UNEP

GEO 5

Global Environment Outlook

Summary for Policy Makers

United Nations Environment Programme

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The GEO-5 assessment process

With its core mandate of 'keeping the global environment under review', UNEP coordinates integrated environmental assessments, which involve extensive consultations and participatory processes. Four Global Environment Outlook (GEO) assessment reports have been produced, in 1997, 1999, 2002, and 2007.

The 25th session of UNEP's Governing Council in Decision 25/2: III requested the Executive Director, through the Programme of Work, to continue to conduct a comprehensive, integrated and scientifically credible global environmental assessment (GEO-5), avoiding duplication and building on on-going assessment work, to support decision-making processes at all levels, in the light of the continuing need for up-to-date, scientifically credible, policy-relevant information on environmental change worldwide, and including the analyses of cross-cutting issues and indicator-based components. It was further approved by UNGA's 2nd Committee (Economic and Financial) resolution (A/C.2/66/L.57).

As a significant contribution to the 2012 United Nations Conference on Sustainable Development (Rio+20), the fifth Global Environment Outlook builds on previous reports and continues to provide an analysis of the state, trends and outlook of the global environment. It differs from previous GEO reports in its emphasis on internationally agreed goals and a shift from assessing 'problems' to providing possible 'solutions'.

The GEO-5 assessment report has three distinct, yet related parts:

Part 1 is an assessment of the state and trends of the global environment in relation to key internationally agreed goals such as Millennium Development Goals (MDGs) agreed in 2000 and goals of various multilateral environmental agreements (MEAs) based on national, regional and global analyses and datasets. It provides an evaluation of the gaps in achieving internationally agreed goals and their indicative implications for human well-being.

Part 2 of the assessment prioritizes a varying number of environmental themes per region and selected internationally agreed goals under each theme through a consultative process. The regional assessments focus on identifying policy responses that would help speed up the achievement of internationally agreed goals. It has been observed that there are many policies that have been shown to work in more than one country, but these policies need to be more widely supported, adopted and implemented according to national conditions to speed up the achievement of internationally agreed goals. The analysis is presented using case studies that illustrate the application of policies at a national or transboundary level within each region and presents the benefits and drawbacks of implementing the policies and the enabling factors and barriers that enhance or impede their uptake.

Limited evidence of the potential for policy transfer to other countries or other regions is documented, as often there is insufficient empirical evidence to make categorical statements on policy success or transferability.

Among the long list of policy responses found to be effective, some highly promising approaches are described in the regional chapters. Together, these form a possible policy agenda that would support an inclusive green economy approach and are worthy of closer analysis by governments when examining new policy options.

Part 3 identifies possible options for action to transition towards sustainable development including through increased coordination, participation and cooperation required to support the achievement of internationally agreed goals and work towards sustainable development at the global level.

The development of GEO-5 involved extensive collaboration between UNEP and a multi-disciplinary network of experts, all of whom made their valuable time and knowledge available to the process in recognition of its importance.

For the first time, authors, reviewers and members of three specialized groups were nominated by governments and other stakeholders. UNEP then followed a selection process.

The following three GEO-5 specialized advisory bodies were convened to support the assessment process:

- **The GEO-5 High Level Intergovernmental Advisory Panel:** The Panel identified the internationally agreed goals that underpin the assessment. The Panel also provided guidance to authors in the drafting of this Summary for Policy Makers (SPM).
- **The Science and Policy Advisory Board:** The Board was responsible for strengthening the scientific credibility and policy relevance of the assessment by providing guidance throughout and undertaking an evaluation of the assessment process.
- **The Data and Indicators Working Group:** The Group provided support to the assessment process on core data.

The SPM is based on and consistent with the findings of the GEO-5 assessment. The GEO-5 Summary for Policy Makers was negotiated and endorsed at an intergovernmental meeting from 29 to 31 January 2012 in the City of Gwangju, Republic of Korea.

This Summary for Policy Makers highlights the findings of the fifth Global Environment Outlook (GEO-5) report and is prepared by the UNEP Secretariat with:

Guidance from members of the GEO-5 High-level Intergovernmental Advisory Panel

Hussein A. Al-Gunied, Mohammed Saif Al-Kalbani, Burcu Bursali, Mantang Cai, Sandra De Carlo, Jorge Laguna Celis, Guilherme da Costa, Liana Bratasida, Raouf Dabbas, Idunn Eidheim, Prudence Galega, Nilkanth Ghosh, Rosario Gomez, Han Huiskamp, Jos Lubbers, John Michael Matuszak, Samira Nateche, Kim Thi Thuy Ngoc, Van Tai Nguyen, Jose Rafael Almonte Perdomo, Majid Shafie-Pour- Motlagh, Jiang Wei, Albert Williams, Daniel Ziegerer

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and

all authors whose contribution in the GEO-5 main assessment report served as a basis for the GEO-5 Summary for Policy Makers

It was negotiated and endorsed on 31 January 2012 by:

The Intergovernmental Meeting on the fifth Global Environment Outlook Summary for Policy Makers

Azerbaijan, Belarus, Belize, Bhutan, Brazil, Burundi, Cambodia, Canada, China, Colombia, Comoros, Cook Islands, Czech Republic, Democratic Republic of Congo, Egypt, Ethiopia, Germany, Georgia, Ghana, Guinea Bissau, India, Indonesia, Iran (Islamic Republic of), Iraq, Kenya, Kyrgyzstan, Mexico, Morocco, Myanmar, Nepal, Niger, Nigeria, Norway, Pakistan, Palau, Peru, Philippines, Poland, Republic of Korea, South Sudan, Romania, Serbia, Spain, Sweden, Switzerland, Thailand, Togo, Turkey, Uganda, Ukraine, United Republic of Tanzania, United States of America, Yemen
Palestine attended the meeting as an observer
The following intergovernmental organisation (IGO)-the League of Arab States also attended the meeting

The UNEP Secretariat included
Joseph Alcamo, Matthew Billot, Ludgarde Coppens, Volodymyr Demkine, Linda Dusquenoy, Sandor Frigyik, Peter Gilruth, Tessa Goverse, Jason Jabbour, Fatoumata Keita-Ouane, Masa Nagai, Nick Nuttall, Brigitte Ohanga, Young-Woo Park, Nalini Sharma, Anna Stabrawa, Ron Witt

