

UNESCO supports the establishment of the Consortium for Science, Technology and Innovation for the South (COSTIS) to enhance South-South cooperation in the field of STI.

## Mobilizing the World's Scientific Community for Rio+20

In the lead up to Rio+20, the International Council for Science (ICSU) and UNESCO joined forces to organize five regional meetings with natural scientists, social scientists and engineers to prepare joint positions for the intergovernmental Rio+20 regional preparatory meetings and process. Recommendations from these meetings include:

- Promoting a development paradigm change which focuses on achieving sustainable development objectives through science;
- Improving multi and trans-disciplinary collaboration and knowledge-sharing between the natural sciences, exact sciences, engineering and technology communities, and the social and human sciences;
- Allowing scientists to disseminate the results of their research even when that may call official positions into question. Doing so must not jeopardize their livelihood or their access to research support;
- Enhancing dialogue and exchange between the scientific and technological community and government decision-makers, and society in general;
- Promoting an ethical view of the principles and vision that guide sustainable development, and which must also guide the science and technology community. Ethical principles help to build trust among various sectors of society and among nations.

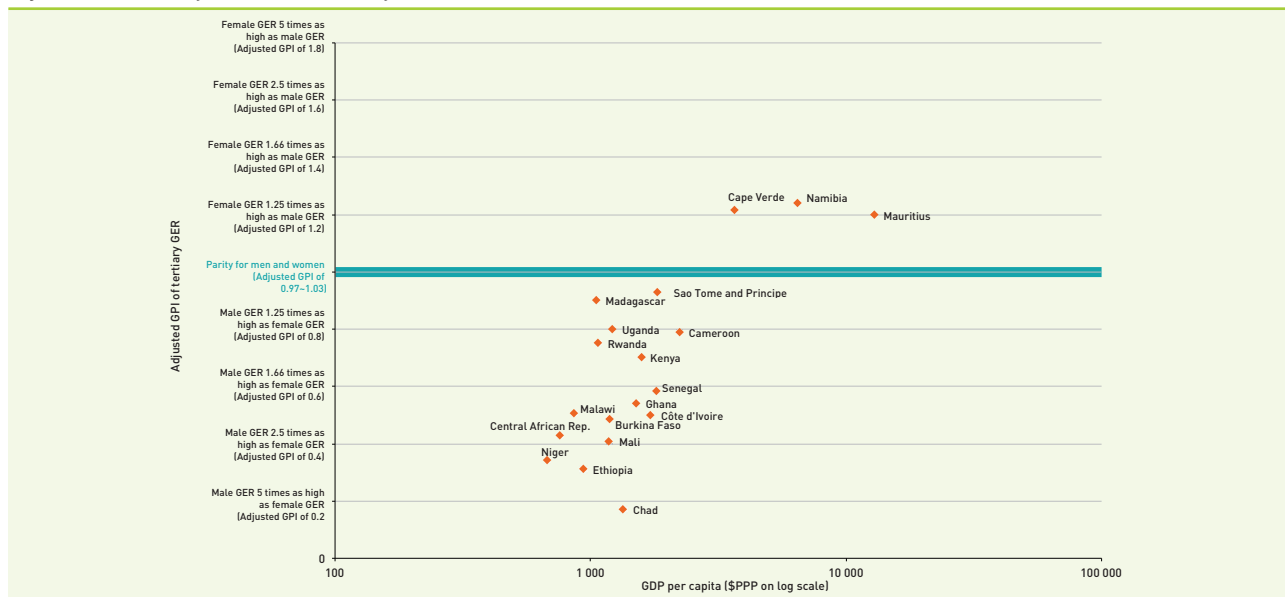


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## The World Needs Science, Science Needs Women

Science education and scientific knowledge empower girls and women to participate in the economic, social and political life of their communities.

### Adjusted Gender Parity Index (GPI) of tertiary Gross Enrolment Ratio (GER)



Adjusted gender parity index for women facing significant barriers to tertiary education in countries with the lowest levels of national wealth. Even a slight rise in national wealth can correlate to fewer gender disparities. Sub-Saharan countries with higher levels of wealth also report higher enrolment rates for women than men. For example, the adjusted GPI is 1.21 in Cape Verde, 1.30 in Mauritius, 1.24 in Namibia.<sup>22</sup>

<sup>22</sup> UNESCO Institute of Statistics, 2011, GDP per capita: World Bank.

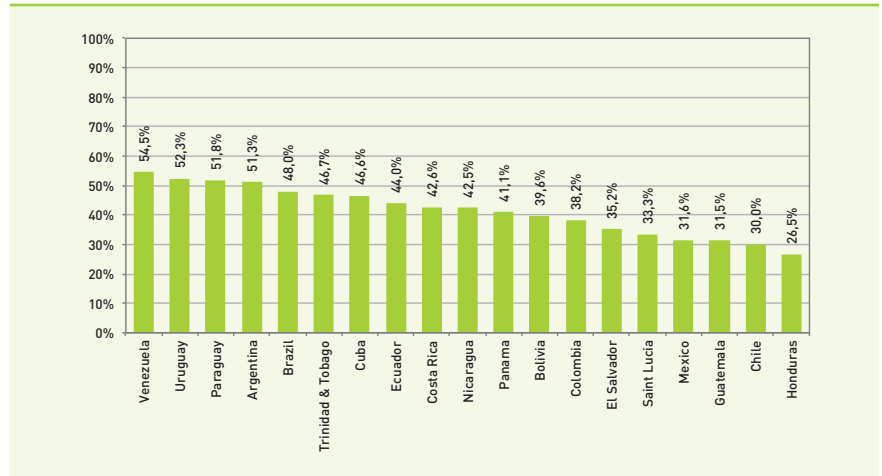


Pr Vivian Wing-Wah Yam, Laureate 2011,  
L'Oréal-UNESCO Awards For Women in Science

Addressing the challenge of a new global sustainable energy system involves an increased use of alternative and renewable energy sources. This requires local competencies and scientific capacities.

For the past 13 years, UNESCO and the L'Oréal Corporate Foundation have recognized women researchers who, through the scope of their work, have contributed to overcoming the global challenges of tomorrow. Each year, the **For Women in Science** Programme highlights scientific excellence and encourages scientific talent. To date (2011), the L'Oréal-UNESCO Awards have recognized 67 laureates from 30 countries, two of whom received Nobel Prizes. Over 1000 national, regional and international fellowships have been granted to young women scientists from 100 countries so that they can continue their research projects. As a result, the programme has become a benchmark of scientific excellence on an international scale, revealing the contributions of scientific women each year.

Female researchers as a percentage of total researchers (HC), 2009 or latest available year: Americas<sup>23</sup>



## Renewable Energy for Sustainable Development

Today, unequal access to electricity constitutes a real social inequality that must be addressed. At present, approximately 1.4 billion people, representing over 20% of the world's global population, lack access to electricity services and some 85% of them live in the rural areas of developing countries<sup>24</sup>. In Sub-Saharan Africa, they represent approximately 72% of the population and this figure rises up to 88% for the rural areas<sup>25</sup>.

<sup>23</sup> UIS 2010.

<sup>24</sup> World Energy Outlook 2010, International Energy Agency.

<sup>25</sup> Ibid.

Addressing the challenge of a new global sustainable energy system involves an increased use of alternative and renewable energy sources. It requires the availability of local competencies as well as endogenous scientific capacity as a foundation for increased knowledge of the various related technologies and their adaptation to different contexts and needs.



Solar for water pumping

**Through its Global Renewable Energy Education and Training (GREET) Programme**, UNESCO is carrying out a number of capacity-building training activities with participants from developing countries, particularly in Africa. The sharing of scientific and technological knowledge is also promoted through the establishment of dedicated networks and through the organization of international conferences, exhibitions and forums focusing on different forms of renewable energy.

UNESCO is providing technical assistance to countries in areas such as energy policy-making and planning in the form of advisory services and institutional capacity-building, and is helping countries define their national energy policies and develop related projects.

At the regional level, UNESCO supports the programme of the African Energy Commission (AFREC), launched by NEPAD, as well as the Community of Sahelo-Saharan States.

The objective of the **Solar School Project in Namibia**, run by UNESCO, with support from a number of other international and national partners, is to contribute to quality education for all children in Namibia and to improve working conditions for rural teachers. It provides energy solutions to remote rural schools, hostels, kindergartens, community resource centres and teacher accommodation in the Ohangwena Region by using renewable energy (solar energy) and energy efficiency. The project adopted a holistic approach towards solar electrification through a number of unique initiatives, such as providing a supply of solar box cookers and wood efficient stoves. It also provided training to all interested members of the community. Solar Clubs were established in each school and their members received specialized training in system usage, maintenance and troubleshooting.

### Energy Efficiency and Energy Conservation for Indigenous Women in Northern Cameroon

UNESCO is working to improve the lives of African Indigenous Women and to promote the efficient use of natural resources through a dedicated programme with the African Indigenous Organisation, Central African Network (AIWO CAN). Activities include supporting training of trainers' workshops on the construction of efficient stoves, manufacturing fireless cookers, and training community members on how to develop radio programmes on climate change adaptation. The manufacturing and use of the fuel-less cooking bags allows women to save more than 50% of firewood through "heat retention" cooking and avoiding the need to reheat. Almost every family home in more than 30 villages now owns a fireless cooker or a clay stove. Community radios in northern Cameroon have developed radio programmes on climate change adaptation with particular focus on firewood efficiency.



Ethical principles should guide green societies. Through its **Ethics of Science and Technology Programme**, UNESCO promotes consideration of science and technology in an ethical framework by initiating and supporting the process of democratic norm

building. This approach is founded upon UNESCO's ideal of "true dialogue, based upon respect for commonly shared values and the dignity of each civilization and culture". Awareness raising, capacity-building and standard-setting are therefore the key thrusts of UNESCO's strategy in this and all other areas.

## ■ Open Access to Scientific Knowledge: A Crucial Step in Advancing Sustainable Development Worldwide

The free flow of information is a fundamental principle for bridging the knowledge gaps between privileged and under-privileged communities, and between the 'information rich and the information poor'.

