

Global Responses



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Main Messages

Environmental degradation heightens risks and reduces opportunities for the advancement of human well-being, especially for poor and vulnerable populations. Harmful environmental changes are taking place in an increasingly globalized, industrialized and interconnected world, with a growing global population and unsustainable production and consumption patterns. The degradation of ecosystem services is narrowing development opportunities and could threaten future human well-being.

The prospect for improving human well-being is dependent on the capacity of individuals, institutions, countries and the global community to respond to environmental change. Innovative and transformative policies and technologies could assist society to overcome current barriers to achieving sustainable development. A more balanced approach to addressing environmental, economic and social concerns could also help.

Even though national and regional responses have begun to address environmental challenges, a polycentric governance approach is needed to attain effective, efficient and equitable outcomes. This approach recognizes a diversity of settings and assumes multiple centres of activity and authority, which, given the range of capacity needs, are critical to generate adequate responses to environmental challenges.

Environmental responses are attracting greater financial flows but these still fall short of the resources needed. The Organisation for Economic Co-operation and Development countries' aid commitments to the three UN conventions on biodiversity, climate and desertification grew from US\$5.1 billion in 1999 to US\$17.4 billion in 2009. The same countries allocated US\$22.9 billion to official development assistance for climate change mitigation and adaptation in 2010. Yet, the cost for developing countries to adapt to climate change alone has been estimated at US\$70–US\$100 billion a year for 2010–2050.

Global responses have a key role to play in promoting coordination, integration and systemic considerations. They can help set goals and develop metrics, support capacity enhancement, generate financial resources and facilitate the sharing of best practices. At the global level, a results-based approach to advancing human well-being and environmental sustainability could be anchored in the strategies and associated response options that follow below. The United Nations Conference on Sustainable Development (Rio+20) provides an opportunity to take stock, assess achievements and shortcomings, and begin to stimulate transformative global responses. The suggested strategies are part of a systemic approach, which could highlight barriers and inform adjustments, learning and continuous improvement.

Global response options

Framing environmental goals in the context of sustainable development, and monitoring outcomes. A process could be initiated to revisit and extend the Millennium Development Goals in the form of sustainable development goals centred on human well-being, with measurable metrics, keeping in mind the need for the coherent and balanced integration of environmental, economic and social dimensions.

Enhancing the effectiveness of global institutions. The sustainable development agenda could be elevated and mainstreamed into the core of decision making within the UN system, supported by enhanced cooperation with and between environmental, economic and social institutions.

Investing in enhanced capacities for addressing environmental change. Delivering results will require strengthened national capacities to develop, deliver and implement strategies to combat environmental degradation. A UN system-wide framework for capacity building could strengthen the national capacities required to implement specific multilateral environmental agreements.

Supporting technological innovation and development. Mechanisms from collaborative

research and development (R&D), knowledge platforms and global prize funds for environmentally sound technologies could be scaled up to accelerate the innovation and diffusion of technologies critical to the transition to a global green economy.

Strengthening rights-based approaches and access to environmental justice through recognition, enforcement and implementation in global and regional institutions. Principle 10 of the Rio Declaration on Environment and Development recognizes the importance of procedural environmental rights. For the past 20 years regional experience has demonstrated that such rights provide a basis for citizens to participate in safeguarding both human and environmental well-being.

Deepening and broadening stakeholder engagement. The private sector and civil society could be invited to explore the use of new information and communications technology to build a stakeholder web to enhance access to information and stakeholder engagement, and to mobilize new partnerships. An intergenerational assembly could provide an opportunity for future leaders and sustainability champions to interact and foster a joint vision for a sustainable future.

INTRODUCTION

Global environmental change such as climate change and the degradation of ecosystem services is heightening risks and reducing opportunities, especially for poor and vulnerable populations. Such change is taking place in an increasingly globalized, urbanized, interconnected and fast-moving world amidst shifting geopolitical power balances. Burgeoning flows of goods and services, capital and technology, information and labour all fuel a growing global population with implications for patterns of consumption and production. The scale and persistence of global environmental problems require sustained collective efforts to meet internationally agreed goals. Responses at national and regional levels are already available, but addressing the underlying drivers of global environmental degradation, rather than the pressures or symptoms, would require the sustained evolution of rules, institutions, economic systems and values to transform the current approach to environmental management. In addition, adequate and stable financial resources, political commitment, knowledge and operational capacity are also imperative. But these enabling conditions and the requisite governance mechanisms and structures vary considerably between regions and countries.

There is no single, overarching solution to environmental challenges. Yet many environmental problems, particularly those pertaining to the global commons, can only be addressed through collective action. Global responses are also critical for enhancing national capacity and facilitating the uptake of solutions among nations with regional commonalities. Responses at national and global levels interact and generate incremental, structural and transformational change (Putnam 1988). The engagement of non-state actors at different levels has, for example, fostered knowledge exchange and strengthened capacities. Policy changes

adopted by individual governments can transmit normative signals, exert peer pressure or encourage learning and replication – providing incentives for the collective adoption of international norms, rules, laws or policies. In several areas – climate, biodiversity, chemicals – global environmental treaties have set new goals, standards and expectations for state performance. The embodiment of these goals and standards in national laws, regulations and action plans in turn induces member states to comply. Global responses integrating a mix of strategies, values, principles, investments and measures supported by a diverse range of capacities can enable national and regional choices.

The capacity of the international community to deliver solutions to environmental problems is a function of its ability to establish and maintain flexible and holistic governance and management frameworks at global and national levels. Ideally, frameworks to accomplish these objectives should be based on clear and measurable goals, verifiable strategies, and strong monitoring and evaluation mechanisms. Adaptive governance is an emerging approach for addressing multi-dimensional, ever-evolving environmental and socio-economic challenges that exhibit a high degree of uncertainty (Gunderson *et al.* 2010; Dietz *et al.* 2003); and it facilitates decision making in complex systems under the circumstances of abrupt, disorganizing or turbulent change (Folke *et al.* 2005). In addition, trust building, involving stakeholder participation and mechanisms for feedback, could help ensure that change is both sustainable and equitable (Kydd 2005; Levi-Faur 2005; Braithwaite and Drahos 2000).

Although results-based management is most commonly used to manage internal organizational processes, it is a perspective that also enhances transparency and accountability when focused on international processes. Modified to reflect the global scale,



Secretary-General Ban Ki-moon addresses the opening high-level segment of the UN Climate Change Conference (COP16) in Cancún, Mexico, urging governments to mobilize the highest level of political will, and to deliver progress towards an eventual international treaty. © Paulo Filgueiras/UN Photo

a systematic and comprehensive results-based global approach could be anchored in six response options:

- framing environmental goals in the context of sustainable development;
- enhancing the effectiveness of global institutions;
- investing in enhanced capacities for addressing environmental change;
- supporting technological innovation and development;
- strengthening rights-based approaches and access to environmental justice; and
- deepening and broadening stakeholder engagement.

These strategies build on the lessons learned and opportunities identified in *GEO-5*. Aligning goals and strategies within a common vision lies at the basis of an integrated approach, which could be instrumental in improving the effectiveness and efficiency of responses at global, national and local levels. The following section assesses the state of global responses to date and highlights gaps and barriers that have hindered the collective ability to manage environmental change. Proposals are then made for results-based responses anchored in the many different centres of governance for addressing global environmental challenges and advancing human well-being.

STATE OF GLOBAL RESPONSES

Over the past 40 years a wide range of responses to environmental problems has been implemented as a set of interacting systems with multiple actors at different scales. Conventional responses at national and global levels include the creation of rules, laws and institutions, with international organizations established to serve as conveners at the global scale; as arbiters for exchange, sharing experiences, articulating interests and aggregating preferences; as sources of expertise; and as enablers of a broader social dialogue (Bearce and Bondanella 2007; Esty and Ivanova 2002; Bartlett *et al.* 1995). The public sector accounts for about 30 per cent of gross domestic product (GDP) worldwide (World Bank 2011) and is an essential tool in creating enabling conditions for societal change, with public-private partnerships and social networks bringing new opportunities for engagement. Notwithstanding all the good intentions and efforts, however, the Earth and its sub-systems are showing signs of considerable degradation.

The global response framework: from isolation to integration

Currently, environmental problems are rarely tackled in an integrated fashion. The connectedness of climate change, water resources, desertification and biodiversity loss, for example, makes isolated governance responses inadequate and potentially counterproductive. A more integrated approach to substantive issues and spatial scale demands a new adaptive governance framework.

Global environmental issues can be divided into those that are common to many or most countries, including pollution of water bodies or solid waste disposal, and those that affect the global commons such as pollution of the global atmosphere or the

open seas. Not all environmental issues require a global scale of governance. Some can be addressed through cooperation between a few countries, for example the transboundary water concerns of the Mekong or Zambezi rivers or networks of protected areas for endangered marine species with limited ranges. However, problems of the global commons – ones that cumulatively lead to negative global trends and/or whose drivers are essentially global – often require international treaties to ensure collective global action. Relationships between international and national scales of governance tend to be structured as:

- bottom-up: countries harmonize national policy, with the policy space created determining the ability to accommodate international commitments;
- top-down: thresholds, targets and principles are decided at global level and then translated into national-scale implementation;
- multi-level: policy development that addresses the complex relationships between the different levels of governance and the actors involved.

Governments have used international institutions as key instruments when global action is required. Cooperative behaviour is enhanced by changing the environment within which collective agreements arise, increasing awareness about particular issues, and enhancing national capacity to deal with the problems in question (Haas *et al.* 1993). In the environmental field, international institutions have channelled information, created norms and principles, provided training and financial resources to affected countries, and catalysed actions at multiple levels of governance (Young 2010, 2002). The UN General Assembly formally initiated the international environmental agenda through Resolution 2398 (XXIII) on 3 December 1968, calling for the convening of the United Nations Conference on the Human Environment, the 1972 Stockholm Conference. The assembly framed the environmental challenge as an integral part of economic and social development, with UNEP established as the institutional mechanism to ensure follow-up to the environmental dimension of the conference outcome. The promotion and coordination of environmental activities within the whole UN system was one of the core functions governments delegated to UNEP. With environmental awareness on the rise, the new programme also initiated a number of new international agreements aiming to address emerging environmental issues.

Environmental activities have become an integral component of the UN system, represented by its programmes, agencies, secretariats and coordinating mechanisms. Table 17.1 identifies core instruments anchored within the UN system's multi-sectoral environmental response regime as they relate to the environmental issues assessed in Part 1 of *GEO-5*. The many instruments at the regional level, such as international agreements on transboundary waters, are not included. Nonetheless, the table illustrates that the competence and capacities of the environmental institutions in the UN system are distributed among its different entities and policy sectors, reflecting the growing importance of various governing bodies across the system.

