

Policy Options: Regional Summary



Coordinating lead authors: Asha Singh and Renat Perelet

Contributing authors: Jane Barr, Ludgarde Coppens, Nicolai Dronin, Jose Etcheverry, Amr El-Sammak, Lailai Li, Clever Mafuta, Catherine P. McMullen, Flavia Rovia (GEO Fellow) and Joanna Kamiche Zegarra

Principal scientific reviewer: Ada Ignaciuk

Chapter coordinators: Matthew Billot and Ludgarde Coppens

Main Messages

The selection of freshwater, climate change and environmental governance as priorities by all regions suggests a recognition that these issues have reached a point of global importance requiring responses that could have relevance worldwide.

Climate change exerts extreme pressure on ecological systems, including on freshwater by exacerbating problems of water supply and demand. Two regions considered climate change to be cross-cutting, and assessed how policies in each theme help to attain international goals related to climate change.

There are common elements in successful policies across the regions. Tools such as integrated water resources and coastal zone management; the removal of environmentally harmful subsidies, especially on fossil fuels and/or carbon taxes; renewable energy, marine protected areas, and cross-boundary biodiversity conservation, are all examples of policies used in more than one region, but customized to each context. Formal, robust, and well-established governance mechanisms and structures at all governance levels are a necessary foundation for successful implementation of environmental policies.

The policies selected by the regions are successful because of some underlying principles. These include policies that are mutually reinforcing and have benefits across sectors, address drivers, invest in monitoring and evaluation to allow revision and enhance accountability, or involve multi-stakeholder participation at local, national and regional level.

There is sufficient experience to enable faster transfer and replication of several of the priority policies. This, however, would be greatly improved by the sharing of experiences between donor and recipient practitioners and stakeholders, learning the specific skills of how to assess potential policies for particular needs and how to adapt these to the selected situation, and establishing capacity and institutional development to support the enhancement and propagation of these skills.

While many of these policies are long-standing management concepts, their application can be innovative if certain principles are adhered to. This includes policies that are mutually reinforcing with positive impacts in more than one thematic domain, and policies that address drivers – as defined in Chapter 1. Concentrating on these deeper, underlying causes of environmental degradation will allow the goals and targets set out in international, regional and national agreements to be met in a more effective way.

Transboundary cooperation is important when natural areas are shared. It promotes understanding and the transfer of knowledge between neighbours, and leads to a collective response to shared problems, allowing new opportunities and ways of overcoming these common problems to be identified.

Improved environmental governance is needed if environmental degradation and the unsustainable use of natural resources are to be reversed. Critical components include multi-stakeholder support, raising public awareness among all stakeholders, stronger mechanisms for financial sustainability, enhanced institutional capacity, adequate legal frameworks and strong compliance mechanisms. Community leadership demonstrated, for example, in the formation of water maintenance trust funds or wetland management schemes provides local services, helps resolve inter-community conflicts, demonstrates the value of participation and learning, and provides income-generating opportunities.

Policies that have proven successful can be analysed for their ability to leverage societal transformation. Understanding the potential of these policies, alone or in combination, could help facilitate transformative change and enhance the effect that policy makers have on reaching sustainable development objectives at local, national, regional and international levels.

INTRODUCTION

Humans have long been aware of the effects on their local environment of resource use, waste production and land use, but only in the last few decades has it been realized how such activities affect the global environment. In the past, when there were fewer humans and each used natural resources less intensively, the capacities of the atmosphere, land and water could carry the load of human consumption and production. But a significant proportion of the 7 billion humans alive today are actively exploiting the planet's resources at accelerating rates and intensities that surpass the carrying capacity of the Earth's systems (Krausmann *et al.* 2009; Liu *et al.* 2003; McNeill 2000). As mentioned in Chapter 1, the scale, spread and rate of change of global drivers are without precedent.

The concept of planetary boundaries was introduced by Rockström *et al.* (2009) to identify those key environmental processes that provide humanity with a safe operating space for well-being. Scientific analysis established nine planetary boundaries with approaching thresholds beyond which humans could not thrive in the Earth System. Of these nine thresholds, three may already have been passed: climate change, biodiversity loss, and the removal of nitrogen from the atmosphere (fixing) for use in fertilizers and weapons (Rockström *et al.* 2009). The concept of impending thresholds, tipping points and crossing boundaries are familiar to those who study complex systems (Limburg *et al.* 2002). Biologists and marine scientists term abrupt changes in the species that populate an ecosystem regime shifts (Kraberg *et al.* 2011; Rodionov and Overland 2005). Earth System scientists are currently debating the imminence

of destabilization in various tipping elements affecting global climate (Lenton *et al.* 2008). A more in-depth discussion of the role of planetary boundaries can be found in Chapter 7.

This chapter provides a summary of Chapters 9–14 and aims to determine those approaches and policies that show promise for adoption and adaptation elsewhere. The outcome of this appraisal is to offer policy options that can help meet internationally agreed goals efficiently and effectively and also lead to international, regional and local co-benefits. It is useful to identify at which level the policies identified as promising are best suited to apply leverage (Chapter 16).

REGIONAL SUMMARY

The selection of themes

The *GEO-5* Introduction describes the process by which each region selected priority themes and internationally agreed goals, as well as the policy appraisal methodology by which promising policies were identified. During the consultations, some regions decided that certain themes cut across the priority environmental challenges that were selected for the region.

The selection of priority themes and goals, which was limited to a maximum of five or six for each region, provides a first indication of what is considered important (Table 15.1).

Different regions focused on different aspects of the same theme. For example, while only two regions selected energy as a priority theme (Table 15.1), three others – Asia and the Pacific, Europe, and Latin America and the Caribbean – included energy

Table 15.1 Priority themes by region

	Africa	Asia and the Pacific	Europe	Latin America and the Caribbean	North America	West Asia
Environmental governance						
Climate change						
Energy						
Air pollution						
Land						
Freshwater						
Oceans and seas						
Biodiversity						
Chemicals and waste						



Selected as a cross-cutting theme



Selected as a theme

in their selection of policies that hold promise for meeting the climate change goal. In Latin America and the Caribbean, policies on wastewater treatment and coastal zone management are included in the water theme, while policies on coastal and marine protected areas are included in the biodiversity theme.

The selection by all regions of freshwater, climate change and environmental governance as priorities suggests recognition that these issues have reached a point of global importance requiring responses that could have relevance worldwide.

Africa

For the first time in 2009, Africa's total population exceeded 1 billion, of which 395 million (or almost 40 per cent) lived in urban areas. Africa should prepare for a total population increase of about 60 per cent between 2010 and 2050, with the urban population tripling to 1.23 billion during this period (UN-Habitat 2010). Africa's cities are characterized by extremes of prosperous centres and poor, informal settlements, and many governments struggle to provide social services including access to water, food and energy security, and management of environmental risks. Climate change and other adverse environmental change may accelerate urbanization (UN-Habitat 2010) and further strain governments' ability to cope (Mohamed-Katerere 2009).

The importance of transboundary natural resource policies is increasingly recognized in Africa as an essential strategy to enable integrated environmental management, economic integration, conflict resolution, and equitable socio-economic development. The integrated water resources management of the Senegal River Basin provides a practical example of transboundary cooperation that strengthens political links while enhancing agricultural productivity and food security. This initiative also improves transport, allowing year-round navigation, and ensures a reliable source of hydroelectricity.