Open Access (OA) is the provision of free access to peer-reviewed, scholarly research information for all. Through OA, researchers and students from around the world gain increased access to knowledge, publications have greater visibility and readership, and the potential impact of research is increased.

UNESCO is supporting the mapping of OA activities produced by various stakeholders around the world. Recently, UNESCO and the Nature Publishing Group launched the 'World Library of Science', an open and permanent online learning resource that will offer high quality educational materials in the life and physical sciences to secondary and university level students around the world.

Furthermore, UNESCO is providing free access to all its educational materials through the recently launched "Beyond Campus" iTunes University site, developed with Apple Inc. It is expected to provide unprecedented opportunities to scholars and students around the world.

## DID YOU KNOW?

- ▶ A virtual dynamic library equivalent to 200 volumes: *Encyclopedia of Life Support Systems (EOLSS)*, produced by the UNESCO-EOLSS Joint Committee, and sponsored by EOLSS Publishers of Oxford, UK, is regularly updated with contributions from thousands of scholars in over 100 countries, and edited by nearly 300 subject experts. [www.eolss.net](http://www.eolss.net)
- ▶ An estimated average of 20,000 highly qualified professionals left the African higher education system each year from 1990 onward for jobs in the United States, Europe, and even the Middle East and Australia. Social sciences and humanities were particularly badly hit. Disciplines such as history, archaeology and philosophy were endangered in many countries.<sup>26</sup>
- ▶ The European Union, Japan, USA, China and the Russian Federation represented 35% of the world population in 2007 but 77% of the world's researchers.<sup>27</sup>
- ▶ In sub-Saharan Africa, the number of researchers rose from 45,000 to 60,000 between 2002 and 2007. Although the sub-continent's world share remained stable at 0.8%, the density of researchers increased from 67 to 79 per million inhabitants.<sup>28</sup>
- ▶ R&D is unevenly distributed *within countries*, both developed and developing. In Brazil, 40% of GERD is spent in the São Paulo region; South Africa's Gauteng Province: 51% of GERD, In the USA, 59% of R&D was performed in 10 out of 50 states in 2005, one-fifth in California alone.<sup>29</sup>



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26 UNESCO World Social Sciences Report 2010.

27 UNESCO Science Report, 2010.

28 Ibid.

29 Ibid.



# A green future must be blue: the role of oceans and freshwater

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**W**ith marine and coastal resources and industries representing more than 5% of global GDP, oceans provide significant environmental, social and economic benefits and play an important role in poverty alleviation. Oceans are at the core of global systems that make the earth habitable for people. Much of our food, the oxygen we breathe, the weather, climate and coastlines are all ultimately provided and regulated by the sea.

Transitioning to blue-green economies is indispensable for generating jobs, mitigating the rapid degradation of the ocean, and addressing natural and man-made disasters, as well as emerging global challenges, such as climate change.

## ■ Fostering the Sustainable Use and Governance of the Oceans

Oceans play a complex and essential role in the regulation of the climate system absorbing each year approximately 25% of all carbon dioxide (CO<sub>2</sub>) we emit. The ocean has

Transitioning to blue-green economies is indispensable for generating jobs, mitigating the rapid degradation of the ocean, and addressing natural and man-made disasters, as well as emerging global challenges, such as climate change.

already spared us from catastrophic climate change.<sup>30</sup> However, this is not without consequence: the oceans are becoming more acidic and in addition they have absorbed most of the supplementary heat generated by climate change. Such changes risk altering the normal patterns of ocean circulation that influence our climate.

Many other emerging challenges need to be addressed such as the increasing frequency of extreme events, the regulation of High Seas or trans-zonal fisheries, unsustainable fishing practices, and protecting marine biodiversity in danger.

<sup>30</sup> UNESCO-IOC Information Kit, 2010.



## ■ An Integrated International Framework for Ocean Governance

The 1982 United Nations Convention of the Law of the Sea (UNCLOS) provides an integrated legal framework on which to build sound and effective regulations pertaining to the different uses of the ocean, which have been implemented by UN specialized agencies and programmes over the last 30 years. However, severe limitations exist for monitoring and enforcing these regulations.

There is a need for integrated policy-making, which addresses issues that cut across several domains in order to connect the environmental, social and economic aspects of ocean governance. The gaps in ocean governance need to be urgently addressed.

## ■ Blue-Green Economies

The concept of green economies has emerged in recent years as a widely accepted shift from traditional thinking, in which environmental protection and management was viewed as being separate from economic development. It is now recognized that future economic development must be linked to both environmental and social pillars. A green economy must benefit coastal communities in developing states who depend on a healthy ocean for their survival. Healthy oceans are essential for the sustainable development of millions of people. Therefore, the concept of a green economy needs to be extended to a blue-green economy.

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### Although there is no universally accepted definition of blue-green economies, key components include:

- Protection and restoration of ocean ecosystems and biodiversity, including beyond national jurisdictions;
- Active sea-floor management (including oil and gas resources, mining, and cables) both within and outside national jurisdictions;
- Change in fisheries and aquaculture management regimes at regional and national levels toward smaller scale, non-subsidized, and sustainable practices;
- Adaptation to sea level rise, climate change and acidification;
- Integrated coastal management;
- Increasing sustainable use of bio-resources, including biotechnology;
- Recognition and adoption of carbon sinks and the creation of a market for trading ('blue carbon');
- Greater adoption of renewable energy from the ocean (a move away from a land-based focus).



States can derive optimal economic and social benefits from a healthy ocean whilst protecting the environment in the long term by adopting the principles of blue-green economies and changing institutional frameworks accordingly.

Blue-green economies could generate social, economic and environmental benefits. There is a clear link between poverty eradication, sustainable development, and better protection and restoration of our marine habitat and biodiversity.

States can derive optimal economic and social benefits from a healthy ocean whilst protecting the environment in the long term by adopting the principles of blue-green economies and changing institutional frameworks accordingly.

## ■ UNESCO's Intergovernmental Oceanographic Commission (IOC): 50 years in the service of society

UNESCO-IOC has been promoting international cooperation and coordinating research, services and capacity-building to find out more about the oceans and coastal areas and to generate knowledge to improve the sustainable management and protection of the marine environment. It has also been providing an evidence base for the decision-making process of its Member States.

### The Adaptation to Climate Change in Coastal Zone of West Africa (ACCC) Project (UNESCO-IOC/UNDP, funded by GEF)

The ACCC is a project coordinated by UNESCO-IOC to improve the climate change adaptive capacity of sensitive coastline ecosystems in five West African countries (Senegal, Mauritania, Guinea Bissau, Cape Verde, Gambia), whilst promoting the development of sustainable livelihood alternatives of local coastal communities.



Coastal Dune Protection in Mauritania  
© Demba Marico

Progress towards the sustainable development of oceans and seas includes:

- IOC-UNESCO has led the successful establishment of a Global Ocean Observing System (GOOS);
- Marine spatial planning was recognized by the international ocean community as a key component of integrated coastal management;
- The UN General Assembly approved in 2010 the programme on reporting on the state of the marine environment.

Rio+20 is an opportunity to provide new guidelines on priorities in coastal and ocean sciences for global sustainability.

IOC is one of the sponsors of the **World Climate Research Programme (WCRP)**, which is singularly placed to make use of the totality of climate-related science systems, facilities and intellectual resources of more than 185 countries. The programme aims at determining the predictability of climate and determining the effect of human activities on climate. This predictive knowledge is useful for developing adaptation and mitigation strategies, which assist communities in addressing the impacts of climate volatility and change on social and economic sectors, along with energy and transport, food security, environment and water. The programmes' objectives directly support the UN Framework Convention on Climate Change.



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### Coral Reefs

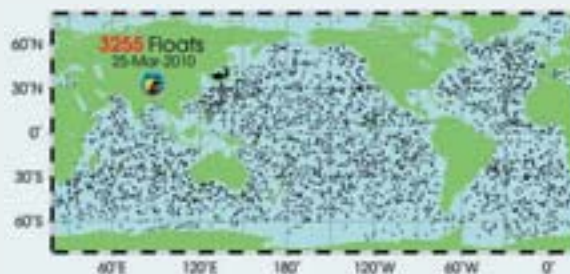
Millions of people are totally dependent on coral reefs for their livelihoods. The world's coral reefs could be the first ecosystem casualty of climate change. This will likely occur in 20 year's time if we continue with 'business as usual'.<sup>31</sup> To provide insights on how to address this global challenge, UNESCO-IOC, through the Global Coral Reef Monitoring Network (GCRMN), is working with its UN partners, to support coral reef

monitoring and data management, and to provide information on related ecological and socio-economic information.

31 Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Paris, 2007.

IOC has been working to enhance marine scientific research, exploitation and development. **The International Oceanographic Data and Information Exchange (IODE)** facilitates the free and open exchange of oceanographic data and information between participating Member States and meets the needs of users for data and information products. The IODE Ocean Data Portal ([www.oceandataportal.org](http://www.oceandataportal.org)) is growing steadily.

The **Global Ocean Observing System (GOOS)**, co-sponsored by UNESCO-IOC, WMO and UNEP, is a permanent global system for observations, analysis and modeling of marine and ocean variables to support ocean services at a global level.



UNESCO-IOC (GOOS): Argo is a global array of over 3,200 free-drifting profiling floats, that for the first time, allows continuous monitoring of the temperature, salinity, and velocity of the upper 2,000m of the ocean. All data are relayed and made publicly available within hours after collection.

### UNESCO's Initiative on Marine Spatial Planning

Marine Spatial Planning (MSP) helps countries put into action ecosystem-based management by defining and identifying space for biodiversity conservation and sustainable economic development in marine environments. UNESCO's work in this area includes documenting marine spatial planning initiatives around the world, analyzing good practices of marine spatial planning, sharing knowledge about it, and promoting capacity building in this area. This is a collaborative effort of the Intergovernmental Oceanographic Commission (IOC), the Man and Biosphere Programme (MAB), and the World Heritage Centre.

