



United Nations
Educational, Scientific and
Cultural Organization

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Beyond 2015 - Role of Science, Technology and Innovation in Shaping the Future We Want for All

Examples of key global challenges:

The Post-2015 Development Agenda needs to respond to new global realities, which indicate that humanity is facing numerous unprecedented and inter-connected socio-economic and environmental sustainability challenges, including:

- Poverty, social and economic exclusion
- Hunger, food security
- Existing and new diseases
- Climate change and disaster impacts
- Massive pollution of water, soil and air
- Unsustainable energy use
- Threats to oceans (acidification, overfishing)
- Intensifying ecological footprints, biodiversity loss
- Water scarcity and water quality deterioration
- Population growth and urbanization
- Peace and security
- Access to quality education

These global challenges present an urgent agenda for all countries, including developing, middle income, and developed nations, requiring inclusive and horizontal cooperation. Besides, the challenges are hugely complex with strong inter-connections. The task to address the above challenges is phenomenally complex, and therefore science has to play a major role in helping to understand the complexities and multi-dimensional character of sustainable development.

Background

The United Nations is preparing for the transition from the MDG era to a new framework for international cooperation and sustainable development after 2015, the so called 'Post-2015 Agenda on Realising the Future We Want for All'. Setting up the Post-2015 Agenda presents a once-in-a-generation chance to fundamentally change global economy – to build a knowledge economy and a knowledge society by mobilizing Science, Technology and Innovation (STI). If science is to have a meaningful impact on the post 2015 development agenda both the science and development communities need to learn from the experience of the MDGs. We need to recognize the dual impact S&T has had in human development in recent centuries, via science-based revolutions, such as the industrial revolution, the medical revolution, the green revolution, and the transportation revolution. On the one hand, these science-based revolutions have brought unprecedented economic progress and welfare for many, but on the other hand:

1. too many people were left out, and
2. the economic benefits came at huge environmental costs, the scope and impact of which we have hardly begun to understand.

Sustainable solutions, whether at the global, regional or country level, require creativity, new advances in scientific knowledge, discoveries and innovations. Innovation geared towards sustainable development has the potential to lift economic growth, create green jobs, boost social development while at the same time contributing to environmental protection and conservation. The development of solutions to these key global challenges, and the transition towards 'green societies' will require the mobilization of a wave of creativity, innovation and entrepreneurship. It will also require a clear strategy that puts science and education at its core. The innovations to transform our societies towards sustainability must be based on sound STI. In mobilizing such 'Science for Sustainability' concept, however, we must apply a forward looking approach that aims to maximize the benefits and minimizes possible negative spin-offs from new S&T based innovations and developments. In that respect we need to learn a lot from mistakes in the past. Besides, it is also clear that we need to 'educate for a sustainable future'.

The Post-2015 Agenda needs to provide both the vision and the commitment to address and resolve the big issues of our time, including: poverty eradication, peace and security, safe and sufficient food, sustainable energy, pollution prevention and control, water and environmental resources management, (existing and new/emerging) disease control, mobility, natural and man-induced disasters, population growth, urbanization and sustainable/liveable cities. The development of solutions to these key global challenges and the overall transition towards a green economy will need to be based on sound science, technology and innovation.

As part of the design of the Post-2015 Agenda, a set of global goals will be identified. The goals need to be universal, holistic/cross-sectoral, equitable between north and south nations and inclusive to represent and protect the interests and rights of all, including of the most vulnerable and marginalized therefore solving the interdisciplinary global challenges of our time (Box -1)



Sustainability Science to Make the Transition towards a Green Economy



Sustainability science has emerged in recent years as a vibrant field of research and innovation. It seeks to facilitate a “transition toward sustainability” promotes inter-disciplinary coordination and global cooperative effort to advance understanding of human environment interactions and systems. There is a need to strengthen the environmental pillar of sustainable development while at the same time reinforcing the economic and social pillars and achieving greater balance among the three. Sustainability Science therefore needs to be positioned to address complex challenges in a real-life setting of today’s world, and aim at guiding the transformational changes required towards a ‘global green economy’. This new approach goes way beyond the need for high quality disciplinary research and expertise, by forging inter-disciplinary and inter-sectoral approaches focused on individual key global challenges and their inter-relations.

The Regional Science Bureau for Asia and the Pacific in Jakarta has initiated the development of a new programme on sustainability science, which builds on the four main science flagship programmes of the office. An operational plan on sustainability science is being prepared via a consultative process, including expert meetings and a regional workshop.