Much of the growth in many of Africa's fastest-growing cities is a result of the expansion of informal settlements, which offer its residents limited access to basic infrastructure. © iStock/Steven Allan

The achievement of policy goals in a given sector or region is now understood to be closely linked to potential improvements and co-benefits in additional areas (Chapter 9). For example, under the Sustainable Land Management Programme in Ethiopia, 177 local watersheds are being protected to enhance land productivity and rural development, simultaneously strengthening resilience in downstream communities and countries (TerrAfrica 2009). For nations faced with limited resources, maximizing policy synergies helps deliver social, ecological and economic benefits, reduces trade-offs, and provides multiple paths for addressing common drivers and pressures.

The establishment of networks of marine protected areas creates additional benefits and provides more effective management opportunities than reliance on isolated ones. Regional cooperation is essential to sustain effective marine protected area networks. Addressing challenges – such as disparities in governance, institutional structures, wealth distribution, social capital and the collection of ecological data – and strengthening enabling conditions help to establish networks.

The effective use of tools and mechanisms to track and monitor environmental performance and change increases the capacity to respond effectively and efficiently to new challenges, including risks such as extreme events. For example, East Africa's Intergovernmental Authority on Development established a Conflict and Early Warning and Response Mechanism that helps communities plan their pastoral activities and food production better, building resilience against threats from famine and inter-community conflicts over grazing and crop production.

Regional cooperation, community-driven strategies and public-private partnerships can support learning, improve sustainability and encourage ecosystem approaches. The recently adopted Mangrove Charter for West Africa, which is complemented by country-specific action plans, is an example of regional cooperation. The relative success of a community-based mangrove management project in Cameroon demonstrates the value of participation and learning for successful adaptation (Ajonina *et al.* 2009). The restoration of 5 hectares of locally significant mangroves in Mauritius, financed by a local bank with technical assistance from government and implemented by a non-governmental organization and the local community, illustrates how partnerships between government, the private sector and civil society can help preserve natural resources and provide a practical climate change adaptation strategy that helps local people cope better with extreme events such as storm surges (ADD 2011, 2009). An island-wide survey has been undertaken to identify potential areas for replication.

Human rights protection is increasingly recognized as critical in strengthening human well-being while delivering environmental benefits. South Africa's Free Basic Water Policy, for example, benefits many impoverished households by guaranteeing access to 25 litres of water per person per day for domestic use within 200 metres of their homes. This strategy reduces the burden on women as well as providing health benefits (Mehta 2005).

The policy also strengthens municipal institutions and helps to reduce surface water pollution from domestic sources by placing authority at the local level.

Asia and the Pacific

The Asia and Pacific region has become a global engine of economic growth, but with large intra-regional differences. China is the world's largest carbon dioxide (CO₂) emitter, while most Pacific island nations are among the smallest. Water endowments range from the highly arid temperate zones and water-stressed small island states to Himalayan snowfields and abundant tropics. There is a wide diversity of environmental governance systems and mechanisms. The region's challenges include lifting millions of people out of poverty, navigating the turbulence of globalization, and dealing with some of the most polluted landscapes on Earth.

As the region is the fastest growing source of greenhouse gas emissions in the world, decisions to implement policies supporting carbon neutrality, renewable energy, conservation, and efficiency are crucial to the success of global efforts to address climate change. Countries in Asia and the Pacific, such as China, India and Indonesia, are reducing and removing fossil fuel subsidies with the objectives of reducing state budget burdens, preventing the use of public funds to support the wealthiest and those responsible for the greatest energy consumption, ensuring fairness for alternative energy development, and reducing environmental damage and contributions to climate change (IEA *et al.* 2010).

Of the ten countries in the world that are most at risk from climate change impacts, six are in the Asia and Pacific region. Key areas for action include integrating climate change adaptation and disaster risk reduction, mainstreaming adaptation concerns into development policies and plans, promoting ecosystem-based adaptation, and developing climate-proofed infrastructure. In the Maldives, policy research continues on possible relocation sites for populations displaced by sea level rise. At the same time, policy implementation increases resilience of individual islands by offering support with measures for afforestation, improving drainage, supplementing natural ridges, replenishing beaches, cultivating mangroves and fostering coral reef health (GEF 2009).

The Asia and Pacific region faces significant water-related challenges. Integrated water resource management planning, balancing water supply and demand through coordination among users, improved water quality management, appropriate pricing and multi-stakeholder participation, represent essential strategies to solve water problems in the region. In China, the Yellow River was cut off from the sea for 226 days in 1997, after episodic flows with shorter cut-offs in preceding years. In 1998, China initiated a programme restricting water withdrawals from the river and assigning quotas to users, with compliance enforcement measures including fines for exceeding withdrawal quotas (NDRC 1998). Since 2000, the river has flowed all the way to the sea.



For the Maldives, adaptation is a multi-dimensional goal that aims to increase the resilience of its vulnerable island systems against climate hazards and risks, and to achieve sustainable development.

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The emerging economies of Asia and the Pacific are exerting immense pressure on natural resources and ecosystem services. Although progress has been achieved through expanding protected areas, conserving species, addressing direct drivers of biodiversity loss, implementing community-based management and innovative financing, the scale of these efforts is insufficient to address current biodiversity and habitat losses. However, some successes can be replicated. In Viet Nam, forest ecosystem service payment schemes charge tourism operators and downstream water and power utilities for upstream water regulation, soil conservation and landscape preservation. Payments for the protection of 210 000 hectares of forest went to forestry businesses and forestry management boards, as well as to 9 870 households comprising mostly ethnic minorities (Winrock International 2011).

Many of the policy successes observed in the region are context specific. Therefore, policy transfer and emulation initiatives require careful analysis of the underlying political, cultural, economic and social contexts and their influence on policy implementation and success. Creating the necessary enabling environment is as important as selecting the right combination of policies.

Europe

The pan-European region is very diverse, with 37 national languages spoken in its 50 European countries (Nations Online 2011), a range of socio-economic and political systems, a variety of physical environments and differing means of environmental governance. Europe's land area of 23 million km² (GEO Data Portal 2011; FAO 2010) is characterized by a diversity of (agri)cultural

landscapes, urban agglomerations, extensive coastal zones, forests and undisturbed pristine areas. Of the nearly 833 million Europeans, about half live in Western Europe, while some 72 per cent of the entire region's population lives in urban areas (GEO Data Portal 2011; UNDESA 2010).

This region has formal, robust, and well-established governance mechanisms and structures to address environmental issues. For more than four decades, the European Union (EU) has developed and implemented environmental policies. That process has evolved from targeted policies and single-issue instruments in the 1970s and 1980s, through diffuse policy integration and public awareness in the 1980s and 1990s, to policy coherence and other systemic approaches since the late 1990s.

At the pan-European scale, the Environment for Europe ministerial process, initiated in 1991, reflects this process of environmental governance. Both EU and non-EU European countries are on schedule to meet their Kyoto targets on cutting greenhouse gas emissions, and are among the major donors to international efforts to address climate change worldwide. The EU's Emissions Trading System (ETS), which covers about 40 per cent of EU emissions, provides valuable implementation and design lessons for other regions. For 2009, the EU carbon trading market was estimated to be worth more than US\$118 billion per year, part of a global carbon-credit market estimated at US\$144 billion, with the volume of emissions covered reaching 6.3 billion tonnes (EC 2009a, 2009b; Ellerman and Buchner 2007).