## DID YOU KNOW?

- ▶ UNESCO-IOC-GOOS forecasted the 2010-2011 La Nina, and the devastating flooding in Australia and Southern Africa that resulted from it.
- ▶ An estimated 80% of the world's biodiversity lives in the ocean.<sup>32</sup>
- ▶ A vast area of the ocean is beyond national jurisdiction.<sup>33</sup>
- ▶ Ocean acidity has increased by 30% since the beginning of the Industrial Revolution.<sup>34</sup>

## Effectively Managing the World's Freshwater Resources

Two-thirds of the world's population could be living in water-stressed countries by 2025 if current consumption patterns continue<sup>35</sup>. Securing access to safe drinking water for all and wisely managing our limited freshwater resources are therefore high priorities on the sustainable development agenda.

Providing the knowledge base necessary to make informed decision-making processes in relation to water management and consumption is pivotal, particularly under evolving weather patterns. Currently, only 22% of developing countries and 37% of developed countries have national Integrated Water Resources Management Plans in place.<sup>36</sup> Even fewer countries have National Water Efficiency Plans. Our knowledge of water use is as poor as our knowledge of water resources.<sup>37</sup>



Dried up Aral Sea

Water must be a key component in all decision-making processes for sustainable development. A lack of dialogue between decision-makers and water managers has contributed to the serious degradation of the world's water resources. Unless water resources management is improved and financing for water development projects is met, billions of people will remain hungry, in poverty, in poor health, and vulnerable to floods and drought.

Water is highly vulnerable to the impact of human activity, and its management transcends political frontiers. To wisely manage this irreplaceable resource, action must be based on partnership.

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<sup>32</sup> UNESCO-IOC Information Kit, 2010.

<sup>33</sup> Ibid.

<sup>34</sup> Ibid.

<sup>35</sup> UN World Water Development Report, UNESCO, 2009.

<sup>36</sup> UN-Water, 2007.

<sup>37</sup> UN World Water Development Report, UNESCO, 2009.





Water is cardinal for achieving sustainable development and the Millennium Development Goals. Sound management of water resources is an essential component of social and economic development, poverty reduction and equity, and sustainable environmental services.

## ■ Water and Sustainable Development

Water is a vital issue for the green economy agenda in a number of different areas, such as:

- Mitigating of water pollution;
- Increasing efficiency of energy use in water and wastewater distribution, reuse and treatment;
- Modernizing irrigation systems to make them less wasteful;
- Developing hydropower as a 'clean' alternative to fossil fuels;
- Managing and protecting natural water ecosystems.

Projects in these areas can conserve energy, reduce the wasteful use of materials, encourage better use of scarce water, and reduce the impact of human activities on the natural environment. Many of these projects are win-win, potentially delivering benefits on several objectives simultaneously. For this, water needs to be explicitly and holistically incorporated in both the framework and the resulting processes of green economies.

While covering most aspects of freshwater resources management, UNESCO's water programmes have developed specific expertise in the following areas: conflict prevention and resolution, water education, cooperation on transboundary groundwater and surface waters, emergency situations and risk management, water ethics, and access/right to water.

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**UNESCO's International Hydrological Programme (IHP)** is the only intergovernmental programme of the UN system devoted to water research, water resources management, education and capacity-building. The programme, tailored to UNESCO Member States' needs, is implemented in six-year phases and relies on a vast network of experts and partners in addition to its National Committees.

## International Waters: From Potential Conflict to Cooperation Potential (PCCP)

Management of international waters has become increasingly complex because of water's unique physical, geographic, and political characteristics. Almost three billion people in 145 countries live within the confines of transboundary river basins.

Through its work with a broad group of stakeholders, PCCP contributes to UNESCO's mandate of 'science for peace' by building capacity for cooperation, development and peaceful management of transboundary water resources. PCCP has developed several activities focused on informal diplomacy with the goal to support cooperation and initiate multi-level and interdisciplinary dialogues related to the management of water resources. The programme uses education and training, research, and support of cooperation processes to anticipate, prevent, and resolve water conflicts.



© UN Photo/Logan Abassi

UNESCO and other partners have identified 274 transboundary aquifer systems worldwide.

© Product of the Transboundary Freshwater Dispute Database, Department of Geosciences, Oregon State University, 2008.

## ■ Assessing the World's Water Resources

The World Water Assessment Programme (WWAP) – a programme of UN-Water which is hosted and led by UNESCO - aims to underline the importance of water's role in green economies and in poverty reduction.



**The United Nations World Water Development Report (WWDR)** coordinated by WWAP, and hosted by UNESCO, is a one-stop resource for up-to-date information on the use, management and state of the world's freshwater resources. It is the only major UN system-wide report representing the collective output of 29 UN agencies. The 4th edition of the Report will be launched in March 2012 before Rio+20. It will provide up-to-date information relevant for the Conference. It will give an account of regional perspectives and challenges, such as climate change adaptation, while recognizing new uncertainties and analyzing associated risks that exacerbate the challenges to decision-making.

World Water Development Report, 2009



Water is crucial for economic development and for providing livelihoods for the poor. A stable water supply helps poor households to increase their income through productive domestic activities such as raising poultry or cultivating vegetable gardens.



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The UNESCO-WWAP Study *Water 2050* is exploring alternative futures of the world's water and its use to 2050. Rational and scientific modelling of water futures will be developed which can inform 'no regrets' policy decisions at the international, national or local level. If risk or uncertainty has prevented us from making the decisions that would take us towards the best possible water future, then scientific information and the development of global, national and basin-level scenarios of the future provide the key to moving towards a better future, not only for water, but also for global security and prosperity.

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## ■ Water Education and Training

Today, knowledge on water is rapidly increasing as are the required skills of water sector professionals. Therefore, continuous professional development is essential to keep up with the latest developments in the field. UNESCO's **Institute for Water Education (IHE)** in Delft, the Netherlands, is the largest post-graduate water education and research facility world-wide. It carries out research, education and capacity-building activities in the fields of water, the environment and water-related infrastructure.

**Managing Water for the City of the Future.** The UNESCO-IHE-led SWITCH project has set out to achieve sustainable urban water management in the “City of the Future”. With support from the European Commission, a consortium of 33 partners from 15 countries is working together to create innovative scientific, technological and socio-economic solutions for urban water management that can be replicated around the world. City-level “Learning Alliances”, which are multi-stakeholder platforms, have helped break down barriers to information sharing, speeding up the process of innovation. The SWITCH Water-Sensitive Urban Design and Sustainable Urban Drainage Manuals provide creative and artful ways to incorporate stormwater into urban planning along with best practice guidelines for stormwater management under extreme conditions.



UNESCO, in collaboration with Gruppo Alcini (Italy), is encouraging schoolchildren around the world to take part in a unique learning experience through the **H2Ooooh! Initiative**.

School children from all over the world are invited to submit their ideas and stories on water related problems which affect their daily lives. Their stories will then be transformed into cartoons and shown on TV. [www.h2oooh.org](http://www.h2oooh.org).

## DID YOU KNOW?

- ▶ 158 of the world’s 263 international river basins lack any type of cooperative management framework.<sup>38</sup>
- ▶ Groundwater is a significant source of water for human consumption, supplying nearly half of all drinking water in the world.<sup>39</sup>
- ▶ A study by the International Water and Sanitation Centre (IRC) of community water and sanitation projects in 88 communities in 15 countries found that projects designed and run with the full participation of women are more sustainable and effective than those that do not.<sup>40</sup>
- ▶ An estimated 300% increase in the number of trained water professionals is needed in Africa if the continent is to meet the sustainability context of the MDGs. Asia must increase its trained technical, managerial and scientific water capacities by nearly 200% and Latin America and the Caribbean by 50%.<sup>41</sup>



SWITCH Project, Santa Lúcia, Belo Horizonte, Brazil

### Why focus on Cities?

Rapid population growth combined with climate change and escalating costs of living are causing cities to face ever-increasing difficulties in efficiently managing scarcer and less reliable water resources.

38 UN Water.

39 UN World Water Development Report, UNESCO, 2009.

40 Interagency Task Force on Gender and Water, 2006.

41 UN World Water Development Report, UNESCO, 2006.

# Conserving biodiversity is life

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## Biodiversity and human well-being are inextricably linked.

**T**he unsustainable use of our natural resources, combined with the needs of a growing global population, is seriously jeopardizing the health of our ecosystems, resulting in the loss of biodiversity. Today, approximately 17,000 species are in danger of extinction.<sup>42</sup> As biodiversity declines, so too does the resilience of our ecosystems, which have been dramatically transformed as a result of human action.

Biodiversity is crucial to human life and to the reduction of poverty, in view of the basic goods and ecosystem services it provides. More than 1.3 billion people depend on biodiversity and on basic ecosystems goods and services for their livelihoods.<sup>43</sup>

Biodiversity and human well-being are inextricably linked.

While the link between biodiversity and human well-being is better understood, the complexity and diversity of the range

of services that flow from biodiversity are still unknown and undervalued.

**Global and national efforts to conserve biodiversity are still not sufficient, no doubt due to the lack of effective multi-sectoral policy responses, political commitment at all levels and awareness-raising, among others.**

We must rise to the complexity of the challenge. To do so, we must target the underlying causes of the loss of biodiversity. These lie in unsustainable practices, insufficient education and information, and development choices that do not take cultural values into account. Poverty is an overarching driver of loss. Equity in biodiversity access and use is a rising moral imperative. Policy responses based on the best scientific knowledge must take into account all facets and

<sup>42</sup> UN, 2010.

<sup>43</sup> Secretariat of the Convention on Biological Diversity.



sectors of society. The economic, cultural, intrinsic and ethical values of biodiversity must be recognized.

The **UNESCO Biodiversity Initiative** will address, in a holistic and integrated manner, all aspects related to the conservation and sustainable and equitable use of biodiversity from the perspective of UNESCO's mandate and its relevant programmes and activities.

UNESCO will work to strengthen biodiversity conservation through generating knowledge and raising awareness on biodiversity and ecosystem values; enhancing the capacity of decision-makers to adequately account for and manage biodiversity and ecosystem values; supporting governments in developing sustainable enterprises through more sustainable policy planning and implementation; and raising awareness about the climate regulating functions of ecosystems.

