Executive Summary

The UNEP Year Book series provides an annual update on new science and developments. It brings emerging environmental issues to the attention of governments and other stakeholders for their consideration. The Year Book is part of a suite of UNEP products whose aim is to strengthen the science-to-policy interface.

The events and developments presented in the UNEP Year Book 2011 remind us that it is urgent to achieve results in the international climate change processes. Although countries' greenhouse gas reduction pledges are contributing significantly to the emission reductions required to keep the temperature increase during the 21st century below 2°C, scientists warn that there is still a considerable 'emission gap' of 5 gigatonnes to be closed. The need to reduce emissions of black carbon and tropospheric ozone precursors has received comparatively little attention so far. New science shows that reducing such air pollutants could go a long way towards mitigating climate change in the short term, while also improving human health and food security.

A global dialogue on greening the economy has begun, driven by environmental concerns and economic opportunities. While countries have renewed their commitments to work towards environmental sustainability, and have agreed on global strategies for doing so, the private sector is responding to new business opportunities and signals that threats to ecosystems could undermine their operations. The rapid expansion of mobile technology is creating new possibilities to further engage citizens in environmental decision making. Citizen science can help to address important data gaps, especially with respect to biodiversity monitoring.

Today the human footprint extends to the remotest parts of the ocean. Even there, plastic can be found. The ocean has become a global repository for much of the waste we generate. Every year large amounts of plastic debris enter the marine environment, where it slowly fragments and accumulates in convergence zones. In particular, scientists are looking at the potential impacts of small plastic fragments, or microplastics. The role of plastics as a vector for transporting chemicals and species in the ocean is as yet poorly understood, but it poses a potential threat to ecosystems and human health. A number of scientists are concerned about releases of persistent, bio-accumulating and toxic compounds when plastic debris enters the food chain through ingestion by fish and other marine organisms.

Plastic debris can damage nets, foul propellers, and pollute beaches and other areas, with major economic impacts on the fishing and tourist industries. Local governments and other bodies spend millions of dollars per year on cleaning up plastic and other marine litter. To reduce the volume of plastic entering the ocean, all aspects of waste management need to be improved and existing policy instruments strengthened.

Phosphorus is a critical nutrient for food production. Further insight is needed into the long-term availability of this essential plant nutrient and the environmental consequences of its use. Agricultural practices commonly include the application of phosphorus fertilizers made from phosphate rock, a non-renewable resource used increasingly since the late 19th century. While several countries have commercially exploitable amounts of phosphate rock, those countries with no domestic reserves could be especially vulnerable to global shortfalls.

Over four times as much phosphorus flows through the environment today as before phosphorus fertilizer began to be used in agriculture, yet only small amounts are recovered and recycled from waste streams. Optimization of agricultural practices, erosion control and the exploration of innovative approaches, such as phosphorus recovery from water treatment installations, would reduce environmental pressures and enhance long-term phosphorus supply.

Our knowledge and understanding of biodiversity have never been greater than they are today. But neither have the pressures on biodiversity ever been greater. Loss of forest biodiversity can reduce the resilience of forests and leave them increasingly vulnerable to mounting pressures, as shown in the example of the mountain pine beetle outbreak presented in the Year Book. Strongly focusing on forests as the key to managing the world's carbon stocks—while disregarding the important role of biodiversity in building forest resilience—may lead to major investments in systems that are vulnerable to fire or pest outbreaks, which could nullify gains made in carbon sequestration.

Conservation of forest biodiversity is fundamental to sustaining forests and people in a world that is adapting to climate change. Ecosystem-based approaches recognize the importance

of biodiversity and the need for broad stakeholder participation in forest-related decision making in order to arrive at more effective conservation outcomes. New approaches to biodiversity conservation are promising, but they need to be matched by more effective governance and greater financial investments.

Environmental indicators such as those in the Year Book can help assess the impacts of complex interactions between people and the environment. The latest available data and trends show progress in addressing stratospheric ozone depletion, the need for more renewable energy and the need for environmental certification schemes. Global carbon dioxide emissions are still increasing and pressures on ecosystems from the use of natural resources continue, with notable impacts in terms of biodiversity loss. Poor availability of environmental data—especially from developing countries—remains a major constraint on identifying and following global environmental trends.