Two other promising policy options in the European region concern the development of renewable energy and adaptation strategies. Feed-in tariffs (FIT) for renewable energy systems were established in Germany more than 20 years ago and are being emulated successfully both throughout the EU and globally (Jänicke 2011). In its adaptation strategies, the EU is moving away from short-term disaster responses, aiming for long-term adaptation measures and policies that will be implemented at national and local levels focusing on land-use planning, agriculture, water management and biodiversity/nature conservation, as well as building adaptive capacity and taking action to increase resilience to climate change.

Although air quality in Europe has improved in recent decades, there are still some outstanding issues, particularly in relation to urban air quality, human health, air pollutants and ecosystem degradation. The efforts of the Convention on Long Range Transboundary Air Pollution (CLRTAP) and its pan-European scientific network have been pivotal in documenting air quality issues and in building credibility, shaping policies and ultimately monitoring trends in air quality improvement. Many of these policies and initiatives have strong replication potential – particularly where rapid industrialization is degrading air quality.

European governmental institutions also play a vital role in solving freshwater issues, while integrated water resources management is becoming a key guiding mechanism for decision-making. The transboundary nature of most European rivers

calls for close cooperation between user countries through the creation of river basin management plans (UNECE 2011). Also, information provision and market-based instruments, such as water metering and incentive-based water pricing, show potential as policy approaches that can yield 20–40 per cent reductions in household water use.

Waste volumes continue to grow despite strong regulation. In Eastern Europe, a legacy of industrial wastes from the Soviet era still poses significant ecological problems (Devyatkin 2009). Policy focus is evolving to make producers responsible for waste reduction, reuse, and recycling and by encouraging the development of new technologies and greater reliance on life-cycle approaches. Legislation has been developed for specific wastes such as electrical and electronic equipment, various chemical substances, and toxic and radioactive by-products.

Europe is at the forefront of multi-national conservation efforts. Through Natura 2000, a coherent network of protected areas, biodiversity monitoring, and conservation activities has been established. However, biodiversity loss remains a problem due to continuing landscape, ecosystem, and habitat degradation. Nevertheless, initiatives such as Forest Europe are addressing biodiversity conservation, climate change, and the protection of freshwater resources and have already contributed to the increase of the total forest area in European countries (Forest Europe *et al.* 2011).

Latin America and the Caribbean

The 33 countries of Latin America and the Caribbean vary significantly in size and economic development. The region includes both Brazil, the seventh largest economy in the world (The Economist 2011) and small island developing states with open and fragile economies (Rietbergen *et al.* 2007). Rich in natural resources, the region is home to approximately 23 per cent of the world's forests and 31 per cent of its freshwater resources. Although these resources are not evenly distributed, the overall richness and economic importance of the region's ecosystems and its natural capital are undeniable (UNEP 2010). With 79 per cent of its population living in towns and cities (UN-Habitat 2010), the region is one of the most urbanized in the world. It faces challenges in providing its burgeoning towns and cities with safe water and sanitation, and in addressing air pollution and the contamination of its freshwater, oceans and seas.

The performance of the region's environmental institutions is currently constrained not by the absence of laws but by a paucity of political will, limited procedural continuity and inadequate enforcement instruments. The region also requires greater financial resources to facilitate sustainable management efforts and to ensure conservation of biological resources.

Achieving a more sustainable model of development requires improved national and regional strategies to facilitate cross-sectoral policies, at relevant scales, that can address environmental and economic issues simultaneously. To improve governance, active community participation and a high level of

inter-institutional cooperation are also needed. The combination of these approaches can help improve environmental problems while enhancing human well-being. These types of initiatives are also crucial to address the most serious challenges faced in the region: poverty and inequality.

Careful analysis and evaluation of social needs, at local and regional levels, facilitates the implementation of more effective environmental initiatives that can also address social development. For example, the innovative transport initiatives implemented first in Curitiba, Brazil, and subsequently in Bogotá, Colombia, illustrate that well-designed projects can yield multiple environmental and social benefits, such as climate mitigation and improved mobility options (WRI 2010).

Integrated water resources management promotes the coordinated development and management of water, land and related resources. If carefully designed and implemented, it can also maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

Green financing options and mechanisms to ensure better inclusion of key stakeholders are also recognized as important approaches to help reduce environmental degradation and threats to the region's biodiversity. For example, the Fund for the Protection of Water (FONAG), a trust fund to which water users contribute, is used to co-finance the rehabilitation and conservation of 65 000 hectares of watersheds that supply water in Quito, Ecuador, and surrounding areas. Similar funds have been developed in Colombia and Peru (Cisneros and Lloret 2008).

Since the 1960s, arable land has increased by 83 per cent in South America, 46 per cent in Africa and 36 per cent in Asia, coinciding with significant deforestation in all three regions (IPSRM 2010). In 2009, more than 280 000 Latin American and Caribbean producers managed 23 per cent of the world's organically farmed land, with the highest regional shares in Dominican Republic and Uruguay (Willer and Kilcher 2011). The overall area of land used for agriculture in South America increased by 20 per cent between 1970 and 2008, while livestock production grew by 37 per cent (FAO 2010).

Based on a review of Latin America and the Caribbean's current and past experiences, the three land management policies considered the most favourable to attain the goals set out in the Johannesburg Plan of Implementation (WSSD 2002) include multi-scale land-use planning, sustainable agriculture and livestock production, and the recovery of degraded lands. Payment for ecosystem services, sustainable forest management, and policies related to integrated land management and water-use plans address multiple themes including climate change, biodiversity and water goals.

Efforts to strengthen technology networks and knowledge flows are needed to improve the management of natural capital and the use of land-based and coastal and marine resources. Such capacity-building efforts are also important to help improve

policies that promote the conservation of biodiversity and water, and climate change mitigation and adaptation, while helping to yield more effective development results (CCCCC 2011).

North America

North America is considered a global economic leader, although changes in regional demographics, rapidly emerging global economies and resource constraints all challenge the country's provision of public goods and services. At the same time, fragmented governance, policy instability, lack of clear targets and science policy, and the dilemma of whether to address global issues rather than seeking local solutions, hamper the achievement of environmental goals (Chapter 1).

In North America, there has been a recent trend emphasizing the success of market-based instruments over the use of regulations and standards in environmental management. However, there is a need for additional empirical data to show the actual impacts of these market-based instruments. Such policy options are best approached in a complementary manner, as market-based instruments need a clear and strong regulatory framework to work well. Furthermore, accountability and transparency can increase their environmental effectiveness while helping to ensure fair and equitable social outcomes.

Integrated water resources management in combination with technological instruments and economic incentives has proved effective in addressing complex water resource challenges. Integrated strategies have great potential for replication, provided that effective coordination and implementation mechanisms accompany them. They require a coordinated effort between stakeholders at multiple geographic and political scales, as well as adequate scientific evidence and monitoring to ensure that appropriate action is taken in response to altered water regimes resulting from climate change and increasing demand. The adoption of policies for maintaining the availability, sustainable use and fair allocation of freshwater to meet the needs of both humans and nature must be embedded into an holistic approach at the scale of a hydrological basin.

The Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement of 2005, involving eight US states and two Canadian provinces, provides a framework for each state and province to manage and protect the basin as a whole. The Great Lakes and St. Lawrence Cities Initiative includes the objective that by 2015, all participating cities of the basin reduce water use by 15 per cent below 2000 levels. By 2010, almost half of the 33 participating cities had collectively achieved a 13 per cent reduction conserving a total of 330 million m³ of water.

The pricing of externalities and integrated land management show potential to increase the sustainability of land-use practices in North America. Jurisdictions throughout the region have adopted many of these policy instruments to different degrees. For example, in British Columbia, Canada, resource companies, environmental groups and coastal First Nations have successfully carried out an ecosystem-based integrated

land-use planning exercise, the 2006 Great Bear Forest Agreements, through a collaborative process (McGee *et al.* 2010). Taxes and other incentives in the United States have increased the total area conserved by local, state and national land trusts to around 15 million hectares. Programmes on payment for ecosystem services have permanently preserved another 92 million hectares in the United States.

At the state or provincial level, North America's growth of renewable energy technologies and the associated rise in the proportion of renewable energy in the region's energy mix can be traced to policy goals supported by market mechanisms such as feed-in tariffs. Greatly increasing the use of renewable energy in North America is technically feasible and can provide multiple benefits including reduction of greenhouse gas emissions, lower energy prices and decreased market volatility, while creating new employment and economic opportunities.

Carbon taxes can also contribute to energy efficiencies. The Canadian provinces of Quebec and British Columbia imposed carbon taxes in 2007 and 2008, respectively. Quebec's tax is very low but British Columbia's revenue-neutral scheme is more ambitious, starting at US\$10 per tonne emitted in 2008 and increasing to US\$30 per tonne in 2012. Addressing drawbacks typically associated with carbon taxes such as comprehensive coverage combined with targeted tax reductions, and reducing potentially large adaptation costs for carbon-intensive industries, appears to have helped it gain citizen acceptance.

West Asia

The predominantly arid and semi-arid region of West Asia covers about 4 million km². Rainfall is scant but with significant spatial and temporal variability. Water scarcity and frequent and persistent droughts are common, making water the region's most precious resource. The region also faces major environmental challenges in the need to address land degradation and desertification; increasing fossil-fuel-based energy production and use with high inefficiencies in generation, distribution and end use; and the conservation and sustainable use of marine and coastal resources. Climate change is becoming one of the region's main problems, with potentially adverse impacts on the economy and human well-being.

West Asia has made considerable progress in environmental governance. For instance, the League of Arab States established the Council of Arab Ministers Responsible for the Environment (CAMRE) as a high-level institution to ensure proper coordination of environmental policies across the region. CAMRE aims to identify major environmental problems, set priorities and address issues related to sustainable environment. However, deteriorating environmental trends indicate a need for using additional policy instruments such as incentives, monitoring mechanisms, economic and environmental assessment tools, environmental education, and public awareness strategies.

Countries in West Asia rely heavily on regulatory strategies rather than market-based instruments. Although new initiatives

to introduce policy mixes aimed at achieving higher levels of integration between different sectors do exist, they remain modest. As an illustration, for the last four decades water policies have mostly focused on supply strategies aimed at overcoming shortages through technical solutions including desalination. This supply-focused approach, enabled by the availability of strong financial resources within key countries, specifically the Gulf Cooperation Council States, has resulted in good progress in meeting the Millennium Development Goal on water supply and sanitation, particularly in urban areas (UNDESA 2011).

The ongoing prevalence of unsustainable patterns of demand and consumption is nevertheless resulting in depletion of water resources and widespread deterioration in water quality, a situation that also increases regional tension over shared sources. Integrated water resource management represents a promising approach to achieve resource sustainability (CEDARE and AWC 2004). In addition, fair pricing of water services is becoming widely understood as crucial for achieving better demand management. In Saudi Arabia, the government has launched a number of measures to reduce consumption by the agricultural sector. It initially limited domestic food production by decreasing the subsidy on diesel fuel and is gradually reducing the government's own purchase of local wheat. In 2009, it set a target to gradually eliminate domestic wheat production over an eight-year period, while increasing incentives and loans for installing modern irrigation systems, providing subsidies for animal feed imports, banning the export of fodder and establishing strategic food reserves (AFED 2010; Hussain *et al.* 2010).

Land degradation and desertification are linked with a number of challenges including food production, biodiversity loss, deterioration of water resources and climate change. National action plans to combat land degradation and desertification therefore need to be better integrated with sustainable approaches to natural resources, biodiversity conservation efforts and climate change initiatives (Ministry of Municipalities Affairs and Land Use Planning 2010).

Many West Asian nations are currently implementing strong coastal development plans. However, regional authorities still need to confirm their commitment to protect coastal and marine ecosystems through the application of ecosystem-based management. The protection of marine and coastal areas from climate change, oil spills and land-based sources of pollution still represent important challenges for this region. The development and implementation of strategies such as crisis management and risk assessment represent very significant tools for climate change adaptation and for the protection of marine environments. The establishment of marine protected areas and the application of integrated fisheries management represent promising solutions to enhance marine biodiversity conservation (Sheppard *et al.* 2010; Price 2002).

West Asia has vast and valuable renewable energy resources but the energy sector is still characterized by heavy reliance on fossil fuels, which results in adverse environmental impacts and



In an effort to reduce damage to coastal and marine ecosystems, Oman has established two marine protected areas. © iStock/Steven Allan

high carbon intensity. Policy efforts to promote energy efficiency and renewable energy to mitigate climate change are evolving. However, to achieve global goals and to develop sustainable energy systems, the region still needs to strengthen its legislative and institutional frameworks. In particular, the building sector in West Asia is a major energy consumer, largely due to a significant demand for air-conditioning. A switch to green building practices is emerging through the adoption of building energy efficiency codes, which, along with renewable energy development, represents great opportunities for the entire region (Ministry of Public Work and Housing 2009).

COMMONALITIES

GEO-5's regional assessments, presented in Chapters 9–14, identify policy responses and instruments based on best practice. Common threads can be traced between and among the regions with particular policy approaches proving successful in a number of cases. Those policy responses adopted successfully in more than one region have a greater likelihood of accelerating achievement of internationally agreed goals.

Successful policy tools and instruments

Environmental governance

At the regional and global levels, environmental governance has evolved into a set of organizations, policy instruments, financing mechanisms, rules, procedures and norms that regulate the processes of environmental protection.

Absent or inadequate governance is one of the major issues in sustainable development, and many proactive efforts are being made to overcome these barriers, including multi-level/multi-stakeholder participation; increased introduction of the principle of subsidiarity; governance at local levels; policy synergy and removal of conflict; strategic environmental assessment; accounting systems that value natural capital and ecosystem services; improved access to information, public participation

and environmental justice; capacity development; and improved goal setting and monitoring systems.

Climate change

A major concern for many countries is how to build resilience, especially in the most vulnerable communities, to climate change impacts already set in motion by past greenhouse gas emissions. Policies are oriented to climate change mitigation and adaptation and disaster risk reduction.

Promising climate change policies already under implementation include the removal of environmentally harmful subsidies, especially on fossil fuels; carbon taxes; forestry incentives for carbon sequestration; emissions trading schemes; climate insurance; capacity building and financing; and climate change preparedness and adaptation such as climate proofing infrastructure.