## ■ Treasuring Biological and Cultural Diversity

Anthropological research, management experience and local voices teach us that many indigenous and local communities shape and manage biodiversity through their actions and social organization. Land tenure and stewardship systems, combined with knowledge and know-how, have a very important role in conserving natural ecosystems.

It is also recognized that linguistic diversity roughly parallels biodiversity. Loss of biodiversity hollows out the foundations of local cultures thus altering their subsequent development and their sense of belonging to a specific place.

**Sustainable development must take both biological and cultural diversity into account.**



Corn Biodiversity

**The UNESCO-CBD Joint Programme of Work on Biological and Cultural Diversity.** In June 2010, a conference co-organized by UNESCO and the Secretariat of the Convention on Biological Diversity pressed for biological and cultural diversity to be genuinely integrated into development cooperation strategies and programmes. The Conference resulted in the 2010 Declaration on Bio-Cultural Diversity and the draft Joint Programme between UNESCO and the Secretariat of the Convention on Biological Diversity containing a number of proposed actions. COP 10 recognized the Joint Programme as a 'useful co-ordination mechanism to advance the implementation of the Convention and deepen global awareness of the inter-linkages between cultural and biological diversity'.



© B. Kasiner

Women embody specific biodiversity knowledge. Nevertheless, their role in biodiversity management and in related decision-making processes has not been properly recognized and capitalized upon.

### DID YOU KNOW?

- ▶ It is estimated that the world's commercial fisheries will have collapsed in less than 50 years unless current trends are reversed.<sup>44</sup>
- ▶ The global forest area has shrunk by 40% in the last 300 years.<sup>45</sup>
- ▶ Twenty-five countries have no more forest left and another 29 countries have lost more than 90% of their forest cover.<sup>46</sup>
- ▶ Each year, we are losing ecosystem services worth an estimated US\$ 68 billion from land-based ecosystems alone.<sup>47</sup>

Women embody specific biodiversity knowledge, and there are many examples of the sustainable manner in which women use biodiversity. Nevertheless, their role in biodiversity management and related decision-making processes has not been properly recognized and capitalized upon.

UNESCO promotes the incorporation of gender-responsive and gender-transformative approaches to biodiversity conservation and sustainable development.

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44 The Economics of Ecosystem and Biodiversity, an Interim Report, 2008, EU-UNEP.

45 Idem.

46 Idem.

47 Idem.

# Mitigating and coping with climate change

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© UN Photo/Marco Dormino Genovaes

Haitian Village Devastated by Tropical Storm "Hanna" in 2008.

to geographical isolation and economic vulnerability. Therefore, special attention is needed to build the resilience of SIDS to address these challenges through integrated sustainable development planning, which includes the economic, social and environmental issues of concern to SIDS.

**T**he impact of climate change is particularly strong in Least Developed Countries (LDCs) and Small Island Developing States (SIDS), which need to strengthen their resources to adapt to, and manage its consequences in terms of human mobility. SIDS are particularly at risk – whether from increasingly unpredictable and severe weather, the prospect of rising sea levels, or due

## Empowering Women Leaders in SIDS

In Apia, UNESCO is working with women leaders in the Tokelau and the Tokelau Administration to produce the nation's first National Women's Policy. Tokelau is a tiny Pacific territory made up of three small atolls and a population of about 1,500. The National Women's Policy is groundbreaking in that it is the first time that there has been any attempt to specifically identify and strategically address the issues facing women living in this remote area. Key issues identified for the women of Tokelau are women's health, violence against women, education and training opportunities for young women, livelihood opportunities and legal and justice issues.



Climate change also often disproportionately affects disadvantaged segments of the population, in terms of gender, ethnicity, poverty, or socio-economic status, thus rendering their situation even more fragile.

While there is evidence that climate change has the potential to generate substantial movements of people, the international community has so far devoted little attention to this issue. This is worrying as such flows are likely to lead to situations of vulnerability and to create tension within and between States, for which the international community and most governments are currently unprepared.

All too often, environmental migration is approached in terms of disasters, as in the 2004 Asian tsunami or the 2005 Hurricane Katrina in New Orleans. By contrast, the 'silent crisis' generated by progressive environmental change, while affecting potentially very high numbers of people, is the object of much less policy attention.

Migration should not be reduced to a last-resort option for people with no other alternatives. In some cases, moving is indeed the strategy of those who have no other means to survive. But migration can also be a valuable adaptation strategy as people decide to move to improve their situation. This calls for strategies that incorporate the potential of migration, and of migration policies, in reacting to climate change.



All parts of society must take concerted action in order to mitigate and adapt to climate change.



A woman holds her severely malnourished young child in a camp for Internally Displaced Persons (IDPs) in Mogadishu, Somalia, 2011.

### Women, Gender Equality and Climate Change<sup>48</sup>

In many contexts, women are more vulnerable to the effects of climate change than men, primarily as they constitute the majority of the world's poor and are more dependent for their livelihood on natural resources that are threatened by climate change. Providing water for domestic use, home gardens and small animals is typically the responsibility of women and girls. Gathering and transporting water typically falls to women and children in developing countries. Although this practice provides women the opportunity to socialize among themselves, it seriously limits their available time for education or other economic, social or political activities. Collecting water is expected to become increasingly burdensome with global warming.

Shortages of firewood or other bio-fuels due to floods or drought, which are expected to increase with higher temperatures, add to women's workloads as they are responsible for its collection. In hurricanes and floods it is a well-documented fact that women have a higher death rate than men. This is due to social inhibitions, lack of survival skills, and the fact that they often care for children, the sick and the elderly, placing themselves at higher risk.

48 UN-Women, Facts and Figures on Gender & Climate Change.

### Effects of Climate Change in Africa<sup>49</sup>

Africa is one of the most vulnerable regions to climate change with the least adaptive capacity.

Areas potentially subject to desertification cover 43% of the continent's land area, on which 270 million people live (40% of the continent's population).

Projected yield reductions could be as much as 50% in some African countries by 2020, thus further threatening food security in the region.

About 25% of Africa's population (about 200 million people) currently experience high water stress. Climate change will aggravate this problem, with a projected 75 to 250 million people at risk of increased water stress by the 2020s.

Warmer temperatures will extend the areas affected by malaria, and could aggravate cholera epidemics in coastal areas.

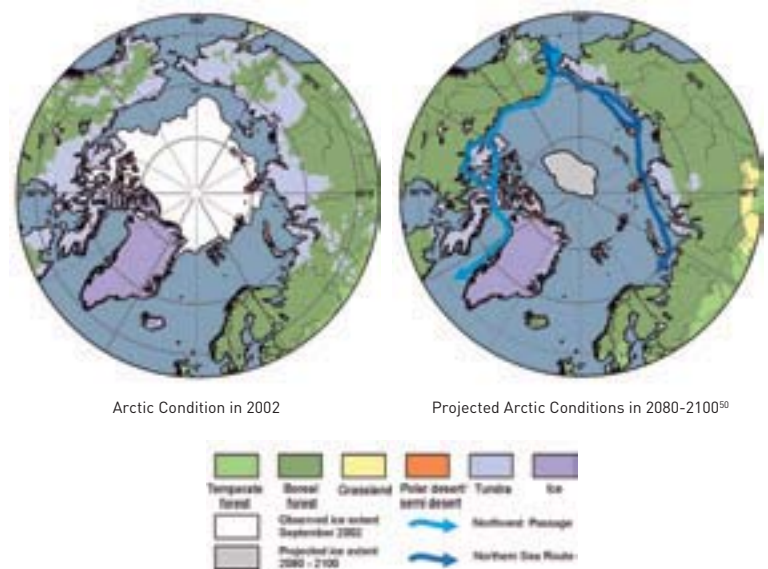


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Men displaced from Shangil Tobaya farm rented land for the rainy season in August 2011, in Dali, close to Tawila in the Sudanese state of North Darfur.

### Coping with Climate Change: UNESCO's Action

Change in climate could jeopardize the conservation of natural ecosystems and the sustainability of socioeconomic systems. Climate change is already adversely affecting many areas, including biodiversity and ecosystems, freshwater resources, human health, human settlements and migration patterns, the conservation of natural and cultural world heritage properties, and peace and prosperity.



<sup>49</sup> 'Satellites and World Heritage sites, partners to understand climate change', UNESCO and partners Exhibit during the United Nations Climate Change Conference, Cancun, 2010.

<sup>50</sup> Intergovernmental Panel on Climate Change (IPCC), 2007.

**To strengthen support to countries in mitigating and adapting climate change, the Director-General of UNESCO launched a Climate Change Initiative.** It seeks to reinforce the scientific, mitigation and adaptation capacities of countries and communities that are most vulnerable to the effects of climate change. It encompasses the following dimensions: climate science and knowledge; climate change education; cultural and biological diversity, and cultural heritage; ethics, and social and human sciences.

## ■ Climate Science and Knowledge

The objective of the science-based UNESCO Climate Change Adaptation Forum is to inform public and private sector stakeholders (national policy-makers, vulnerable communities and women, the local media, social, cultural and scientific networks and local, regional and international scientific organizations) in agriculture, fisheries (including aquaculture), forestry, alternative energy, fresh water, oceanography, environmental sciences, and coastal services of the longer-term climate projections and their potential impacts, as well as to strengthen capacities for appropriate response strategies.



Summertime sea ice may become a much rarer sight in the future

### Assessing Snow Glacier and Water Resources

Glaciers are an intrinsic element of the landscape, environment and culture in high mountain regions, and are key indicators of global warming and climate change. Glaciers represent a unique source of freshwater for agricultural, industrial and domestic use, as well as an important economic component of tourism and hydro-electric power production. It is therefore critical to assess and monitor all aspects of water resources in the highly important headwaters of rivers to observe changes in and consequent impacts on river regimes of the melting of snow, glacier ice and permafrost.

UNESCO-IHP has been coordinating glacier mass balance studies, research, training and capacity-building programmes in different mountain regions: Himalayas, Central Asia, European Alps and Latin America/Caribbean.