Ensuring Water Security beyond Water Supply and Sanitation Goals



Water is the main limiting factor preventing increased food production and many people (especially children) die from water borne disease. It is estimated that over 90% of all climate change impact is water related; we need better flood forecasting, community preparedness, and adaptation measures. The rivers and groundwater systems are becoming increasingly polluted, this creates challenges to society at large for aquifer and river restoration and integrated water resources management. There is an urgent need to go beyond the previous MDG target of reducing by half the proportion of people without sustainable access to safe drinking water, by understanding ecological impacts of water projects, including for drinking water supply, but also for industrial water use, irrigation, and dams and dikes on water quantity, quality and related environment links. The key objective is to re-establish water quality and ecosystem functions via improved storm water management, human and industrial waste management, flood loss reduction, sedimentation and pollution control, improvement of water quality, recreation, education and introduction of natural or manmade cropping systems tailored to deliver solutions at all levels. This needs to be set in a human rights-based approach aimed at achieving ‘sufficient, safe, acceptable, and affordable water for personal and domestic uses’ for all. Human Rights based Integrated Water Resources Management (IWRM) implementation tool can address water supply and sanitation-related exclusion issues that are commonly rooted in weak governance, power inequality and poverty, rather than sheer physical availability of water for food security.

Building Community Resilience from Climate Change and Disasters



Science and technologies can help build tools for adapting to climate change and enhancing disasters awareness, preparedness and education. STI can guide our rational responses during the immediate post-disaster phase as well as for supporting the transition to “building back better” and the mitigation of future damages and loss of life from recurrent and cyclical natural disasters. Strengthening local capacities for better preparedness for managing disasters needs to build on lessons learnt from a number of areas such as given below where UNESCO has been very active. In this effort we need to work on community resilience which is a key new paradigm referring to the sustained ability of a community to withstand and recover from adversity. As part of the post 2015 agenda the UN system can help build community resilience by helping strengthen coping capacities and policies at international, regional, national, and local levels. This concept is especially important when resources are limited to withstand with emergencies of earthquakes, floods, droughts and tsunami etc. UNESCO has played major role in the global coordination and monitoring of the Tsunami Early Warning System e.g. in the technical development of Tsunami Early Warning System (Upstream) as well as community preparedness for tsunami hazard (Downstream). UNESCO also established Tsunami Information Centers that serve as information resource to share and distribute educational, awareness and preparedness materials/publication in cooperation with local partners to strengthen the capacity in preparedness, tsunami exercise and tsunami emergency response. The Jakarta Tsunami Information Center implements its activity in Indonesia, Thailand, Timor Leste, the Philippines, Bangladesh, and Myanmar.

Adaptive Management through Local and Indigenous Knowledge



Science and policy can benefit greatly from local and indigenous knowledge, which are understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings. Such knowledge and practices can be an important asset in reducing risk to disasters, and to devise locally-appropriate climate change adaptation strategies. In Indonesia, the Philippines, and Timor Leste the resilience of coastal and small island communities to hydro-meteorological hazards and climate change impacts are being strengthened through better preparedness using local and indigenous knowledge and practices combined with scientific knowledge. Self-assessment tools for local and indigenous knowledge in disaster risk reduction, and educational & awareness raising materials that incorporate local and indigenous knowledge will further help transfer this experience to other communities. Additional activities to promote local and indigenous knowledge and sustainable development, especially in coastal zones, are being implemented in Timor-Leste.

The transition towards a 'green economy' requires that we educate and train the human resources and prepare society at large for such sustainable future. This requires complete revisions of job qualifications and corresponding learning objectives of educational programmes at all levels. This requires both curricular and didactic review and overhaul of programmes. We are moving to the end of the Education for Sustainable Development (ESD) decade, the post 2015 agenda provides us with an opportunity to elevate ESD to be fully integrated into the sustainable development agenda. This will emphasize the need for educating for a sustainable future. Subjects such as environment, water, climate change, but also food/nutrition, hygiene/health, disasters and preparedness, could be strengthened. Science education provides a useful entry point for these subjects in the curriculum.



To this end, the Regional Science Bureau in Jakarta has initiated a so called "Green schools action programme", which demonstrates the integration of ESD related subjects both into the curriculum and also in the overall school operations and via school based projects. The Green Schools programme will be further expanded to include also CLCs and as such it would reach the community at large.

In order to avoid the digital and technological divide in environmental protection there is a need for the adoption of right-based approaches. The rights based approaches must focus on improving north-south relationships and south-south cooperation processes, multilevel accountability mechanisms and open new channels for marginalized actors to actively participate in post 2015 development agenda through better access to knowledge and capacity building at all levels. This also needs to bring on board indigenous rights while formulating regional and national plans for adaptation to climate change in agriculture and forests and restoration of rivers and wetlands.



Over the years, the Biosphere Reserves and World Heritage sites have made great contribution to protecting and enhancing biodiversity and contributed to local socio-economic development. However, the management of natural and cultural heritage in fast growing economies in Southeast Asia, is currently under a lot of pressure from population boom, the reduction of financial resources, challenges of climate change, and other issues.



This is especially affected by the need to maintain a balance between the preservation of natural and cultural values and socio-economic development. Using biosphere reserves and heritage sites as open laboratories for sustainable development can help in achieving true sustainability and a genuine community participation. Due to the diverse and often challenging social, economic, and educational contexts, all the sites need to foster the development and implementation of local integrated policies, strategies, and management models in order to improve the living standards for local communities, and foster cooperation among countries on heritage conservation in the name of sustainable development. The biosphere sites provide us with a unique opportunity for piloting climate change mitigation and adaptation options including the REDD+ modalities.