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1. Critical thresholds

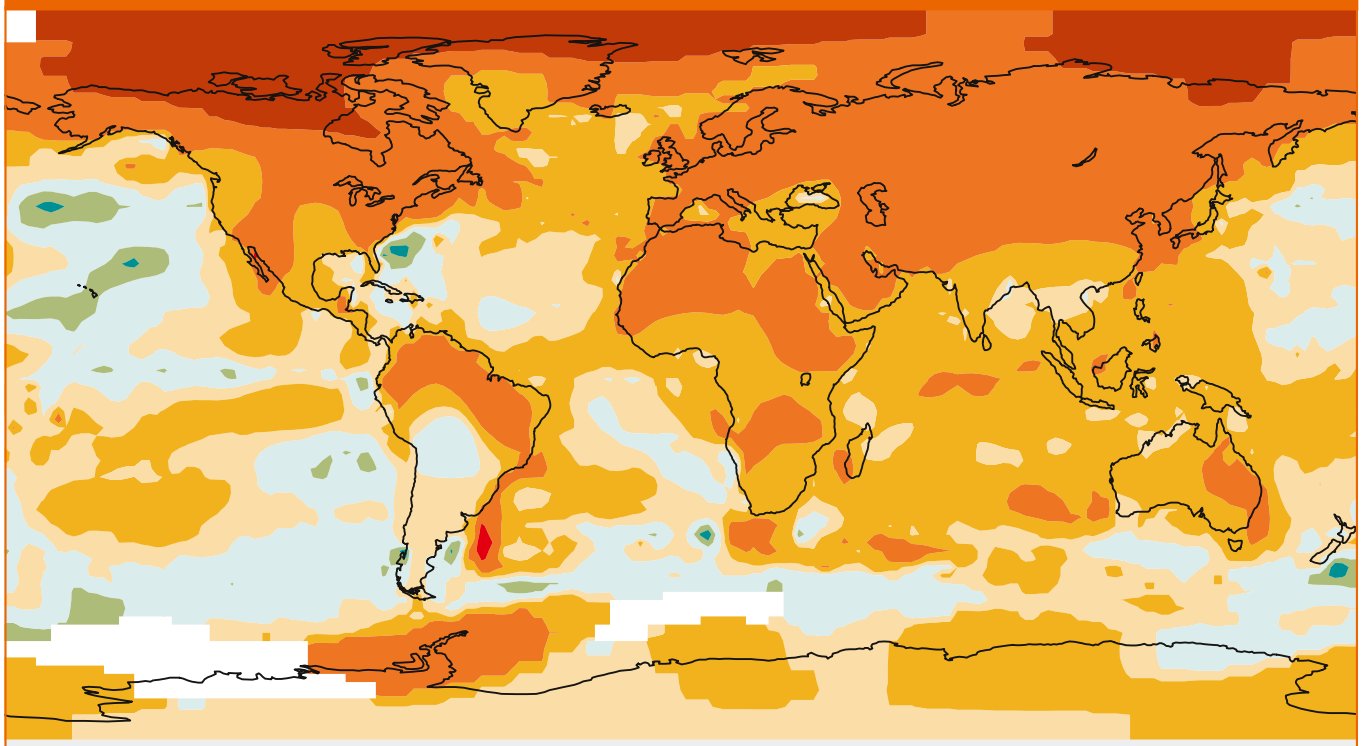
The currently observed changes to the Earth System are unprecedented in human history. Efforts to slow the rate or extent of change – including enhanced resource efficiency and mitigation measures – have resulted in moderate successes but have not succeeded in reversing adverse environmental changes. Neither the scope of these nor their speed has abated in the past five years.

As human pressures on the Earth System accelerate, several critical global, regional and local thresholds are close or have been exceeded. Once these have been passed, abrupt and possibly irreversible changes to the life-support functions of the planet are likely to occur, with significant adverse implications for human well-being. An example of an abrupt change at a regional scale is the collapse of freshwater lake and estuary ecosystems due to eutrophication; an abrupt and irreversible example is the accelerated melting of the Arctic ice-sheet, as well as glacial melt, due to an amplification of global warming (Figure 1).

The impacts of complex, non-linear changes in the Earth System are already having serious consequences for human well-being such as:

- multiple and interacting factors, including droughts combined with socio-economic pressures, affect human security;
- increases of average temperature above threshold levels in some places has led to significant human health impacts such as increased incidences of malaria;
- increased frequency and severity of climatic events, such as floods and droughts, to an unprecedented level affect both natural assets and human security;
- accelerating changes of temperature and sea level rise are affecting human well-being in some places. For example, they affect the social cohesion of many communities including indigenous and local ones, and sea level rise poses a threat to some natural assets and the food security of the small island developing states; and
- substantial biodiversity loss and on-going extinction of species are affecting the provision of ecosystem

Figure 1: Change in annual mean surface air temperature, 1960–2009



services, such as, the collapse of a number of fisheries and the loss of species used for medicinal purposes.

The prospect of improving human well-being is critically dependent on the capacity of individuals, countries and the international community to respond to environmental changes which increase risks and reduce opportunities for the advancement of human well-being, in particular efforts to eradicate poverty amongst poor and vulnerable populations. Because of the complexities of the Earth System, responses need to focus on the root causes, the underlying drivers of environmental changes, rather than only the pressures or symptoms.

2. Evidence-based policy making requires more, reliable data

The lack of reliable and consistent time-series data on the state of the environment is a major barrier to increasing the effectiveness of policies and programmes. Additionally, many of the most important drivers of environmental change or even their impacts are not systematically monitored. All countries should undertake to monitor and assess their own environment and integrate social, economic and environmental information to inform decision-making processes. As standardized approaches to data collection are needed, international cooperation and capacity building for collecting data must be strengthened. Improving access to information is also essential.