The Global Earth Observing System of Systems – launched at the World Summit on Sustainable Development in Johannesburg in 2002 – has demonstrated the high societal relevance of hazard mitigation. Through the **UNESCO Geological Application of Remote Sensing (GARS)** Programme, it is coordinating remotely sensed and in situ observations to provide products for managers in the field, planners and decision makers. The development of radar remote sensing satellites permits near real-time observation of landslides, tsunamis, earthquakes and other hazards, even during long rainy seasons and at night.

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**The International Sediment Initiative (ISI)** advances sustainable sediment management at the global scale in an effort to contribute to sustainable water resources management. These include an information system, a global evaluation of sediment transport, an assembly of case studies of sediment problems and sediment management for river basins in different environments, a review of erosion and sedimentation research, and an initiative to promote education and capacity-building in the sediment field. ISI has an important role to play in highlighting the wider context of global change and the importance of such change to erosion.

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### A Water Knowledge Platform for Climate Change Adaptation in Nepal

Sound institutional arrangements have always been perceived as one of the backbones of climate change adaptation. In order to cater to a similar need, UNESCO is providing technical assistance to the Government of Nepal for the establishment of a Nepal Water Forum. Its objective is to strengthen the country's bid for climate change adaptation by creating a single platform to guide water policies and facilitate water related activities.

## ■ Climate Change Education for Sustainable Development Programme

To promote climate change education in the context of ESD, UNESCO is providing policy and planning advice to Ministries of Education. It is also developing and encouraging innovative educational approaches to help a broad audience (with particular focus on youth) understand, address, mitigate, and adapt to the impacts of climate change; to encourage changes in attitudes and behaviour needed to put the world on a more sustainable development path; and to build a new generation of climate change-aware citizens.

Climate change is a tangible entry point to ESD. Climate change can connect the abstract concept of sustainable development to the real and immediate challenges facing the world today.

In addition to taking the lead to address specific gaps in climate change education, particularly in terms of climate change ethics, justice and uncertainty, UNESCO is developing national case studies to integrate climate change into national education policy and planning in regions that are most vulnerable to the impacts of climate change, including Small Island Developing States (SIDS) and Africa.



UNESCO Sandwatch Programme: Learning to measure a wave, Dominican Republic

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UNESCO is launching a Teacher Education Course on Climate Change Education for Sustainable Development. The course is designed to give teachers confidence in facilitating climate change education inside and outside the classroom so that they can help young women and men understand the causes and consequences of climate change, bring about changes in attitudes and behavior to reduce the severity of future climate change, and build resilience in the face of climate change that is already present. The 6-day-course helps teachers understand the causes, dynamics and impacts of climate change through a holistic lens. Teachers are familiarized with a range of pedagogical approaches that they can use in their own school environment. This includes engagement in whole school and school-in-community approaches.

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UNESCO's Green School Action on CO2 Project in Central Kalimantan, Indonesia, focuses on two specific strategies: to strengthen and enrich current Green School Initiatives in Indonesia by adopting a whole-school system approach and by focusing on Climate Change Education (CCE); and to specifically target students and teachers, and support governmental and institutional experts such as education curriculum planners and policy decision-makers. UNESCO is among the nine UN agencies selected for the implementation of the REDD+ Quick Wins project to demonstrate tangible preparatory actions for future REDD+ implementation in Central Kalimantan under the interim fund management of UNDP.

### Raising Awareness through Social Media: Climate4Change Campaign

In collaboration with more than 30 global partners including UNESCO, the World Bank is launching the Connect4Climate initiative, a campaign, a competition, and a community that cares about climate change. Heavily relying on social media, the campaign focuses on a photo/video competition for African youth, aged 13 to 30, which is designed to raise awareness about climate change. Participants in the competition are invited to share their personal stories and solutions for change in six Connect4Climate award categories: Agriculture, Energy, Forests, Gender, Health, and Water.

## Climate Change, Cultural and Biological Diversity, and Cultural Heritage

The objective of the creation of the Global Climate Change Field Observatory of UNESCO Sites is to use UNESCO World Heritage Sites and Biosphere Reserves as priority reference sites for understanding the impacts of climate change on human societies and cultural diversity, biodiversity and ecosystems services, the world's natural and cultural heritage, and the possible adaptation and mitigation strategies, such as in relation to REDD+.

## Our World Cultural and Natural Heritage at Risk: Monitoring Climate Change Impact

The adverse impacts of climate change will have consequences for humanity as a whole including the products of human creativity. In the case of built cultural World Heritage these consequences are manifest in at least two principal ways: the direct physical effects on the buildings or structures; and the effects on social structures and habitats that could lead to changes in, or even the migration of, societies which are currently maintaining the sites.



© NASA/GSFC/METI/ERSDAC/JAROS, J. Kargel and U.S./Japan ASTER Science Team. Himalayan glaciers in the Bhutan-Himalaya range are retreating and leaving glacial lakes in their stead.

### Effects of Desertification on the Mosques of Timbuktu, Mali

Timbuktu was an intellectual and spiritual capital and a centre for the propagation of Islam throughout Africa in the 15th and 16th centuries. Its three great mosques, Djingareyber, Sankore and Sidi Yahia, recall Timbuktu's golden age. Although these monuments are being restored, desertification is threatening the site. The site is under threat due to desert encroachment and sand storms. The landscape surrounding Timbuktu is composed mainly of sand and desert. Between 1901 and 1996, the temperature increased by 1.4°C in that area, and the impact of droughts has become significant. Projected changes show that in future the area will face a decrease in average rainfall, and an increase in atmospheric temperature, which will surely enhance desert encroachment and wind-blown sand damage in Timbuktu. The University of Cape Town (South Africa), with the support of UNESCO, is using space technologies to document this site.



© UN Photo/Eskinder Debebe

View of the melting Collins Glacier in Antarctica, showing the effects of climate change

### Developing and Testing Climate Change Adaptation Models in UNESCO Biosphere Reserves

#### *Sierra Gorda Biosphere Reserve – innovative incentives*

In the Mexican Sierra Gorda Biosphere Reserve carbon off-sets and payment for ecosystem services schemes are used as incentives to conserve and restore local forests and to enhance the critical ecosystem services they provide, such as climate and water regulation. Voluntary carbon credits are used to compensate private landowners within the biosphere reserve for planting native trees on their degraded lands and managing their reforestation for optimum growth and carbon sequestration. In parallel, through the Hydrological Services Payment Program, land owners of the forests located in the buffer and transition areas of the biosphere reserve are encouraged to preserve and protect their lands for improved water caption and infiltration. <http://www.sierragorda.net>

In *Kruger to Canyons (K2C) Biosphere Reserve in South Africa*, traditional healers play an important role in biodiversity conservation and sustainable use. To facilitate dialogue with local authorities, researchers and companies interested in their traditional knowledge, in 2009 a group of healers in the Bushbuckridge area of the K2C developed a bio-cultural protocol stating their needs, their rights to protect their traditional knowledge, shared challenges and common way forward, in the three most important languages of the region.

### Assessing the Ethical, Social and Science Dimensions of Climate Change

Based on environmental ethics, social and human sciences, UNESCO is developing an action-oriented programme focusing on the design and implementation of appropriate climate change adaptation actions related to energy, water and biosphere management. It seeks to benefit the most marginalized segments of society. It also seeks to improve the understanding of gender equality issues related to climate change.



# Supporting disaster preparedness and countries in post-crisis situations

© UNESCO/Roger Dominique

**T**he increasing loss from natural and human-induced disasters including earthquakes, floods, land-slides, windstorms, drought and desertification represent a major challenge for many countries, particularly developing countries in their quest for sustainable development. Scarcity of natural resources and difficult living situations brought upon by these disasters can lead to conflict. Disaster and conflict further undermine the prospects for boosting sustainable economic growth, reducing poverty and achieving the Internationally Agreed Development Goals (IADGs). To provide support to the millions of women, men, children and youth who suffer the consequences of wars and disasters, UNESCO is rendering operational assistance to countries in post-conflict and post-disaster situations, from immediate recovery to longer-term reconstruction and towards sustainable development.

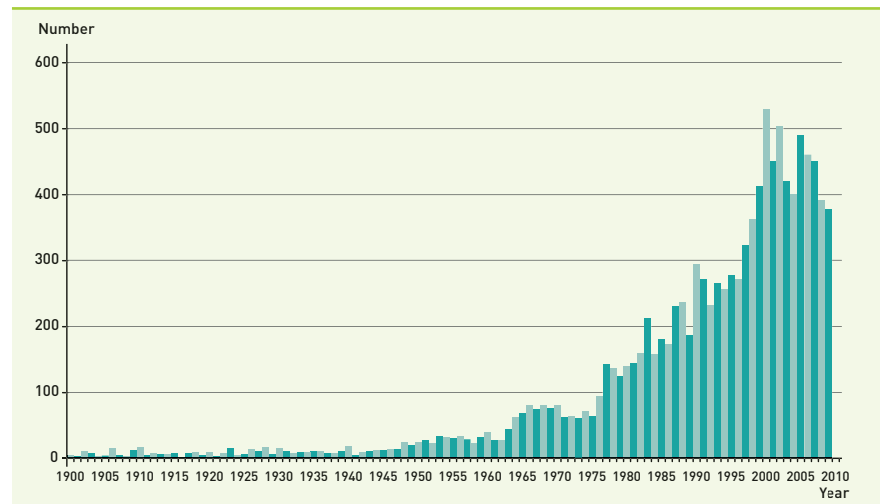
Building resilient and peaceful communities requires active and knowledgeable citizens and informed decision-makers. Through a multidisciplinary and intersectoral approach,

UNESCO is building capacities and fostering partnerships so that science and technology can serve to mitigate threats and reduce vulnerability. Activities focus on improving regional and national networking on knowledge management and capacity-building for disaster preparedness and mitigation, and providing advice to countries for promoting education for disaster prevention and public awareness within the framework of the UN Decade of ESD.

UNESCO's strategy to respond to post-disaster and post-conflict situations focuses on five operational strengths: education in emergencies and reconstruction, capacity-building for natural disaster risk reduction, protecting culture and world heritage in emergency situations, strengthening media in conflict and post-conflict situations, and mainstreaming gender in reconstruction and peacebuilding efforts. In the context of post-disaster situations, UNESCO works for the full integration of disaster prevention into recovery and reconstruction efforts, notably through early warning systems.