The Year Book gives numerous examples of practical measures that can be taken to prevent further pollution and resource depletion. However, the persistence of environmental problems tracked over time also shows that there is still much room to improve the effectiveness of environmental governance.

As countries prepare for the World Summit in 2012 in Brazil (Rio+20), it is important to signal emerging challenges that could undermine sustainable development efforts - alongside promising signs that countries, companies and communities are starting to embrace the transition to a low-carbon, resource-efficient economy.

UNEP welcomes your feedback. Readers are invited to use the questionnaire form available at www.unep.org/yearbook/2011/

Credit: Vera Kratochvil

Credit: Project Kaisei

Credit: D.M.G. de Sousa

Credit: José Badelles

Credit: Edward Obi-Akpere

On 140 acres of unused land at Nellis Air Force Base, Nevada, United States, 70 000 solar panels are part of a solar photovoltaic array that will generate15 megawatts of solar power for the base. *Credit: Nadine Y. Barclay/USAF*

Events and Developments

Driven by environmental concerns and economic opportunities, a global dialogue on greening the economy has begun. Countries have renewed their commitments to work towards environmental sustainability at various international fora, and some have initiated national actions. The private sector is responding not only to clean technology and green investment opportunities, but also to signals that threats to ecosystems could have serious impacts on business operations. At the same time, scientists and others point out multiple approaches and technologies available for the reduction of greenhouse gas emissions. These international events and developments—together with a series of extreme weather events—continue to urge us to achieve results in international climate change processes.

Environmental events and developments during the past year present a mixed picture. A review of the status of the achievement of the Millennium Development Goals (MDGs) in September showed that many countries, including some of the poorest, have made good progress. However, more efforts are required in regard to Goal 7 on ensuring environmental sustainability. Rapid biodiversity loss has not been halted, but in October governments agreed on new targets. They also agreed to establish a new body to provide the science-policy interface for biodiversity. The latest round of climate negotiations, held in December in Cancún, Mexico, put the world's efforts on climate change back on track. The package of decisions agreed succeeded in 'anchoring' the national targets and actions governments had put forward in and after the 2009 climate conference in Copenhagen, Denmark. Nevertheless, a significant emissions gap exists between what is being promised by countries and what is needed to keep the rise in global temperature below 2°C. Agreeing a process to close this gap will be one of the major challenges at the global climate negotiations in 2011 in Durban, South Africa.

2010 was a year of extreme weather. The World Meteorological Organization (WMO) reported that it tied with 1998 and 2005 as the warmest years on record (WMO 2011). There were 950 major natural disasters in 2010 compared to 785 in 2009. The heat wave in the Russian Federation and in particular the flooding in Pakistan resulting from an unusual stagnant jet stream, caused the loss of many lives (Red Cross 2011). Still unclear are the environmental impacts stemming from the months-long discharge of crude oil into the Gulf of Mexico that will go on record as one of history's worst oil spill disasters. The environmental impacts will be monitored over the next few years and are continuously evaluated.

Sustainable development and a green economy

While the world is slowly recovering from economic and financial crises, a global dialogue on natural capital and greening the economy has begun in countries, communities and companies. The need for urgent action to address climate change in the first half of the 21st century is fostering this dialogue, which is also stimulated by abundant potential economic opportunities for those who undertake the transition to a green economy.

A decade after the 2000 Millennium Summit, governments met at the High-level Plenary Meeting of the 65th Session of the UN General Assembly to review progress on achieving the MDGs and to renew their commitment to achieve the targets for 2015. Developing countries have made major progress on the health and education targets, but global progress has been slow on other goals, including ensuring environmental sustainability (IISD 2010, UNGA 2010). Key areas where progress on this goal could be accelerated include:

- implementation of the three UN Conventions on combating desertification, biological diversity and climate change, as well as the global objectives on forests and sustainable forest management;
- new and renewable energy sources, low-emission technologies, more efficient energy use, greater reliance on advanced energy technologies, and sustainable use of traditional energy sources;
- sustainable access to safe drinking water and basic sanitation;
- integrated waste management systems;
- sustainable management of marine biodiversity and ecosystems, and preservation of fragile mountain ecosystems;
- sustainable consumption and production patterns.