3. Environmental deterioration demonstrates internationally agreed goals have only been partially achieved

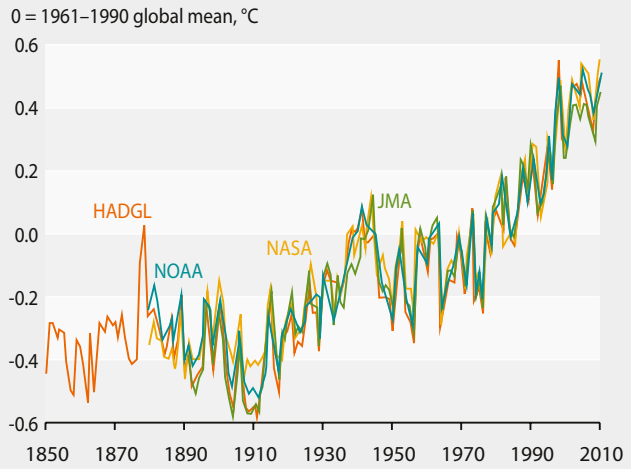
Many sub-national, national and international instruments now in place are contributing to environmental improvements. There is evidence, however, of continuing deterioration in many places and for most of the global environmental issues reported on in GEO-5. For such issues as exposure pathways and effects of chemicals, and the trends in land degradation a better understanding would support better responses. For others, such as reducing particulate matter (PM) concentrations in the atmosphere, more consistent implementation of existing instruments is needed.

■ Atmosphere

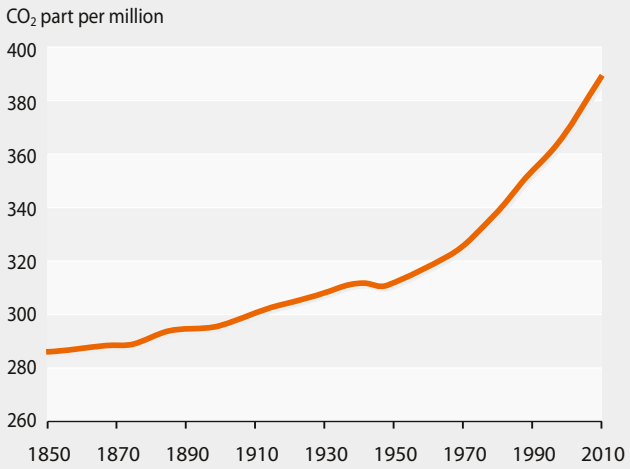
Some atmospheric issues have been solved effectively as a result of a variety of mechanisms and where successful action has been taken, the benefits far exceed the costs. Significant progress has, for example, been made in reaching the internationally agreed goal of the Montreal Protocol to protect the stratospheric ozone (ozone in the upper atmosphere) layer. A drastic reduction in both the production and use of ozone-depleting substances (ODS) has been achieved, resulting in a 31 per cent improvement in ODS indicators at mid latitudes since 1994, and the predicted avoidance of 22 million cases of cataract for people born between 1985 and 2100 in the United States of America alone.

For other issues, such as the reduction of indoor and outdoor PM and emissions of sulphur and nitrogen compounds, progress has been mixed. Tropospheric ozone (ozone in the lower atmosphere) remains a significant problem and is proving difficult to address.

Figure 2: Trends in temperature change and atmospheric CO_2 concentrations, 1850–2010



Sources: Climate Research Unit at the University of East Anglia (HADGL), NOAA NCDC, NASA GISS, Japan Meteorological Agency



Sources: Scripps Institute of Oceanography, NOAA

In parts of Africa, Asia and Latin America, where urban PM levels remain far in excess of international guidelines, the concern is high. Similarly, the dust-haze phenomenon in the Middle East is of concern. Improved public information on local air quality could contribute to raising awareness of this issue.

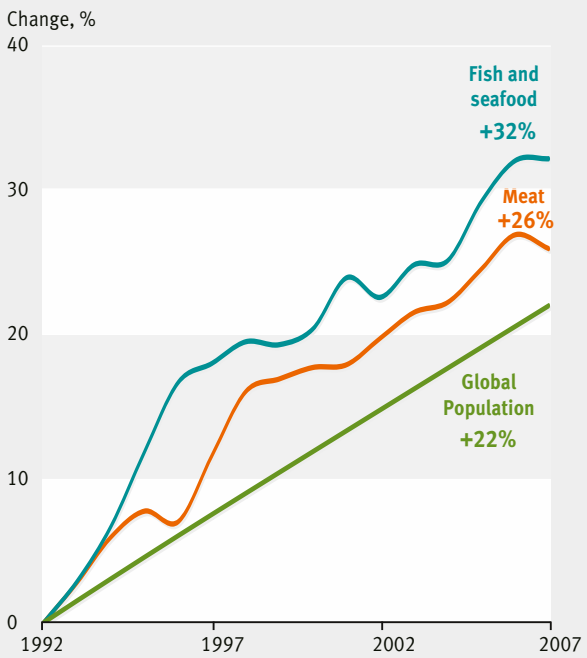
The internationally agreed goal of avoiding the adverse effect of climate change is presenting the global community with one of its most serious challenges (Figure 2) that is threatening overall development goals. As progress in reducing the carbon intensity of consumption and production is being outstripped by increased levels of consumption, reaching the climate goal under the United Nations Framework Convention on Climate Change (UNFCCC) of reducing global greenhouse gas (GHG) emissions so as to hold the increase in global average temperature below 2° C above pre-industrial levels will require not only the fulfilment of current pledges but also transformative change towards a low-carbon global economy.

In addition, progress is necessary on preparing and implementing national plans of action on climate change, including nationally appropriate mitigation action and national adaptation plans of action. Complementary action to address short-lived climate forcers – black carbon, methane and tropospheric ozone, which are air pollutants that also warm the planet – can cost-effectively reduce the rate of temperature increase in the near term while reducing risks to human health and food production.

■ Land

The pressure on land resources has increased in recent years. Economic growth has come at the expense of natural resources and ecosystems, for example, due to perverse incentives, deforestation and forest degradation alone will likely cost the global

Figure 3: Change in global population and in meat, fish and seafood supplies, 1992–2007



Source: UNEP/FAO

economy more than the losses in the 2008 financial crisis. Improving land-resource and sustainable land management systems to prevent land degradation, including soil erosion, has been increasingly recognized as an important goal, and there are many examples of effective progress. Coordinated efforts in the Brazilian Amazon have shown that innovative policies on forest monitoring, land tenure and law enforcement, together with consumer-driven initiatives, can have a significant impact on lowering deforestation rates.