The IPCC predicts that by 2080, millions more people will experience flooding every year due to sea level rise.

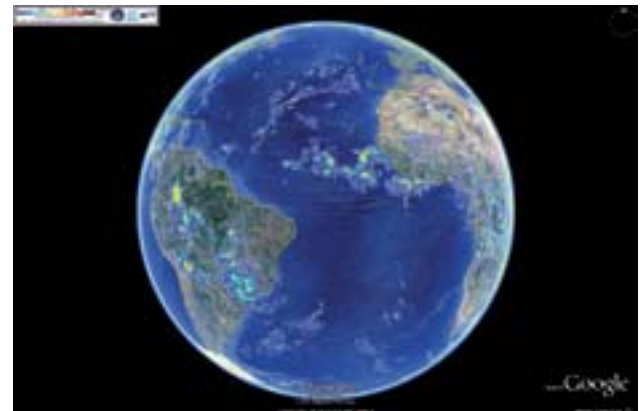
Number of natural disasters per year (1900-2009)<sup>51</sup>



Natural disasters have increased sharply in the second half of the 20th century.

Arid and semi-arid areas globally face the greatest pressures to deliver and manage freshwater resources. These areas are particularly vulnerable to climate variability, with consequences that may have very serious social and environmental effects. UNESCO-IHP launched the **Global Network on Water and Development Information in Arid lands (G-WADI)** in 2002 with the aim to strengthen the global capacity needed to manage the water resources of arid and semi-arid areas. In cooperation with the Center for Hydrometeorology and Remote Sensing (CHRS), University of California, Irvine, UNESCO-IHP developed tools to provide access to global satellite estimates of precipitation at high spatial and temporal resolutions that are relevant for the monitoring of precipitation.

June, 2009: UCI's CHRS Launches a Real-time Google Earth Global Precipitation Mapper<sup>52</sup>



**The Groundwater for Emergency Situations (GWES) Programme** provides guidance in identifying bodies of groundwater resources resistant to natural disasters located in areas at risk. These aquifers, if properly managed, could supply drinking water in the poster-disaster emergency phase, replacing damaged water supply systems. The GWES Methodological Guide provides background information on groundwater protection with particular reference to its use in emergency situations, as a result of natural hazards and hydrological extremes. It also outlines the governance policy framework in which groundwater as an emergency resource may be integrated into overall emergency management and service provision.

51 UNESCO, *Engineering: Issues, Challenges and Opportunities for Development*, UNESCO, Paris, 2010 with data from the OFDA/CRED International Disaster Database, Université catholique de Louvain.

52 <http://chrs.web.uci.edu>

In recent years many countries around the world experienced devastating floods resulting in many deaths and damage to infrastructure. The IPCC predicts that by 2080, millions more people will experience flooding every year due to sea level rise. Decreased land precipitation and increased temperatures are important factors which have contributed to more regions experiencing droughts. Droughts aggravate food security and lead to an increase in food prices which puts further stress on the most vulnerable segments of society.

### Responding to the Floods in Pakistan

UNESCO's water family provided a comprehensive response to the 2010 devastating floods in Pakistan by upgrading the flood forecasting and early warning system through education and training at various levels. The UNESCO flood management program in Pakistan is using the software and management tools developed by the International Centre for Water Hazard and Risk Management (ICHARM), a UNESCO category-2 centre hosted by the Government of Japan.

### Mapping Zones of Inundation Risk

One of the keys to improve climate resilience is to strengthen the knowledge management system of countries. UNESCO is fostering research on "Preparedness for Flood Risk Reduction through Mapping and Assessing Risk and Management Options and Building Capacity in Lal Bakaiya Watershed, Nepal". The project is developing multi hazard maps to better identify flood hazards, and assess vulnerability and climate change risks. The study is also trying to identify and assess structural and non-structural mitigation measures and adaptation options, including strategies to build capacities of key stakeholders through awareness raising, training, networking and institutional strengthening. It is being implemented under the HKH-FRIEND Initiative, with ICIMOD co-funding.

## Education for Disaster Risk Reduction

The disasters in Haiti and Pakistan in 2010 have shown the need for education to build a culture of safety and resilience at all levels. Indeed, education in disaster risk reduction strategies can save lives and prevent injuries should a hazardous event occur; prevent interruptions to the provision of education, or ensure its swift resumption in the event of an interruption. It also develops a resilient population that is able to reduce the economic, social and cultural consequences.

UNESCO gives policy advice and technical assistance in restoring education systems in post-disaster situations. It is active in advocacy, networking and participation in inter-agency activities, to make sure that educational needs are addressed in post-disaster settings. It is actively involved in post-disaster programmes.

The **Myanmar Education Recovery Programme (MERP)** enhances the resilience of the education sector by focusing on Disaster Risk Reduction (DRR) and Emergency Preparedness. In order to help the country's catastrophe contingency plans, UNESCO, in close collaboration with the Ministry of Education, has produced a comprehensive multi-stakeholder capacity-building package on Disaster Risk Reduction in Education which includes a focus on the impacts of climate change. In 2010, over two thousand educators from affected townships in Myanmar participated in training on DRR in education. Furthermore, over one hundred teacher trainers from 20 teacher training institutes in Myanmar received similar training. As a result, over 400 000 students in affected areas have benefited from educational content focused on disaster preparedness.

When Japan was hit by an earthquake in March 2011, a tsunami alert was issued 3 minutes after thanks to the Pacific Tsunami Warning System set up by the IOC.

## ■ Tsunami Early Warning Systems

UNESCO's Intergovernmental Oceanographic Commission (IOC) provides the intergovernmental coordination of tsunami early warning and mitigation systems at both global and regional levels. Overall more than 400 sea level stations are reporting real-time observations through the IOC Sea Level Station Monitoring Facility (up from 25 stations at the end of 2006). The number of seismic stations that deliver data in real time has increased from about 350 in 2004 to more than 1200 today. While lives have been saved by the existing operational tsunami warning systems, the earthquake and tsunami off Tohoku in Japan on 11 March 2011 once more demonstrated that communities living close to potentially tsunamigenic zones should step up their efforts to develop awareness, preparedness and mitigation measures. Development of the tsunami warning systems in the Indian Ocean, Caribbean and North East Atlantic and Mediterranean and Connected Seas are making steady progress. Three tsunami information centres are currently in operation with a fourth to be established.

Four regional systems for global early warning are being established with the support of UNESCO-IOC.

When Japan was hit by an earthquake in March 2011, a tsunami alert was issued 3 minutes after thanks to the Pacific Tsunami Warning System set up by the IOC.



Tsunami Japan, 2011

### A Tsunami Warning System in the Indian Ocean

The magnitude 9.0 earthquake of 26 December 2004 triggered a basin-wide Indian Ocean tsunami that killed more than 200,000 people in eleven countries – over 30,000 of them in Sri Lanka, some 1600 kilometres away from the epicentre in Indonesia.

The Indian Ocean tsunami warning system, set up by UNESCO-IOC, became fully operational in October 2011.

### Protecting Cultural Heritage

World Heritage sites are exposed to natural and man-made disasters which menace their integrity and can compromise their natural and cultural significance. UNESCO, as the leading guardian of the world's heritage, is closely involved in risk assessment and rescue operations to protect monuments and urban historic centres, sites, museums, and archives, in cooperation with other international conservation institutions. The Organization has implemented numerous projects to safeguard cultural sites and objects in the wake of disasters, such as the temples of Prambanan (Indonesia), severely damaged by earthquakes in 2006. The Organization has published several manuals and guidelines on protecting cultural sites, such as the policy document "A Strategy for Reducing Risks at World Heritage Properties."

## Did you know?

- ▶ The number of water-related disasters has steadily increased from an annual average of 263 in the 1990s, costing a total annual average of US\$50 billion, to an annual average of 412 in 2000-09, costing US\$72 billion in real terms.<sup>53</sup>
- ▶ Over 300,000 lives are claimed each year because of climate change. Over 300 million people are seriously affected. According to various estimates, between 24 million and almost 700 million people have already been displaced because of environmental changes over the past few decades, with one million new cases every year, largely as a result of water-related factors.<sup>54</sup>
- ▶ By 2050, extreme weather could reduce global gross domestic product (GDP) by 1 per cent and that, unabated, climate change could cost at least 5 per cent of global GDP each year.<sup>55</sup>

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53 EM-DAT, 2011.

54 Global Humanitarian Forum, Human Impact Report Climate Change 2009.

55 Stern Review: The Economics of Climate Change, 2006.

# Culture: a driver for effective sustainable development

© UNESCO/Patrick Lagès

**C**ulture, in all its dimensions, is a fundamental component of sustainable development.

As a sector of activity, through tangible and intangible heritage, creative industries and various forms of artistic expressions, culture is a powerful contributor to sustainable economic development, social stability and environmental protection. As a repository of knowledge, meanings and values that permeate all aspects of our lives, culture also defines the way human beings live and interact with each other and their environment.

The cultural dimension of sustainable development advances a human-centered approach to development that reflects the complexities of societies and local contexts, facilitates the creation of an environment that is conducive to sustainable development, promotes the plurality of knowledge systems, and serves as a powerful socioeconomic resource.

Development initiatives and approaches which take culture into account are likely to result in inclusive and context-sensitive development that yields equitable outcomes, enhances ownership by target beneficiaries, and ensures effectiveness.

Consequently, it presents a vehicle for the vital socioeconomic transformation to green societies.

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Within the **MDG-F Culture and Development** Thematic Window, led by UNESCO, 18 UN inter-agency programmes demonstrate the contribution of culture to development at the country level, with the goal of speeding up progress towards the achievement of the Millennium Development Goals. Funded by Spain, these programmes foster social inclusion, poverty reduction and sustainable development through the promotion and enhancement of cultural resources.

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Cultural diversity has an important – yet often underestimated – role to play in tackling current ecological challenges, coping with climate change, preventing biodiversity loss and ensuring environmental sustainability.