S&T can help guide investments in renewable energy technologies such as solar, wind, hydroelectricity, biomass, and biofuels to help reduce the carbon foot print as well as make cheap energy available to all. Addressing the challenge of a new global sustainable energy system 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. This calls for the development of energy strategies and policies, disseminating relevant scientific knowledge and technology and ensuring local capacities and competencies for the use and better management of locally available energy resources. UNESCO provides technical assistance to countries in energy research, policymaking and planning in the form of advisory services and institutional capacity-building.



Educating for a Sustainable Future

Social Inclusiveness in Technology Innovation for Green Growth

Protecting and Enhancing Biodiversity

Renewable Energy for Sustainable Future

Science for Good Ocean Governance



The ocean, our common heritage, covers over 70% of the globe's surface. It shapes Earth's climate and influences the distribution of ecosystems, biodiversity, and thus food availability. The ocean and coasts constitute an essential component of human lives, and therefore environmental sustainability cannot be achieved without addressing this essential dimension. Furthermore, the ocean and coasts, and their ability to provide essential ecosystem services are threatened. Despite the vast expanse of the global ocean, there is effectively no marine space left that is not affected by humans. The ocean absorbs approximately 26% of the CO₂ added to the atmosphere from human activities each year, hence greatly reducing the greenhouse gas effect and regulating global temperatures. Increased levels of atmospheric CO₂ are however causing the ocean to acidify at rates not seen for the last 20 million years. As a result, ocean acidification impacts on the marine food chain, biodiversity, food security and livelihoods of coastal community could be significant. There is also a need for policy-making to address ocean issues in a more integrated manner, linking the spatial, environmental, and socio-economic dimensions of ocean management. These policies should be supported by sound scientific research and systematic observations, providing an assessment of ocean health to decision-makers and society. In this respect, many nations need to build their scientific, technical and management capacity in order to develop such sustainable ocean policies and poverty alleviation strategies, hence deriving greater benefits from a healthy ocean.

Science to Tackle Climate Change and Related Challenges



Science must help us understand and plan post 2015 actions to avoid destabilization of environmental and social conditions due to climate change all around the globe. These disturbances could jeopardize the conservation of natural ecosystems and sustainability of socioeconomic systems. Consequently, climate change will also adversely affect, and indeed is already affecting, many areas, including, inter alia, agriculture and food security; biodiversity and ecosystems; freshwater resources availability; human health; human settlements and migration patterns; the conservation of world heritage natural and cultural properties; energy, transport and industry; and peace and prosperity. Over 300,000 lives are claimed each year because of climate change. The importance of water's role in the Green Economy in tackling poverty reduction and adverse effects of climate change, and importance of the implicit, cross-cutting role of water in new Sustainable Development Goals, should be acknowledged and acted upon.

Boosting the Science-Policy Interface for Informed Decision-Making



Scientific knowledge, up-to-date data, statistics and information on natural resources and related trends are of paramount importance for the definition of appropriate political decisions for sustainable development. Moreover, taking into account the cross-national nature of many of the sustainable development elements like freshwaters, air, oceans etc. the availability of internationally comparative data and statistics is of utmost importance for decision-makers and other stakeholders. Better knowledge about the state of resources and the impacts of decisions can also reduce uncertainty. In recognition of need of science for sustainable development it is important that science is positioned higher up in both the national and international agendas and institutional hierarchy.

Building Sustainable and Resilient 'Cities of the Future'



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In mega cities population, climate change, land use change and struggle for resources have extremely distorted the environmental balance and pushed social and economic disparities to a climax. The challenge for science is to redesign existing mega cities to achieve social and economic inclusion and sustainable consumption and production patterns. We need to close production and consumption cycles of energy, emissions, food, nutrients and water by reducing, recycling, reusing and redesign them. Science has to help create future cities for healthy people and healthy environment.

For more information, please contact

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UNESCO Actions in Asia and the Pacific

The Jakarta Office launched 'The Regional Bureau's Science Support Strategy'. This Strategy builds on the C4 Strategic Programme Objectives, while reflecting on main challenges faced in the region that would benefit from a science approach. Under the current financial constraints, it is essential that we sharpen and focus our programme to address main challenges and problems at the global, regional and national levels. As such, the strategy identified four main themes (Climate Change, Water, Disaster, and Science Policy and Education). In terms of programmatic focus the strategy identified four flagship programmes.

These Flagships are all heavily rooted in the sciences, but require inter-sectoral cooperation to generate maximum impact and benefits. The flagships are:

- BRES: a climate change and poverty alleviation programme
- SWITCH-in-Asia: a programme on water in the catchments of the future
- COMPETENCE: which focuses on STI, science education and ESD
- FORCE: a natural disaster and climate change preparedness programme.