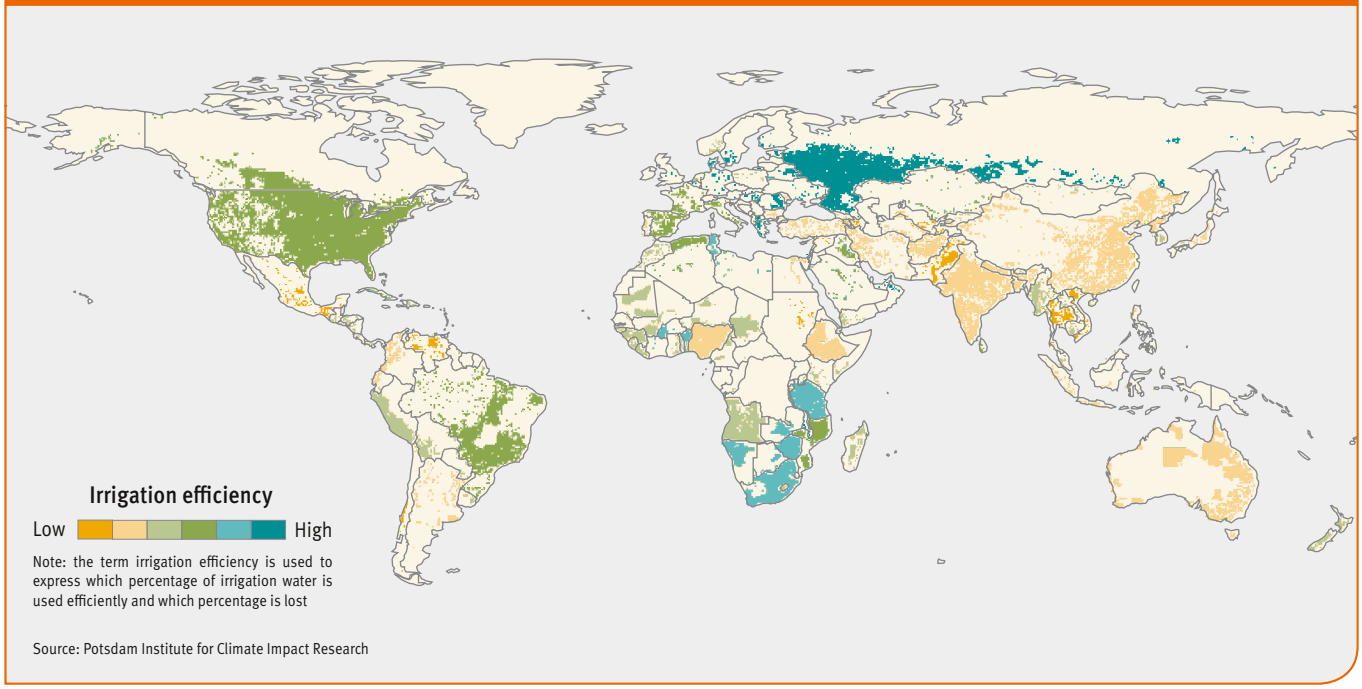
Some forestry and agroforestry systems, as well as efforts to reduce land conversion to other uses, offer examples that can result in the maintenance and enhancement of terrestrial carbon stocks and contribute to conservation and the sustainable use of biodiversity. Appropriate forest management could include natural regeneration of degraded forests and reforestation, regulating the diversion of forest land for non-forest purposes with comprehensive mechanisms for compensatory afforestation and the adoption of agroforestry. Efforts to better understand ecosystem services provided by various land uses, as well as the valuation of natural capital, are at an early stage of development and should be strengthened.

Overall, however, the challenges are severe and successes relatively few in number. The rate of forest loss, particularly in the tropics, remains alarmingly high. The burgeoning population, economic development and global markets are important drivers of change that collectively intensify pressure on land by raising demands for food, livestock feed, energy, and raw materials (Figure 3 on previous page). Simultaneous growth in demand is causing land-use conversion, land degradation, soil erosion and pressure on protected areas. The need to increase agricultural productivity due, for instance, to population growth, and to compensate for the loss of arable land due to urbanization, infrastructure building and desertification, has to be weighed against potential environmental costs. Land-use decisions often fail to recognize the non-market value of ecosystem services and overlook biophysical limits to productivity, including the additional stress on productive areas caused by climate change. Many interventions intended to protect ecosystems have also failed to engage adequately with indigenous, local communities and the private sector, or to take local values into account. In addition, an integrated approach to conservation and development is not always easily reconciled with local land-use legislation.

The potential to create more sustainable land management systems nevertheless exists. Land policies represent some of the most active areas of policy innovation, including payment for ecosystem services (PES) and integrated place-based management. For these to be extended, some deficiencies need to be addressed:

- data and monitoring are severely inadequate; and
- clear, more tangible internationally agreed goals for land are needed as most of those that exist are imprecise and non-quantifiable.

Figure 4: Global irrigation efficiencies, c. 2000



Freshwater

The world is on track to reach the Millennium Development Goal (MDG) on access to safe drinking water, but not that of sanitation – 2.6 billion people still lack access to basic sanitation – and some progress has been made in meeting water efficiency goals. Despite the progress, there are concerns that the limit of sustainability of water resources, both surface- and ground-water, has already been reached or surpassed in many regions, that demand of water continues to increase and that water-related stress on both people and biodiversity is escalating rapidly. Global water withdrawals have tripled over the last 50 years; aquifers, watersheds and wetlands are increasingly at risk yet are often poorly monitored and managed. The rate at which global groundwater stocks are decreasing more than doubled between 1960 and 2000. Today, 80 per cent of the world's population lives in areas with high levels of threat to water security, with the most severe threat category affecting 3.4 billion people, almost all in developing countries. By 2015, some 800 million people are expected still to lack access to an improved water supply, even though improving the drinking water supply and sanitation is still a cost-effective way of reducing water-related disease and death. In many countries, data collection, monitoring and assessment of hydrology, water availability and water quality, which are critical to integrated water resource management and sustainable development, are lacking and must be improved.

Water, energy, socio-economic development and climate change are fundamentally linked. For example, traditional energy production sources result in increased GHG emissions and climate change that contribute to water scarcity, extreme climatic events such as flood and droughts, sea-level rise, and loss of glacial and polar sea ice. Responses to climate change, including developing energy sources with lower carbon footprints, can also have implications for the water environment. Hydropower production can contribute to fragmentation of river systems, while the construction of some solar-energy infrastructure consumes significant quantities of water, often in arid environments already experiencing water scarcity. As water scarcity increases, some regions will be forced to rely more on water harvesting and watershed management. Desalination may also make a contribution but currently requires large amounts of energy, financial and human resources, as well as technical assistance for its implementation.