Mrs Mariette Meunier, a traditional healer with her medicinal plants

Cultural diversity has an important – yet often underestimated – role to play in tackling current ecological challenges, coping with climate change, preventing biodiversity loss and ensuring environmental sustainability. Sustainability cannot be understood as the pristine natural world isolated from the societies that extract, manage, and impact it. The values and beliefs that shape the relationship of a people to their natural environment are a central aspect of sustainable development.

Cultural factors influence lifestyles, individual behaviour and consumption patterns, values related to environment stewardship and the ways in which we interact with our natural environment. There is much to learn from the environmental management skills embedded within local, rural or indigenous peoples, including multi-use strategies of appropriation, small-scale production with little surplus and low energy needs, as well as a custodial approach to land and natural resources that avoids waste and resource depletion. Culturally-based knowledge and endogenous know-how are core resources for sustainable development. Not only are biological and cultural diversity linked to a wide range of human-nature interactions, but they co-evolve, are interdependent and mutually reinforcing.

**Women: holders of local and indigenous knowledge and agents of social change**, are key to ensuring sustainable and equitable development. UNESCO, through its Local and Indigenous Knowledge Systems (LINKS) Programme, is working to bring recognition to this issue, and to demonstrate the link between cultural and biological diversity. The Organization published in 2011 a book entitled 'Savoirs des Femmes: médecine traditionnelle et nature' detailing the knowledge and practice of traditional women healers of the Mascarene Islands (Mauritius, Réunion and Rodrigues), focusing particularly on perinatal care. These islands were populated by successive waves of human migration both voluntarily and due to slavery. New health care traditions were developed by women and for women, who were underserved by mainstream healthcare. They combined elements of African, European, Indian, and Chinese health systems, adapted them to local needs, and used local and introduced medicinal plants.



© Lâm Đức Hiên

Women from the Dianéguéla district of Bamako dyeing textiles

### Empowering Women to Access Green Livelihoods and Green Jobs in Mali

Malian women are known for their knowledge and know-how in the dyeing of textiles. The sector employs numerous women, particularly in Bamako.

However, the general usage of chemical dyes and the runoff of toxic effluents into groundwater or into the waters of the Niger river are suspected of causing health problems for inhabitants in the area (cancer, skin and respiratory diseases), and to polluting vulnerable ecosystems in the vicinity of the World Heritage site of Djenné. To address this issue, UNESCO is supporting the construction of an artisanal, eco-friendly dying factory in the framework of its 'Niger Loire: Governance and Culture' project funded by the European Commission. The aim of this project is to detoxify the dye waste so as to reduce the waste runoff into the natural environment, while at the same time improve the working conditions of women, who have until now been exposed to dangerous chemicals. The centre will also encourage women to experiment with using natural dye, and will be run by the women themselves, through a management committee.

Culture is also a vehicle for sustainable, pro-poor, green development, particularly for developing countries. It is a powerful global economic engine generating jobs and income with a value of USD 1.3 trillion in 2005.<sup>56</sup>

The economic prospects of the culture sector are particularly relevant for developing countries given their rich cultural heritage and substantial labor force.

Sustainable tourism, as well as culture and creative industries, are strategic outlets for income generation and poverty reduction. Culture is a powerful economic engine generating jobs and income with a value of USD 1.3 trillion in 2005.

56 2009 UWR.



### Capacity Development of Local Communities for Sustainable Eco-tourism and Development in Easter Island, Chile

Easter Island and its heritage face significant challenges as the natural and cultural resources of the island are threatened by unsustainable practices and pressure from tourism. UNESCO is working to enhance capacities of Easter Island communities and local stakeholders for the development of community-based sustainable eco-tourism. Innovative micro-projects on sustainable development and sustainable tourism were implemented. Children produced messages for radio and television on how to protect the environment of Easter Island, for example. In the course of this initiative, a major Resource Management Plan for sustainable tourism planning on Easter Island was developed with the local community.

Cultural industries require limited capital investment and have low entry barriers. Culture-related economic opportunities are not easily outsourced making it attractive to investors. Owing to its significant operation within the informal sector where the poor and marginalized often work, effective promotion of the cultural industries is likely to have a direct impact on vulnerable populations, including women, and can stimulate social inclusion while maximizing jobs and trade opportunities. Development experiences indicate that the economic empowerment of women frequently results in a multiplier effect with community gains and economic growth. Besides empowering marginalized communities,

the cultural industries encourage innovation, creativity, support skill development, and generate entrepreneurial capital within local communities.

### Strengthening the Crafts Industry in Mongolia

UNESCO is providing capacity-building opportunities and technical guidance to local creative practitioners to strengthen their creative and managerial skills and promote crafts making as a sustainable income-generating activity while preserving Mongolia's cultural heritage.

This project, which stands to benefit 20,000 people (50% women), will provide practitioners, designers and local entrepreneurs of handicrafts with an understanding of the global and regional trends in the crafts industry, and basic marketing skills. It will also support the relevant authorities in elaborating an effective development strategy for cultural and creative industries in Mongolia.

### DID YOU KNOW?

- ▶ Cultural industries account for more than 3.4 percent of the global gross domestic product with a global market share of approximately 1.6 trillion USD in 2007.<sup>57</sup>
- ▶ Cultural and creative industries represent one of the most rapidly expanding sectors in the global economy with a growth rate of 13.9 percent in Africa, 11.9 percent in South America, and 9.7 percent in Asia.<sup>58</sup>
- ▶ National economies of developing countries significantly benefit from the cultural sector. For instance, Mali's culture sector accounted for 5.8 percent of employment in 2004 and 2.38 percent of the gross domestic product in 2006.<sup>59</sup>

57 PricewaterhouseCoopers (PwC), 2008.

58 Ibid.

59 IBF International Consulting for the European Commission, 2007.

► Australia's 15 World heritage areas contribute to its GDP with over AU \$12 billion, and more than 40,000 jobs.<sup>60</sup>

► In Colombia, craft production represents an annual income of roughly 400 million USD, including some 40 million USD in exports. In Tunisia, 300,000 craftworkers produce 3.8 percent of the country's annual GDP, while in Thailand the number of craftworkers is estimated at 2 million.<sup>61</sup>

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60 Australian Government Department of Environment, Water, Heritage and the Arts 2008, Annual report 2007-08.

61 UNESCO World Report, Investing in Cultural Diversity and Intercultural Dialogue, 2009.

# UNESCO's sites: living laboratories for sustainable development

© 2005 Harimawan Latif

**W**ith 580 Biosphere Reserves in 114 countries and 936 World Heritage sites in 153 countries, UNESCO designated sites are ideal places for engaging in innovative approaches to conservation and sustainable development. Biosphere Reserves seek to reconcile conservation of biological and cultural diversity, and economic and social development, through partnerships between people and nature. World Heritage sites protect the most iconic and exceptional cultural and natural areas, including cities, cultural landscapes, marine and terrestrial ecosystems, and support their sustainable use through the development of tourism, livelihoods, and enterprises to sustain local and national economies.

## ■ UNESCO Biosphere Reserves: Ideal Places for Testing and Demonstrating Innovative Approaches to Sustainable Development

UNESCO Biosphere reserves reconcile conservation of biological and cultural diversity, and economic and social development, through partnerships between people and nature. They also contribute to the transition to green societies by experimenting with green development options, such as sustainable tourism and training for eco-jobs. The economic value of biodiversity and ecosystem services also needs to be factored into measures of economic development.

The economic value of biodiversity and ecosystem services conserved through the vast estate of Biosphere Reserves and natural World Heritage sites must be factored into measures of sustainable development.





**Traditional knowledge for Vanilla Organic production in Mananara Biosphere reserve, Madagascar.** In the North Mananara Biosphere Reserve of Madagascar National Park, a farmers association brought together 138 members from 10 villages in 2004 to capitalize and valorize traditional knowledge relating to the production of high quality organic vanilla products. The association has grown to 918 members from 36 villages, all of whom produce organic vanilla and cloves. Production has grown from 34 kg to 20 t, and sales amounted to 2,676 million Ariary (975,000 euro), with 48 per cent benefit going towards the funding of community micro projects.

Through the Combating Desertification by Harnessing Scientific and Traditional Knowledge Sustainable Management of Marginal Drylands” (SUMAMAD) project, UNESCO is working to improve the alternative livelihoods of dryland people by rehabilitating their degraded lands. It fosters dryland productivity through the identification of wise practices, which use both traditional knowledge and scientific expertise. This project is being implemented through UNESCO’s MAB Programme in collaboration with the dryland ecosystems programme of the United Nations University-Institute for Water, Environment & Health (UNU-INWEH).

### Indigenous Knowledge of the Fish and Turtles in the Bosawas Biosphere Reserve, Nicaragua

UNESCO is working with the Mayangna population, estimated at 28,000, 10,000 of whom live in the indigenous territories of the Bosawas Biosphere Reserve in Nicaragua, to safeguard their intangible cultural heritage and to demonstrate to scientists, reserve managers and policy-makers the depth and breadth of local knowledge of the natural milieu and, as a result, the key role that they must play in the sustainable use and management of the extensive territories from which they derive their livelihood. Through its Local and Indigenous Knowledge Systems (LINKS) programme, UNESCO is collaborating with a team of Mayangna researchers to gather and transmit the collective knowledge and world views of the Mayangna people of the aquatic resources. This information attests to their extensive, detailed knowledge of the fish and turtle species of the Bosawas Reserve. It also complements current scientific data, and fills existing knowledge gaps.

### UNESCO’s World Heritage Sites: Demonstrating Conservation and Sustainable Use of Natural and Cultural World Heritage

Cultural heritage sites in general, and UNESCO inscribed World Heritage sites in particular, generate substantial revenues and employment from tourism. The same applies to intangible cultural heritage which sustain living cultural expressions and traditional know-how, as well as the performing arts. Museums and other cultural institutions also significantly contribute to economic investments and benefits. Therefore, promoting sustainable tourism as a sub-sector for investment encourages investment in infrastructure and stimulates local, sustainable development.

In the framework of the World Heritage Convention, UNESCO is working to foster green jobs in developing countries through capacity-building and training in heritage preservation.