Table 17.1 Core elements of the UN system-wide environmental response regime

Theme	Instruments
Sustainable development	<p>International soft law instruments and institutions: Rio Declaration on Environment and Development and Agenda 21 from the United Nations Conference on Environment and Development (UNCED, 1992); Johannesburg Plan of Implementation (JPOI); Millennium Development Goals (MDGs); Commission on Sustainable Development (CSD); and UN system entities</p> <p>Science processes: Group on Earth Observations and its Global Earth Observation System of Systems (GEOSS); Inter-Agency and Expert Group (IAEG) on MDG indicators coordinated by the United Nations Statistics Division</p> <p>Inter-agency bodies: Chief Executive Board for Coordination (CEB); High Level Committee on Policy (HLCP); Executive Committee on Economic and Social Affairs (ECESA)</p>
Environment broadly defined	<p>International soft law instruments and institutions: Declaration and Programme of Action from the Stockholm Conference on the Human Environment; UNEP; Global Environment Facility (GEF); the environment-related portfolio of 44 UN system entities including the United Nations Development Programme (UNDP), Food and Agriculture Organization of the United Nations (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Bank Group.</p> <p>Science processes: Global Environment Outlook (GEO) (UNEP); International Panel for Sustainable Resource Management (UNEP); Millennium Ecosystem Assessment (MA)</p> <p>Funds: Environment Fund (UNEP); GEF Trust Fund; World Bank environmental and natural resource management (ENRM) lending portfolio; the environment portfolio of other UN Multi-Donor Trust Funds (MDTF) administered by UNDP</p> <p>Inter-agency bodies: Environment Management Group (EMG)</p>
Atmosphere	<p>Multilateral environmental agreements: Vienna Convention (1985) and Montreal Protocol (1987); United Nations Framework Convention on Climate Change (UNFCCC, 1992) and Kyoto Protocol (1997)</p> <p>International soft law instruments and institutions: a broad range of UN system entities, including FAO, the United Nations Conference on Trade and Development (UNCTAD), UNDP, UNEP and the World Meteorological Organization (WMO) as well as the World Bank have programme activities related to atmosphere</p> <p>Science processes: Technology and Economic Assessment Panel (TEAP) under the Montreal Protocol (UNEP); Intergovernmental Panel on Climate Change (IPCC) administered by WMO and UNEP; World Climate Research Programme (WCRP)</p> <p>Funds: Montreal Fund (UNEP); GEF is the financial mechanism for the UNFCCC; Clean Development Mechanism (CDM); Special Climate Change Trust Fund (SCCF), Adaptation Trust Fund and Least Developed Countries Trust Fund (LDCF) administered by the GEF; Environment Fund (UNEP)</p> <p>Inter-agency bodies: Working Group on Climate Change under the High-Level Committee on Policy (HLCP) of the Chief Executives Board for Coordination (CEB), and UN Energy</p>
Land	<p>Multilateral environmental agreements: United Nations Convention to Combat Desertification (UNCCD, 1994)</p> <p>International soft law instruments and institutions: A broad range of UN system entities, including FAO, the International Fund for Agricultural Development (IFAD), UNDP, UNEP, UN-Habitat, World Health Organization (WHO), World Food Programme (WFP) and the World Bank, have programme activities on land-related issues</p> <p>Science processes: Covered by the Global Environment Outlook (GEO) and Millennium Ecosystem Assessment (MA).</p> <p>Funds: GEF as the financial mechanism for UNCCD; Global Mechanism (UNCCD); Environment Fund (UNEP)</p> <p>Inter-agency bodies: EMG Issue Management Group on Land</p>
Water	<p>Multilateral environmental agreements: United Nations Convention on the Law of the Sea (UNCLOS, 1994); International Convention for the Prevention of Pollution from Ships (MARPOL, 1973); International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC, 1990); Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LDC, 1972); International Convention for the Control and Management of Ships' Ballast Water and Sediments (2004); United Nations Convention on the Law of the Non-navigable Uses of International Water Courses (1997) (not entered into force)</p> <p>International soft law instruments and institutions: International Oceanographic Commission, administered by UNESCO; Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) administered by UNEP; FAO Code of Conduct for Responsible Fisheries; a broad range of UN system entities including FAO, the International Maritime Organization (IMO), UNDP, UNEP, UNESCO, WMO and the World Bank, have programme activities related to oceans and water</p> <p>Science processes: Regular process for global reporting and assessment of the state of the marine environment (UNCLOS); Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP); World Water Development Report (UNESCO); and covered by the GEO and the MA</p> <p>Funds: GEF international waters focal area; Environment Fund (UNEP)</p> <p>Inter-agency bodies: UN-Oceans and UN-Water</p>
Biodiversity	<p>Multilateral environmental agreements: Ramsar Convention on Wetlands (1971); World Heritage Convention (WHC, 1972); Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1973); Convention on Migratory Species (CMS, 1979); Convention on Biological Diversity (CBD, 1992) and the Cartagena Protocol (2000); Treaty on Plant Genetic Resources (ITPGRFA, 2001)</p> <p>International soft law instruments and institutions: Commission on Genetic Resources for Food and Agriculture under FAO; United Nations Forum on Forests (UNFF); a broad range of UN system entities, including FAO, IMO, UNDP, UNEP, UNESCO, United Nations University (UNU), United Nations World Tourist Organization (UNWTO), WHO, WMO, World Trade Organization (WTO) and the World Bank, have programme activities related to biodiversity</p> <p>Science processes: Intergovernmental science-policy platform on biodiversity and ecosystem services (IPBES); Global Biodiversity Outlook (CBD); Global Forest Resource Assessment; State of the World Fisheries and Aquaculture; State of the World's Plant Genetic Resources for Food and Agriculture; State of the World's Animal Genetic Resources for Food and Agriculture; International Assessment on Agricultural Science and Technology for Development (IAASTD), and covered by GEO and the Millennium Ecosystem Assessment (MA)</p> <p>Funds: GEF as the financial mechanism for CBD; Environment Fund (UNEP)</p> <p>Inter-agency bodies: EMG Issue Management Group on Biodiversity; Biodiversity Liaison Group</p>

Table 17.1 Core elements of the UN system-wide environmental response regime *continued*

Theme	Instruments
Chemicals and waste	<p>Multilateral environmental agreements Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989); Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998); Stockholm Convention on Persistent Organic Pollutants (POPs, 2001).</p> <p>International soft law instruments and institutions: Negotiation of a convention on mercury (UNEP); Strategic Approach to International Chemicals Management (SAICM); a range of UN entities, including FAO, International Labour Organization (ILO), UNDP, UNEP, United Nations Industrial Development Organization (UNIDO), United Nations Institute for Training and Research (UNITAR), WHO and the World Bank, have programme activities related to chemicals</p> <p>Science processes: Covered by GEO</p> <p>Funds: GEF is the financial mechanism for the POPs Convention; Environment Fund (UNEP)</p> <p>Inter-agency bodies: Inter-Organization Programme for the Sound Management of Chemicals (IOMC)</p>

While the level of environmental integration both within and outside the UN system is significant – representing an important source of competence and capacity – the integrated governance of the diverse and multi-sectoral environmental field is complex and, at times, problematic (Oberthür and Stokke 2011), especially for sustainability goals.

At times it seems that calls to simplify are at odds with a need to capture system complexity: on one hand, governments have requested that the United Nations foster synergies between compatible multilateral environmental agreements and identify guiding elements for realizing such synergies while respecting the autonomy of the conferences of the parties (UNEP 2011e). There have been several attempts to integrate these diverse efforts, including clustering the chemical conventions by convening simultaneous Extraordinary Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions in February 2010 in Bali, Indonesia. There is also coordination between the three Rio conventions – on climate, biodiversity, and desertification – under the Joint Liaison Group and the 44 UN entities of the Environment Management Group, the UN-wide coordination body for the environment (UNEP 2011f).

On the other hand, interrelationships and interdependencies exist between all levels of governance and intervention – from the individual and community scale to the global level. Multiple causal mechanisms are at work, including normative influences, prices and markets, political pressure and incentives, persuasion, social learning and the science-policy interface (Simmons *et al.* 2006). Each may operate in isolation or with others, build pressures over time and in combination. Multi-scale interventions can be both counterproductive and mutually enforcing. In such interventions, countries can adopt policies that they then encourage others to adopt as international norms and/or law, yet those policies may influence others adversely. Once in place, the norms and economic incentives may affect behaviour more broadly. They may also engender future changes to legal regimes, normative signals, social learning and resource transfers. In addition, diverse actors including members of civil society organizations, scientific networks and research institutions, international organizations, faith communities and the private sector are engaged not only in demanding but also in providing global responses (Slaughter



The late Mrs Indira Gandhi, then Prime Minister of India, addressing the UN Conference on the Human Environment in Stockholm on 5 June 1972.

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2004; Commission on Global Governance 1995; Rosenau and Czempiel 1991; Keohane and Nye 1971).

Legal and policy framework

As Part 1 of this report illustrates, it is difficult to measure success in achieving environmental goals, especially if those goals are not quantified. Environmental treaties form the core legal and policy framework for the global environment and aim to set appropriate goals for the international community. While environmental laws are legally binding, the lack of specific targets and timetables often implies that these are, in effect, soft law guidelines rather than hard law frameworks. Some treaties are also difficult to implement because of the lack of capacity in individual countries. In addition, verifying change in environmental quality and attributing changes to specific policy measures is challenging without robust and comparable data, especially at the global level.

Environmental treaties

Today, there are more than 500 international treaties and other agreements that relate to the environment, of which 323 are regional and 302 date from 1972 and the early 2000s. The core of the global environmental legal framework, however, is made up of a more limited number of treaties with a growing number of ratifications (Figure 17.1). Most of the new agreements have established new, independent bureaucracies and this proliferation has fragmented authority in international environmental governance. Thus, while the creation of the various environmental conventions and protocols can be viewed as an achievement, it also raises the need for continuing support in developing countries when national administrations become overloaded with reporting requirements and countless international meetings (Najam 2005; Biermann 2004).

A distinguishing feature of the more effective treaties is their development through the interplay of organized scientific communities (Haas and Stevens 2011) and a moderate to strong international institution (Biermann and Siebenhüner 2009; Haas 2007). The scientific community informs treaties that reflect an understanding of the problems and their solutions, while the institutions integrate the science into draft treaties, help promote the ideas of the scientists, coordinate meetings, compile information repositories, provide incentives to states to participate in negotiations and assist member states in complying with their obligations. Innovation in technology, networking, coordination and knowledge management can help this process. Chapter 16 has also pointed to the critical role

of planning in creating the conditions suitable to coordinate integrated, complex or multi-procedural outcomes.

The Montreal Protocol on Substances that Deplete the Ozone Layer is one example of such a success. Under this, countries have almost totally eliminated the production of chlorofluorocarbons (CFCs) in just 20 years. The protocol's success resulted from:

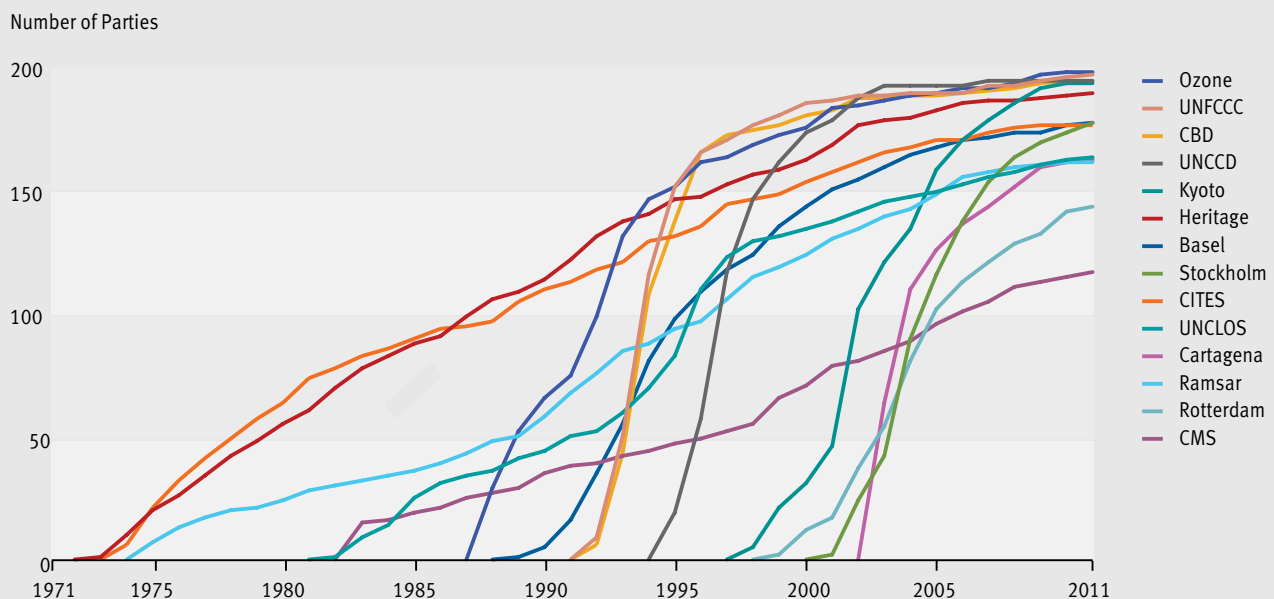
- scientific consensus on the problem;
- public awareness and pressure;
- existence of a cost-effective substitute;
- private sector buy-in;
- leadership from both an international institution, UNEP, and a national agency, the US Environmental Protection Agency;
- a concrete plan of action; and
- mobilization of financial resources in developed countries to assist developing countries and economies in transition.