Energy

Legislative and institutional frameworks for developing sustainable energy systems are needed to achieve global goals.

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

Air pollution

Europe was the only region to select air pollution as a priority theme and perform an appraisal of policy options.

Successful policies include fuel and vehicle emission standards; control of industrial pollution through technical emission controls, best available techniques, fuel switching and reduced sulphur content in liquid fuels; and local air quality management plans including adequate monitoring and information systems and appropriate institutional mandates for local authorities.

Land

Land policy has a role in preventing environmental degradation and its social and economic costs.

Clear and protected rights, and effective rules defining access and regulating land, water and other natural resource use, are all essential means of ensuring long-term sustainable land and resources management. Successful policy options include integrated watershed (catchment) management; resource-efficient urban growth; protecting prime agricultural land; improved forest management; payment for ecosystem services and REDD+; and agroforestry and silvo-pastoral practices.

Freshwater

The equitable and sustainable management of freshwater is a major challenge for all water users, with most governments, from the local to the international level, facing the need to realign the availability of water with human and economics-based

demand at levels that also maintain ecosystem integrity and environmental sustainability. In large part, this realignment requires the integration of environmental considerations, alongside domestic, agricultural and industrial requirements, into the drafting and implementation of national and international policies and legislation. Given that environmental considerations have historically been deemed secondary or even of no priority in decision-making related to the allocation and management of freshwater resources, the realignment will have to focus, at least initially, on expanding the attention paid to environmental concerns in the existing people-centred processes (UNEP 2010).

Policies identified as successful across the regions include integrated water resources management; the conservation and sustainable use of wetlands; promotion of water-use efficiency; water metering and volumetric-based tariffs implemented at a national or sub-national level; recognizing safe drinking water and sanitation as a basic human right/need; and effluent charges.

Oceans and seas

Polices such as integrated coastal zone management and marine protected areas, and economic instruments such as user fees have provided a level of success in terms of management.

Biodiversity

Biodiversity policies promote the protection, conservation and sustainable use of biologically diverse ecosystems and habitats. In doing so, they create significant public benefits and contribute to social well-being.

Successful policy instruments include market-based instruments for ecosystem services, including payment for ecosystem services and Reducing Emissions from Deforestation and Forest Degradation (REDD+); increasing and improving the management of protected areas; establishing transboundary biodiversity and wildlife corridors; community-based participation and management; and sustainable agricultural practices.

Chemicals and waste

Important international legal instruments and frameworks have been adopted with regard to the sound management of hazardous chemicals and wastes, including such policies as the registration of chemicals; extended producer responsibility; product redesign and design for the environment; life cycle analysis; reduce, reuse and recycle – the 3Rs – alongside cleaner production; national and regional hazardous waste treatment systems; and control of inappropriate export and import of hazardous chemicals and waste.

Applying policies in a more effective way

Many of the policies selected as promising are based on well-studied and accepted management concepts such as integrated water resources and coastal zone management, and protected areas. However, some common conclusions were identified across the regions, indicating that the application of these management concepts can be innovative if certain principles are adhered to.



Wastewater treatment aims to remove as much of the suspended solids as possible before the remaining water – or effluent – is discharged back to the environment. © Christian Uhrig/iStock

Cross-cutting policies across themes and sectors

The selected policy options were often identified as being promising because they are mutually reinforcing, with positive impacts in more than one thematic domain.

- “It is important to maximize opportunities by focusing on options that are mutually reinforcing and cross-cutting.” (Chapter 9 – Africa)
- “The coherent application of effective policies across themes and sectors can bring major benefits in terms of an improved physical environment and a healthier population.” (Chapter 11 – Europe)
- “To be sustainable, the region’s natural capital needs to be managed in an integrated fashion across sectors.” (Chapter 12 – Latin America and the Caribbean)
- “Failure to introduce sectoral policy integration, policy mixes and regional integration will intensify currently unsustainable consumption and production patterns, especially for energy, water, food security and marine resources, with the potentially grave consequences of natural resource depletion and increased pollution, which in turn impact human health and well-being.” (Chapter 14 – West Asia)

Addressing drivers

There is increasing awareness among practitioners of a need to shift attention away from the effects of environmental degradation and instead focus on the underlying drivers.

- “Policy responses are beginning to shift from a focus on environmental impacts to addressing the key drivers through market- and information-based approaches.” (Chapter 10 – Asia and the Pacific)
- “Until policies begin to address some of the deeper, underlying causes of environmental degradation – or drivers

– countries are unlikely to meet the goals and targets set out in international, regional and national agreements.” (Chapter 12 – Latin America and the Caribbean)

Monitoring, evaluation and accountability

Monitoring and evaluation can be used to improve policy design, increase the accountability or ownership of stakeholders and identify promising practices that can be applied subsequently or in other country settings.

- “Investing in monitoring and evaluation, as well as social learning, supports the revision and modification of policy responses. Strong accountability helps secure government and private-sector commitment to implementation and to achieve agreed outcomes (Najam and Halle 2010). Developing performance indicators rather than effort-based indicators, such as the number of meetings held, improves clarity about how and to what extent the purpose of the policy is being achieved (Najam and Halle 2010). Strong and effective national and sub-regional reporting systems help hold implementing agencies to account and provide an opportunity to document successes, which in turn set the basis for up-scaling and replication.” (Chapter 9 – Africa)
- “Improved monitoring and data collection, and access to information and legal redress, have the potential to alter the drivers of environmental change and unsustainable development.” (Chapter 10 – Asia and the Pacific)
- “Enabling conditions that would increase policy success and replication include more efficient monitoring systems.” (Chapter 11 – Europe)
- “Performance indicators are necessary to evaluate policy progress and clearly identify successes and shortcomings.” (Chapter 13 – North America)
- “The systematic collection, processing, analysis, production, dissemination and exchange of environmental information would lead to sound decision making and proper policy formulation and implementation.” (Chapter 14 – West Asia)

Transboundary cooperation

Natural areas shared by neighbouring countries are not only a common treasure, but also a common responsibility. They can be either a source of conflict or a source of cooperation and prosperity.

- “Cooperation has been shown to be effective for achieving sustainable management, including policy options for transboundary coastal and land-based resource management, and where there are multiple stakeholders. This has improved equity, enhanced skills sharing and reduced conflict.” (Chapter 9 – Africa)
- “Efforts to enhance the sustainability of forests through management face a lack of national capacity and awareness, and intensifying competition in international forest product markets. There is therefore an urgent need for transnational coordination to address common and cross-border issues (Hogl 2002).” (Chapter 11 – Europe)
- “Cooperation is an important element in improving sustainability in the region. Cooperation between its countries will facilitate the sharing of information, expertise

and technology transfer, the lack of which may currently limit countries in moving to more sustainable paths of development. It could also help to improve the management of transboundary ecosystems and species.” (Chapter 12 – Latin America and the Caribbean)

Multi-stakeholder participation at local and national levels

The benefits of involving stakeholders in decision-making processes have been acknowledged. They include opportunities to share views, needs and knowledge; build consensus; enable participants to influence outcomes; and build commitment and a feeling of ownership to enhance and ensure implementation.