There is a need to use water more efficiently. Ninety-two per cent of the total global water footprint is related to agriculture. Irrigation efficiency and water reuse could be increased by about a third simply by implementing existing technology (Figure 4). Prevention and reduction

of aquatic pollution from both point and non-point sources are also vital steps in improving water availability for multiple uses. Though significant progress has been made on integrated water-management over the past 20 years, the overall pace of increasing pressures on water supplies and use needs to be matched by accelerated improvements in governance at all levels.

Oceans

A number of global, regional and sub-regional conventions, protocols and agreements have been established to protect the marine environment from pollution. They also support an integrated and sustainable use of marine and coastal resources as well as ecosystem based water management.

Despite global agreements, there are continuing signs of degradation. For example, the number of eutrophic coastal areas has increased dramatically since 1990 – at least 415 coastal areas have exhibited serious eutrophication and only 13 of these are recovering. Instances of reported outbreaks of paralytic shellfish poisoning (PSP), one example of which is the toxin produced by algal blooms in eutrophic waters, have increased from fewer than 20 in 1970 to more than 100 in 2009. Of the 12 seas surveyed between 2005 and 2007, the coasts of the East Asian Sea, North Pacific, Southeast Pacific and Wider Caribbean contained the most marine litter. In contrast, the Caspian, Mediterranean, and Red Seas had the least. Excessive absorption of CO_2 from the atmosphere is causing acidification of the oceans which is postulated to be a major threat to coral reef communities and shellfish. Additional studies are needed, to better understand the extent, dynamics and consequences of this process.

Sustainable management of coastal areas and ocean resources, including through marine protected areas, requires national action, effective coordination and cooperation at all levels.

Biodiversity

Protected areas now cover nearly 13 per cent of the total land area, with increasing recognition of indigenous and local community-managed areas. Concern remains, however, because protected areas are often isolated from one another. This can be addressed by establishing biological corridors between protected areas. Less than 1.5 per cent of total marine area is currently protected, while the internationally agreed goal in the Convention on Biological Diversity's (CBD) Aichi Biodiversity Target is 10 per cent of coastal and marine areas by 2020.

Policies, regulations and actions have been adopted to minimize the pressures on biodiversity, including reducing habitat loss, land conversion, pollution loads

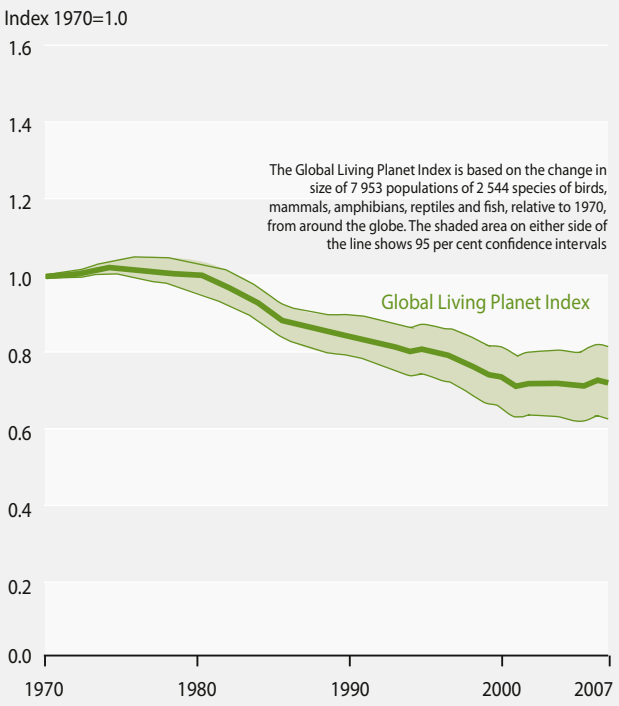
and the illegal trade in endangered species. These measures also encourage species recovery, sustainable harvesting, habitat restoration and the management of invasive alien species.

Nevertheless, substantial and on-going losses of species contribute to ecosystem deterioration. Up to two thirds of species in some taxa are threatened with extinction; species populations are declining, since 1970, vertebrate populations have fallen by 30 per cent (Figure 5); and since 1970 conversion and degradation has resulted in declines of 20 per cent of some natural habitats. Climate change will have profound impacts on biodiversity, particularly in combination with other threats.

Habitat loss and degradation, including from unsustainable agriculture and infrastructure development; unsustainable exploitation; pollution and invasive alien species remain predominant threats to terrestrial and aquatic biodiversity. All contribute to a decline in ecosystem services, which may lead to increasing food insecurity and endanger poverty reduction and the improvement in human health and well-being.

The CBD Aichi Biodiversity Targets and the entry into force of the Nagoya Protocol on Access and Benefit Sharing provide opportunities to develop a concerted global approach to reverse the decline of biodiversity. To achieve this, it would be helpful to sharpen policy makers' awareness of the contribution of biodiversity and ecosystem services to human well-being, as well as to further integrate policies and institutional responses. These include incentives for and effective engagement with indigenous and local communities as well as the private sector.

Figure 5: Global Living Planet Index, 1970–2007



Source: WWF

■ Chemicals and Waste

The development of the chemicals industry has brought many benefits that underpin advances in agriculture and food production, crop pest control, industrial manufacturing, sophisticated technology, medicine and electronics. Around 248 000 chemicals are now commercially available and the pace of their production and use continues to grow (Figure 6).

Nonetheless, some chemicals pose risks to the environment and human health because of their intrinsic hazardous properties. The negative effects on human health and the environment, and consequently the cost of inaction, are likely to be substantial. Chemicals and

waste management are currently addressed through a number of regional and global multilateral environmental agreements, including the Basel, Rotterdam and Stockholm Conventions and, since 2006, the Strategic Approach to International Chemicals Management (SAICM). Even so, more chemicals of global concern need to be addressed by such agreements.

Greater urbanization has contributed to the generation of more waste, including e-waste in general and more hazardous waste from industrial and other activities. The countries of the Organisation of Economic Co-operation and Development (OECD) produced some 650 million tonnes of municipal waste in 2007, growing at around 0.5–0.7 per cent each year, of which 5–15 per cent was e-waste. There are indications that the final destination of most e-waste is the developing world and that, at the global scale developing countries, may generate twice as much e-waste as developed countries by 2016.