Unfortunately, one of the replacement chemicals, hydrofluorocarbons, has a high global warming potential and now needs to be phased out to address climate change – illustrating the interconnectivity of environmental problems. Similarly, cold temperatures in the upper atmosphere, possibly due to climate change, are resulting in increased loss of ozone, particularly over the Arctic.

Capacity building and diffusion of policy tools

To ensure a responsive and cohesive approach to meeting country needs and achieving environmental results and

Figure 17.1 Growth in ratification of environmental treaties, 1971–2011



Source: UNEP Environmental Data Explorer, compiled from various MEA Secretariats <http://geodata.grid.unep.ch>

Box 17.1 Diffusion of policy tools worldwide – the case of strategic environmental assessment

One widely used policy tool across all regions is strategic environmental assessment, which helps to integrate national environmental policies. This goes beyond environmental impact assessments to ensure that environmental, social and economic information is incorporated into decision making in a unified manner. The process involves analysing the likely impacts of decisions; fostering public participation; developing and comparing alternatives; recording the impact, options and comments from the public in a report; ensuring that the report is taken into account when making final decisions; and informing the public about the decisions.

Strategic environmental assessments were initially implemented in Europe, but have since spread to many

countries, increasingly becoming an obligatory part of national legislation (OECD 2012). Experiences in Africa, for example, show that this type of assessment has to go beyond the project level and be carried out on the level of policy plans to become effective. In Guinea, it has been used to develop the co-management of reserved forests; in Zambia and Zimbabwe, the International Union for the Conservation of Nature (IUCN) supported its use for planning developments around Victoria Falls – a World Heritage site; Morocco used it to provide an analysis of legal, regulatory, and institutional aspects of environmental impacts in the large-scale irrigation sector (Economic Commission of Africa 2005); while in Ghana it has improved the management of mangrove forests (Sampong 2004).

outcomes, developing and implementing a system-wide capacity-building framework is crucial (OECD 2011b). Studies from international organizations (Baser and Morgan 2008), academics (Eyben 2006), non-governmental organizations (Lipson and Warren 2006) and other practitioners (James and Wrigley 2007) suggest that capacity building:

- is a complex human process based on values, emotions and beliefs;
- involves the main actors taking responsibility for the process of change;
- involves shifts in power and identity;
- involves changes in relationships between elements of human systems;
- is uncertain and unpredictable in its outcomes; and
- is strongly shaped by culture and values (Woodhill 2010).

This implies greater consideration and recognition of the less visible aspects of capacity building, such as values, legitimacy, identity and self-confidence, as well as other non-monetary forms of motivation (Aragón and Macedo 2010). It also involves improving access to key resources such as finance, technology and knowledge that underpin capacity and capabilities. Capacity building can also be advanced by building on lessons learned from a diffusion of policy tools. Strategic environmental assessments are an example of diffusion of policy instruments where timing, public participation and credibility of policy analysis stand out as important determinants of success (Runhaar and Driesen 2007).

Financial flows

Expanding the donor base, increasing the availability and accessibility of funds, and ensuring stable and predictable financial flows are among the top priorities in international environmental governance (UNEP 2010). The first financing mechanism designed explicitly and exclusively for global environmental purposes was the Environment Fund. Created in 1972 through UN General Assembly Resolution 2997 as one

of the core elements of the new environment programme, the Environment Fund was intended to finance new environmental initiatives within the UN system and to assist developing countries. Today, environmental financing comes in the form of environmental aid from bilateral and multilateral donors, including through funds dedicated to specific environmental concerns such as the Montreal Fund to support ozone-related work, climate funds to support mitigation and adaptation, funds to combat deforestation, and others. The Global Environment Facility (GEF) is the largest funder of projects that specifically seek to improve the global environment through support for the additional costs of transforming projects with national benefits into projects with global environmental benefits.



Rapid developments in information technology over the past 20 years have revolutionized many aspects of life, including the development of truly global financial markets. © Robert Churchill/iStock

Box 17.2 Identifying financial flows for environmental response

It is currently difficult to get a complete picture of the amount of resources invested in environmental activities at normative and operational levels. Financial resources are often counted several times as funding flows from one organization to another or between funding categories. This double counting is also due to lack of distinct definitions and the inherent overlaps between categories of spending. Reported financial figures are often not fully comparable because the financial year and budget procedures vary among institutions. Furthermore, since much of the investment in environmental activities happens through integrating environmental perspectives and issues into policies, programmes and projects, it is often difficult to distinguish environmental activities from sectoral ones. For example, as much as 85 per cent of the World Bank's environmental and natural resource management (ENRM) projects are currently being managed by non-environmental sectors in the bank (UNEP 2011c). Several important developments illustrate annual financial flows for responses to environmental challenges.

- The carbon market stalled in 2010 at US\$142 billion after rapid growth, partly because of lack of regulatory clarity. The figure includes the value of the primary and secondary Clean Development Mechanism (CDM) markets, which respectively stood at US\$1.5 billion and US\$18.3 billion (World Bank 2011).

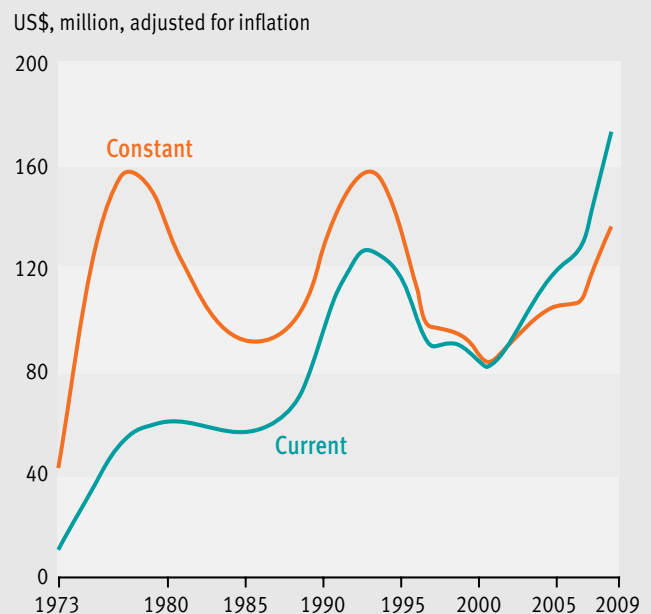
- Countries of the Organisation for Economic Co-operation and Development (OECD) allocated the following official development assistance (ODA):
 - up to US\$22.9 billion, 15 per cent of total ODA, to climate change mitigation and adaptation in 2010 (OECD 2011c);
 - US\$4.3 billion to biodiversity in 2009 (OECD 2011a);
 - US\$1.9 billion to desertification in 2009 (OECD 2011a).
- UNEP (2011c) reports the following indicative levels of financial environmental flows:
 - annual pledges to the GEF for the fifth replenishment agreed in 2010 amount to US\$1.1 billion;
 - the World Bank's environmental and natural resource management (ENRM) portfolio, including the GEF, in 2008 reached US\$3 billion;
 - the United Nations Development Programme's (UNDP) expenditures on environmental activities, including the GEF, in 2009 were US\$1.1 billion;
 - UNEP's budget for 2010 was US\$0.5 billion including the GEF, the Environment Fund and the Multilateral Fund for the implementation of the Montreal Protocol;
 - the combined annual budget for the three Rio conventions in the period 2008–2011 was of the order of US\$0.1 billion.

Yet, long-standing commitments from developed countries to improve access to finance for developing countries remain largely unfulfilled, and insufficient and unpredictable financial resources continue to constrain effective environmental governance at all levels (OECD 2011b). It is currently difficult to identify the financial flows for environmental responses (Box 17.2) as there is no tracking system to monitor resources invested in environmental activities by the United Nations and other international institutions (UNEP 2011e). A review of the existing data shows that while there are significant financial investments in climate change and other environmental initiatives, they fall well short of the scale required to address the challenges (Behrens 2009; Müller 2009; UNDP 2007). For example, the World Bank estimates that the price tag between 2010 and 2050 for adapting to an approximately 2°C warmer world by 2050 will be in the range of US\$70 billion to US\$100 billion a year (World Bank 2010a).

The Environment Fund

The Environment Fund is the principal source of financing for the implementation of UNEP's programme, and was established by the UN General Assembly in 1972. Altogether, 181 countries have made at least one voluntary contribution in the period between 1973 and 2011, with 12 countries having maintained their regular annual contributions over the whole period (UNEP 2012). The four-decade trend depicted in Figure 17.2, however, shows that the original intention to grow the fund proportionally

Figure 17.2 The Environment Fund, 1973–2009



Source: Ivanova 2011

Table 17.2: Financial resources available to selected global multilateral environmental agreements, 2010

Cluster: Atmosphere	US\$, million
Convention on Long-range Transboundary Air Pollution (CLRTAP)	3.62
Vienna Convention on Substances that Deplete the Ozone Layer	4.84
United Nations Framework Convention on Climate Change (UNFCCC)	107.90
Total	116.36
Cluster: Biodiversity	
Convention on the Conservation of Migratory Species of Wild Animals (CMS)	0.33
Cartagena Protocol on Biosafety	2.76
Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention)	4.67
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	5.07
Convention on Biological Diversity (CBD)	12.36
Total	25.19
Cluster: Chemicals and wastes	
Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention)	0.93
Convention on Persistent Organic Pollutants (Stockholm/POPs Convention)	5.47
Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention)	5.84
Total	12.24
Other agreements	
Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention)	1.95
United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD)	5.90
Total	7.85
TOTAL	161.64

Source: Ivanova and Delina forthcoming in 2012.

with intensifying environmental problems has not been truly realized. While it shows some growth in current terms, in real terms (adjusted for inflation), the fund fell by 44 per cent between 1977 and 1987 and is only now reaching the US\$160 million per biennium that UNEP attracted in the 1970s and again in the run-up to the 1992 Rio Earth Summit (Ivanova 2011).

Multilateral environmental agreements

As discussed, governments created multilateral environmental agreements when new environmental issues emerged. Table 17.2 offers an overview of financial flows for the secretariats of MEAs by cluster – the GEF provides funding for project-level work in these clusters.