- “Several of the options presented, including sustainable land management, show that a high degree of participation at local and government levels helps to ensure relevance, with good outcomes for strengthening sustainability. Decentralization and devolution policies, including in community-based resource management, have achieved positive outcomes for communities and for the environment.” (Chapter 9 – Africa)
- “Successful implementation of policies requires the establishment of a planning framework for adaptive and integrated management of water resources, under which appropriate pricing and multi-stakeholder participation are essential. Governance improvements are critical to enhanced accountability as a means of achieving sustainable development.” (Chapter 10 – Asia and the Pacific)
- “Enabling conditions that would increase policy success and replication include a more active civil society engaged through awareness raising and strong multi-stakeholder agreements.” (Chapter 11 – Europe)
- “The standard governance principles and values of transparency, accountability, equity, sustainability and inclusive participation of all stakeholders are fundamental for strengthening governance frameworks.” (Chapter 12 – Latin America and the Caribbean)
- “Active stakeholder involvement, with explicit discussion of issues, improves decision making and acceptance, offering advantages over top-down planning, which often lacks public support and understanding.” (Chapter 13 – North America)
- “Environmental governance, rather than merely focusing on environmental policies, needs to take account of societies’ common goals and engage with various stakeholders in the design and execution of policies.” (Chapter 14 – West Asia)

CHALLENGES AND OPPORTUNITES

Traditionally, policy analyses have been conducted in the context of a specific plan, programme or project at the local or national level, focusing on economic and social costs and benefits and involving specific stakeholder groups. But policy analysis now faces new challenges as rules and norms adapt to changing expectations (Hajer 2003). The *GEO-5* policy mandate aimed to extend the scope of analysis and appraisal to identify successful environmental policies in the regions and to highlight their potential to speed up the achievement of internationally agreed goals. The analysis is intended to provide policy makers with promising avenues for exploration.

It is not certain whether the policies identified and appraised are the optimal choices with respect to the selected international goal, although there is evidence of their effectiveness. Furthermore, clusters of policies were identified, not just individual ones, acknowledging that most policies are implemented as part of a complementary package. Whether a policy could be effective in a different context or on a different scale is uncertain: for many policies, direct evidence of the specific reasons for their effectiveness is limited, as is evidence of the potential for their transferability and replication. Undoubtedly, political will remains an essential ingredient for success. However, direct causality is always difficult to isolate in dynamic systems such as societies. Inconvenient variables can be difficult to eliminate, and convenient ones usually cannot be introduced spontaneously. So experimentation and observation must continue despite inherent problems.

Information and indicators

Investing in and generating environmental knowledge and translating it into information that can be used in governance and policy development are essential for management success (Adger *et al.* 2005), and require a better interface between science, policy makers and communities. To influence policy and decision making effectively, environmental information should be transformed into scientifically derived, easily understood indicators that convey clear messages to policy makers and the public (UNESCO-SCOPE 2006; Cimorelli and Stahl 2005).

Policy instruments designed to increase accountability and transparency seek to make information on environmental performance and the impacts of resource use more widely available, facilitating decision making and mobilizing a variety of stakeholders. Relevant information and indicators also help in monitoring and evaluating the effectiveness of policies and determining whether they allowed management approaches to adapt to new conditions – these are important elements of good environmental governance. At regional and sub-regional levels mechanisms for sharing information and knowledge could be better utilized.

Environmental impact assessment for individual projects, cumulative impact assessment for series of projects, and strategic environmental assessment for policies, plans and programmes all provide essential information (World Bank 2006). Documented cases of policies that appear to have made a contribution to achieving environmental goals can also be valuable. The promising policies described are illustrated by case studies, which provide insights into the context within which they were successful.

Transboundary and regional cooperation

Environmental problems do not respect borders. The transboundary nature of environmental degradation is the result of scale, as pollution or damage affect larger and larger areas. Solving transboundary environmental problems can provide an opportunity to establish regional cooperation.

Addressing shared environmental problems through regional cooperation can support the transfer of innovative solutions based on common characteristics of terrain, climate, economic activities and history, among others, which increases the likelihood of success. Transboundary approaches often enhance cooperation and reduce conflict by facilitating dialogue, establishing networks and encouraging learning and knowledge sharing. This helps create the political stability needed for economic and development cooperation.

Other benefits of cooperation are an augmentation of national efforts, the transfer of capacities and conservation efforts involving several stakeholders across borders. The key challenges are sustainability, the differing capacities of the institutions involved and the political nature of cooperation whenever sensitive sovereign issues arise.

Chapters 9–14 offer many examples of successful transboundary initiatives:

- In Africa, although there are significant variations in focus, structure, delivery and scope, the rapid increase in transboundary natural resource management demonstrates that this policy, despite some challenges, has high potential for replication and for managing Africa's diverse shared ecosystems.
- In Asia and the Pacific, transboundary collaboration fosters the cooperation of national institutions to the benefit of multiple countries, as demonstrated by several examples involving cross-boundary interest in protecting areas with high levels of biodiversity such as the Greater Mekong sub-region, the Terai Arc landscape in India and Nepal, Sulu-Sulawesi marine areas and the Coral Triangle.
- The transboundary nature of most European rivers calls for close international cooperation, and integrated water resources management is increasingly the guiding mechanism for implementation.
- In Latin America and the Caribbean, transboundary cooperation and integration in the energy sector have been shown to increase electricity supply, widen coverage and enhance system functionality.
- The International Watersheds Initiative, which was conceived by the governments of Canada and the United States, promotes the establishment of watershed authorities and facilitates integrated transboundary watershed management.
- In West Asia, there are conflicting national interests in forging equitable sharing agreements for transboundary resources. These issues, however, could be addressed through integrated water resources management supported by strong commitment by decision makers to place water high on the political agenda.

Challenges specific to each region influence policy approaches

Each region reflects varying characteristics – population, area, level of internal cohesiveness regarding shared history and culture, language, wealth distribution and education. Questions of political will, economic capacity, history and other intangibles persist, with the regions weighing these differently.

In Africa, population growth, rapid urbanization, climate change, unsustainable development choices and weak governance persist as critical challenges to achieving both the environmental and the social aspects of important regional goals. Addressing human well-being was taken as a point of departure for strengthening environmental policy and implementation. The support of donors has been crucial to the implementation of some policies. The principles of the Paris Declaration on Aid Effectiveness – ownership, harmonization, alignment, management for results and mutual accountability – define collaboration with donors and are designed to ensure that aid supports agreed government priorities and uses, and strengthens, government systems rather than developing parallel institutions.

The Asia and Pacific region has become a global engine of economic growth, but this success has come at the cost of some of the planet's most threatened ecosystems. Many of the policies being adopted in the region had their origin and initial trials in other regions, often Europe and the United States. The failure to implement many of these policies successfully may stem from the assumption that if a policy works in a developed country then it should also work in a developing one. For example, the strong command-and-control policy regime to manage air and water pollution in the United States, involving standard setting, permits and prosecution of offenders, tends not to work as well in the developing countries of Asia and the Pacific (AECEN 2004). A policy regime built around voluntary compliance, the social pressures of naming and shaming polluters, and compensation where appropriate may be more applicable for the socio-cultural context of the region, although measures of effectiveness require further analysis.