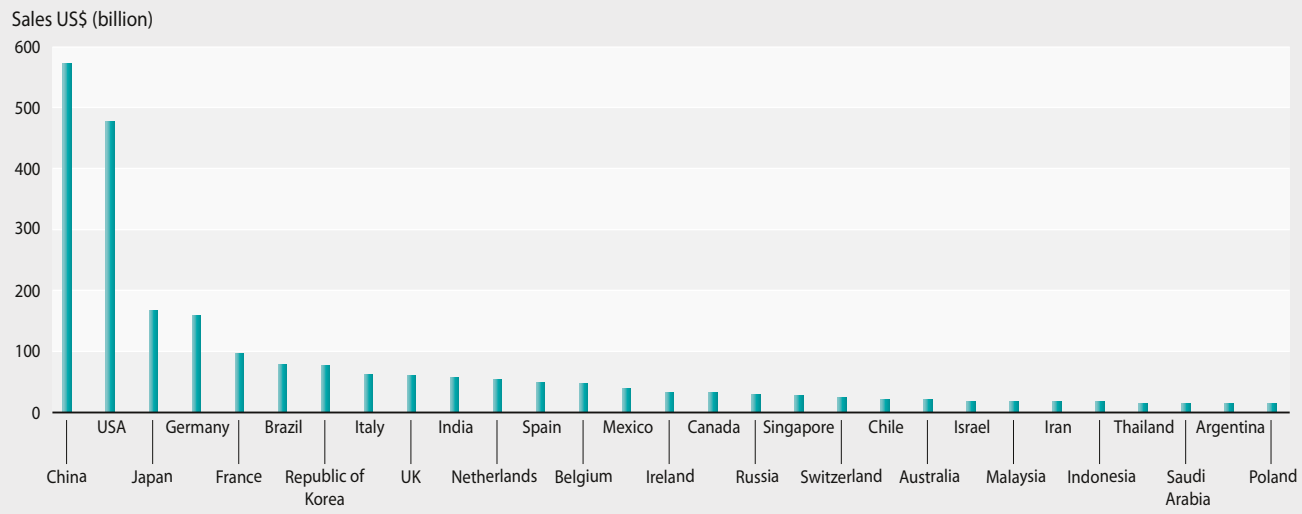
While policies to manage wastes exist in many countries, their implementation has met with mixed success, and reporting of hazardous waste data has declined. Problems of managing waste are set to grow with recycling alone not being a sufficient solution, and exceed the capacity of countries to deal with it. Waste prevention, minimization, reduce-reuse-recycle and resource recovery all require attention.

Many developing countries are at risk of temporary regulatory vacuums where shifts in the production or use of chemicals are out of step with the implementation of adequate control and management systems, including cleaner production and the environmentally sound management of the wastes.

There is, however, an acute lack of data to indicate whether policies are effective, where the problems are most challenging and, perhaps more tellingly, where problems may be mounting but have yet to be detected. In many countries, the capacity, in particular technical capacity including finance, technology, infrastructure for the environmentally sound management of chemicals and hazardous wastes, is lacking or inadequate. This is of serious concern since there is a shift in the production of chemicals from developed to developing countries, and the use of chemicals in developing countries is growing rapidly. Due to a lack of data, little can be said about how well the internationally agreed goals in this area are being met and how to improve programmes and policies to address these goals.

Emerging issues, such as endocrine disrupting chemicals, plastic in the environment, open burning, and the manufacture and use of nano-materials and chemicals in products, require action to better understand them and prevent harm to human health and the environment.

Figure 6: Chemical sales by country, 2009



Source: OECD 2010

4. Shifting the policy focus

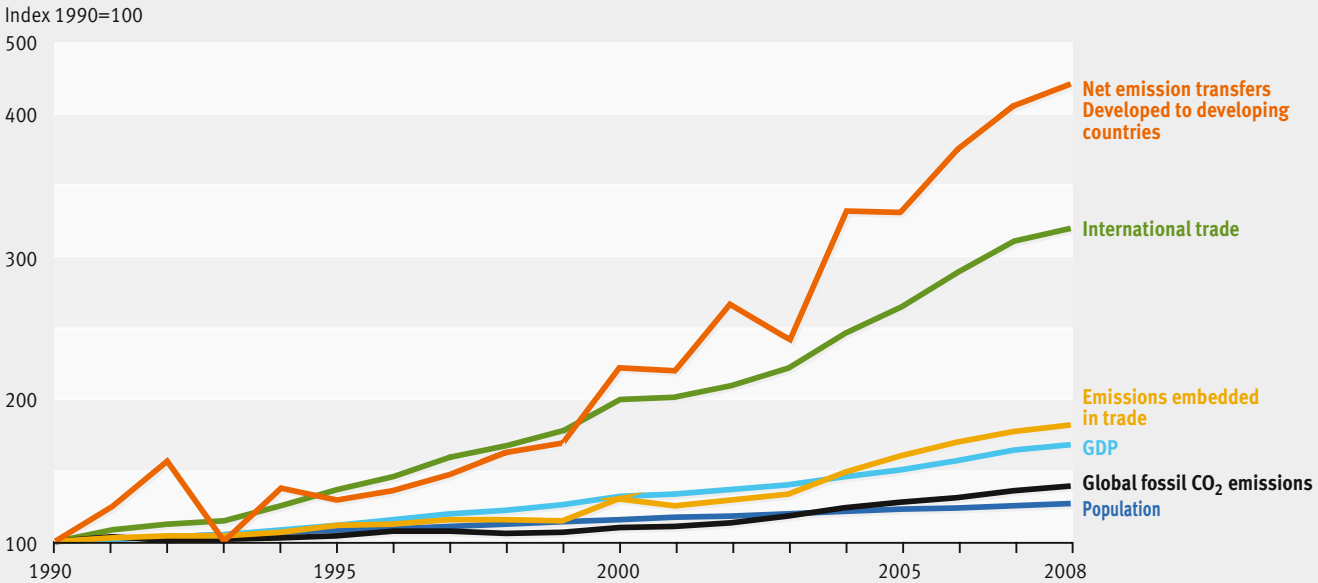
There are compelling reasons to consider policies and programmes that focus on the underlying drivers that contribute to increased pressure on environmental conditions, rather than concentrating only on reducing environmental pressures or symptoms. Drivers include, *inter alia*, the negative aspects of population growth, consumption and production, urbanization and globalization (Figure 7).

Often these drivers combine and interact. Concerns about the effects of climate change, for example, including crop vulnerability and food insecurity, gave rise to climate policies that included mandates to increase biofuel production, such as ethanol and bio-diesel.