The Multilateral Fund for the Implementation of the Montreal Protocol

Funding for implementation of most multilateral environmental agreements comes through special funds, the largest of which is the Multilateral Fund for the Implementation of the Montreal Protocol. Created in 1990 and administered by UNEP, it helps developing countries comply with the protocol's

control measures. It has been replenished eight times since the beginning of its operation in 1991, with contributions from the industrialized countries, including countries in transition, assessed according to the UN scale of assessment. The significant financial resources devoted to the ozone treaty – during 1991–2011 governments pledged US\$2.8 billion to the Montreal Protocol (UNEP 2011f) – can be seen both as a reason for and an indicator of the treaty's effectiveness in eliminating the production and consumption of most CFCs. Significant initial investment was critical to the fund's success, and this initial success stimulated sustained investment in the longer-term.

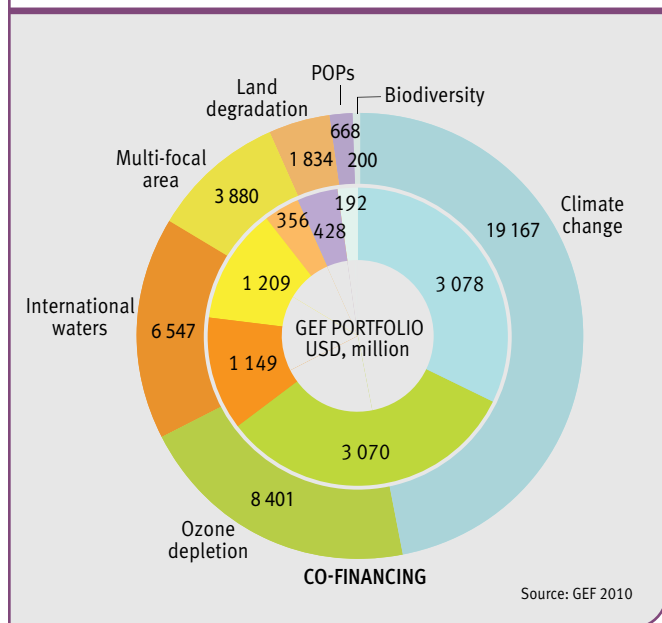
The Global Environment Facility

Established as a US\$1 billion pilot programme in the World Bank in 1992, the GEF has evolved to become the financial mechanism for several multilateral environmental agreements, including UNFCCC, the Convention on Biodiversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) and the Stockholm Convention. Over the past 20 years, the GEF has allocated US\$10 billion for more than 2 800 projects in more than 168 developing countries and economies in

transition, and more than 13 000 small grants totalling US\$634 million have been made directly to civil society and community-based organizations (GEF 2011). Although the GEF was initially a partnership between the World Bank, UNDP and UNEP, today it is in partnership with ten UN agencies, 182 civil

society organizations and the private sector. This diversity of participation is directly related to the GEF's co-financing requirement, through which it has leveraged more than US\$47 billion of funds additional to those available through UN and World Bank channels since 1992. The GEF's operational arrangements have also evolved, with a new system for the transparent allocation of resources (STAR) implemented in 2010. That same year, donors pledged more than US\$4.3 billion in replenishment for the period 2010–2014 (GEF-5), representing a 55 per cent increase in resources over GEF-4 (GEF 2010). During 1991–2010, the GEF invested more than US\$50 billion, US\$40.7 billion of which came from co-financing from development partners – almost half of these funds were used for climate change mitigation and adaptation (Figure 17.3). In 2010 alone, the GEF disbursed a little over US\$5 billion for its work; 81 per cent of this amount was from co-financing (GEF 2010).

Figure 17.3: GEF portfolio and co-financing allocations by focal area, 1991–2010



Environmental official development assistance

Close to US\$100 billion of aid, an average of 15 per cent of the global total, was committed to the environment in 1998–2007 (Castro and Hammond 2009), with the most significant source of environmental financing being official development assistance (ODA) from the OECD countries. OECD countries' aid commitments targeted at the objectives of the three Rio conventions combined grew from US\$5.1 billion in 1999 to US\$17.4 billion in 2009 (Figure 17.4), largely because of increases in funds targeted at climate change. The challenges of proliferation of institutional mechanisms, however, are acute in the environmental field.

Box 17.3 International aid for the environment

Environmental aid is no different from aid to other sectors: there are too many actors, adding to the administrative burden on countries and donors, and impeding aid effectiveness. The average partner country has 17 donors out of the 23 members and 10 major multilateral agencies that report to the OECD's Development Assistance Committee (DAC). Adding up the number of donors in each country for the 153 countries that receive ODA shows that there are 2 617 donor/recipient partnerships, all of which need to be maintained through policy dialogue, planning, coordination, accounting and reporting. In 1 571 of these partnerships – 60 per cent – donors are providing environment aid.

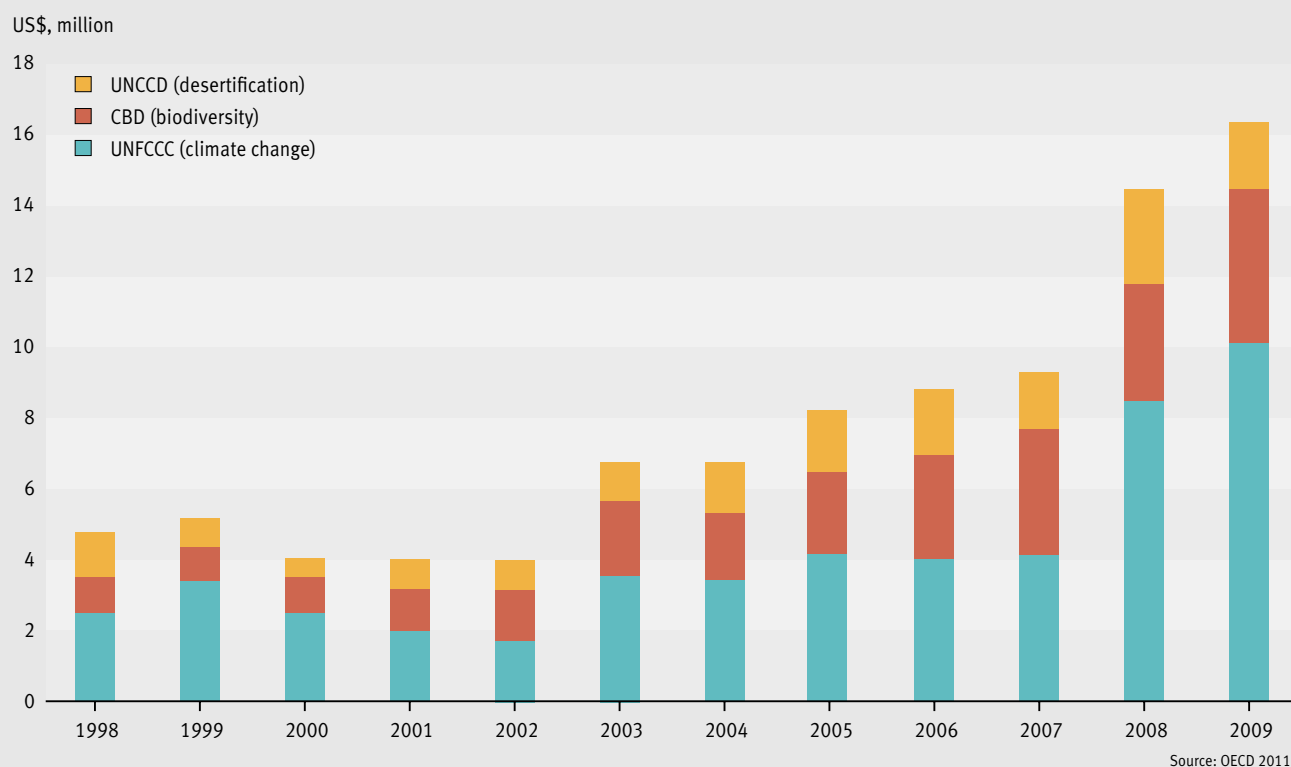
The individual size of the projects and programmes that constitute these partnerships varies enormously. At one extreme, four donors annually provide over US\$10 million of core environmental aid on average per partner, while at the other extreme there are 11 donors whose average aid per partner is less than US\$1 million. Moreover, the number of small partnerships has increased faster in the past decade than the larger ones. This plethora of partnerships

is just a glimpse of the complexity of the architecture of environmental aid. Each donor operates through an average of three agencies using literally thousands of channels. There are also 30 or more bilateral donors that are not members of the DAC, and dozens of small multilateral agencies operating environmental aid programmes.

Official development finance for the environment is big business, with thousands of actors and annual commitments exceeding US\$15 billion. But, in common with the health sector, the number of actors and channels needs to be rationalized through a better division of labour. Otherwise, as aid to the environment is scaled up in response to the challenges of climate change, there is a danger that developing countries will be further overburdened with a plethora of competing actors, funds and initiatives, which will undermine the effectiveness of the aid being provided and limit developmental and environmental results.

Source: Castro and Hammond 2009

Figure 17.4 OECD countries' aid commitments to UNCCD, CBD and UNFCCC, 1998–2009



Stakeholder engagement: from consultation to participation

Traditionally reserved for governments, the global arena is now open to a broader range of civil society actors, including non-governmental organizations, businesses, faith groups and academic institutions (Willetts 2011; Gemmill and Bamidele-Izu 2002). Over the years, the role of stakeholders in global governance has shifted from simply being consulted in the 1960s, to serving as back-stage managers in the 1970s, to being protected and empowered in the 1980s, to being invited as partners in the 1990s, to the present state as practitioners carrying out initiatives on the ground. This transition has been described as one of increasing engagement and empowerment (Gupta 2003). Stakeholders have had significant impact, from their role in requesting advisory opinions from the International Court of Justice on the legality of nuclear weapons (Yamin 2001), to involvement in environmental litigation (Beyerlin 2001). In global water governance, non-state actors have even taken the lead, filling an institutional void and responding to an emerging need for a global response to water problems (Varady and Iles-Shih 2009; Pahl-Wostl *et al.* 2008).

National and global responses to environmental challenges require effective engagement of multiple stakeholders – at different levels of governance – in the collective definition, adoption and implementation of solutions (Parts 1 and 2). At the global level, collaboration between actors comes into play

at different stages of policy intervention, including agenda setting and framing; rule-making; enforcement; and assessing resilience (Underdal 1998; Haas 2000). By participating in global governance, civil society groups have the opportunity to communicate concerns from local stakeholders to international organizations. Additionally, civil society groups facilitate informed public debate by collecting and disseminating information about, and critical evaluations of, international governance (Steffek and Nanz 2008).

Participatory approaches can be transformational (Hickey and Mohan 2005; Chambers 1997; Mohan 2002) or instrumental (Neef 2008; Hooper 2005; Mohan 2002; Mayo and Craig 1995). In the information age, decision makers possess a plethora of new means to engage stakeholders. Social networks, for example, can be valuable if unpredictable assets for engaging citizens in active, emergent and functional communities of practice. Crowdsourcing, the act of sourcing tasks normally performed by individuals by issuing an open call, is increasingly used to encourage community-based design and democratic participation. Iceland recently crowd-sourced a wiki/open-source version of its constitution and the result was a proposal for several changes with broad public support (Constitutional Council of Iceland 2011). In fact, non-governmental organizations have been critical to the development and existence of an open, publicly accessible internet conducive to democratic global engagement (Willetts 2011).