In Europe, concerns about long-term threats to the environment and human health persist, the latter especially for its large urban population (EEA 2010). Despite some successes in decoupling environmental pressures from economic growth, Europe's environmental footprint remains disproportionately high due to the continued unsustainable use of natural resources, both within and outside the region, to satisfy the high consumption and production level of its inhabitants (Chapters 1–7) (EEA 2010). To deal with these trends an integrated policy approach is required, for which strong governance mechanisms need to be in place. Given that Central and Western Europe in particular have a dense network of political boundaries, a regional focus to tackle environmental issues is necessary, with focus on transboundary as well as global environmental decision making. Regular monitoring, reporting and assessment required by legislation are an integral part of EU environmental governance.

Latin American and Caribbean countries face many challenges in managing their rich natural resources. Population growth, as well as unsustainable global and regional production and consumption patterns, drives the increasing demand for and extraction of raw materials and other natural capital (Chapter 1). This has led to the extensive conversion of natural environments to productive systems, with impacts on the region's biodiversity.

To be sustainable, the region's natural capital needs to be managed in an integrated fashion across sectors. To respond to the complex nature of the region's environment, its opportunities and challenges, policies should be designed and implemented in ways that transcend the traditional compartmentalized, sectoral approach. This will help the region deal with some of its persistent environmental and associated socio-economic problems, including poverty, inequity and social conflict.

In North America, changes in regional demographics, rapidly emerging global economies and resource constraints all challenge the countries' provision of public goods and services. At the same time, fragmented governance, policy instability, lack of clear targets and science policy, and the dilemma of whether to address global issues rather than seeking local solutions, hampers the achievement of environmental goals (Chapter 1). Federal governments are no longer the primary leaders in setting the policy agenda or devising innovative policy instruments, yet they remain essential to the ultimate success of those policies, help ensure harmonization across jurisdictions and prevent the development of environmental inequities. In addition, there is a strong tendency to favour market-based instruments because of early successes, and to overlook traditional regulatory instruments. Finally, relative federal disengagement has opened the door to policy initiatives and innovations at sub-national levels, by states and provinces or municipalities, as well as to regional transboundary cooperation. The latter is extensive and continues to expand, and its dynamics are further supported by the Commission for Environmental Cooperation, which oversees the environmental accord of the North American Free Trade Agreement (NAFTA).

The drivers of environmental change in West Asia are linked to peace and security, demography and the state of the economy. The international desire to secure valuable energy resources and disputes, including current political conflict, play a major role in ongoing environmental degradation. Environmental damage is escalating and the number of displaced people is increasing, straining the environment and contributing to the degradation of land and water resources (UNEP 2010). Although environmental policies in the region have developed over the past two decades and continue to progress, they need to become proactive rather than reactive. Additionally, environmental governance, rather than merely focusing on environmental policies, needs to take account of societies' common goals and engage with various stakeholders in the design and execution of policies. The integration of sectoral policies is also important. Regional environmental governance is crucial for the region's countries share many common environmental conditions.

Challenges in policy replication

There is a degree of scepticism as to whether a policy can be successfully reproduced and applied in different circumstances and for different stakeholders with different needs and expectations. The differing governance contexts and enabling environments in a region as diverse as Asia and the Pacific, for

example, may be barriers to adoption. However, as suggested in Chapter 10, there is sufficient experience with several of the priority policies analysed to justify faster replication.

The Asia and Pacific region (Chapter 10) considered the following factors when evaluating the potential for replication of policies:

- how many countries have already implemented such policies;
- how quickly the policies have been adopted by multiple countries since their first introduction;
- how easily the private sector has been convinced that the policies are not harmful to their businesses; and
- how the policies have contributed co-benefits that made them even more acceptable.

Part of the above analysis relates to the enabling and/or impeding factors that have led to the success or otherwise of specific policies. Europe (Chapter 11) identified the following enabling conditions for policy success and replication:

- more policy coherence, streamlining and simplified procedures that enhance cost efficiency and effectiveness;
- more efficient monitoring systems;
- stronger long-term commitment on the part of politicians and governments;
- stronger enforcement;
- transnational coordination to address common and cross-border issues;
- stronger private-sector involvement by creating and making better use of markets; and
- a more active civil society engaged through awareness raising and strong multi-stakeholder agreements.

The Latin America and Caribbean region (Chapter 12) has developed and implemented good examples of policies and approaches, usually at national and sub-national levels, that offer opportunities for replication both within and outside

the region. Their characteristics usually include the effective incorporation of scientific information, knowledge and best practice, links across sectors, strong governance mechanisms, stakeholder participation, and political will and support.

The potential for transferability and replication of policies identified in North America (Chapter 13) is not straightforward and is dependent on context and specific instrument design. For example, the institutional framework of the North American electricity grid is highly fragmented, while many other countries have nationally owned networks (Willrich 2009). Denmark, France, Germany, Italy and Japan all have experience with feed-in tariffs at the national levels, while the United States and Australia have experience of production tax credits and renewable portfolio standards (IEA 2011). Policies on feed-in tariffs and renewable energy portfolio standards are in force in a variety of jurisdictions including Canada, China, Kenya, Portugal and Uganda (IEA 2011). Statistically, correlations demonstrate that the policies are effective, particularly in the case of feed-in tariffs (Haas *et al.* 2011). Direct causal evidence of effectiveness of other policies, however, is limited, as is evidence of their potential for transfer to and replication in other jurisdictions (Carley 2009; Doris *et al.* 2009).

In West Asia (Chapter 14), an excellent policy in one country does not usually stand alone and, as such, cannot easily be transferred or successfully replicated in its original form (UN ESCWA 2007). New circumstances, new management and various interdependent problems such as poor and low implementation capacities, lack of financial resources and marginalized local stakeholders, can make many successful programmes lose their effectiveness when replicated. The Council of Arab Ministers Responsible for the Environment (CAMRE) played, and continues to play, a major role in the coordination of environmental policies of the Arab countries at regional and global levels and has ensured a certain level of replication of environmental policies among West Asian countries.



Enforcement officers on a survey mission at the Myanmar-Thailand border discuss joint action to combat transnational crime through regionally organized law enforcement, October 2011. © UNODC

On the other hand, examples of successful replication from within and across regions provide possible tools for ensuring further success. Sharing experiences between practitioners and stakeholders may be a first step to a better understanding of the specific conditions in which a policy has been successful, and whether it could be replicated in another context, and to what extent.

Compliance and enforcement

However admirably designed, sensitively implemented and wisely administered, policies emerging from internationally agreed goals must be enforced to ensure continuity and accountability, but decision makers rarely give sufficient priority to this. Political will and leadership are required at all levels of implementation and enforcement. Compliance regimes can be more effective if the authority with responsibility is clearly identified and transparency is maintained to allow both higher levels of government and citizen-stakeholders to understand where the enforcement falls short. In this way, policy success is achievable.

Future work

Efforts to make the greatest possible use of quantitative evidence of policy effectiveness have highlighted opportunities for future work. In particular, there is a great need for governments and organizations to increase policy monitoring, for further research into policy effectiveness, and for the development of assessment methodologies that take greater account of synergistic policy effects and feedbacks.

PLANETARY POLICY PERSPECTIVES

The policies presented in *GEO-5* can be analysed for their utility to leverage societal transformation. Understanding the potential of these policies, alone or in combination, could help facilitate transformative change and enhance the effect that policy makers have on reaching sustainable development objectives at local, national, regional and international levels.

Feedback and adjustments – managing markets

These include price adjustment and other market instruments that are intended to reduce burdens and provide signals that correct or reinforce patterns of behaviour.