Some direct and indirect drivers can be controlled through action that brings direct benefits to human well-being. For example, increasing energy efficiency to reduce GHG emissions also reduces air pollution and its risks to human health, while reducing consumer energy costs and increasing energy security.

Because of the rapid growth in drivers, the complexity of their patterns and dynamics, and their ability to generate unexpected impacts, improved efforts in surveillance and monitoring the drivers may produce tangible benefits. When basic environmental, social and economic data are available and integrated it becomes feasible to assess the possible environmental impacts of drivers effectively.

Figure 7: Growth in population, GDP, trade and CO_2 emissions, 1990–2008



Source: Proceedings of the National Academy of Sciences of the United States of America

5. Scaling up promising policies, practices from the regions

GEO-5's regional assessments identified policy responses/instruments based on best practice adopted successfully in one or more regions that would speed up the achievement of internationally agreed goals include:

Freshwater
Integrated water resource management; conservation and sustainable use of wetlands; promotion of water-use efficiency; water metering and volumetric-based tariffs implemented at a national or sub-national level; recognizing safe drinking water and sanitation as a basic human right/need; effluent charges.

Biodiversity
Market-based instruments for ecosystem services, including Payment for Ecosystems Services (PES) and Reducing Emissions from Deforestation and Forest Degradation (REDD+); increasing the extent of protected areas; sustainable management of protected areas; transboundary, biodiversity and wildlife corridors; community-based participation and management; sustainable agricultural practices.

Climate change
Removing perverse/environmentally harmful subsidies, especially on fossil fuels; carbon taxes; forestry incentives for carbon sequestration; emission trading schemes; climate insurance; capacity building and financing; climate change preparedness and adaptation such as climate proofing infrastructure.

Land
Integrated watershed (catchment) management; smart growth in cities; protecting prime agricultural land and open space; no till and integrated pest management and/or organic agriculture; improved forest management; PES and REDD+; agroforestry and silvo-pastoral practices.

Chemicals/waste
Registration of chemicals; extended producer responsibility; product redesign (design for the environment); life cycle analysis; reduce, reuse and recycle (3Rs) and cleaner production; national and regional hazardous waste treatment systems; control of inappropriate export and import of hazardous chemicals and waste.

Energy
Increased international cooperation in the area of transfer and application of energy saving technologies; promotion of energy efficiency; increased use of renewable energy; feed-in tariffs; restriction on fossil fuels subsidies; low emission zones within cities; research and development, especially on batteries and other forms of energy storage.

Oceans and seas
Integrated coastal zone management (ridge-to-reef); marine protected areas; economic instruments such as user fees.

Environmental governance
Multi-level/multi-stakeholder participation; increased introduction of the principle of subsidiarity; governance at local levels; policy synergy and removal of conflict; strategic environmental assessment; accounting systems that value natural capital and ecosystem services; improved access to information, public participation and environmental justice; capacity strengthening of all actors; improved goal setting and monitoring systems.

Each region found, however, that even were such apparently successful policies more widely implemented, there is little confidence that some of the current global environmentally adverse trends would be reversed – innovative approaches are definitely needed. Furthermore, alongside the wise selection of policies, there is an increasing need to shift away from dealing with the impacts of environmental degradation and tackle the underlying drivers. Regulatory, market- and information-based policies that actually change human and corporate behaviour can become true levers of transformative change. In addition, many of the policies examined were successful, in part, due to the enabling environment or local context. It follows, therefore, that the transfer and replication of policies, although a commonly observed approach, always requires careful examination of the local context and a full sustainability assessment before proceeding.

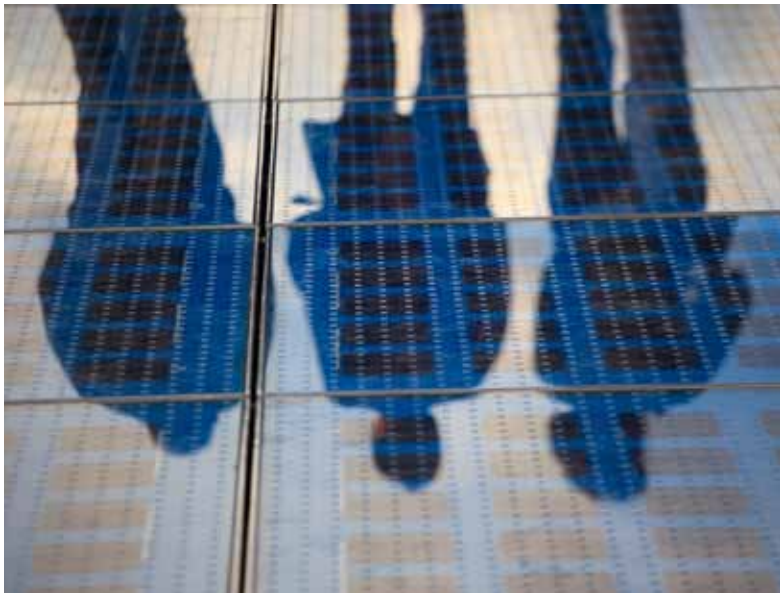
6. Innovative responses – an opportunity for cooperation

GEO-5 identifies a selection of internationally agreed goals and targets that address the need to improve human well-being throughout the world, while protecting and using life-supporting environmental processes. Achieving these goals and targets for sustainable development requires further innovative responses at all levels, as replicating and up-scaling current policies alone will not suffice. Existing sustainability-scenario studies show that both short-term policy solutions and long-term structural measures are needed to meet established targets.

Responses at the local, national and international level interact and generate incremental, structural and transformational change. As there is no universal solution to environmental degradation, a range of tailored responses is required to reflect the diversity of regional needs. In areas of common global concern, however, coordination, participation and cooperation are critical for jointly meeting internationally agreed goals and targets, while also addressing the capacity deficits in a range of countries.

In order to be effective, action at the sub-global level can make use of the following four strategic insights derived from recent scientific understanding of transition processes in complex socio-ecological systems:

- a compelling vision of sustainability – building on goals and targets and informed by science. Society at all levels needs to be engaged to define visions of a sustainable future and what is required to get on to the pathway of a successful transition;
- reversing what is unsustainable – the introduction of innovative measures consistent with a vision of and pathway to sustainability must be accompanied by identifying and redirecting or reversing policies that are unsustainable;
- applying leverage – a successful transition will require a diverse array of measures that:
  - strengthen a sustainability mindset in society through education and awareness raising;
  - change the rules and incentives to advance sustainable practices; and
  - create feedback and make adjustments in the physical processes and structures of organizations to keep environmental pressures at acceptable levels;



- Adaptive management and governance – governments and other entities need improved capacity to manage complex transition processes through continuous monitoring, learning and course correction to reduce the costs of not meeting the internationally agreed goals.