OPTIONS FOR GLOBAL RESPONSES

Effective responses to global environmental problems require a management framework that embodies a holistic and adaptive approach at all levels. Such a framework would include clear and measurable goals, verifiable strategies, and sound monitoring and evaluation mechanisms to address the root causes of emerging environmental problems, reducing environmental and social vulnerability, and accommodating multiple perspectives and solutions. At each stage, a multi-stakeholder interactive and iterative process would take place. This approach would facilitate the adoption of more realistic plans that can be continuously monitored, as well as promoting ownership and accountability (FAO 2010; UNDG 2010). Against this backdrop, this section assesses the rationale for the following six linked and mutually reinforcing response options:

- framing environmental goals in the context of sustainable development;
- enhancing the effectiveness of global institutions;
- investing in enhanced capacities for addressing environmental change;
- supporting technological innovation and development;
- strengthening rights-based approaches and access to environmental justice; and
- deepening and broadening stakeholder engagement.

Framing environmental goals in the context of sustainable development

Findings from *GEO-5* reinforce the importance of setting measurable goals and targets to effectively monitor progress and advance the sustainability agenda. Goal-setting arenas at the international level include not only public institutions such as the UN system but also civil society groups and private-sector associations, among others. Global goals need to be complemented by synergized regional, national and local goals, as well as concrete national action plans.

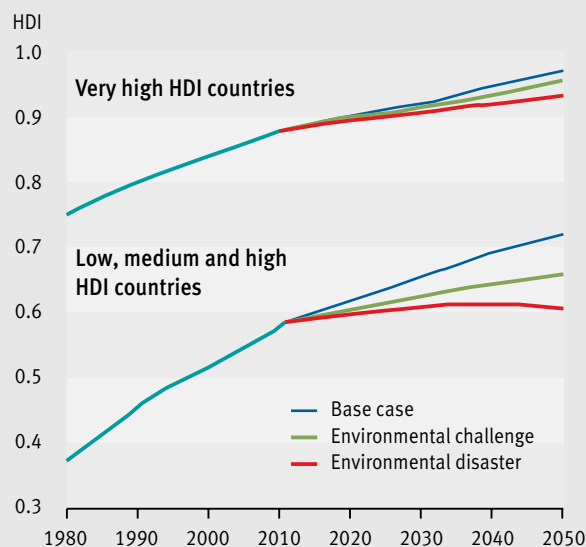
The Millennium Development Goals (MDGs) represent a results-based approach to advancing human well-being by setting and monitoring global development outcomes. Lessons should be learnt from the MDGs to implement a results-based framework with global goals for sustainable development, including the environment, and provide clear metrics for measuring and tracking progress. The MDG addressing environmental sustainability, MDG 7, for example, has proven challenging to implement in most countries, not least because of a lack of measurable indicators (World Bank 2005). The MDG 7 target of integrating the principles of sustainable development into country policies and programmes, and reversing the loss of environmental resources, is the only non-quantitative target in the MDG framework. As a result, according to the OECD (2008), MDG 7 “often gets pushed aside in the programmes of bilateral donors and international financing institutions”.

A more balanced set of goals for sustainable development could more effectively help address the risks that environmental change may pose to development. This can be illustrated by the scenario analysis from the *Human Development Report*

2011 (UNDP 2011), which shows that countries with a very high Human Development Index (HDI) score are projected to be less affected by environmental risks than those in all other categories (Figure 17.5), and demonstrates the need for a set of goals for sustainable development that promotes a balanced integration of its environmental, social and economic dimensions.

Effective monitoring of environmental outcomes requires establishing quantifiable metrics or conditional states that can be measured, such as the nitrate concentration in a body of water or the number of species inhabiting a specific area (Jordan *et al.* 2010). Methodological techniques – such as gap analysis, distance-to-target comparative analysis and benchmarking – can provide valuable insights into how countries perform relative to each other. Common indicators can facilitate knowledge transfer as they help governments at all levels to identify and share successful implementation strategies (Strange and Bayley 2008). The MEAs have been developing global goals that focus on articulating the desired state of the environment, reducing pressures and creating joint measures, together with technical assistance and capacity building to scale up implementation. Increasingly, these goals have been specified so that results can be identified through quantifiable metrics or conditional states that can be measured.

Figure 17.5 Scenarios projecting the impacts of environmental risks on human development, 1980–2050



The HDI's base case scenario assumes limited changes in equality, environmental threats and risks, while the environmental challenges scenario envisions intensified environmental risks. The biophysical and human systems in the environmental disaster scenario are put under severe stress by, for example, the overuse of fossil fuels and falling water tables, glacial melting, progressive deforestation and land degradation, dramatic declines in biodiversity, greater frequency of extreme weather and increased civil conflict.

Source: UNDP 2011

Without clear metrics for measuring progress towards sustainable development, achieving internationally agreed goals will remain elusive. In bringing sustainability to the core of decision making, rethinking the way economic development and human well-being are currently measured and monitored becomes crucial (Pintér *et al.* 2011; Stiglitz *et al.* 2009). This requires a broader set of indicators for measuring economic, social and environmental dimensions of sustainable development that go beyond GDP, currently the most widely used indicator of economic development. This has long been called for, and measurement reform has recently received greater attention in political agendas, as illustrated by such efforts as the on-going review and revision of the framework for environmental accounts led by the UN Statistics Division (United Nations 2011), the adjusted net national savings methods of the World Bank (World Bank 2010b), the European Commission's Beyond GDP programme (Stiglitz *et al.* 2009), the OECD's Measuring the Progress of Societies initiative (Hall *et al.* 2010) and UNEP's Green Economy Initiative (UNEP 2011d). These have resulted in the development of environmental and social indicators and aggregate indices to complement GDP and traditional national accounts that are now beginning to be applied.

Governments, academia, civil society and the private sector could collaborate in the development of environmental goals for the global, regional and national levels within the sustainable development framework. Examples of such collaborations include internationally agreed goals to:

- stabilize greenhouse gas concentrations in the atmosphere at a level that would keep the increase in global temperature below 2°C relative to pre-industrial levels, and enhance long-term cooperative action to combat climate change on the basis of equity (UNFCCC 2010);
- halt the loss of biodiversity in order to ensure that ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life and contributing to human well-being and poverty eradication (CBD 2010);

- reverse and prevent desertification and land degradation and mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability (UNCCD 2008).

Any internationally agreed sustainable development goals would need to be customized and translated into national targets in order to facilitate measurement of progress towards meeting those targets and facilitate support for their implementation. The development and implementation of internationally agreed indicators could then be coupled with piloting, capacity building in statistical offices, and collaboration with the private sector, research institutions and non-governmental organizations. The data collected and utilized through the monitoring of indicators could be maintained and shared through collaborative databases open to the public. Such goal-setting processes could draw on regional experiences and be informed by and draw inspiration from various schemes that address Earth System challenges, such as the Earth Charter Initiative (2011) and the *Stockholm Memorandum: Tipping the Scales Towards Sustainability* (Nobel Laureate Symposium 2011). Furthermore, incentive and accountability mechanisms would need to be put in place for monitoring the progress towards achieving goals, acknowledging and supporting successes and thereby facilitating progress.

Enhancing the effectiveness of global institutions

Successful global responses to environmental challenges require accurate data and rigorous analysis, agreement on any course of action, and effective execution and implementation of agreed strategies at all levels. The science-policy interface has been strengthened in recent years, particularly in the field of indicators, assessments and early warning systems, supported by developments in research, modelling, monitoring and observations, and especially by advances in information and communication technologies. Significant attention has been given to the design and governance structure of these processes to ensure their scientific independence and credibility as well as their legitimacy and relevance to the full and meaningful participation of developing countries (UNEP 2011e). The interface

Box 17.4 Response option 1: Framing environmental goals in the context of sustainable development and monitoring outcomes

Establish a sustainable development goals framework that integrates the contribution of the environment to development and poverty reduction. A process could be initiated to revisit and extend the MDGs in the form of Sustainable Development Goals (SDGs) with clear, measurable indicators, keeping in mind the need for a coherent and balanced integration of the environmental, economic and social pillars of sustainability.

These goals could serve as a common reference point for action and accountability for a wide range of actors, including intergovernmental institutions, the private sector, civil society

and individuals. The framework could articulate a vision for enhancing human well-being – as it relates to health, material needs, social relations and security – in an inter- and intra-generational, equitable manner.

Such a framework could be complemented by targets and measurable indicators building on initiatives that go beyond GDP. Placed within such a framework, a sub-set of global environmental goals could draw on an assessment of existing international environmental agreements and instruments, including the three Rio conventions – UNFCCC, CBD and UNCCD.

could be further strengthened by addressing inequalities in scientific capacity through scaling up support for science-policy capacity in developing countries. Additional efforts could include strengthening data-gathering systems, cooperation on enhancing the connectivity and efficiency of existing international environmental assessments, scientific panels and information networks, and targeting the communication of scientific findings to various audiences. Technology can enable resource users to make better decisions and can give decision makers access to better and timelier information about environmental conditions, helping them organize effective responses. The diffusion of global positioning systems (GPS), mobile telephones and other decentralized technologies, including social media, can strengthen citizen engagement and involvement, which can help create a more robust foundation for coherent decision making. This sort of dynamic approach would strengthen institutions by adding wider society into the science-policy interface – further broadening the depth of stakeholder engagement and integrating the concept of human well-being into action and implementation.

Agreement on a global course of action requires effective coordination, which is especially difficult at the global level. Within the United Nations, the environment falls within the of organizations with thematic and functional focuses directly related to the environment, and of other institutions that have integrated the environment as a priority area (UNEP 2011c). Consultations on how to strengthen international environmental governance have been active since 2006, when the UN General Assembly agreed to explore the possibility of a more coherent institutional framework to address environmental activities

efficiently. The negotiations, including consultations under UNEP's Governing Council, revealed that regularized processes for developing, implementing, assessing and revising a UN system-wide environmental strategy and the division of labour are necessary. A new strategy, developed through an inclusive process involving governments and seeking input from civil society, including the private sector, could facilitate inter-agency cooperation and clarify the division of labour within the UN system (UNEP 2011e). A recent review of the evolution of environmental activities in the United Nations has demonstrated that there are substantive environmental resources and capacities within the system (UNEP 2011f), which could be mobilized and better utilized through a regularized process of developing, implementing and revising an overarching strategy.

While the system for global environmental governance has grown rapidly, there has been no systematic assessment of the performance of international organizations in relation to their mandates or to their impact on environmental quality. The absence of a scientifically credible and politically legitimate assessment of the institutional aspects and options for strengthening international environmental governance could be a reason why it has proved difficult for countries to agree on a way forward. The United Nations Conference on Sustainable Development in 2012 (Rio+20) is an opportunity to initiate an assessment of institutional performance and a strategic analysis of options for strengthening international environmental governance. The process could follow the procedures of the GEO process and take the form of a special GEO report that builds on and deepens the analysis of the global response. The intergovernmental aspects of the process could



The five successive Executive Directors of UNEP gathered together in Glion, Switzerland, for the Global Environmental Governance Forum in June 2009, where they lent their voices and support for an international agreement on climate change. © Satishkumar Belliethathan/Global Environmental Governance Project

Box 17.5 Response option 2: Enhancing the effectiveness of global institutions

Elevate and mainstream the sustainable development agenda into the core of decision making within the UN system, supported by enhanced cooperation with and between environmental, economic and social institutions.

Cooperation between key institutions could be strengthened, including by building on and further enhancing the work of the Chief Executives Board on Coordination (CEB) and the Environmental Management Group (EMG) as currently guided by the Economic and Social Council (ECOSOC) and the UNEP Governing Council respectively.