The Rock-Hewn Churches of Lalibela are a XIth century World Heritage Site.

In Ethiopia, UNESCO helps to foster green jobs for local workers in traditional, environmental friendly building conservation skills, and by training tourism guides in the Lalibela region, where the Lalibela Rock Hewn Churches are located. Lalibela is one of the poorest regions of Ethiopia, but one of the richest in terms of architecture, religion and liturgical music. In the town of Lalibela, cultural assets are a primary source of income.

A variety of national and international regulations and agreements to protect valuable natural and cultural heritage sites are important in helping to guard against environmental and cultural degradation. In 1992, UNESCO's World Heritage Convention included criteria to identify and protect cultural landscapes as "the combined works of nature and man" in addition to natural heritage. The continued existence of traditional forms of land-use supports biological diversity in many regions of the world. The protection of traditional cultural landscapes contributes to the maintenance of biological diversity.

### Improving Business Skills for Green Jobs at Natural World Heritage Sites

As part of the five-year Business Skills for World Heritage programme project, established in partnership with Shell and Earthwatch, UNESCO World Heritage Centre is providing training for managers of World Heritage sites on how to develop and implement business strategies to promote the sustainable development and management of these sites. This training programme is innovative because of its year-long peer to peer follow-up that is built into the training programme. Once back at the office at their respective World Heritage sites, these managers work with their staff to complete and to implement the business plan. During this process, the Shell mentors provide on-going support, via email, conference call, or, if feasible, via follow-up visits. Earthwatch is responsible for developing and implementing the training, while Shell provides financing and the experienced staff to carry it out.

Participants of the Business Skills Workshop.

In the framework of the World Heritage Convention, UNESCO is working to foster green jobs in developing countries through capacity-building and training in natural and cultural heritage preservation.





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## Showcasing the Impact of the UNESCO World Heritage Convention on Global Environmental Decisions

**Protecting freshwater ecosystems.** In 2006, the World Heritage Centre received some concerned messages about plans to build an oil-pipeline which would pass through 800 meters of Lake Baikal's northern shore, endangering the health of this outstanding freshwater ecosystem, listed as a World Heritage site (Lake Baikal is the oldest and deepest of the world's lakes, containing nearly 20% of the world's unfrozen freshwater reserve). In response to these concerns, the World Heritage Committee decided that the possible routing of the East Siberia-Pacific Ocean Pipeline through the site or in its immediate vicinity would merit inclusion on the List of World Heritage in Danger. The Russian Federation was therefore asked to re-examine its proposal to prevent this from happening. As a result, the President of the Russian Federation announced his decision to re-route the Trans-Siberian pipeline so as to ensure the protection of Lake Baikal and to eliminate all risks of ecological damage.

**Protecting whales.** Following a World Heritage Centre-IUCN reactive monitoring mission to the Whale Sanctuary of El Vizcaino (Mexico) to evaluate the impacts of a proposal for a large scale salt production in 1999, the Government of Mexico decided in March 2000 to halt the project. Subsequently efforts were undertaken for sustainable tourism development in the area including through a United Nations Foundation project.

**UNESCO's World Heritage Marine Programme** aims at establishing effective conservation of existing and potential marine areas of outstanding universal value. This programme is supported through the Tides of Time partnership and the Government of Flanders. Since August 2010, the ocean area protected under the World Heritage Convention has more than doubled through the inscription of Phoenix Islands Protected Area (Kiribati) and Papahānaumokuākea (USA), two of the world's largest and most pristine marine protected areas.

Through its **Central Africa World Heritage Forest Initiative (CAWHFI)**, UNESCO is working to support the management of protected areas in the Congo Basin and to improve their integration in the ecological landscape encompassing them. Protected areas of this initiative are located in three distinct ecological landscapes of the Congo Basin: Tri-National Sangha (TNS), Tri-National Dja-Odzala-Minkebe (TriDOM), and the Gamba-Conkouati landscape. In parallel with the site-based activities, which aim at helping sites raise their standards to meet World Heritage criteria, CAWHFI also aims to enlarge the scope of World Heritage in central Africa by helping sites that have the potential to meet the criteria to prepare their dossiers for submission to the World Heritage Centre.



Tri-National Sangha

© Conrad A. Velling

## Saving the Borobudur World Heritage and Revitalising Green Livelihoods

One of the casualties of the 2010 eruption of the Mt Merapi volcano in central Java was the Borobudur temple compounds, a UNESCO World Heritage site located about 30km away from Mt Merapi. As a result of limited transportation to the site, the number of tourists visiting the temple plummeted, causing a severe decrease in the revenue coming into the area. People from every level of society lost their livelihoods because of this catastrophe.

To address this situation, UNESCO immediately began to organize help to revive the surrounding area of the Borobudur World Heritage site, which gave all members of the community a chance to become agents of their own recovery in a sustainable way. This included organizing workshops for local communities on the creation of quality souvenir items for tourists out of the volcanic materials, which helped to remove the ash from the Borobudur Temple compounds. Work to revive the livelihoods of communities affected by the disaster continues. Training and capacity-building is being offered on how to bring homestays up to tourists' standards and on how to market and promote local businesses.



Emergency cleaning activity conducted by the Indonesian Ministry of Culture and Tourism and the community, November 2010.

# The media – building awareness for green policy priorities



**T**he media plays a major supporting role in making informed policy choices for green economies. Hence, building the capacity of media professionals to investigate and report on sustainable development issues is an essential component of making the transition to green societies. In many developing countries, journalists lack the skills needed to report on sustainable development issues.

Comprehensive journalism education, which focuses on how to cover sustainable development issues, must therefore be included at the tertiary level, and through other forms of training for media professionals. Considering that journalists who have investigated environmental malpractices (illegal logging, land clearing, destroying



© Mike Shanahan / IIED

Participants working away on climate change story ideas during the pre-conference workshop on climate change and biodiversity, held on 26 June 2011 in Doha.

conceptual knowledge about the science and practice of climate change and biodiversity, before engaging them in practical skills training on how to report on climate change and biodiversity, including how to pitch story ideas in the newsroom. Thus far 500 media professionals from more than 60 countries have benefited from skills training to

biodiversity, human-made hazards and waste mismanagement, etc.) have faced threats to their lives, it is important for States to proactively guarantee the safety of journalists so that the media can become an effective partner in investigating and educating on issues related to sustainable development.

To address these issues, UNESCO is supporting training workshops for journalists from developing countries to introduce them to contemporary



deliver quality media content on sustainable development issues. At least 7 networks have been established to carry forward the momentum of the workshops at country and regional levels.

The Organization is also promoting regional and international collaboration to offer and generate solutions to the most urgent questions concerning climate change and broadcast media, particularly in developing countries. For example, the Organization organized the 2009 International Broadcast Media and Climate Change Conference at UNESCO Headquarters in Paris from 4-5 September 2009, with UNEP. This Conference brought together regional broadcasting unions and other international broadcasting organizations to consider a global consensus to raise public awareness about the challenges of climate change. It resulted in the Paris Declaration on Broadcast Media and Climate Change, which provided a set of recommendations about how to strengthen regional and international collaboration of all broadcasting organizations and concerned professional organizations to optimize the quality and relevance of programming and reporting on climate change.



Logo for the 2009 International Broadcast Media and Climate Change Conference, held at UNESCO's Headquarters in Paris

UNESCO is also working to strengthen the journalistic capacity of journalists from developing countries to report on the complex issues surrounding climate change risk adaptation and mitigation. For example, UNESCO recently provided support to the Inter Press Service (IPS) Africa, a global development news agency, to send journalists from developing countries to cover the 16th Conference of the Parties (COP-16) in Cancun, Mexico. A spin-off of the activity was a distribution of the resultant news/feature articles to over 700 media outlets across Africa, achieving

the overall result of building strategic partnerships for the dissemination of scientific information and knowledge.



Protestors at COP-16 in Cancun, photographed by an Inter Press Service journalist

In addition, UNESCO is supporting the development of training materials for media professionals, including the provision of basic information about sustainable development issues, drawing on practical exercise to inspire investigative reporting, and drawing on the existing experience that may enrich the information resources of media professionals.



# UNESCO's commitment to sustainable development

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**T**he complex and multifaceted challenges and risks of our times call for an urgent and holistic response. An in-depth rethinking of development, in all of its dimensions, is imperative.

There is no single path to sustainable development. Sharing fundamental principles, every path is different. To be sustainable, our future must be built on economies and societies that are inclusive, ethical, equitable and sustained by a culture of peace and non-violence. To be sustainable, solutions must be local in shape and outcome. They should espouse the contours of regions, countries, cities, and communities. They should marry with local customs and traditions.

Green societies should attract investment in human capital and mobilise the knowledge, skills and innovation needed for green economies. They should highlight the crucial role of science and culture for development, raise global awareness and build a new development paradigm involving all stakeholders in sustainable development through enhanced dialogue and participation.

By their very nature, education, the sciences, culture, information and communication have the power to generate the necessary transformational changes towards sustainable development and green societies. UNESCO will continue to leverage these capacities for developing an inclusive, sustainable development agenda for Rio+20 and beyond.

### **Greening UNESCO Voluntary Group (GUVG)**

The GUVG began its efforts to make UNESCO a more sustainable agency in 2007. Since its inception, GUVG has sponsored a number of initiatives aimed at raising awareness among UNESCO staff about sustainable development and environmental issues, while also encouraging a change in attitudes and behaviours. The group, for example, produced a “Staff Guide to Greening UNESCO”.

### **UNESCO and Sustainable UN (SUN)**

UNESCO is closely engaged with the SUN project, and has contributed significantly to the draft Strategic Plan for Sustainability Management in the United Nations System - presented to the EMG (Environment Management Group) Senior Officers meeting in September 2011 - via the IMG (Issue Management Group) on Sustainability Management set up by SUN.

“Genuine sustainable development calls for more than green investment and low carbon technologies. Besides its economic and ecological dimensions, the social and human dimensions are central factors for success. Ultimately, we must focus our efforts on building green societies”.

Irina Bokova, Director-General, UNESCO