Delivering results requires a combination of technology investment, governance and management measures, together with sustainable consumption and production patterns. A low carbon and resource efficient green economy in the context of sustainable development and poverty eradication, with adequate support for the development of environmental innovation, offers great environmental and economic opportunities for the preservation of the environment, the creation of new jobs, lowering production costs and the strengthening of competitiveness. New measures will only succeed if accompanied by a reversal or redirection of policies that have generated unsustainable outcomes. Transformations of such complexity require a gradual but steady transition process. During such a process, the impact of responses needs to be properly monitored so that if required, corrective measures can be taken to keep progress towards internationally agreed goals and targets on track. At the same time, it is important to strengthen the structural conditions – providing support for capacity building and creating an enabling environment consistent with the vision of a sustainable world.

A results-based approach to advancing human well-being and sustainability involves:

i Framing environmental goals and monitoring environmental outcomes within the context of setting sustainable development goals

Building on the lessons of the MDGs is critical to the possible development of any sustainable development goals. Metrics should track sustainability progress, strengthen accountability and facilitate learning. Such goals could also guide a public and private sector investment roadmap to a green and inclusive economy to stimulate economic development and job creation by the sustainable use of ecosystems and natural resources, as well as infrastructural investments and technologies. New goals, related to the critical drivers including the consumption and production of food, energy and water, could be explored. Systematic monitoring and periodic reviews of progress on the agreed universal goals would promote continuous improvement and social learning as well as institutional and individual accountability.

ii Investing in enhanced capacities and mechanisms at local, national and international levels to achieve sustainability, including through a green economy in the context of sustainable development and poverty eradication

This may involve mechanisms to circulate critical policy lessons, based on the priorities identified earlier and inputs from governments and other stakeholders across the world and strengthened accountability through data collection and assessment including financial tracking and regular reviews. A stable policy environment, partnerships and the development of an enabling environment are key to unleashing the creativity of the private sector, together with innovation and enhanced technological cooperation through collaborative research and development and knowledge-sharing platforms. Delivering results will also require strengthened national capacities to develop, deliver and implement strategies to combat environmental degradation.

iii Enhancing the effectiveness of global institutions to fulfil human needs while avoiding environmental degradation

Across the world, entities within the international environmental system need to transform their operational approach by improving efforts to mainstream environmental concerns into the development of economic policies, plans and programmes, deliver results at sub-regional, regional, national and local levels, and improve coordination and communication. A United Nations system-wide strategy on environmental protection, within the context of sustainable development, could be explored to improve the alignment of its broad range of instruments, activities and capacity, and support efforts by member states to implement the environmental agenda, including multilateral environmental agreements. Other enabling factors are the enhanced delivery of science-policy capacity development needs across the world, strengthened monitoring systems and data gathering, as well as the targeted communication of scientific findings to various audiences. In the future, the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) is expected to make an important contribution to the science-policy interface. In addition, the synergies process for the chemicals and waste conventions – Basel, Rotterdam and Stockholm – provides an opportunity to enhance awareness raising, knowledge transfer, capacity building and national implementation that should be further explored.

iv Consistent time series, accessible data collection and assessments

The valuation of natural capital and ecosystem services and the development of evidence-driven environmental policies require timely, reliable, consistent, accessible and relevant official and environmental data that are regularly collected. Furthermore, it is impossible to judge the effectiveness of policies or programmes without regular and repeated data collection and assessment. The derived environmental information should be integrated with social and economic data for possible inclusion in national accounts. Furthermore, the information is needed to demonstrate to decision makers and other stakeholders how budgets are

allocated, as well as for better understanding and use. Financial resources and capacity building are critical for reliable and consistent data collection, including in developing countries. Development of technical capacity, as well as institutional capacity to embed regular data collection, monitoring and use within the policy and planning process at the national level, is also a high priority.

v Strengthening environmental education for and raising awareness of sustainability issues

To facilitate the implementation of internationally agreed goals and objectives, achieve tangible results at the national, regional and international level, align environmental policy and programmes with sustainable development goals by strengthening education for and raising awareness of sustainability issues as one of the major driving forces is essential.

vi Strengthening access to information, public participation in decision making and access to justice in environmental matters

To enhance engagement and develop capacity at national and international levels, the substantive involvement of civil society, the private sector and other relevant actors in policy-making processes is critical. The international community and government at all levels could improve access to information, enhance engagement of and develop capacity for stakeholders to participate in decision making and improve access to justice in environmental matters in order to meet environmental and development challenges.

Notwithstanding the enormous challenges, moving on to a pathway that leads to meeting internationally agreed environmental goals and targets is possible and the transition is already under way. There are, today, great opportunities to scale up policies that can help to reverse negative environmental trends and address inequalities and inadequate institutional frameworks within which human society currently operates. It is also imperative for the international community to invest in structural solutions, from fundamental shifts in the values, design and structure of institutions to innovative policy frameworks, that will help tackle the root causes, rather than merely the symptoms, of environmental degradation. Solutions are within reach, but urgent, ambitious and cooperative action is imperative to meet internationally agreed goals and targets and to avoid irreversible changes to the life-support functions of the planet and further escalating economic, environmental and human well-being costs.

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The fifth Global Environmental Outlook (GEO-5) provides the scientific analysis as to why the world needs an urgent switch in its developmental direction 20 years after the Rio Earth Summit of 1992.

GEO-5 underlines not only the severity of the environmental changes and challenges emerging across the globe but will also show that in far too many areas, environmental change is accelerating and pushing the planet towards tipping points.

As the UN's most authoritative assessment of the state, trends and outlook of the global environment, the GEO-5 report and the world-wide consultative process underpinning its findings offers governments and societies, on the eve of Rio+20, the scientific foresight that can empower positive environmental change as a contribution to achieving sustainable development.

This Summary for Policy-Makers of GEO-5 provides a snapshot of the current state of the environment and the world's performance in meeting key internationally agreed goals. It also highlights promising approaches, responses and policy options able to support a transition towards an inclusive green economy and a sustainable century.

Achim Steiner,
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