Within the institutional framework of sustainable development:

- **convene a science-policy interface forum with representatives from existing environmental assessments, scientific panels and information networks** to advance their connectivity and efficiency, facilitate ways of meeting the science-policy capacity needs of developing countries, strengthen data gathering and target the communication of scientific findings to various audiences;
- **launch a consultative process for the development of a system-wide strategy for the environment in the UN**

system, built around those environmental goals that already have international agreement. The UNEP Governing Council, the principle subsidiary body of the General Assembly on environmental matters, could set up a process by tasking the EMG as the principle inter-agency environment body to draft the strategy and then devise a process for review by and consultation with the governing bodies of members of the EMG and other inter-agency bodies and stakeholders;

- **initiate a strategic review of entities in the international environmental system** that compares actual performance to expected results, identifies key constraints and opportunities and outlines ways to measure impact. An independent review would help clarify the environmental mandates of existing organizations, elaborate a substantive vision for global environmental governance and outline ways to address priority issues. It would also collate reports on the status of reform efforts, set short- and long-term goals, and establish timeframes to complete reforms. It could provide a replicable template for similar assessments of other global public goods and help build a foundation for continued United Nations reforms.

be ensured through an initial and concluding intergovernmental consultation and government peer review. Scientific credibility could be ensured by appointing leading scientific experts both from within and beyond the UN system, and through extensive scientific and system-wide peer review.

Investing in enhanced capacities for addressing environmental change

Enhancing capacity requires multi-dimensional and systemic approaches. The capacity of individuals, institutions and organizations as well as societies and communities to implement effective policies is tied to a complex set of tangible and intangible attitudes, resources, strategies and skills (Aragón and Macedo 2010). Part 2 of *GEO-5* highlights the inadequacy of purely technical assistance and emphasizes the importance of governance systems, knowledge systems, technology and shared value systems in reducing vulnerability and strengthening resilience to environmental change. Limited capacity for designing, implementing and reviewing the effectiveness of policies can be a significant barrier to successful policy replication, scaling and learning, especially in developing countries. More focused policies are needed on the less visible aspects of capacity enhancement, such as values, legitimacy, identity and self-confidence, as well as other non-monetary forms of motivation (Aragón and Macedo 2010).

Effective environmental governance is made more challenging by the range of sectoral agencies whose decisions can have an environmental impact. Organizational design at the international

and national level rests on the functional division of authority into isolated decision-making units. While governments and the international system have, since the 1972 Stockholm Conference, striven to remedy gaps in information flow and authority, environment ministries remain relatively weak within national governments and within the international system. Economic ministries have maintained their influence, and thus efforts to develop policies to internalize the ecological externalities of economic development have continued to be weak.

Numerous countries and international organizations have experimented with institutional designs to improve the flow of information between functional authorities. For instance, France, Spain and the United States created coordinative environmental councils to work with other government agencies to complement the regulatory authority of environment ministries. At the international level, the United Nations has tried to encourage inter-agency cooperation and to internalize environmental considerations into the policies of other functional agencies (Haas and Haas 1995; Ivanova and Roy 2007).

Policy experience and best practice at a range of scales can also provide lessons for policy development and strengthening capacities. Part 2 of *GEO-5* offers several examples of relatively successful regional policy design and implementation, such as the Maldives adopting a goal of carbon neutrality by 2020, and the European Union Industrial Emissions Directive that resulted in significant reductions in sulphur dioxide emissions across Europe. In addition to these, the use of strategic environmental



Aerial view of Malé, capital of the Republic of the Maldives. In September 2011, the country launched an online campaign seeking help from the world's top experts on how to achieve carbon neutrality by 2020. © Lucyna Koch/iStock

assessment has generated examples of how environmental goals can be integrated into and addressed through national development policy (Box 17.1).

Another key capacity challenge lies in the dearth of financial resources. Insufficient predictability and availability of funds has been a key constraint on effective environmental governance at all levels. Yet, global foreign direct investment flows in 2010 were US\$1.2 trillion (UNCTAD 2010), far exceeding the value of development funding from international organizations or ODA-related flows. Innovative financial instruments that leverage private investments and improve environmental performance could help bridge the finance gap (Girishankar 2009) – through, for example, linking financing to environmental outcomes (World Bank 2010c). Such instruments include debt-for-nature swaps, payment for ecosystem services, emissions trading and carbon finance, as well as tools from development finance such as green bonds, microcredit, insurance and other risk management instruments, and performance derivatives (Sander and Cranford 2010). More recent ideas include advanced market commitments that guarantee revenues to companies for a limited time to stimulate markets, and prize funds for environmentally sound technologies.

At the national level, targeted policies and instruments are needed to facilitate large-scale green investments, generate necessary resources for public expenditure on environmental

priorities and encourage green consumer choices. These could include eco-taxes, performance standards, public procurement strategies, green financing instruments such as green bonds, and green accounting mechanisms (UNEP 2010). Income from taxes related to environmental outcomes – on electricity, heating fuels, transport fuels, greenhouse gas emissions, air pollution, water and waste – raised 2–3 per cent of GDP in European countries in 2007, US\$400 billion (€304 billion) in revenues or 6.2 per cent of total taxes and social contributions (Georgescu 2010). In addition, some countries, such as the United Kingdom, are establishing green infrastructure banks or greening existing investment institutions, while at the international level there are proposals to generate large-scale additional revenues through coordinated levies on aviation and shipping and financial transactions (Barbier 2012; Steckhan 2009).

The term green economy was coined some 20 years ago in the publication *Blueprint for a Green Economy* (Pearce *et al.* 1989). The authors argued that a green economy that values environmental assets, employs pricing policies and regulatory changes to translate these values into market incentives, and adjusts the economy's measure of GDP for environmental loss was needed to ensure the well-being of current and future generations. A renewed focus on a green economy has resulted in reports on how to promote public and private investments in different sectors of the economy to help address unprecedented levels of environmental change and advance the sustainable

Box 17.6 Response option 3: Investing in enhanced capacities for addressing environmental change

Establish a UN system-wide framework for capacity building.

Such a framework would strengthen the national capacity required to implement environmental policies and could be an integral part of a system-wide strategy on the environment established within the wider institutional framework for sustainable development.

Adopt a green economy roadmap, possibly within the context of a sustainable development goals framework.

A roadmap would set out how human well-being can be enhanced through public and private investments in the sectors of the economy that cover demand for, and supply of the goods, services and technologies needed to address unprecedented levels of environmental change, and that advance the sustainable use of natural resources. A combination of market-based mechanisms and regulatory structures might be needed to create employment and economic activities, but the appropriate policy mix would depend on national circumstances and contexts. The full spectrum of available measures includes public investments, green accounting, subsidies, taxes, charges, sustainable trade, creation of new markets, planning, standards, regulations, technological innovation, technology transfer and capacity building.

Establish policy banks. This would enable the sharing of examples of sound environmental policy, design and implementation from different regions, including a green economy roadmap. This could provide opportunities for learning, adaptation or replication at an unprecedented scale, with the early involvement of multiple stakeholders facilitating the development and uptake of relevant reforms. Matching needs to the right policy tools is unlikely to occur organically without facilitation or brokerage. Governments

and other actors could consider establishing decentralized, possibly open-access, web-based sustainability policy banks to:

- act as a repository of good practices for learning and replication;
- assist governments and stakeholders in identifying good practices for their priority areas for intervention;
- provide a forum for discussions on tailoring policies to national needs; and
- provide rosters of experts to assist in realistic applications in particular countries and at sub-national levels.

Principles for greener investments. A financial strategy could be built on a set of common principles, and a renewed commitment could be made to meeting existing obligations and creating sufficient and predictable funding to promote a green economy and sustainable living. These norms would serve to guide:

- the greening of existing and new investments to improve the environmental impacts and outcomes of all investments, including mainstreaming the environment in development expenditure;
- raising additional resources for green investments through new mechanisms such as green taxation; and
- public-private partnerships that leverage private funding sources while also addressing environmental objectives.

Establish a system for financial tracking. Regular reviews and renewal of funding commitments would further evolve private-public partnerships and scale up direct budget support to ensure mainstreaming of the environment in development, more effective participation in global processes and improved analytical capacity.

use of natural resources (UNEP 2011c, 2011d). There have been concerns that a green economy might create unsustainable jobs, lead to inequity, create trade distortions or promote new forms of green protectionism (UNEP 2011c). Such concerns would have to be addressed through existing mechanisms such as trade agreements and a balanced integration of the three pillars of sustainable development. A calibrated framework of sustainable development goals could guide an investment roadmap to the green economy and help ensure that such investments are socially and financially sustainable (Bina and Camera 2011).

In addition to increasing financing for the environment, a related, overarching priority would be to make all investment decisions – both public and private – greener. With US\$24–30 trillion to be invested in infrastructure globally over the next 20 years (CG/LA Infrastructure 2008), the challenge to integrate environmental considerations into investment decisions is daunting. A set of principles for green investment

by institutional investors, governments and international bodies could accelerate the growing commitment to making investments greener. Many of the policy instruments mentioned above would deliver opportunities and benefits for both the environment and the economy (Part 2).

Supporting technological innovation and development

Technology has a substantial role to play in the effort to meet the most pressing global environmental challenges. Advanced and environmentally sustainable technologies can help developing economies leapfrog the resource-intensive, highly polluting growth phase. This is not just about technologically advanced solutions but also other adaptive ones. As technology systems include not only the deployment of hardware but also knowledge and know-how, lessons from traditional knowledge and practices can also be shared and adapted (IPCC 2001). Increased domestic capacity for innovation, including adapting existing technologies to local conditions, is an important goal for many countries.

Technologies can help improve environmental performance along the supply chain from resource extraction to manufacture and transportation and more efficient, greener end-use equipment for consumers. System-level technology links are often crucial for transformative change. For example, the smart grid concept aims to integrate electric vehicles, the power sector, information management and consumers into a single network. Technologies are also essential for successful adaptation to changing environments, from drought-resilient seeds through efficient methods of irrigation to flood defences.

But technologies and technological systems have a much broader role in green transformation than direct mitigation and adaptation. They play a key enabling role in such areas as remote and onsite monitoring of environmental change; early warning systems and new types of collaborative problem solving including crowdsourcing. Social networks are also having a significant but unpredictable impact on the environmental activity of governments, non-governmental organizations and communities.

In all of these areas, the ability of individuals, companies and institutions to absorb both new technologies and available finance varies in the different national contexts of developing countries (Ruggie 2008; Puustjarvi *et al.* 2003), making capacity building and demonstration projects key enabling factors (WBCSD 2010).

Addressing the technology gap is at the fore of international negotiations on responses to environmental challenges. Since 1990, developed countries have agreed to take all practicable steps to encourage the transfer of green technologies and know-how to developing countries. But this agenda has seen slow progress, with persistent disagreements even about what constitutes a technology transfer. The processes through which



Türanor PlanetSolar, the world's largest solar powered boat – topped by 500 m³ of solar panels – was the first solar electric vehicle to circumnavigate the globe. © Tatiana Kakhill/iStock

large-scale transfers should occur are not straightforward, given that most technologies are owned by the private sector rather than governments.

Some developing countries are critical of existing technology transfer regimes due to the high transaction costs of obtaining information or negotiating and acquiring technologies protected by intellectual property rights, and a lack of clarity in defining

Box 17.7 Technology Mechanism at the UNFCCC

At the 2010 UN Climate Change Conference (COP 16) in Cancún, Mexico, governments agreed to establish a Technology Mechanism to facilitate technology cooperation and transfer. It comprises an executive committee and a climate technology centre and network.