Example 1: Volumetric-based tariffs and water metering in Armenia (Chapter 11)

- Metering, cost-recovery tariffs and proper pricing structures stimulate more responsible water use while generating funds for the maintenance of the supply system.
- Various studies reveal that, on average, if individual metering systems are in place, reductions of 10–40 per cent can be achieved in household water use (Inman and Jeffrey 2006; Scheuer 2005).
- Soon after the reforms took place in Armenia, average water use decreased three to four times compared to use based on flat-rate calculations. The massive process of introducing individual metering became a trigger for a chain of water sector improvements, all backed by a legal, regulatory and institutional framework that enabled private-sector

involvement accompanied by investment and management efficiencies. As a result, the quality and reliability of water delivery improved.

Example 2: Carbon taxes in British Columbia (Chapter 13)

- The revenue-neutral carbon tax in British Columbia phased in rate increases starting at a modest US\$10 per tonne of CO₂-equivalent in 2008, increasing at a rate of US\$5 a year thereafter to US\$30 a tonne in 2012.
- The tax's revenue neutrality is achieved by allowing tax reductions for businesses as well as for poorer sections of society who also receive payments.
- The tax applies to emissions from fossil fuels, accounting for approximately 70 per cent of the province's total emissions (emissions from fossil fuels exported from British Columbia to other jurisdictions are exempt).
- Addressing the drawbacks typically associated with carbon taxes may have enhanced the acceptability of British Columbia's policy. This includes mitigating or eliminating the potentially regressive nature of carbon taxation by its comprehensive coverage combined with targeted tax reductions, and reducing potentially large adaptation costs for carbon-intensive industries through a gradual phase-in of the tax.

Rules and incentives – state action

The creation and administration of rules is a key policy leverage point, as these have direct influence on and power over the actions of individuals and groups.

Example 1: The Free Basic Water Policy of South Africa, allowing households to benefit from free, secure access to water (Chapter 9)

- The South African constitution provides a right of access to sufficient water, implemented through the Free Basic Water Policy. Many impoverished households benefit from secure access to at least 25 litres of water per person per day within 200 metres of the household for domestic use (Mehta 2005). This is in line with the World Health Organization's recommendation for minimum consumption, though it does not cover broader health and livelihood needs.
- Positive outcomes include a saving of the time and effort women and girls spend collecting water, freeing them to engage in other activities, removing the need to resort to unprotected water sources and reducing vulnerability to water-borne disease (Mehta 2005). In addition, citizens directly attribute such policies to good governance, and this in turn supports long-term political stability.
- A major challenge for the policy is to strike a balance between the human benefits and the cost (DWA 2002). However, improvements in human well-being are seen as outweighing the associated costs (Stalk 2004).
- Failure to provide the legally guaranteed quantity has resulted in citizens instituting litigation.
- Critical enabling factors include addressing cost recovery, identifying target groups, ensuring financing, managing demand and facilitating the expansion of infrastructure.

Example 2: Energy conservation in buildings in Kuwait (Chapter 14)

- Demand for electrical power in Kuwait has progressively increased, particularly in the past two decades. As all electricity generation depends on fossil fuels, power plants consume about 55 per cent of Kuwait's total primary energy. In addition, 85 per cent of electrical peak power and 60 per cent of the country's total annual output is used for air-conditioning and lighting in buildings.
- The Ministry of Energy in Kuwait launched its energy code for buildings in 1983 with a set of mandatory standards and regulations to enhance energy conservation and decrease the progressive negative impacts on the climate.
- The main objectives of the building code, which is applied to new and retrofitted air-conditioned buildings, are to decrease the capacity of air-conditioning systems and to reduce peak power demand by introducing smaller units.
- Implementation of the energy code has saved Kuwait nearly US\$10 billion over the past two decades.

Mindsets – civil society

Measures that shift the paradigms guiding individual behaviour create shared mindsets that translate into vision, goals and collective action.

Example 1: Payment for ecosystems services – including the costs of environmental and resource use in the value of ecosystems (Chapter 12)

- In general terms, payment for ecosystem services schemes offer incentives, usually monetary, to individuals to protect and ensure the delivery of key ecosystem services at the local, national and regional levels.
- The mechanism can address many of the driving forces of biodiversity loss, especially habitat loss and unsustainable land management, as it usually aims to protect and/or rehabilitate natural vegetation.
- Payment for ecosystem services can be used in conjunction with other policies such as protected areas, integrated water resources management, conservation and restoration of water-supplying ecosystems, sustainable forest management, small-scale agro-ecological systems and the recovery of degraded lands.
- Lack of information on economic valuation highlights the need to invest more in research and further the scientific understanding of local environmental conditions.

Example 2: Participation in the management of natural resources in India and Nepal (Chapter 10)

- In India, about 22 million hectares of forests are included in the Joint Forest Management programme, under which more than 100 000 committees formed by forest-fringe communities protect patches of state-owned forest, receiving a share of forest resources in return (MOEF 2009a).
- In conjunction with stringent legislation prohibiting the use of forest land for non-forestry purposes, forest cover has stabilized after decades of rapid deforestation (MOEF 2009b).
- Additional incentives for participation have been created by a constitutional amendment that mandates decentralization and devolution of power to local authorities at village,

intermediate and district levels (MLJ 2011).

- In Nepal, more than 14 000 community forest user groups have access to fuelwood and fodder, and are additionally provided with income-generating opportunities (DoF 2011).

CONCLUSION

This summary shows that in response to common concerns in the regions over freshwater, climate change and environmental governance, there are a variety of successful responses ranging from local actions to guarantee water quality, through transboundary agreements to tackle concerns affecting shared resources, to national programmes designed to shift the behaviour of whole economic sectors.

Improvements in governance are crucial if global goals are to be achieved, requiring the integration of sustainability concerns across all policy areas. Key elements, highlighted by the regions, include better enforcement at all appropriate levels of government, improved monitoring and data collection, greater access to information, increased multi-stakeholder participation and capacity building.

Whether a policy is replicable in a different context and on a different scale remains uncertain. Direct evidence of specific reasons for effectiveness is limited, as is evidence of the potential for transferability. The effectiveness of a specific policy or instrument and its potential to be scaled up or implemented elsewhere depends on significant context-specific variables, on the nature of the specific environmental issue, and on the existence of detailed and rigorous analyses of factors associated with its effectiveness in terms of behavioural change.

Nonetheless, common elements can be seen among the regions, with particular policy approaches proving successful in a number of places. Some of these, such as integrated approaches to water resources and coastal zone management or the creation of protected areas, draw on well-established concepts. But significantly, where policies have been successfully replicated, there is evidence that their application has taken significant account of local cultures, conditions and needs.

Responses at the local, national, regional and international levels interact and generate incremental, structural and transformational change. There is no universal solution to environmental degradation and a range of responses is required to address the diversity of regional needs. However, on issues of common global concern, coordination, participation, and cooperation are vital for meeting jointly internationally agreed goals and targets, while also addressing the capacity deficits of a range of countries.

Better progress in achieving internationally agreed goals can be made if policies apply leverage at the most advantageous place. Examples of promising policies identified in the regional chapters can be found at all leverage levels, namely feedback and adjustments in managing markets; rules and incentives in state action; and mindsets at the level of civil society.

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