The priorities for this mechanism include the development and enhancement of the capacities and technologies of developing countries; deployment and diffusion of environmentally sound technologies and know-how; increased public and private investment in technology development, deployment, diffusion and transfer; strengthening of national systems of innovation and technology innovation centres; and development and implementation of national technology plans for mitigation and adaptation. Further, it is hoped that the technology mechanism will stimulate and encourage – through collaboration with the private sector, public institutions, academia and research institutions – the development and transfer of

existing and emerging environmentally sound technologies and opportunities for North-South as well as South-South technology cooperation.

In December 2011, governments adopted the modalities for the Technology Mechanism at the 17th Conference of the Parties in Durban. Since funding has always been a barrier to technology transfer to developing countries, the Green Climate Fund (GCF), newly established at Durban, could also help speed up implementation of the goals set by the international community to combat climate change, and promote a paradigm shift towards low-emission and climate-resilient development pathways. Though the UNFCCC process has been a useful forum to initiate global intergovernmental procedures to foster global technology transfer, collaborative work with the other multilateral environmental agreements, such as CBD, is also imperative to ensure the development and transfer of technologies for achieving other global environmental goals.

Box 17.8 Response option 4: Supporting technological innovation and development

Accelerating the innovation and diffusion of technologies is a critical element of any holistic support framework that seeks to encourage the uptake of environmentally sound technologies in the transition to a global green economy. This includes:

Collaborative R&D. Collaborative research for environmentally sustainable technologies could be coordinated between governments and the private sector for early pre-competitive stages of technology system development, before particular standards or industry value chains become embedded in national economies and the global industrial system, as happened in the semi-conductor market. Model technology cooperation agreements could take different levels of development and jurisdictional requirements into account to limit the potential of patent-related conflicts and to encourage joint development. National laboratories could be twinned, or new ones set up that are multilaterally managed and funded in pursuit of agreed long-term technology objectives, ideally with the participation of industry.

Support for knowledge-sharing platforms. Collaborative initiatives on agriculture and the environment, such as the Consultative Group on International Agricultural Research (CGIAR), demonstrate the potential of stakeholder advice platforms and provide support for knowledge-sharing structures at the regional level. These initiatives could be emulated to scale up much needed environmentally sustainable technologies. Existing and potential barriers to the development and diffusion of such technologies could be assessed at the sectoral level to create the most appropriate incentives.

Global prize funds to stimulate innovation on green technologies. Prize funds and similar awards could be an effective means of bridging innovation gaps, including technologies to improve sustainability for the poor, as demonstrated by some successes in the public health and energy sectors. A range of global technology prizes could be established to promote innovation in all areas that support sustainability, especially for developing economies. Such prize funds could function as a patent pool and/or a repository for cross-licensing environmental technologies.

what is protected and what is not (Li and Correa 2009; Barton 2007; Hutchison 2006; Commission for Intellectual Property Rights 2002). The impact of intellectual property (IP) rights on the technological advancement of developing countries varies according to the sector (Barton 2007), with countries like China and India making significant advances in technological development and acquisition despite the barriers (Puustjarvi *et al.* 2003). Maskus (2010) argues that although patents and IP rights may not in fact restrict access to environmentally sustainable technologies, there may be needs for beneficial differentiation in patent rights such as “*ex ante* extensions of patent terms tied to licensing commitments, expedited patent examinations in environmentally sustainable technologies, investments in patent transparency and landscaping efforts, and facilitation of voluntary patent pools”.

Technological innovation has the potential to reduce the cost of achieving global environmental objectives (OECD 2010). The costs of implementing green policies have often turned out to be far lower than those projected, in part due to technological advances. Investment in research and development (R&D) is mostly undertaken by the private sector and is increasingly global in nature, but government actions and public policy can help leverage the power of markets to solve environmental challenges through innovation. Efforts to increase the flow of technology to developing countries and economies in transition include the UNFCCC decision to create a new Technology Mechanism (Box 17.7).

International cooperation is needed to build and strengthen innovation links between different sectors, especially between

developed and developing economies. This is not least because many transformative approaches involve complex changes to technology systems and new forms of industrial models that are yet to be demonstrated at scale. International cooperative research could help pool development risks, share information (OECD 2011b) and overcome barriers to private-sector investment. Yet innovation cooperation is primarily a national activity, not an international one. A study of six clean energy sectors points out that only 1.5 per cent of patents are co-assigned, listing more than one company or institution as co-owners, and only 2 per cent of these joint patents are shared between developed and developing economy companies and institutions (Lee *et al.* 2009).

Strengthening rights-based approaches and access to environmental justice

Human and environmental rights can play a valuable role in ensuring that governments stay on track in meeting environmental goals and in providing safeguards against the adoption of environmental policies that reduce human and ecological well-being. Several important developments are evident in environmental rights. Adverse impacts on human health from environmental misuse are increasingly seen as violations of the human right to life (Kravchenko and Bonine 2008). Further, globally agreed human rights frameworks increasingly emphasize the intersection between human well-being and environmental health, as well as social-ecological resilience (Campese *et al.* 2009; ICHRP 2008; Jeffery 2005; Hunter *et al.* 2001), setting the basis for sustainability in environmental decision making.



Aerial view of oil rigs in the Niger Delta, close to a village. Over recent decades, the delta has faced extensive environmental degradation, undermining sustainable environmental management and the right to access to a clean environment. © Eric Miller/Still Picturesock

The environmental aspects of the current human rights framework are still too weak, however, to ensure that citizens are able to protect their well-being and hold governments accountable. In part, this is because environmental rights law at the global level is predominately soft law, making it easy for states to avoid their responsibility, with regional courts and judicial bodies not always able to ensure that their decisions are put into effect. For example, the decision of the African Commission on Human Rights that pollution from oil exploration in the Niger Delta that affects environmental quality and human health constitutes a violation of the right to a clean environment in the African Charter has never been put into effect. In contrast, implementation of the 1998 United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters – the Aarhus Convention – demonstrates that effective procedural rights and state acceptance can be effective in protecting people and the environment. Replicating this approach regionally or globally is one option for giving effect to Rio Principle 10 by both state (UNECE 2011) and non-governmental organizations (Barreira 2012; UN-NGLS 2007). In 2011, the Meeting of the Parties to the Convention adopted a decision encouraging accession by states outside the UNECE region and a simplified procedure for doing so, creating a pathway for propagating the protection offered by this international environmental rights treaty on a global scale (UNECE 2010).

Although environmental rights are widely recognized, full access to justice at the national level can be difficult to implement. The effectiveness of legal systems has been hindered by local inability to access the courts, with a lack of financial resources, distance from courts, and language barriers being key

challenges. Further, state entities do not always understand the nature of their obligations under environmental and human rights law (Serra and Tanner 2008). Global and regional investment in strengthening these national systems by enhancing citizen and state capacity could improve access to justice.

Despite its limitations, soft law can play a valuable role in shifting the culture of environmental practice by providing a basis for citizen advocacy, including claims for access to vital livelihood resources such as land and water; for governments to review their current practice; and for strengthening public participation in environmental decision making, particularly where citizens' rights are affected. For example, with the adoption of the United Nations Declaration on the Rights of Indigenous People (UNDRIP) (United Nations 2007), the United Nations agreed that all its activities must be based on the recognition of these rights. For example, the UN programme for Reducing Emissions from Deforestation and Forest Degradation (UN-REDD) seeks to incorporate the UNDRIP rights into its practice and policy by, among other action, giving effect to the right to free prior informed consent. The recognition by the UN General Assembly of the human right to water and sanitation (Gupta *et al.* 2010) is another clear step forward to promote human rights. At the national level, the 1992 Rio Declaration on Environment and Development is widely accepted as a framework for allocating rights and responsibilities between states and citizens. Importantly, soft law can catalyse hard law agreements – the Aarhus Convention was negotiated in response to Principle 10 of the Rio Declaration (UNCED 1992).

Given current limitations within the human rights system, there is a renewed debate on the merits and drawbacks of a

Box 17.9 Response option 5: Strengthening rights-based approaches and access to environmental justice

Recognize the links between human rights, environmental rights and the responsibilities of states, which can set the basis for better environmental performance where these rights are incorporated in decision making. Improving understanding of how this can be achieved through learning from best practice at inter-state and inter-regional levels should be facilitated. Existing human rights platforms could provide the basis for dialogue between diverse actors, including states, academics and communities, and strengthen and clarify understanding.

Develop a global legal instrument, or a series of regional instruments, to strengthen access to information, public participation and access to justice in environmental matters, based on Principle 10 of the Rio Declaration and taking into consideration experience gained with the UNECE Aarhus Convention (1998).

Create a shared legal normative basis for action. Globally, a number of soft law norms have emerged to protect the environment in an equitable and responsible manner. There is,

however, a need for a legal process to promote the hardening of these norms into legally binding rights and responsibilities that would provide a shared legal normative basis for action.

Recognize and support the different kinds of dispute resolution systems, including indigenous systems to ensure that justice is delivered. Although a number of formal and alternative dispute resolution systems are being developed in different forums, and national courts are offering non-nationals the right to seek adjudication on their environmental claims, there is need for a process that recognizes and supports these kinds of dispute resolution processes.

Establish a process for creating an international environmental court to address violations of environmental standards. Agreeing to a process for considering the establishment of an international environmental court is an important first step in improving dispute resolution. It is important to build on the experience of existing judicial systems at the regional level and within the human rights field, avoid duplication and ensure sufficient human capacity and finance.

judicial system for the environment at the international level. Options discussed range from an international court for the environment to enhanced complaint mechanisms to turning environmental and related equity rights into law (Klabbers *et al.* 2009). A number of models have been proposed as a template for an International Court for the Environment (ICE), which could function as a Court of First Instance for the International Court of Justice, rendering decisions and/or advisory opinions, or act as a specialized environmental tribunal in the spirit of the Permanent Court of Arbitration, or could provide a combination of negotiation, conciliation, arbitration and adjudication similar to the Dispute Settlement Body of the WTO. Furthering the ICE, the International Court for the Environment Coalition (2011) proposed three characteristics for it:

- the court or tribunal should have specialized environmental judges or a process that addresses the current gaps between international law and environmental science;
- its standing should be offered to non-state actors, provided the cases satisfied a materiality threshold, i.e. what is considered relevant or material to a case; and
- the court should incorporate the common law principle of *stare decisis*, which would establish precedence in the international environmental legal order.

Traditional adjudication, however, faces some significant constraints, which could reduce the court's effectiveness in resolving international resource disputes, such as those over the use and sharing of natural resources. Analysis of the use of adjudication by international courts and tribunals reveals four categories of limitation:

- parties may refuse to submit to adjudication;
- the judicial decision might not address the merits of the dispute;
- non-compliance is not punishable; and
- recurrence of the dispute or conflict (Spain 2011).

These constraints can be overcome through the use of integrated methods for dispute settlement and resolution. Ultimately, however, successful resolution of international resource dispute hinges on the availability of mechanisms – judicial or otherwise – that allow for the active engagement of non-state actors and for addressing the concerns of all parties with legitimacy, fairness and speed.

Deepening and broadening stakeholder engagement

The complexity and varied nature of global environmental challenges facing the international community today, as demonstrated in Part 1, require a range of interventions beyond action by public institutions. Many of the solutions described in Part 2 also demand collective action by civil society, private sector actors, the media and academic and research institutions.

The role of civil society actors in supporting global environmental governance has evolved over the past 40 years to create groups that operate from the local to the global level, offering means by which to connect global policy to local action. Non-governmental organizations tend to be more flexible than governments and intergovernmental agencies, and can therefore offer swift support for seeking and implementing solutions. They frequently have the capacity to conduct in-depth research, collect and disseminate

Box 17.10 Social learning

Social learning comprises formal or informal processes to share knowledge and lessons, at different levels and across different communities, to support innovative problem solving required for addressing unprecedented environmental change. Social learning is as much about changes in relationships and in individual and collective attitudes and mindsets as it is about practical tools and institutional change to deal with new challenges (Pahl-Wostl 2006). Platforms for social learning include, for example, biotechnology citizens' juries (Pimbert 2011), Oxfam's climate dialogues and the United Nations Human Rights Council's Social Forum.

Access to technology and information is vital, but not sufficient, for effective social learning. Governance and the dynamics of interaction between actors are important factors that determine what knowledge and experience is shared and how it is used. In order to be effective, collaborative learning requires open communication, engagement outside

established decision-making circles, consideration of multiple kinds of knowledge, unrestrained thinking and self-reflection (Woodhill 2010; Keen *et al.* 2005; Schulster *et al.* 2003).

At the global scale, social learning can be fostered by facilitating institutional openness, multi-level governance both horizontal and vertical, and dialogue between sectors as well as between different communities. Specific options for a strong global response to foster social learning include:

- promoting actor and stakeholder learning networks – South-South, global inter-generational dialogues and private-public;
- cross- and multi-actor participation in international decision making such as Conferences of the Parties;
- improved transparency and access to information;
- support of experimentation and variation; and
- improvement of monitoring and regular reviews of policies and experiments using rigorous analysis and providing rapid feedback on success or failure.

data, and support assessment and monitoring (Gemmill and Bamidele-Izu 2002), together with awareness raising and public mobilization. Similarly, academic institutions can offer unique support for global responses by granting credibility through scientific and technical support. Non-governmental organizations and academic institutions together contribute to increasing public participation, creating and maintaining knowledge networks and facilitating the diffusion of knowledge and ideas (Ramos 2009; Eriksson and Sundelius 2005; Stone and Maxwell 2005). The recently launched Global University Partnership on Environment and Sustainability (GUPES), a UNEP-planned

consultative, sharing and learning platform for university leaders from developed and developing countries, offers a possible model for collaboration between international organizations and universities (UNEP 2011b).

As attempts to transition to a green economy advance, business engagement in a variety of ways and at multiple scales can also bring added value to global responses. The Montreal Protocol offers an example of a successful international environmental treaty, in which a critical element in the negotiations was the inclusion of businesses and NGOs in drafting the treaty



The future in our hands: access to information and technology is vital; open communication and diffusion of knowledge with ever increasing public participation can lead to collective action from global to local level and vice versa. © Peeter Viisimaa/iStock

and supporting its implementation. In treating businesses as collaborators rather than constituents, they can become engaged in the problem, the strategy and the implementation (Ivanova *et al.* 2007). Some also benefit from being first movers in commercial terms. While the Montreal Protocol was relatively limited in its scope and fairly straightforward in terms of policy decisions, this strategy could offer useful lessons for other agreements and initiatives.

Businesses have also taken the lead in developing private certification schemes, which are an emerging approach to environmental governance. Supply-chain management guidelines have been effective in promoting sustainable practices in forestry through the Forest Stewardship Council, and fisheries by the Marine Stewardship Council (Auld *et al.* 2008; Cashore *et al.* 2004) and for establishing broader global standards of corporate social responsibility through the United Nations Global Compact (Ruggie 2001). Such efforts depend on proper institutional design that includes legitimate third-party verification, supportive government institutions at the national level, clear relationships between the private sector and civil society and a public awareness of the meaning of the codes. Schemes initially focused on one sector can lead to similar approaches being applied in others, as public and corporate awareness and experience develop. Similarly, national schemes are sometimes scaled up to the regional or international level. The dangers of voluntary approaches for environmental policy, however, include their non-enforceability, poor monitoring and a lack of transparency (OECD 1999).

Collaboration and engagement of sub-national authorities is another important element of public participation. Cities, for example, have embarked on environmental and sustainability



Vancouver, Canada, used the 2010 Winter Olympics to boost its efforts to become a greener, more sustainable and more resilient city.

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action of their own (Box 17.11). While bottom-up initiatives such as these might not deliver the necessary degree of change, the proactive measures provide channels for implementation, engagement and feedback on the efficacy of policy (Otto-Zimmerman 2011).

Box 17.11 Cities and climate action

Many cities worldwide have begun to take climate action, illustrating the important role that sub-national actors can play in addressing global environmental problems. Most city efforts thus far have focused on mitigation rather than adaptation (Hoornweg *et al.* 2011), with more than 2 000 cities now committed to reducing their greenhouse gas emissions (ICLEI 2010). Their motivations for taking climate action is complex and varied, typically reflecting frustration with the limited progress in international negotiations and the desire of city leaders to respond to citizens' concerns.

Climate action by cities and sub-national regions has also taken on a global dimension. Cities are increasingly acting in concert and learning from one another, with little distinction between North and South. Globally, the landscape of networks and entities active in climate change adaptation and mitigation at the city level is emerging but fragmented: these include the C40 Cities Climate Leadership Group, ICLEI – Local Governments for Sustainability, the World Mayors Council

on Climate Change, the Covenant of Mayors and the Climate Alliance in Europe, and the Climate Protection Agreement of the United States Conference of Mayors.

Climate action by cities has increasingly been recognized by national governments and at the international level. Although the UNFCCC and its Kyoto Protocol did not originally include any explicit role for cities, this has been changing. The 16th Conference of the Parties in Cancun recognized local governments as key governmental stakeholders in global climate change efforts, with numerous references in Decision CP.16. More recently, ICLEI – Local Governments for Sustainability has called for a framework of global environmental governance that includes local and sub-national governments as part of a multi-stakeholder system of collaborative policy setting, implementation and accountability (Otto-Zimmerman 2011). The European Union has also called for new governance modes that foster social innovation and that adopt an holistic approach to environmental and energy issues in cities (EC 2011).

Box 17.12 Response option 6: Deepening and broadening stakeholder engagement

Build a stakeholder web for sustainability. Non-state actors and the private sector could be invited to explore how the modalities of a stakeholder web could evolve by building on existing structures and utilizing modern information and communication technologies including social media. The web could help identify issues on which the public sector may need to act in terms of implementation of the Rio Declaration's Principle 10 as it relates to access to information and stakeholder engagement. Principle 10 could also act as a platform to mobilize new partnerships for action towards implementing internationally agreed goals and targets, such as a possible framework of sustainable development goals and the transition towards an inclusive green economy.

Establish an inter-generational assembly. An inter-generational assembly could provide an opportunity for future leaders and sustainability champions to interact and foster a joint vision for a sustainable future. The idea of the assembly could be taken up as part of the current reform process, building on discussions at the UN Conference on Sustainable Development. In terms of concrete outputs, the assembly could also promote access to information and shared accountability through innovative tools that would support decision making, including a global database of conceptual innovations in environmental governance and management.

While the public sector is an essential agent in creating enabling conditions for societal change, the private sector and civil society are also core agents. The implementation of the Rio Declaration's Principle 10 could help further empower individuals, the private sector and non-state actors in responding to environmental problems. The principle, amongst others, recognizes that each individual should have appropriate access to information about the environment that is held by public authorities, and that states should facilitate and encourage public awareness and participation by making information widely available. Although stakeholder participation in intergovernmental affairs and public-private partnerships has evolved through, for example, the Commission on Sustainable Development, a greater deepening and broadening of stakeholder engagement, through using modern information and communication technologies for example, could make society better prepared to respond to the scale of environmental change. Civil society and the private sector could be invited to develop a stakeholder web for sustainability, building on existing structures aimed at mobilizing action to implement internationally agreed goals and targets.

Current decision-making processes tend to focus on the short term – to the probable detriment of future generations. Explicit future orientation is an important element of adaptive governance strategies for sustainable development and, while foresight processes are a regular part of decision-making processes (de Lattre-Gasquet 2009; Green and Stewart 2004), broader mechanisms to help strengthen the voice of future generations could be considered.

Governments possess various options to strengthen the voice of future generations at various levels (Brown Weiss 1992). They can install an office that has responsibility for ensuring that the interests of future generations are considered, for investigating complaints and for providing warnings of emerging problems. States could also give standing in their national courts and administrative bodies to a representative of future generations, who might function as a guardian. Another approach is to designate an ombudsman for future generations or to appoint

commissioners for future generations who could operate internationally, nationally or locally. This was advocated by the World Commission on Environment and Development and in some countries, Hungary for example, experiments are now under way with ombudsmen – who in national law have the responsibility to safeguard social and environmental conditions to the benefit of future generations.

CONCLUSION: RESPONDING TO EARTH SYSTEM CHALLENGES

When the international community last took stock of the state of the environment in 2007 as part of the *GEO-4* process, promises and recommendations were made to tackle the environmental challenges. But neither the scope of environmental policy nor the speed of its implementation has been sufficient. Efforts to reduce the pressures from the underlying drivers – including enhanced resource efficiency and climate mitigation measures – may have resulted in moderate successes but have fundamentally failed to reduce environmental problems on a global scale.

Five years on, it is clearer than ever that there is no global panacea or single, overarching solution to environmental challenges. Rather, collective action built around strategies, values, principles, investments and measures, supported by a diverse range of competencies and capacities, needs to be woven into the fabric of nations, international society and its institutions. Ultimately, the prospect for improving human well-being is critically dependent on the capacity of individuals and countries as well as the global community to respond – through mitigation and adaptation – to environmental change. While the modalities of multilateral cooperation need to be kept under review to ensure their effectiveness, the key challenge of addressing capacity issues in the developed and developing world remains.

As *GEO-5* demonstrates, however, notwithstanding the enormous challenges, there are great opportunities to scale up policies that could help take the world's citizens along trajectories that begin to reverse negative environmental



Rio de Janeiro, host to the 2012 United Nations Conference on Sustainable Development. © Zxvisual/iStock

trends, and that address the inequalities and inadequacies of the institutional frameworks within which human society operates. It is also imperative for the international community to invest in solutions that will help tackle the root causes, not merely the symptoms, of environmental degradation, from fundamental shifts in values through the design and structure of institutions to innovative policy frameworks. Modified to reflect the global scale, a systematic and comprehensive results-based global approach could be anchored in the six response options outlined in this chapter.

The 2012 United Nations Conference on Sustainable Development (Rio+20) provides an opportunity for the international community to take stock, assess achievements and shortcomings, and stimulate transformative global responses. It is also an opportunity for the international community, from individual member states to the United Nations, to demonstrate political leadership in tackling these complex challenges. This chapter has identified a number of response options that together could help society address the problems of global environmental change. While these do not guarantee success, they expose, clearly and systematically, whether or not progress is being made. In addition, evaluation and collective learning could enable the identification

of barriers to implementation. This, in turn, could inform adjustments and adaptive management as part of a larger, systemic approach to global governance.

Integrated governance of socio-ecological systems must be cross-sectoral, cross-scale, and across time. Authority and accountability must be dispersed to the appropriate level of decision-making – subsidiarity – while including a broad set of actors beyond the state and enhancing their capacity.

At the global level, it remains a daunting challenge to design and implement effective measures that can motivate citizens, companies, institutions, networks and governments to cooperate and deliver ambitious policies and action. Highlighting the rewards of cooperation and shared purpose could embolden efforts to overcome barriers and past trajectories, reversing unsustainable trends that were once considered insurmountable. The rewards of progress are often obscured against a landscape fraught with challenges and inequities. In the end, openness to possibility – reflecting the optimism, creativity and potential of young people around the world – and investing in an environment in which multiple sustainable and desirable solutions can emerge, would probably be the most effective, and meaningful, global response.

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